

**COUNTY OF WESTCHESTER
NEW YORK**

**DEPARTMENT OF PUBLIC WORKS
AND TRANSPORTATION**

DIVISION OF ENGINEERING

ADDENDUM NO. 3

CONTRACT NO. 22-510

FOR

**JACKSON AVENUE PUMPING STATION REHABILITATION
BRONX VALLEY SANITARY SEWER DISTRICT
TOWN OF GREENBURGH, NEW YORK**

The attention of the bidders is directed to the following changes, additions, and/or substitutions affecting the above-referenced contract(s).

A. GENERAL CONTRACT INFORMATION

Item 1: Bidders Questions and Responses

Attached hereto.

Item 2: All requests for information shall be directed in writing to Ray Schofield - rschofield@edrdpc.com, Abby Doyle - adoyle@edrdpc.com, Bob Butterworth - bbutterworth@edrdpc.com and copy John Coelho – jjcb@westchestergov.com ; no later than Tuesday, April 2, 2024 by 12:00PM.

B. SPECIFICATIONS

Item 1: Notice to Contractors, Cover Sheet & Proposal Page Cover

Note: Change in Bid Date

Delete: March 27, 2024

Insert: April 10, 2024

Item 2: Specification 03415

Delete Specification 03415 and **Replace** with Attachment 1 in Addendum No. 3.

Item 3: Specification 05425

Add the following as paragraph 1.03.A.4

“4. Design roof trusses to support 25 psf dead load from 2” concrete roof panels.”

Item 4: Specification 05500 Paragraph 2.02G

Add the following as paragraph 2.02G

“G. Bar Screen

1. Provide bar screens constructed of shapes and materials as detailed on Contract Drawing G-006.

2. Provide (2) bar screen rakes fabricated of all welded aluminum flat bar and tube shapes, with rake spacing bars located to fit fabricated bar screen spacing.”

Item 5: Specification 07429

Add specification section 07429 included as Attachment 2 in Addendum No. 3.

Item 6: Specification 17095

Delete Specification 17095 and **Replace** with Attachment 3 in Addendum No. 3.

C. **DRAWINGS**

Item 1: Drawing G-005

Revise Note 1 for Type A, B, and C Pipe supports to “All material including fasteners and hardware shall be Type 316 Stainless Steel”

Item 2: Drawing G-007

Delete Drawing G-007 and **Replace** with Attachment 4 in Addendum No. 3.

Item 3: Drawing A-004

Delete the detail indicators calling out A-601 and **Replace** with “A-006”

Item 4: Drawing S-001

Delete Drawing S-001 and **Replace** with Attachment 5 in Addendum No. 3.

Item 5: Drawing S-002

Delete Drawing S-002 and **Replace** with Attachment 6 in Addendum No. 3.

Item 6: Drawing S-005

Delete Drawing S-005 and **Replace** with Attachment 7 in Addendum No. 3.

ADDENDUM NO. 3
CONTRACT NO. 22-510

Item 7: Drawing S-006

Delete Drawing S-006 and **Replace** with Attachment 8 in Addendum No. 3.

Item 8: Drawing S-007

Delete Drawing S-007 and **Replace** with Attachment 9 in Addendum No. 3.

Item 9: Drawing S-008

Delete Drawing S-008 and **Replace** with Attachment 10 in Addendum No. 3.

Item 10: Drawing S-009

Delete Drawing S-009 and **Replace** with Attachment 11 in Addendum No. 3.

Item 11: Drawing S-010

Delete Drawing S-010 and **Replace** with Attachment 12 in Addendum No. 3.

Item 12: Drawing S-011

Delete Drawing S-011 and **Replace** with Attachment 13 in Addendum No. 3.

Item 13: Drawing S-012

Delete Drawing S-012 and **Replace** with Attachment 14 in Addendum No. 3.

Item 14: Drawing M-003

Delete Drawing G-003 and **Replace** with Attachment 15 in Addendum No. 3.

Item 15: Drawing M-004

Delete Drawing M-004 and **Replace** with Attachment 16 in Addendum No. 3.

ALL PROVISIONS OF THE CONTRACT NOT AFFECTED BY THE FOREGOING SHALL REMAIN
IN FULL FORCE AND EFFECT.

COUNTY OF WESTCHESTER
DEPARTMENT OF PUBLIC WORKS

By: Hugh J. Greechan, Jr., P.E.
 Commissioner

Dated: March 21, 2024
White Plains, New York

Bidders Questions and Responses

BIDDER'S QUESTIONS AND RESPONSES

**CONTRACT NO. 22-510
JACKSON AVENUE PUMPING STATION REHABILITATION
BRONX VALLEY SANITARY SEWER DISTRICT
TOWN OF GREENBURGH, NEW YORK**

To All Contractors:

Contractors submitting proposals for the above-named project shall take note of the following changes, additions, deletions, clarifications, etc., in the Contract Documents, which shall become a part of and have precedence over anything contrarily shown or described in the Contract Documents, and all such shall be taken into consideration and be included in the Contractor's bid proposal.

Below are the **Questions** that have been submitted with **Responses**:

Question 1: *There are several callouts on the contract drawings pointing to the monorail and hoist with no detail or drawing number (X/S-XXX). Also, there do not seem to be any structural details shown for the monorail and structural attachments. Please provide additional information*

Response: This Drawing has been modified in Addendum No. 3.

Question 2: *Please provide a specification for the raised FRP platform and grating shown on drawing M-004 section A. Additionally, provide details of the ladder shown on the left side of the same view.*

Response: This Drawing has been modified in Addendum No. 3.

Question 3: *There is Thrust Support/Restraint shown on discharge header at the south wall on drawings M-003 and M-004. Please provide a detail for this support.*

Response: This Drawing has been modified in Addendum No. 3.

Question 4: *The pipe supports and fasteners material per the details shown on drawing G-005 is 304 stainless steel. The schedule shown in specification 15140 page 11 indicates 316 stainless steel. Please confirm the requirement for the supports and fasteners.*

Response: This Drawing has been modified in Addendum No. 3.

Question 5: *Sheet Number S-009, Section C/S-009 refers to detail 6 on sheet S-013. The current drawings set does not include sheet S-013. Please provide clarification.*

Response: This Drawing has been modified in Addendum No. 3.

Question 6: *Sheet Number S-006 shows the aluminum access hatch between intermediate and top level to be 42"x42", however on the previous sheet it shows it to be 66"x38". Please clarify which size is correct.*

Response: This Drawing has been modified in Addendum No. 3.

Question 7: *Sheet Number S-005, intermediate level plan section refers to details 5 and 7 on sheet S-010, however these details are not on that sheet. Please provide detail.*

Response: This Drawing has been modified in Addendum No. 3.

Question 8: *Sheet Number M-003 shows FRP Gratings, Sheet Number M-004 refers to a ladder up to FRP Grating, please provide detail section and extent for this ladder and FRP Gratings.*

Response: This Drawings have been modified in Addendum No. 3.

Question 9: *Sheet Number S-008, Section refers to a detail for the monorail. There is no sheet detail shown for the monorail. Please provide detail and connection information.*

Response: This Drawing has been modified in Addendum No. 3.

Question 10: *Division 1, Section 01026, Lump Sum Item 3, states that contractor is to furnish and install bar screens in accordance with Divisions 01-Division 46. Table of Contents only shows Divisions up till 41. Please Provide specifications for the bar screens.*

Response: Specification section 05500 has been modified in Addendum No. 3 to include the bar racks.

Question 11: *Regarding the following statement from specification 17095 section 1.08.C: "The Systems Integrator shall be a reputable firm that has been in the business of providing automated control systems specifically for the water and wastewater treatment industry for a minimum of ten (10) years. Systems Integrators with less than ten (10) years of experience will not be accepted", there is a MWBE integrator that has been in business for 7 years in which the principle has 20 years of experience. As long as the other requirements of the specification are met, will this integrator be acceptable?*

Response: Qualification and/or substitution will not be evaluated during the bid period.

Question 12: *Please clarify if any electrical equipment (i.e. Generator, ATS Switch, Pump VFDs, Panelboards, Transformer) shall be salvaged and given to the Westchester County Department of Public Works during demolition.*

Response: The owner has the first right of salvage for any equipment shown to be demolished.

Question 13: *In review of the contract documents and in conversation with several metal truss manufacturers, there is a concern of the installation of 2" T&G Concrete Planking over the truss system due to a significant weight differential between standard wooden sheathing and the concrete plank. Please clarify what the intent is for the use of the 2" concrete plank and is there an alternate that can be offered to achieve the desired intent of the design.*

Response: The 2-inch concrete plank is a County standard. Specification 05425 has been modified in Addendum No. 3.

Question 14: *Please review Drawing A-004 and please confirm that the detail indicator calling out drawing A-601 is an error and is referencing drawing A-006. We do not find drawing A-601 in the set of construction documents.*

Response: This Drawing has been modified in Addendum No. 3.

Question 15: *Sheet Number A-006, Detail 1 Wall Section refers to a 2" Concrete Sheathing. Specifications do not list an acceptable manufacturer or product information. Please provide specification/details.*

Response: Specification 03415 has been modified in Addendum No. 3.

Question 16: *Sheet Number A-006 shows metal soffits on details 1 and 2, however, specifications do not have any product information on the mentioned metal soffits or products. Please provide information.*

Response: Specification 07429 has been added in Addendum No. 3.

ATTACHMENT 1

SECTION 03415

PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Shop cast prestressed, precast concrete hollow core slabs (planks).
- B. Concrete and grout mixes.
- C. Saw cut openings and trim.

1.02. APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification:

- A. American Concrete Institute (ACI) Publications
 - 1. ACI 301 - Specifications for Structural Concrete
 - 2. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
 - 3. ACI 308 - Guide to Curing Concrete
 - 4. ACI 309 - Practice for Consolidation of Concrete
 - 5. ACI 318 - Building Code Requirements for Reinforced Concrete
- B. American Society for Testing and Materials (ASTM) Publications
 - 1. A82 - Steel Wire, Plain, for Concrete Reinforcement
 - 2. A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 3. A416 - Uncoated Seven Wire Stress Relieved Steel Strand for Prestressed Concrete
 - 4. A421 - Uncoated Stress Relieved Steel Wire for Prestressed Concrete
 - 5. A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement
 - 6. A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement
 - 7. C33 - Concrete Aggregates
 - 8. C94 - Ready Mixed Concrete
 - 9. C150 - Portland Cement

10. C260 - Air Entraining Admixtures for Concrete
11. C494 - Chemical Admixtures for Concrete
12. C595 - Blended Hydraulic Cements
- C. Precast/Prestressed Concrete Institute (PCI) Publication
 1. MNL 116 - Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products
 2. MNL-120 - Design Handbook - Precast and Prestressed Concrete

1.03. DESCRIPTION OF WORK

- A. The work includes the design, supply, and installation of prestressed, precast hollow core concrete planks, herein referred to as precast planks. The Contractor shall furnish all materials including grout and headers, labor, equipment, tools, etc., required for the design, fabrication, transportation, and erection.
- B. Contractor shall be responsible to coordinate and provide all opening sizes and locations, and to obtain and provide weights of all approved equipment and accessories to precast plank supplier.
- C. Contractor shall be responsible to coordinate the complete installation and to provide labor and equipment to saw cut and/or core drill all required openings, weld all connections, grout in all shear keys, and install connections as indicated or required by the design.

1.04. DESIGN REQUIREMENTS

- A. Contractor-Furnished Design - Design of precast concrete hollow core planks for the design load conditions and spans indicated on the Contract Drawings and for additional loads imposed by openings and supports of the work of other trades (and other contracts).
- B. Concrete toppings shall not be used in establishing the design strength of the precast planks.
- C. Calculations and shop drawings shall be prepared, sealed, and signed by a professional engineer registered in the State of New York.
- D. Loads shall be as shown on the Contract Drawings and for support of all equipment and accessories (with information provided by Contractor).

1.05. SUBMITTALS

- A. Submit documentation to show current PCI certification.
- B. The (General) Contractor shall transmit precast plank shop drawings to all other contractors and/or subcontractors of all the trades to obtain locations and sizes of all required openings, and to acquire loads (weights) of all approved equipment and accessories. This coordination shall be done prior to design of precast plank(s) and submission of shop drawings.

- C. Shop Drawings - Provide stamped and sealed shop drawings for approval prior to fabrication, after the Contractor has completed their coordination of all equipment and accessory loads, and required opening locations and sizes. Include complete information for the fabrication, handling and erection of all precast planks. Shop drawings shall not be reproductions of Contract Drawings. The shop drawings shall indicate, as a minimum, the following information:
1. Layout of precast planks.
 2. Location and size of all openings verified by the Contractor.
 3. Details of joints and connections between planks.
 4. Connection details of planks to other construction (supporting structure) such as walls, beams, etc.
 5. Header sizes for openings, if required.
 6. Dimensions and surface finishes of each plank type.
 7. Estimated camber.
 8. Prestressing strand details and locations.
 9. Material properties of prestressing strands, concrete, and grout.
 10. All loads used in design such as live, dead, mechanical equipment and accessories (verified by Contractor), handling, and erection.
 11. Notation that indicates compliance with references and publications as listed in Article 1.03 above.
- D. As a separate submittal, provide two file copies of calculations for each type and length of precast plank with a stamped and sealed "Design Summary" cover sheet listing all the design criteria and loads used in the design(s). Only the Design Summary cover sheet will be reviewed, not the prepared calculations. Calculations will not be returned to the Contractor.
- E. Prestressing Strands - Certified mill test reports shall be submitted to the Engineer for record.
- F. Concrete Mix Design - Maintain on file, for submittal to Engineer only if requested, the concrete mix design for each strength and type of concrete. List materials including type and amount of cement and admixtures; and applicable reference specifications. Keep copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified.

- G. Near completion of project when all equipment and accessories have been installed on/from the precast planks and all saw cuts and holes have been made, the Contractor shall accurately map these items on the precast shop drawing plan and submit to precast manufacturer to confirm adequacy of precast plank designs. Actual loads (weights) of installed equipment and accessories shall be provided by Contractor. Any resulting deficiencies of installed precast planks shall be strengthened or replaced at Contractor's expense. Submit written confirmation of final acceptance from precast plank supplier for file.

1.06. QUALITY ASSURANCE

- A. Manufacturer shall be a PCI-certified plant for production of precast planks as specified herein.
- B. All fabricated precast planks shall meet the tolerances as specified in PCI MNL-116 and per MNL-120. In addition, the measured cambers for all precast planks shall not vary by more than 1/2 inch (\pm).
- C. A minimum of four 6-inch diameter test cylinders shall be taken during each day's casting operation.

Compressive strength tests shall be run on each day's cylinders as follows: 2 shall be broken prior to prestress force release and 2 at the end of 28 days.

Cylinders shall be prepared and tested in accordance with ACI 301.

The manufacturer may test the concrete cylinders with their own qualified staff and equipment. When requested, the manufacturer must demonstrate to the Engineer's satisfaction that only competent, trained personnel will be engaged in such work and that all testing equipment has been recently inspected and calibrated within the last year, and is in first class operating condition, otherwise an independent testing laboratory shall be used.

- D. Contractor shall coordinate Special Inspections as required for precast plant inspections and for field installations. Reference Section 01420, Special Inspections

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Store precast concrete off the ground. Separate stacked members by battens across the full width of each bearing point.

PART 2 PRODUCTS

2.01. CONCRETE

- A. The minimum compressive strength of concrete at 28 days shall be 5,000 psi.

2.02. MATERIALS

- A. Cement - ASTM C150, Type I or III.
- B. Water - Water shall be potable.

- C. Aggregates - ASTM C33.
- D. Grout - Use cement/sand mixture per plank manufacturer's recommendations.
- E. All exposed metal accessories shall be hot-dip galvanized or Type 316 stainless steel.
- F. Admixtures
 - 1. Air Entraining - ASTM C260.
 - 2. Accelerating - ASTM C494, Type C or E.
 - 3. Water Reducing - ASTM C494, Types A, E or F.
- G. Reinforcement
 - 1. Prestressing Strands
 - a. Seven-Wire Stressed Relieved - ASTM A416 or ASTM A416 with supplement for low relaxation wire.
 - b. Single-Wire Stressed Relieved - ASTM A421 or ASTM A421 with supplement for low relaxation wire.
 - 2. Reinforcing Steel - ASTM A615, Grade 60 deformed bars.
- H. Bearing Pads - As required by plank manufacturer.

2.03. FABRICATION (PCI MNL 116 UNLESS SPECIFIED OTHERWISE)

- A. Forming operations shall produce a smooth dense surface.
- B. Reinforcement Placement - ACI 318 for placement and splicing. Provide connecting bars or other approved connection methods between precast and masonry or cast-in-place construction.
- C. Concrete Cover - Provide minimum 1-1/4-inch strand cover for severe exposure.
- D. Concrete
 - 1. Concrete Mixing - ASTM C94. Mixing operations shall produce batch to batch uniformity of strength, consistency and appearance.
 - 2. Concrete Placing - ACI 304 and ACI 309, unless otherwise specified.
 - 3. Concrete Curing - Commence curing immediately following the initial set and completion of surface finishing. Provide curing procedures to keep the temperature of the concrete between 50 and 190 degrees F. When accelerated curing is used, apply heat at controlled rate and uniformly along the casting beds. Monitor temperatures at various points in a product line in different casts.

- E. Prestressing - Do not transfer prestressing forces until the concrete has reached a minimum compressive strength of 3,000 psi unless a higher strength is required by the Contractor furnished design.
- F. Surface Finish and Condition
 - 1. Unexposed Surfaces to Receive Roofing - Provide a commercial grade floated finish.
 - 2. Exposed Surfaces - Provide a standard grade surface finish acceptable to be painted. Fill all imperfections greater than 1/8 inch deep or 1/16 inches wide and grind smooth.
 - 3. Precast planks which consist of honeycombs or other surface defects deep enough to expose prestressing strands shall be rejected.
 - 4. Precast planks containing hairline cracks which are visible but less than 0.02 inches in width and/or excessive in quantity require approval by Engineer prior to installation.
 - 5. Precast planks that are damaged or have cracks greater than 0.02 inches in width shall be rejected.
 - 6. Precast planks that do not meet the fabrication tolerances specified in Article 1.07 shall be rejected.
 - 7. All rejected planks, solely determined by the Engineer, shall be removed from the site and replaced at no cost to the Owner.

2.04. 2" METAL-EDGE TONGUE & GROOVE PLANK

- A. Scope: The work consists of furnishing all materials, labor and equipment necessary to install precast concrete plank as shown on the drawings.
 - 1. Basis of design: MidCon Products Inc. Metal-Edge Tongue and Groove.
- B. Materials: All roof deck and floors shall be 2" tongue & groove plank. The plank shall be made of lightweight insulating concrete adequately reinforced with galvanized welded wire mesh. The compressive strength of the concrete shall be 1500 psi when tested at 28 days. Edging shall be a tongue and groove section made of 22 ga., prefinished, cold-rolled, galvanized steel. Finish shall be smooth on one face and standard Realite acoustical finish on the exposed face.
- C. Installation: The installation of the plank shall be performed in a workman like manner and in accordance with the manufacturer's recommendations. Attachment to the supporting member shall be one of the following, or as recommended by the manufacturer:
 - 1. Steel, concrete or wood supporting member.
 - 2. One galvanized purlin clip nailed to the plank edge at each support.
 - 3. Use one self-drilling galvanized metal fastener through each plank at each support

4. Weld leading metal edge to structural support with a fillet weld using a minimum of one inch of weld per plank. Welding voltage to be set so as to minimize burning through the metal edge.
5. For applications with pitches greater than 30 degrees, plank must be welded or thrust angles must be used in conjunction with standard attachment. For other applications, contact manufacturer for recommendation.
6. Installation shall begin at a building corner, plank placed with smooth side up and groove edge leading. Plank should be installed across roof supports with ends staggered a minimum of 24". The first row of plank shall start with a plank having a minimum of two structural supports. All plank must have at least one structural support. At building perimeter, ridge, and valley all plank ends and edges without metal edging must occur over continuous support.
7. The tongue and groove sides and ends of all plank shall be firmly mated to form tightly closed joints when viewed from above the plank surface. Finished deck shall provide a smooth surface ready for roofing application.
8. Holes: All holes shall be site cut and shall be centered between the metal edges. For any openings greater than 12" on any dimension, suitable framing angles should be utilized.
9. Storing: For exterior storage, plank should be stacked on edge with a minimum of 3" between stacks and 3" from the ground.

PART 3 EXECUTION

3.01. SURFACE REPAIR

- A. Prior to erection and again after installation, Contractor shall check precast concrete for damage such as cracking, spalling, and honeycombs. Precast concrete that does not meet the surface finish requirements specified in Part 2 shall be repaired or removed and replaced at the Contractor's expense.

3.02. BEARING SURFACES

- A. Shall be flat and free of irregularities. Before erection, the Contractor shall verify that bearing surfaces are sized to provide the required clearances. Correct bearing surface irregularities with non-shrink grout and/or grinding as required. Provide bearing pads only as required by plank manufacturer's design.

3.03. ERECTION

- A. Precast planks shall be erected after the concrete has attained the specified compressive strength, but shall not be fixed in position until the unit has "aged" 90 days after detensioning.
- B. Erect in accordance with the approved shop drawings. Reference PCI MNL-116 and MNL-120 for tolerances.

- C. Follow the plank manufacturer's recommendations for maximum construction loads. Place precast planks level, plumb, square and at right angles to the bearing surface, unless indicated otherwise, and draw up tight without forcing or distortion. Align plank ends.
- D. Connections - All plank end and sidelap connections to supporting structure(s) shall be installed in accordance with the details on the Contract Drawings or as approved on the shop drawings.
- E. Grouting - All keyways between adjacent units shall be fully grouted. Take care to solidly pack entire depth of keyway flush to top of precast. Prevent leakage or droppings of grout through the assembled deck. Any grout which seeps through the deck shall be removed before it hardens. Grouting shall not start until all units are in place.
- F. Differential camber occurring between adjacent units at roof deck levels in excess of 1/4 inch shall be dressed with non-shrink grout, or other approved material.
- G. Welding - Connections which require welding shall be accomplished only by experienced and qualified personnel.

3.04. CONSTRUCTION LOADS

- A. Loads shall not be placed on these precast planks until all keyways have been fully grouted and/or as instructed by the plank manufacturer.
- B. In no case shall concentrated loads or construction loads exceeding the design loads be placed on these precast planks.

3.05. FIELD-INSTALLED OPENINGS

- A. The Contractor shall locate and receive prior approval from plank manufacturer for all openings to be field installed.
- B. All circular openings 16 inches in diameter or smaller shall be core drilled.
- C. All rectangular openings shall be saw cut without overcutting. Use of a specialty type concrete saw is required. All cuts shall be clean and not broken out.
- D. The Contractor shall finish off and/or trim any cores left exposed and visible after construction. This includes plank ends or exposed cores after saw cutting for openings. If not otherwise indicated on the Contract Drawings, all cores shall be sealed with backpainted aluminum trim.
- E. Any oversized cut openings which result in a gap around equipment or mechanical fittings shall be trimmed off by the Contractor to neatly hide gaps using backpainted aluminum trim.

3.06. PROTECTION OF WORK

- A. All precast planks are to be protected from physical damage, and from water infiltration and freezing immediately following installation.
- B. Any and all remedial efforts to correct noted deficiencies for installed precast planks shall be determined by the plank manufacturer and are the responsibility of the Contractor.

END OF SECTION

ATTACHMENT 2

SECTION 07429

SOFFIT PANELS

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. Metal soffit panels.

1.03. SUBMITTALS

- A. Product Data: For each type of product.

- 1. Including construction details, material descriptions of individual components and profiles, and finishes for each type of panel and accessory.

- B. Shop Drawings:

- 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of flashing, trim, and anchorage systems.

- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

- 1. Include similar Samples of trim and accessories involving color selection.

- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

- 1. Metal Panels: 12"-16" long by actual panel width. Include fasteners, closures, and other metal panel accessories.

- E. Sample Warranties: For special warranties.

1.04. QUALITY ASSURANCE

- A. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.05. DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal 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.

1.06. FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.07. COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.08. WARRANTY

- A. Special Warranty on 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:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01. PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads: As indicated on Drawings.

2.02. METAL SOFFIT PANELS

- A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

- B. Metal Soffit Panels: Match material of metal roof panels.
 - 1. Finish: Match finish and of metal roof panels.
 - 2. Sealant: Factory applied within interlocking joint.
 - 3. Color to be selected by Owner / Engineer.
 - 4. Soffit above Macedon Wet Well to be solid material (not vented).

2.03. MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Sub-framing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. 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 pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

2.04. FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

2.05. FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
 - 2. Examine sheathing to verify that sheathing joints are supported by framing or blocking, and that installation is within flatness tolerances required by metal panel manufacturer.
 - a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. PREPARATION

- A. Miscellaneous Supports: Install sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.03. INSTALLATION

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.

2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
4. Stainless Steel Panels: Use stainless steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

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 are permanently watertight.

1. Install exposed flashing and trim that is without 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 achieve waterproof 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 expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.04. CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

ATTACHMENT 3

SECTION 17095

CUSTOM CONTROL PANELS AND INTEGRATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. It is the intent that the Contractor will work with a system integrator (CSI) to successfully fulfill the requirements herein and shown on the Contract Drawings to provide a complete and operable control system (fully integrated) with the intent specified and shown on the Contract Drawings.
- B. System integrator referenced throughout this specification is referring to the panel provider.

1.02 SECTION INCLUDES

- A. Station Control Panel (JA-SCP)
- B. Bubbler Wetwell Level Detection System
- C. Submersible Pressure Transducers
- D. Backup Float Control Panel (BUFCP)
- E. Float Switches
- F. Magnetic Flow Meter
- G. Pressure Transmitter
- H. Chart Recorder
- I. Auto-Dialer
- J. Software
- K. Integration Services, Programming, and Screen Development
- L. Sequence of Operations
- M. Commissioning, Startup Services, & Training
- N. I/O Table

1.03 REFERENCE STANDARDS

- A. All control systems as specified herein shall be provided in accordance with the latest additions of the NEC and IEC.

- B. All wiring shall be in complete conformance with the National Electrical Code, State, local and NEMA electrical standards. All incoming and outgoing wires shall be connected to numbered terminal blocks and all wiring neatly tied and fastened to chassis as required.
- C. All control panels shall be UL 508A listed or UL 698A listed whichever may be applicable. The UL 508A/698A “sticker” shall be clearly displayed in the appropriate location within the panel. Third party substitutions of UL 508A/698A listed equipment shall be strictly prohibited.
- D. All equipment and installations shall satisfy applicable Federal, State, and local codes.
- E. Furnish products listed and classified by Underwriters Laboratories (UL), CSA, or FM approval as suitable for purpose specified and indicated.
- F. Auxiliary and accessory devices necessary for system operation or performance, such as transducers, relays, signal amplifiers, intrinsic safety barriers, signal isolators, software, and drivers to interface with existing equipment or equipment provided by others under other Sections of these specifications, shall be included whether they are shown on the Drawings or not.
- G. Use the equipment, instrument, and loop numbering scheme shown on the Drawings and specifications in the development of the submittals. Do not deviate from or modify the numbering scheme without the Engineer's approval.

1.04 RELATED SECTIONS

- A. Contractor to coordinate sequence of operation with the Engineer and Owner.
 - 1. Contractor to include two (2) 4-hour meetings with the Engineer and Owner to discuss/finalize sequence of operation in which control system is to be programmed for.
 - a. Meetings to take place at the project site.
- B. Section 11303 – Dry Pit Submersible Pumps
- C. Section 16484 – Contactors & Motor Starting Equipment

1.05 SUBMITTALS

- A. Shop Drawings – Submit under provisions of Sections 01300, Submittals, and 01640, Equipment-General. The following submittal material shall be submitted for the Engineer’s review and approval prior to fabrication of any PLC or Telemetry/Network enclosures. Enclosure’s fabricated prior to the approval of these shop drawings are subject to alteration to conform with the approved shop drawings by the supplier at the supplier’s cost:
 - 1. Written Sequence of Control System Operation (coordinate as required with the Engineer and Owner).
 - 2. Using AutoCAD, provide these drawings for each PLC in the following order. Label all components with manufacturer and complete model numbers on the drawings. Typical drawings are not acceptable.

- a. Scaled enclosure layout drawings in 11-inch by 17-inch format, detailing locations of all components on the subpanel, door, and all other enclosure faces. Label each view as “Enclosure Door”, “Enclosure Subpanel”, “Enclosure Side”, etc. Drawing shall display layout of completed assemblies, including, but not limited to, PLC backplane, PLC I/O modules, empty slots, radios, UPS, Ethernet switches, autodialers, terminal blocks, installed spare equipment, power supplies, power line isolators, surge suppression, grounding lugs, wireway, disconnect switches, fuses, control relays, acceptable regions for conduit penetrations of both AC and DC wiring separately, and external power. Illustrate handles, hasps, hinges, and dimensions of exterior-mounted devices. Identify equipment manufacturer and model numbers by placing a number next to the piece of equipment on the drawing and cross-referencing with the Bill of Materials. In addition to the Bill of Materials cross-reference labeling, label PLC I/O modules on the drawing with the manufacturers complete model numbers
- b. Elementary diagram drawings in 11-inch by 17-inch format, detailing all enclosure electrical components including, but not limited to, power line isolators, surge suppression, UPS, power supplies, fuses, duplex receptacles, indicating lights, switches, and control relays. Diagrams shall include terminal point designations, line reference numbers, and wire numbers. All wires shall maintain the same wire number for the entire contiguous segment of wire. Diagrams shall illustrate all network cabling and DC and AC electrical distribution. Drawing shall illustrate all available instrument terminations, both used and unused, and be labeled with the manufacturer’s terminal point label as will be found on the installed instrument. Provide a legend on this sheet for all symbols and general notes used on this sheet and on the PLC I/O module detail drawings.
- c. Scaled PLC I/O module detail drawings, in 11-inch by 17-inch format, for each card installed in the PLC backplane. Detail the wiring of all terminations on the PLC I/O module including, wiring of all I/O points and power. Illustrate all terminations points for each signal including termination points for terminal blocks, relays, etc. Identify each wires color and wire number. Utilize NFPA 79 standards to illustrate termination points: to an MCC, to a device terminal, to a control panel terminal, to fused blocks, to surge suppressor blocks, etc. Label each point on PLC I/O modules with the PLCs physical address. Utilize NFPA 79 standards for illustration of wiring: internal to the PLC enclosure, outside the PLC panel, and integral to a device. Progression of I/O modules detail drawings shall be in the order of the orientation of the I/O modules in the PLC backplane (e.g., Slots 1 and 2 on sheet 7, Slots 3 and 4 on sheet 8, etc.). Not more than two card details shall be shown on any one drawing. Each I/O module shall be labeled with the installed rack and slot number. Illustrate installed spare I/O modules, but it is not necessary to detail slot filler cards. Each drawing title shall have the following format:

Line 1: PLC Name (e.g. “Jackson Ave. PS, JA-SCP”)

Line 2: Module Type (e.g. “Discrete Inputs”, “Combo Module: AI, AO, DI, DO”, etc.)

Line 3: Installed Rack and Slot (e.g. "Rack 1, Slots 3 and 4")

Label all PLC I/O module termination points and I/O point description as shown on the PLC I/O lists. For I/O list points that lack certain information, create descriptions that are in accordance with ISA Standard 5.1. Each point description shall utilize the following format:

Line 1: Equipment Description (e.g. "JA-IP-1", "Jackson Ave PS Influent Pump No.1", "Wet Well Level Transmitter", etc.)

Line 2: Signal Description (e.g. "Run Indication", "Flow Indication", etc.)

Line 3: Signal Functional Designation (e.g. "YI-XXXX", "FI-XXXX", where "XXXX" is the instrument loop number.)

- d. Include one AutoCAD drawing of the SCADA system network architecture. Detail all Ethernet switches, fiberoptic cabling, Category 6 cabling, SCADA nodes, printers, modems, radios, antennas, PC Ethernet cards, PLC CPUs, and all other details required to illustrate to the Engineer that the Contractor is proposing a communication network that meets the requirements of the completed system as specified in the Division 17 Instrumentation Specifications and on the Contract Drawings. Illustrate location of the detailed equipment in the appropriate buildings and rooms. Label all communication cabling and connector types. Illustrate all communication ports of the equipment as they will be found in the field, including spare and unused ports. Illustrate all DIP-switch and jumper settings.
3. Submit manufacturer information on all software.
4. Submit calculations to substantiate sizing of each UPS. For each UPS, itemize all equipment drawing from the UPS and compare the respective current and power draws to the manufacturer's rating of current draw for the specified amount of time.
5. Unless the manufacturer is specifically named in these specifications, the following must be provided along with the manufacturer information for the proposed "or equals". Provide the following information for a minimum of 20 references for the Engineer to verify 7 of these installations: name and address of the client and location of installation, if different; name of the person in direct responsible charge; consulting design engineer; system programmer; details of the equipment; installation date; startup date; and full performance details. It is the sole responsibility of the Contractor to provide this information. Include all travel costs for Engineer to visit two of the referenced installations.
6. Bill of Materials.
7. Vendor Data Sheets.
5. System Warranty (see below).
6. System Integrator Qualifications (see below).

7. Control Panel Heat Dissipation Calculations.
 8. List of autodialer alarms and the order in which they are wired into the dialer inputs.
- B. Process Control System Coordination - Where PLCs are utilized, submit the following information within 60 days after receiving an approved shop drawing submittal for the equipment.
1. PLC Memory Map - Submit a PLC memory map to coordinate the PLC memory registers that will be utilized to facilitate bidirectional read and write functionality between the PLC and the County SCADA system. The PLC memory map shall conform to the following requirements:
 - a. Transmitted electronically to the Engineer in Microsoft Excel format.
 - b. Identify PLC memory locations of key operating data. At a minimum, PLC memory address locations shall be provided for each data point in the supplied OIT to enable OIT functionality to be fully replicated over the specified protocol within the supervisory software.
 - c. Communication shall be direct to the PLC or protocol converter. Communication to an supplied computer or OIT is not acceptable.
 - d. Accurate text descriptions for all data points.
 - e. Datatype of each data point (i.e. Boolean, Integer, Double Integer, Floating Point/Real, etc.).
 - f. Scaling/range of values for all analog data points (i.e., 0 to 60 Hertz, 0 to 10.00 mg/L, etc.).
 - g. Engineering units of all analog data points (i.e., gpm, mgd, mg/L, feet, inches, etc.).
 - h. Configuration details for any “packed” integers whereby the integer value of the data point signifies different equipment or process conditions. Examples are an integer whose value signifies the pump is Not Running (0), Running (1), Failed (2), Ready (3), etc.; Hand (0), Off (1), Auto (2) status; or Lead (0), Lag (1), Standby (2) configurations. Alarm conditions shall be contained in individual Boolean registers and are prohibited from existing solely in packed integers.
 - i. Identify value of Boolean/Discrete values when they are “active”, i.e., alarm is active when Boolean register is True (1) or active when False (0).
 - j. Alarms – Identify alarm conditions that are annunciated in the OIT. Differentiate alarm conditions from events. Prioritize alarm conditions and identify alarm conditions that are worthy of notifying the operations staff via the plant’s alarm notification system (dialer).

- k. Key operating setpoints useful to the operating staff to view remotely. Access to all setpoints is required.
- 2. Submit HMI/operator interface graphic displays (screen shots) for each HMI graphic display for the completed program. Submit four sets of color screen shots.
- 3. PLC Program – Complete electronic form of PLC program for coordination with plant process control system.
- C. The Engineer and Owner shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture, as in accordance with Article 3.03 FACTORY ACCEPTANCE TESTING (FAT).
- D. The Contractor shall make all arrangements and pay for all travel and expenses for up to three people from the Owner and Owner's Engineer to witness the shop tests.

1.06 OPERATIONS AND MAINTENANCE DOCUMENTATION

- A. The Systems Integrator shall provide to the contractor, three (3) hardcopy sets and one (1) electronic copy (USB) of the following Operations and Maintenance documentation; all documentation shall be neatly bound in 3-ring binders.
 - 1. Final Written sequence of control system operation (coordinate as required with the Engineer and Owner).
 - 2. As-Installed Electrical and Mechanical Schematic Drawings.
 - 3. Bill of Materials.
 - 4. Vendor Operation, Maintenance and troubleshooting documentation.
 - 5. PLC and OIT program printouts.
 - 6. Back-up Copies of As-installed PLC and OIT programs on CD and USB thumb drive.
 - 7. Point to point wiring diagrams indicating as-built conditions.

1.07 WARRANTY

A. JA-SCP

The Systems Integrator shall provide with the above submittals, a written parts warranty against system failure for twelve (12) months from system startup, not to exceed eighteen (18) months from date of shipment from their factory. This warranty period will, except for human negligence or acts of nature such as lightning, floods, etc., provide for repair or replacement of any defective or failed components, at the project site, and at no cost to others.

- B. Contractor to provide two-year warranty for all instruments specified/provided as part of this section. Warranty to cover the entire instrument including any associated transmitters/controllers, flow tubes, etc... This warranty period will, except for human negligence or acts of nature such as lightning, floods, etc., provide for repair or replacement of any defective or failed components, at the project site, and at no cost to others.

1.08 QUALITY ASSURANCE

- A. The Equipment, controls and accessories covered in this specification section constitute a completely integrated system, designed, constructed, programmed, and tested by one Systems Integrator, accountable for its operation and performance. The Systems Integrator shall be selected based on their ability to Engineer, design and manufacture systems of the type herein specified.
- B. The Contractor shall submit to the Engineer the name of the System Integrator to whom they propose to award the work. No Systems Integrator will be approved by the Engineer who cannot furnish satisfactory proof of at least five (5) successful installations which in the judgment of the Engineer are of equal or greater complexity to that described herein.
- C. The Systems Integrator shall be a reputable firm that has been in the business of providing automated control systems specifically for the water and wastewater treatment industry for a minimum of ten (10) years. Systems Integrators with less than ten (10) years of experience will not be accepted.
- D. The Systems Integrator shall have as a minimum, five (5) full time employees who are experienced in routine and emergency services of the equipment herein specified. The Systems Integrator shall as a minimum provide two (2) direct cell phone numbers in which service personnel can be reached 24hrs, 7 days a week.
- E. The System Integrator shall be U.L. approved for manufacturing systems in compliance with UL 508A and/or UL 698A whichever may be applicable. Each assembly and subassembly of the system shall be listed and labeled as U.L. approved. Systems Integrators who outsource panel fabrication services for the purpose of providing UL labeling will not be accepted.
- F. For serviceability reasons the system integrator's service facility shall be located within 100 miles of the project site. In addition, they must possess a factory trained, service staff experienced in routine and emergency service of the type of equipment herein specified who are located within a maximum of two (2) hours of the project site.
 - 1. The Systems Integrator shall be Aaron Associates of CT, Inc. or approved equal
 - a. 2 Mattoon Road
Waterbury, CT 06708
Phone: (203) 753-1536
- G. Control panels shall be fabricated with the following features as a minimum:
 - 1. All sub panel wiring shall be run in plastic wire duct sized with 50% spare space, AC and DC wiring shall be run in separate wire ducts.

2. All power supplies shall be sized for an additional 50% spare ampacity over expected load. Each power supply shall include an AC input fuse and independent output fuses for each device requiring DC power.
 3. All field terminations shall be made on screw type terminal blocks labeled according to wire number, separate terminal strips shall be provided for AC and DC signals. A minimum of 20% spare terminals shall be provided.
 4. Wiring to door mounted components shall be neatly bundled wiring harnesses protected by plastic spiral wire wrap when crossing door hinge. Wiring harnesses shall have adequate stress loops and be fastened at both sides of hinge crossing.
 5. All wiring shall be wire numbered at both ends with plastic Brady type labels.
 6. All nameplates shall be engraved on lamacoid material providing black lettering on a white background. Lettering shall be no smaller than 1/8 of an inch in height.
 7. Twenty percent spare mounting space is required for future modifications.
- H. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
- I. It is a requirement of this specification that all equipment, devices, instruments, and ancillary elements specified herein be furnished by a single supplier. The supplier shall have total responsibility for the equipment and services specified within this section.

1.09 ENVIRONMENTAL CONTROL OF PANELS

- A. Panels shall be provided with louvers, sun shields, heat sinks, forced air ventilation, or air conditioning units as required to prevent temperature buildup inside of panel. Internal temperature of all panels shall be regulated to a range of 45 Deg F to 104 Deg F under all conditions. Under no circumstances shall panel cooling or heating equipment compromise the NEMA rating of the panel.
1. Refer to submittal article above and article 2.01(C) below for additional information/requirements.
- B. For panels with internal heat that cannot be adequately dissipated with natural convection and heat sinks, or forced air ventilation, an air conditioner shall be provided.

1.10 DESCRIPTION OF OPERATION

- A. Overview
1. The System Integrator shall supply for contractor's installation the control panel specified herein. The control panel shall through communications and/or hardwired status and alarm signals monitor/control the operations of process equipment, vendor supplied equipment, and all equipment/devices pertinent to the operations of the pump station.

2. The Station Control Panel shall provide local alarm monitoring by door mounted common alarm lights, momentary pushbutton (for alarm acknowledgement, reset, and horn silence) alarm horn and Operator Interface Terminal (OIT).
3. Refer to the Contract Drawings for intent and all equipment/components that control panel is to interface with.
4. Provide all hardware/software, programming, and services as herein specified to provide one (1) completely factory assembled and programmed Station Control Panel (JA-SCP).
5. System integration, programming, screen development, and startup services are to be provided as part of this contract/specification.
6. Contractor and Systems Integrator to provide two (2) 4-hour meetings with the Owner/Engineer at the project site to discuss control panel programming, sequence of operation, and overall intent to ensure specified control panel is programmed properly.
 - a. Coordinate meeting with Owner/Engineer two weeks in advance and prior to submittal documentation submission.
7. Note, the programming/logic to accomplish the sequence outlined below has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.

B. Sequence of Operations

1. The station control panel to be PLC based and completely factory programmed as required to provide the following control strategies. All control strategies to be fully coordinated with the Owner and Engineer. Refer to above required meetings to review sequence and finalize programming requirements.
 - a. Wetwell Level Monitoring:
 - 1) Primary wetwell level detection to be by means of a bubbler system while secondary wetwell level detection to be by means of a submersible pressure transducer. Since the wetwell is dual chamber, there is to be a single bubbler system with tubing that is split/valved to serve each chamber of the wetwell. There will then be two (2) independent submersible pressure transducers, one in each wetwell chamber for secondary level detection.
 - a) Bubbler System – wetwell level shall be measured by a pressure-to-current (P/I) transmitter. Major system components shall consist of the P/I transmitter, low pressure air supply, and two air-lines extending into and terminating near the bottom of each wetwell. An air selector valve shall be provided to allow either of the two wetwell levels to be monitored. The air supply shall continuously purge the selected airline. P/I transmitter outputs shall be 4-20mA DC proportional to wetwell level and shall be connected to the

station control panel PLC through an analog input. The JA-SCP shall utilize this signal for control, monitoring, trending, and alarming. Ancillary bubbler system components shall include, but not be limited to, the following: two (2) air compressors, one (1) air flow indicator, air pump selector switch, wetwell airline selector switch, 3/8" & 1/2" air piping, and two (2) 3" PVC air bells for installation within each chamber of the wet well.

- b) Submersible Pressure Transducer – A submersible pressure transducer shall be provided for installation within each wetwell chamber (typical of 2). The transducer shall provide a 4-20 mAdc signal linear and proportional to wetwell level. The station control panel shall utilize this signal for control, monitoring, trending, and alarm functions. Provide an additional selector switch to provide the operator the ability to select between the two (2) pressure transducers as to which is being used for level control.

b. Level Control Mode Selection:

- 1) A level control mode selection (Primary Bubbler / Secondary Transducer) switch to be provided on the JA-SCP door. Each mode to operate as follows:
 - a) Primary Bubbler – JA-SCP system logic provides variable level control of wetwell level by use of associated pump soft starters as described below. Control mode remains in primary bubbler level mode until altered by operator or float mode enabled (refer to below backup float control panel specifications).
 - b) Secondary Transducer – JA-SCP system logic provides variable level control of wetwell level by use of associated pump soft starters as described below. Control mode remains in secondary transducer level mode until altered by operator or float mode enabled (refer to below backup float control panel specifications).
 - c) Note, there is an independent backup float control panel specified as part of this specification. The backup float control system will serve as backup level control for the station when in either mode (bubbler vs transducer) described above. The backup float system is initiated by a high-high level float. Refer to below backup float control panel specifications and electrical drawings for additional information.

c. Wetwell Level Control (Variable Level):

- 1) As level in the wetwell rises above an adjustable Lead Pump "ON" setpoint, system logic shall start the lead pump by use of an associated soft starter. The soft starter shall ramp up in speed to begin pumping down the wetwell. The adjustable lead pump on setpoint shall be fully adjustable via the JA-SCP door mounted Operator Interface Terminal (OIT).

- 2) Should influent flow (wetwell level) exceed the capacity of the lead pump, system logic shall automatically stage on the first lag pump after the lead pump has been operating at its maximum speed for a programmable time delay. The lead pump time delay setpoint for staging on the first lag pump shall be fully adjustable via the JA-SCP door mounted OIT.
- 3) Should the wetwell level decrease (while both pumps are operating) to below the Lag Pump "OFF" setpoint for a programmable time delay, system logic shall turn the lag pump off by use of an associated soft starter. The lead pump shall continue pumping until the wetwell level has decreased to below the lead pump off setpoint for a programmable time delay. The lead pump shall remain off until wetwell level once again rises above the Lead Pump "ON" setpoint initiating the next pump down cycle.

The time delay settings and wetwell pump off setpoints shall be fully adjustable via the JA-SCP door mounted OIT.

- 4) Should influent flow exceed the capacity of the lead and first lag pumps (while operating together), system logic shall automatically stage on the second lag pump after the initial two pumps have been operating at maximum speed for a programmable time delay. The lead/lag pumps time delay setpoints for staging on the second lag pump shall be fully adjustable via the JA-SCP door mounted OIT.
- 5) Should wetwell level decrease (while all three pumps are operating) to below the second lag pump "OFF" setpoint for a programmable time delay, system logic shall shut the second lag pump down and the remaining two pumps shall continue to pump. The time delay setpoints for staging off the second lag pump shall be fully adjustable via the JA-SCP door mounted OIT.
- 6) Note, three (3) pumps maximum can be called to run at the same time with the fourth pump being a standby. Time delays, pump on, pump off, etc. are to all be user adjustable at the JA-SCP door mounted OIT.
- 7) Operator adjustable high and low level alarm setpoints shall be provided for alarm annunciation of an abnormally high or low wetwell level condition. Alarm setpoints and associated time delays for high and low level alarms shall be fully adjustable via the JA-SCP door mounted OIT. All level alarms shall be annunciated on the JA-SCP door mounted OIT, common alarm light and alarm horn.

d. Pump Alternation and Sequence Selection:

- 1) Pump alternation and sequence selection shall be provided for the Stations thru the door mounted OIT on the JA-SCP.

- a) Manual Selection – A manual sequence table will be provided on the door mounted OIT. Operator to have the ability to choose which pump becomes the lead pump and the following lag pump sequence.
 - b) Selection Auto – Lead Pump determined by system logic, alternation between pumps on each pump down cycle, lead pump runtime (adjustable via OIT), or upon lead pump not being available for operation.
- e. Pump Motor Winding Temperature Monitoring:
 - 1) Each pump is equipped with seal leak detection and high motor winding temperature switches. The station control panel shall monitor these elements via discrete PLC inputs.
 - 2) In the event of a motor winding temperature alarm, system logic shall shutdown the respective pump and render it unavailable for operation.
 - 3) In similar fashion in the event of a seal leak detection/condition, system logic shall shutdown the respective pump and render it unavailable for operation.
 - 4) All seal leak and motor high temperature alarms shall be annunciated on the JA-SCP door mounted OIT, common alarm light and alarm horn.
- f. Pump Availability:
 - 1) A pump shall be considered unavailable for operation when any of the following conditions occur:
 - a) Respective pump mode of operation selector switch is in the “OFF” position
 - b) Respective pump fails to start
 - c) Respective pump soft starter failure
 - d) Wet well low-level condition
 - e) Motor winding high-temperature condition
 - f) Pump seal leak condition
- g. Additional System Monitoring:
 - 1) In addition to monitoring and controlling the Stations based upon wetwell level it is anticipated that the JA-SCP will monitor the following systems:
 - a) Ventilation system
 - b) Emergency generator system

- c) Backup float control panel
 - d) Door contacts (intrusion)
 - e) Smoke/Heat detectors
 - f) Gas monitoring system
 - g) Various instruments (pressure, flow, etc.)
 - h) Refer to Contract Drawings and I/O Table for additional information and I/O that is to be incorporated at the JA-SCP.
- h. Alarm Monitoring:
- 1) All system alarms shall be annunciated locally via the panel mounted OIT, common alarm pilot light, and alarm horn. Alarm acknowledgement, reset, and horn silence of alarms shall be provided by an JA-SCP door mounted pushbutton.

1.10 COORDINATION

A. Coordinate the following meetings and workshops at a minimum with the Owner:

- 1. Networking Coordination Meeting:
 - a. Meeting is intended to review networking and communication requirements for establishing secure communication links between Pump Station site and County Network.
 - b. Minimum of one meeting. 2-hours each.
 - c. Participants: County (including County IT), Engineer, Contractor (with Contractor's Systems Integrator and/or packaged system vendor as applicable).
- 2. OIT Graphics and Controls Workshop:
 - a. Workshops are intended to review the proposed OIT graphics and controls that are part of the Work. All workshops are to be conducted prior to factory acceptance testing of control panel.
 - b. Minimum of one meeting. 2-hours each.
 - c. Participants: County (including County Operations Personnel), Engineer, Contractor (with Contractor's Systems Integrator and/or packaged system vendor as applicable).

PART 2 PRODUCTS

2.01 STATION CONTROL PANEL (JA-SCP)

- A. The control panel shall be housed in NEMA 4X floor mount enclosure constructed of 316 stainless steel. The enclosure shall be provided with an inner swingout panel for mounting

of door interlocked disconnect switch, fault reset push buttons, OIT, pilot lights, pushbuttons, and switches as specified below. The enclosure shall be 62" high by 48" wide by 18" deep. Dimensions provided are maximum. Contractor may utilize smaller enclosure if approved by the Engineer to house the hardware specified and meet the intent of the specification herein.

1. Provide enclosure with 12" floor stand kit.
 2. Provide enclosure as double door with 3-point latch system.
 3. Provide doors with gasket system.
 4. Control panel to be provided with a NEMA 4X fan/filter and thermostat kit per manufacturers recommendations.
 5. Control panel to be provided with internal climate control heater (refer to below).
 6. Bottom six (6) inches within enclosure to be free of all hardware, devices, components, terminal blocks, etc. to provide ease of installation and testing.
 7. The enclosure to be Hoffman A62H4818SS6LP3PT or approved equal.
- B. Control panel shall be equipped with a climate control heater designed to protect sensitive electronic equipment from the harmful effects of condensation, corrosion, and low temperatures. The heater shall have the following features as a minimum (to be confirmed with manufacturer during submittal phase):
1. Operating voltage - 115VAC
 2. Wattage - 200W
 3. Durable anodized aluminum housing
 4. Integral thermostat adjustable from 0°F to 100°F (-18°C to 38°C)
 5. Continuously running ball bearing fan for even temperature distribution
- C. During submittal phase manufacturer to provide quantifiable control panel heating/heat loss calculations, in which results would indicate if control panel air conditioning is required or not. Intent is to detail if cooling (Air Conditioning) is required for the control panel. Contractor to provide air conditioning unit for the control panel if recommended by manufacturer/CSI because of the calculations. For bidding purposes contractor to assume A/C unit is required to be provided for the control panel. Calculation to consider the following:
1. Calculate total heat generated.
 2. Calculate temperature rise
 3. Calculate heat dissipation
 4. Compare/contrast calculation versus component ratings.

- D. Control panel shall be UL 508A listed or UL 698A listed whichever is applicable. The UL “sticker” shall be clearly displayed in the appropriate location within the panel. Third party substitutions of UL 508A/698A listed equipment shall be strictly prohibited.
- E. Panel Input power shall be 120VAC, 1 Phase, 60Hz. Provide a sufficiently sized main circuit breaker disconnecting means. Interlock main circuit breaker disconnect with the control panel door handle.
- F. Refer to Electrical Drawings for additional information/requirements.
- G. A 120VAC single phase surge protector shall be provided for the incoming 120VAC supply. The surge protector shall be designed to protect electrical and electronic equipment against transients caused by lightning, induction, load switching, EMP and other sources. Line to neutral, line to ground and neutral to ground protection shall be provided. The surge protector shall have a protection level of 1kV and a maximum discharge current of 140 kA as a minimum. The surge protector shall have a remote signaling device for fault indication to the PLC. The AC surge protector shall be CITEL model DS72RS-120 or approved equal.
- H. All communication cabling that exits the building shall have surge protection provided.
- I. An analog signal surge protector shall be provided for protecting analog input signals from electrical surges caused by lightning and other sources. The surge protector shall have the following features as a minimum:
 - 1. Designed specifically for 4-20 mA_{dc} and pulse signal lines including both two and four wire transmitters
 - 2. Shall be capable of absorbing electrical surges with no interruption to instrumentation signal
 - 3. Shall have a removable arrester element that when unplugged from the base will not interrupt the instrumentation signal
 - 4. Surge protector housing shall be constructed of flame-resistant resin
 - 5. Maximum Line Voltage of 30VDC
 - 6. Discharge Voltage – Line to line of 30V minimum and line to ground of 500V minimum
 - 7. Maximum Surge Voltage – Line to line of 40V maximum and line to ground of 650V maximum
 - 8. Response Time – Line to line of less than 4 nanoseconds and line to ground of less than 20 nanoseconds.
 - 9. Discharge Current Capacity of 5000A
 - 10. Internal series Resistance of approximately 20 ohm including return

- J. Short circuit protection of 120VAC input and UPS control power shall be provided by a miniature branch rated circuit breaker with an interruptive capacity of 10K amperes at 240VAC. Circuit Breakers shall be Allen-Bradley 1489 series or approved equal
- K. One print pocket shall be provided on the control panel door. One complete set of electrical control drawings shall be provided in the pocket.
- L. Separate circuit breaker disconnects for each load supplied from the control panel shall be provided. All branch circuits shall be short circuit protected.
- M. The control panel shall be provided with an Uninterruptible Power Supply (UPS) for protection against power disturbances, noise, and brownouts. Refer to article below for UPS specifications.
- N. The station control panel shall be provided with a Programmable Logic Controller (PLC). The PLC shall be factory programmed, tested, and debugged to meet all the requirements of the applicable process. Refer to article below for additional PLC specifications/requirements.
 - 1. Note, the programming/logic to accomplish the sequence outlined within this specification has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.
- O. The control panel shall be provided with a door mounted 10" Operator Interface Terminal (OIT) for system monitoring, setpoint entry/review and alarm annunciation. Communications between the OIT and PLC shall be Ethernet. The OIT shall be color touchscreen. Refer to article below for OIT specifications.
- P. The control panel shall be provided space to install an Owner furnished Ethernet switch/media converter for network communications and programming. Additional Ethernet ports to be available for system programming, connectivity to future Local Area Network (LAN), and connection to future Ethernet devices.
 - 1. Networking switches inside the control panel shall be selected, configured, and furnished by the Owner. This contract to install Owner furnished switch within the control panel.
 - 2. Ethernet switch manufacturer and model shall be determined during the specified coordination meetings between the Owner, Engineer, and system supplier.
 - 3. Utilize IP addresses selected by the Owner.
- Q. Control panel shall be provided with a DC power supply: a 24V direct current power supply shall be provided to power the PLC, OIT, I/O, and all ancillary equipment. The power supply shall have an operational input range of 85 to 132VAC and shall have a minimum rated output of 24 to 28VDC/240 watts. Power supply shall be Weidmuller or approved equal.

- R. The control panel shall provide visual alarm annunciation via common alarm pilot light and OIT alarm screen. Pilot light shall be 30mm, industrial grade, push-to-test type, Allen-Bradley 800H series or approved equal.
1. Color coding for equipment status, pilot lights, and alarms shall be as follows:
 - a. Green for on, open, or running
 - b. Red for off, closed, or stopped
 - c. Amber for indication of malfunction, trouble, or alarm
 - d. Blue for indication of electrical power on
- S. The control panel shall provide audible alarm annunciation via alarm horn. Alarm horn shall provide a typical sound pressure of $95 + 5$ dB(A) at 30VDC, at 24 inches and shall have a built-in volume control providing variable attenuation up to 20 dB(A). The alarm horn shall be Floyd Bell model MC-V09-530-Q or approved equal.
- T. A momentary pushbutton shall be provided for alarm acknowledgment/reset and alarm horn silence, pushbutton shall be 30mm industrial grade, Allen-Bradley 800H series or approved equal.
- U. Control panel shall have a single tube, LED light fixture, 10 Watt in size, mounted internally to the ceiling of the panel. Light fixture shall be switched and shall be complete with the lamp.
- V. Control panel shall have one (1) specification grade duplex convenience receptacle with ground fault interrupter, mounted internally within a stamped steel device box with appropriate cover. Convenience receptacle shall not be powered from a UPS and shall be protected by a dedicated fuse or circuit breaker.
- W. AC power fuses shall be provided as required for over current protection of individual AC powered panel components. Single circuit fusible terminal blocks with neon blown fuse indicators suitable for use with $\frac{1}{4}$ " x $1\frac{1}{4}$ " glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 100 to 300VAC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H4 or approved equal.
- X. DC power fuses shall be provided as required for over current protection of individual DC powered panel components. Single circuit fusible terminal blocks with LED blown fuse indicators suitable for use with $\frac{1}{4}$ " x $1\frac{1}{4}$ " glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 10 to 57V AC/DC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H5 or approved equal.
- Y. Interposing and control relays shall be provided as required. They shall be of industrial grade, plug-in socket type, and shall have 24VDC or 120VAC coils and 2PDT or 4PDT form C relays as required. All relay contacts shall be silver nickel plated, 2PDT relay contacts shall be rated for 10A at 300VAC and 4PDT relay contacts shall be rated for 7A at 300VAC. All relays shall be provided with a standard ON/OFF flag indicator, mounting

base and retainer clip. Control relays shall be Allen-Bradley series 700-HC or approved equal.

- Z. Screw type terminal blocks shall be provided for all field connections, wiring field equipment directly to PLC I/O bases or other panel components is not acceptable. Terminal blocks shall have the following electrical ratings as a minimum:
1. Two Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 20 Amp
 - c. Wire Size Range: 30-12 AWG
 2. Three Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 10 Amp
 - c. Wire Size Range: 26-14 AWG
 3. Terminal blocks shall be Allen-Bradley series 1492 or approved equal.
- AA. The station control panel is to interface with the operator control station for each of the pumps. Operator control station (hand-off-auto switch) located on the respective pump soft starter. Refer to below I/O list and electrical drawings for additional information.
- AB. The JA-SCP shall be provided with intrinsically safe barrier(s) for the influent channel high level float switch, wetwell entry door contact, wetwell submersible pressure transducers, and wetwell access hatch door contact. All Intrinsically safe wiring shall be separated from other wiring by a distance of at least 2-inches, secured from conductors and cables of non-intrinsically safe circuits. Physical barriers shall be installed where required to prevent intrinsically safe circuits from encountering non-intrinsically safe circuitry. Refer to Electrical drawings for additional information.
- AC. The control panels shall be provided with an integrally mounted and wired telephone alarm dialer for remote annunciation of system alarms. Refer to article below for additional dialer specifications/requirements.
- AD. The control panel shall be completely factory assembled, wired, configured, and tested prior to being shipped to the project site.
1. The Engineer shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture.
 2. The Contractor shall make all arrangements and pay for all travel and expenses for up to three people from the Owner and Owner's Engineer to witness the shop tests.

AE. Enclosure Nameplates – Provide the following machine engraved nameplates permanently affixed to the front door of each PLC enclosure:

1. Short Circuit Current Rating (SCCR) – Calculate and display SCCR per UL508A Supplement SB. Contractor shall establish the SCCR of individual, relevant power circuit components; apply current limiting components to modify the SCCR in a portion of a circuit in the panel; and determine the overall SCCR of the panel. Submit itemized SCCR calculations with PLC shop drawings. On the nameplate, identify.
 - a. The panel builder company name and address.
 - b. Main supply voltage, phase, and frequency.
 - c. Electrical power full load current, largest motor FLA, and SCCR.
 - d. Enclosure type rating.
 - e. The lighting panel name (i.e., LP-1) and circuit breaker position (i.e., CB-15).
2. Enclosure Nameplate – Nameplate for Jackson Ave. PS shall be: PS-JKA-CP.

2.02 UNINTERRUPTIBLE POWER SUPPLIES (UPS)

A. AC Input Parameters

1. Surge Protection: 570J
2. Voltage Range: 84VAC - 140VAC (+/- 10VAC)
3. Frequency Range: 55-64 Hz. (+/- .1 Hz)
4. Input Power Cord: 6 ft. attached, w/NEMA 5-15 P

B. AC Output Parameters

1. Output Receptacles: Battery backup and surge protected Six (6) NEMA 5-15R, Surge protected only Two (2) NEMA 5-15R
2. Voltage Normal Mode: Nominal (110, 120, 127VAC) +/-10%
3. Voltage Battery Mode: 120VAC +/- 8%
4. Output: 1000VA, 8.3A
 - a. Contractor to confirm UPS sizing based upon devices shown on Contract Drawings requiring UPS power and internal control panel components specified herein. Adjust UPS output size/configuration as required to provide UPS power to devices shown on the Contract Drawings.
5. Battery Mode Waveform: Computer Grade Sine Wave (Pure)
6. Frequency: 50/ 60 Hz (auto sensing)

- 7. Overload warning: greater than 100%
- 8. Overload shutdown: greater than 110%
- C. Data Line
 - 1. RJ11 (1 in/1 out), surge protected
- D. Battery Parameters
 - 1. Battery Type: Valve-regulated, non-spill able, lead acid
 - 2. Battery Quantity: One (1), user replaceable
 - 3. Transfer Time: 4 - 6 milliseconds.
 - 4. Back-up Time: Full Load 15 minutes
 - 5. Recharge Time: 6 hours to 90% at rated capacity, after full discharge into resistive load.
- E. Provide relay output module as required.
- F. Provide dry contact module for battery low level alarm to be connected to the PLC.
- G. The UPS shall be Liebert, APC (pure sine wave) or approved equal.
- H. UPS Bypass Switch – Provide UPS bypass switch that gives the ability to transition between UPS backup power and panel incoming line power without any power interruption. Model: Liebert MicroPOD, or equal.

2.03 PROGRAMMABLE LOGIC CONTROLLERS (PLC)

- A. The Station control panel shall be provided with a Programmable Logic Controller (PLC). The PLC shall be factory programmed, tested, and debugged to meet all the requirements of the applicable process. PLC system to be CompactLogix platform as manufactured by Allen Bradley.
- B. PLC system to have the following built-in communication ports:
 - 1. EtherNet/IP
 - 2. USB
- C. PLC system to have the following communications options:
 - 1. EtherNet/IP
 - 2. USB for firmware download and programming (local programming)
- D. PLC system to have an onboard display included.
- E. Controller Connections:

1. 256 EtherNet/IP
 2. 120 TCP
- F. Contractor responsible for providing their own programming software support per manufacturer's recommendations to fulfill sequence of operations described above and overall project intent. Software does not need to be turned over to the Owner as part of this project.
- G. PLC system to have the capacity of storing up to 3MB of user memory.
- H. Local I/O expansion Modules.
1. Provide all I/O modules (discrete & analog) and cards to meet site specific I/O requirements, plus 20% spare I/O points of each type used. Coordinate requirements with the Owner, Contract Drawings, and I/O table.
 2. Support up to sixteen (16) 1769 Compact I/O modules
- I. PLC system to be provided with controller, communication, chassis, and power supply as recommended by equipment manufacturer.
- J. PLC system shall be capable of stand-alone operation in the event of failure of the communication link to the OIT subsystem.
- K. Note, the programming/logic to accomplish the sequence outlined within this specification has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.
- L. The Programmable Logic Controller (PLC) shall be Allen-Bradley CompactLogix model 1769-L33ER with 1769 I/O modules. The County has standardized on Allen Bradley PLCs and no equal will be approved.
- M. The PLC shall be provided with an Ethernet module allowing the assignment of an IP address for the PLC and communications with the SCADA system.
- 2.04 OPERATOR INTERFACE TERMINAL (OIT)
- A. Display:
1. Display Type: Color active-matrix TFT
 2. Size: 10-inch
 3. Resolution: 1024 x 768, 18-bit color graphics
 4. Touch Screen: analog resistive
- B. Operating System:
1. Microsoft Windows CE with extended features and MS Office Viewers

C. System Memory:

1. 512 MB RAM, 512 MB nonvolatile storage for applications.

D. External Storage:

1. Secure Digital (SD) card, cat. no.1784-SDx
2. USB flash drives supported by high-speed, hot-swappable, 2.0 USB host ports

E. Battery (Real-Time Clock)

1. Battery-backed time clock timestamps critical data. Accuracy +/-2 minutes per month

F. Environmental Operating Temperature:

1. 0 - 55°C (32 - 131°F)

G. Ratings

1. NEMA 12, 13, 4X, IP66 as classified by UL

H. USB Ports:

1. Two USB high-speed 2.0 host ports (type A) support removable flash drives for external storage

I. Ethernet Ports:

1. Two 10/100Base-T, Auto MDI/MDI-X Ethernet Ports that support Device Level Ring (DLR), linear or star network topologies

J. Input Power

1. 18-32V DC (24VDC nominal)

K. Standard Software:

1. Software FactoryTalk View Machine Edition software, version 7.0 or later
2. FactoryTalk ViewPoint software, version 2.6 or later
3. PDF viewer
4. Active X Controls
5. Remote Terminal Control
6. FTP Server

L. Contractor responsible for providing their own programming software per manufacturer's recommendations to fulfill screen development and overall project intent. Software does not need to be turned over to the Owner as part of this project.

- M. The Operator Interface Terminal (OIT) shall be Allen-Bradley PanelView Plus 7 model 2711P-T10C22D8S, 10". The County has standardized on Allen Bradley OITs and no equal will be approved.

2.05 ETHERNET SWITCH/MEDIA CONVERTER

- A. To be furnished by the Owner and installed within control panel as part of this contract.
 - 1. Allow sufficient space within control panel to install Owner furnished switch.
 - 2. Communication shall be through Ethernet TCP/IP from the PLC CPUs to the County owned networking equipment.

2.06 BUBBLER SYSTEM

- A. Contractor to provide a complete air bubbler system (UL Listed) for monitoring levels of both chambers of the wetwell independently. The air bubbler and all associated appurtenances shall be installed within a dedicated enclosure as indicated on the Contract Drawings. A single bubbler system with split/valved tubing to each chamber of the wetwell is required.
- B. Wetwell level shall be measured by a pressure-to-current (P/I) transmitter located in the air bubbler panel. Major system components shall consist of the P/I transmitter, low pressure air supply, and two air-lines extending into and terminating near the bottom of each wetwell. An air selector valve shall be provided to allow either of the two wetwell levels to be monitored as well as monitor both wetwell levels at the same time. The air supply shall continuously purge the selected airline. P/I transmitter outputs shall be 4-20mA DC proportional to wetwell level and shall be connected to the station control panel PLC through an analog input. The JA-SCP shall utilize this signal for control, monitoring, trending, and alarming.
 - 1. Refer to Contract Drawings for dimensions/depth of wetwell. Contractor responsible for providing a system which monitors level over the entire range (empty - full). Typical of both wetwell chambers.
- C. Ancillary air bubbler system components shall include, but not be limited to, the following:
 - 1. Two (2) AC air compressors shall deliver free air from 1 to 4 scfm.
 - a. Air compressors shall be rated for use on a 120-volt, single-phase, 60 hertz power supply.
 - b. Provide automatic and timed cycle air tube purging
 - c. Provide automatic air tank moisture drain valve control
 - d. Air compressor and system status indicators to be displayed on front panel.
 - 2. Control Module
 - 3. High accuracy pressure transducer (Air Tank & Bubbler Tube)

4. Pressure gauge
 5. Level digital display
 6. Air flow indicators, Dwyer model RMA-5-SSV or approved equal
 7. Air compressor selector switch
 8. Wetwell airline selector switch, Parker XM40NBG553A or approved equal
 9. Purge valve, isolation valve, check valve, and relief valve as required.
 10. Calibration potentiometers
 11. Air piping from bubbler system to each chamber of wetwell
 - a. Utilize 3/8" stainless steel tubing and 1/2" schedule 80 PVC as indicated below.
 12. Two (2) 3" PVC air bells for installation within each chamber of the wetwell
 - a. Air bells to be shipped loose for Contractor installation within the field.
- D. Contractor to provide 3/8" air piping (stainless steel tube) from bubbler system control panel and transition to 1/2" schedule 80 PVC rigid pipe outside the control panel. Provide fittings to transition from 3/8" air piping to 1/2" PVC pipe. The 1/2" schedule 80 PVC pipe is to then be routed to each of the wetwell chambers. All tubing/piping to be sloped towards wetwell chambers to allow condensate drainage and tees shall be provided at all changes in direction. All wet well brackets, hardware and supports shall be 316 stainless steel. Contractor shall confirm air piping diameter with air bubbler system requirements. Refer to the contract drawings for additional information.
- E. Contractor to provide air bell within each wetwell chamber. Air bell to be comprised of 3-foot section of 3" schedule 80 PVC pipe. Provide necessary fittings to reduce/connect 1/2" PVC air pipe to the 3" air bell. Contractor to support/attach air bell to wetwell as well as support the 1/2" air piping. Utilize stainless steel pipe standoff supports within the wetwell for support/anchor every 24 inches. Refer to contract drawings for additional information.
1. Air bell to not be supported by 1/2" air pipe. Must be independently supported to wet well.
 2. Refer to Contract Drawings for dimensions/depth of wetwell. Contractor responsible for providing a system which monitors level over the entire range (empty - full). Provide suitably sized air bell. Typical of both wetwell chambers.
- F. Contractor to provide all necessary tubing, piping, valves, fittings, connectors, elbows, etc. to place in operation a complete and operable bubbler system for wetwell level monitoring (typical of each chamber of wetwell).
- G. Bubbler system to be model number 12138-2 as manufactured by Digital Control Company or approved equal.

2.07 SUBMERSIBLE PRESSURE TRANSDUCER

- A. The submersible pressure transducer shall be specifically designed for wastewater service and be certified intrinsically safe for hazardous locations.
- B. The transducer shall be non-fouling design incorporate a 4.10" PTFE isolated diaphragm with a 2.75" sensing area fitted to a rugged 316 stainless steel case.
- C. The sensor shall utilize silicon pressure cells fitted into the case with an integral, compliant stainless steel barrier diaphragm and have a 0.25% static accuracy.
- D. The transducer shall be 2-wire (22 AWG) design and produce a 4-20 mAdc signal linear to wetwell level. The conductors shall be encased in a polyurethane jacketed shielded cable with a polyethylene vent tube and Kevlar tension members. The cable shall have a 200 lbs. pull strength and be of enough length to reach the station control panel in a continuous run without splices.
- E. The transducer shall have a 1/2" MNPT conduit fitting to provide for mounting the transducer to a conduit or suspension kit.
- F. The transducer shall carry a lifetime surge protection warranty which shall include a din rail mount 24VDC surge protector for installation in the pump control panel.
- G. The level transmitter shall be provided with an aneroid bellows for transmitter vent tube termination. The bellows shall be mounted within a junction box. Refer to E-drawings for additional information.
- H. The level transmitter shall be provided with a weighted suspension kit consisting of a 1" stainless steel pipe (a minimum of 40" long) which shall be attached to the transmitter conduit fitting. The suspension kit shall be provided with 40' of 1/8" stainless steel cable and clamps to facilitate suspending the transmitter into the wetwell, while allowing it to be easily removed for service without entry into the wetwell.
- I. The transducer range shall be suitable for the operating range of the wetwell. Contractor to field verify and coordinate with the Owner.
- J. The level transmitter shall be TE Connectivity/Measurement Specialties model 750 or approved equal. Provide two (2) submersible pressure transducers, one for each chamber of the wetwell as specified and shown on the Contract Drawings.

2.08 BACKUP FLOAT CONTROL PANEL (BUFCP)

- A. Backup float control panel to be housed in a wall-mount NEMA 4X enclosure constructed of 14-gauge 304 stainless steel. The enclosure shall be provided with an inner swing-out panel for mounting of the float control mode pushbutton. The enclosure shall be sized per manufacturer's recommendations. The enclosure shall be Hoffman or approved equal. Refer to Contract Drawings for mounting location information.
- B. Control panel shall be UL 508A listed or UL 698A listed whichever is applicable. The UL "sticker" shall be clearly displayed in the appropriate location within the panel. Third party substitutions of UL 508A/698A listed equipment shall be strictly prohibited.

- C. Panel Input power shall be 120VAC, 1 Phase, 60Hz. Provide a sufficiently sized main circuit breaker disconnecting means. Interlock main circuit breaker disconnect with the control panel door handle.
- D. Refer to Electrical Drawings for additional information/requirements.
- E. A 120VAC single phase surge protector shall be provided for the incoming 120VAC supply. The surge protector shall be designed to protect electrical and electronic equipment against transients caused by lightning, induction, load switching, EMP and other sources. Line to neutral, line to ground and neutral to ground protection shall be provided. The surge protector shall have a protection level of 1kV and a maximum discharge current of 140 kA as a minimum. The surge protector shall have a remote signaling device for fault indication to the PLC. The AC surge protector shall be CITEL model DS72RS-120 or approved equal.
- F. One print pocket shall be provided on the control panel door. One complete set of electrical control drawings shall be provided in the pocket.
- G. The control panel shall provide with a pushbutton to activate and deactivate float control mode. Pushbutton shall be 30mm, industrial grade, Allen-Bradley 800H series or approved equal.
- H. The control panel shall provide visual indication the system is operating in float control mode via pilot light. Pilot light shall be 30mm, industrial grade, push-to-test type, Allen-Bradley 800H series or approved equal.
 - 1. Color coding for equipment status, pilot lights, and alarms shall be as follows:
 - a. Green for on, open, or running
 - b. Red for off, closed, or stopped
 - c. Amber for indication of malfunction, trouble, or alarm
 - d. Blue for indication of electrical power on
- I. AC power fuses shall be provided as required for over current protection of individual AC powered panel components. Single circuit fusible terminal blocks with neon blown fuse indicators suitable for use with 1/4" x 1 1/4" glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 100 to 300VAC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H4 or approved equal.
- J. DC power fuses shall be provided as required for over current protection of individual DC powered panel components. Single circuit fusible terminal blocks with LED blown fuse indicators suitable for use with 1/4" x 1 1/4" glass fuses shall be provided for each circuit requiring fuse protection. Fusible terminal strips shall have a working voltage rating of 10 to 57V AC/DC, and have a current rating of 12 Amps, fuse blocks shall be Allen-Bradley model 1492-H5 or approved equal.
- K. Interposing and control relays shall be provided as required. They shall be of industrial grade, plug-in socket type, and shall have 24VDC or 120VAC coils and 2PDT or 4PDT form C relays as required. All relay contacts shall be silver nickel plated, 2PDT relay

contacts shall be rated for 10A at 300VAC and 4PDT relay contacts shall be rated for 7A at 300VAC. All relays shall be provided with a standard ON/OFF flag indicator, mounting base and retainer clip. Control relays shall be Allen-Bradley series 700-HC or approved equal.

- L. Control panel to be provided with time delay relays to allow for stagger starting pumps. Refer to below sequence for additional information.
- M. Screw type terminal blocks shall be provided for all field connections, wiring field equipment directly to PLC I/O bases or other panel components is not acceptable. Terminal blocks shall have the following electrical ratings as a minimum:
 - 1. Two Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 20 Amp
 - c. Wire Size Range: 30-12 AWG
 - 2. Three Level Terminal Blocks
 - a. Rated Voltage: 300V AC/DC
 - b. Rated Current: 10 Amp
 - c. Wire Size Range: 26-14 AWG
 - 3. Terminal blocks shall be Allen-Bradley series 1492 or approved equal.
- N. The control panel shall be completely factory assembled, wired, configured, and tested prior to being shipped to the project site.
 - 1. The Engineer shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture.
 - 2. The Contractor shall make all arrangements and pay for all travel and expenses for up to three people from the Owner and Owner's Engineer to witness the shop tests.
- O. The BUFCP shall be provided with intrinsically safe barrier(s) for the float switch inputs. All Intrinsically safe wiring shall be separated from other wiring by a distance of at least 2 inches, secured from conductors and cables of non-intrinsically safe circuits. Physical barriers shall be installed where required to prevent intrinsically safe circuits from encountering non-intrinsically safe circuitry.
 - 1. Refer to below article for float switch specifications.
- P. BUFCP to be completely independent of the PLC based control to serve as redundant control in the event of a PLC failure, power supply failure, primary level detection system failure, etc.

Q. Sequence of operation notes:

1. BUFCP shall always be ready when powered on. System to activate and take control of pump control in the event of a PLC failure, bubbler failure, or transducer failure.
2. When float control mode is enabled (via trigger of high-high level float or panel pushbutton) PLC control is prohibited.
3. BUFCP to interface with influent pump starters. Refer to electrical drawings for additional information/requirements.
4. When activated by the high-high level float all pump control floats will be activated. Adjustable time delay relays shall be provided to stage on each pump to prevent multiple pumps from coming on at one time. The highest pump control float, pump 4 shall have the shortest delay and therefore will come on first. Pump 3 shall have a longer delay and come on next providing pump 4 has not pumped the level down below the pump 3 control float. The sequence continues for all 4 total pumps. All operating pumps shall continue to run until the all pumps "OFF" float is reached. All pumps shall remain off until level once again rises to the pump 1 control float.
5. After the initial pump down cycle, individual pumps run when the respective float is re-activated.
6. The BUFCP remains in control of the pumps until an operator visits the BUFCP and physically depresses the float control off pushbutton.

2.09 WET WELL FLOAT SWITCHES

- A. Float switch shall be of the direct acting type, containing a single pole non-mercury switch, which actuates when the longitudinal axis of the float is horizontal, and deactivates when the liquid level falls 1" below the actuation elevation.
- B. Each float shall be housed in a chemical resistant polypropylene casing with a firmly bonded electrical cable protruding. One end of the cable shall be permanently connected to the enclosed switch with the entire assembly encapsulated to form a completely watertight and impact resistant unit, provide enough cable length as required to reach the backup float control panel as indicated on the Contract Drawings.
 1. Provide sufficient cable length to enable floats to be removed from one wetwell chamber and installed within the second chamber.
- C. Float switches shall be suitable for low-current operation compatible with intrinsically safe barriers and/or PLC inputs.
- D. A coated steel anchor assembly with stainless steel chain and float clamps shall be provided for installing the float switch as indicated on the Contract Drawings. Float switches to be installed along wetwell dividing wall with sufficient cable length to allow installation within either wetwell chamber (or either side of divider wall). Contractor to field verify.
- E. Float switches to be wired as inputs to the Backup Float Control Panel (BUFCP). Refer to electrical drawings for additional information.

- F. Float switches shall be Flygt model ENM-10 or equal. Typical of six (6) float switches required. Refer to the Contract Drawings for additional information.

2.10 MAGNETIC FLOW METER

- A. The Contractor shall furnish and install, ready to operate, the magnetic-type flow metering equipment, complete with flow tube, remote mounted flow transmitter, interconnecting cables and all necessary accessories, in compliance with the following specifications and as shown on the Contract Drawings.
- B. Contractor to provide a total of one (1) magnetic flow meter and associated remote transmitter. Unit to be utilized with an associated 14" Ductile Iron pipe size and be suitable to measure a flow range of 0 - 2,500 gallons per minute.
- C. Contractor is responsible to verify with the supplier that the appropriate ratings and options are provided for each application, taking into account area classification, flow, passing media, temperature, and vacuum limitations. Any such deviation from that which is specified shall be brought to the Engineers' attention during shop drawing submittals.
- D. Contractor to coordinate necessary factory/interconnect cable length between flow tube/element and remote flow transmitter.
- E. Produce a pulsed DC magnetic field that, when applied to a conductive liquid, generates an induced voltage as the liquid flows through the magnetic field. Generate voltage directly proportional to the flow of the metered liquid. Identify the ratio of flow velocity to voltage generated for all meter sizes, thereby permitting primary head and transmitter direct adaption and interchangeability without circuit modifications or system recalibration.
- F. Flow Element Design:
 - 1. Flow elements shall be magnetic flow tubes, low frequency electromagnetic induction type and shall produce a 4-20 mA output linear to liquid flow rate.
 - 2. The flow tubes shall have ANSI Class 150 flanged ends. Wafer-style flow tubes are not acceptable.
 - 3. The flow tube material shall be 304 stainless steel.
 - 4. Electrodes shall be conical-shaped (bullet nose) and shall be Type 316L stainless steel, Hastelloy C, or Zirconium. Substantiate compatibility with media monitored in the shop drawing submittal.
 - 5. The flow tube housing shall be splash-proof and weather-resistant. It shall be capable of accidental submergence in up to 30 feet of water for up to 48 hours without damage to the electronics or interruption of the flow measurement.
 - a. Flow tube shall be provided with potted junction box and combo/cable gland for use in conduit as indicated on drawings. Contractor to assume 100 linear feet of cable for bidding purposes. Final cable length to be coordinated in the field.

6. Empty Pipe Detection - Flow tube shall measure the conductivity between the electrodes to monitor for an empty pipe condition. Upon detection of an empty pipe condition, the flow transmitter shall indicate the pipe is empty on the main transmitter display and drive the flow signal to zero.
7. Grounding Rings:
 - a. Provide two grounding rings installed on each end of the flow tube. Ground rings to be 316L stainless steel. Contractor to bond ground rings together to grounding lug on housing of flow tube using #4 bare copper conductor.

G. Flow Transmitter Design:

1. Signal converters shall be wall mounted, housed in a NEMA 4X enclosure. Provide sunshield for enclosure as transmitter is to be installed in an exterior atmosphere.
2. Terminal strips for electrical connections shall be supplied. Housing shall not need to be opened to make adjustments.
3. Transmitter (Converter) Electronic Characteristics
 - a. The electronics shall be of the solid-state, feedback type and utilize integrated circuitry.
 - b. The input span of the signal converter shall be continuously adjustable between 0 to 1 and 0 to 31 fps and the range adjustment shall be direct reading.
 - c. Complete zero stability shall be an inherent characteristic of the meter system to eliminate the need to zero adjust the system with a full pipe at zero flow.
 - d. The converter shall not be affected by quadrature noise nor shall it require zero adjustment or special tools for startup.
 - e. Input and output signals shall be fully isolated.
 - f. Outputs:
 - 1) 4-20 mA into 500 ohms, providing 50 megohms of isolation from ground, and isolated from the transmitters power supply. Minimum of 250 ohms is required for HART communicator.
 - 2) Pulse output with minimum time duration of 0.5 seconds.
 - g. The electronics shall be designed for operation on 120 VAC +10 percent, 60 Hz +5 percent.
 - h. The converter shall also include:
 - 1) Integral zero return based upon a user-adjustable percentage of flow meter span. Setpoint shall be adjustable 0 to 10 percent.
 - 2) Direct adjustment of scaling factor in Engineering units.

- 3) Integral calibration self-test feature to verify proper operation at the electronics.
 - 4) Local direct reading indicator calibrated in gallons per minute or million gallons per day as directed by the Engineer. Flow totalizer with manual reset.
- i. Each meter shall be hydraulically calibrated to the specified flow range in a NIST-certified facility.

H. Performance Requirements:

1. The equipment furnished shall measure, indicate, and transmit flow rates to within +0.5 percent of actual flow from a flow velocity of 1.0 to 31 fps.
2. Accuracy shall not be affected by changes in percent solids or changes in fluid density, temperature, or viscosity. Accuracy shall not be affected by the presence of air bubbles to a greater extent than the fluid volume represented by such air bubbles.
3. Maximum power consumption for each flow element shall be 15 watts.
4. Equipment design specifications shall be considered as an integral part of the performance requirements.

I. Accessories:

1. Nameplates – Provide nameplate, wording of nameplate shall be as identified on the contract drawings (device tag).
2. Mounting Hardware - Provide stainless steel mounting hardware as necessary to mount equipment in locations as described in the Contract Documents.
3. Cabling - Provide power and signal circuitry as specified and as shown on the Contract Documents.
4. Flow tubes shall be provided with grounding rings on each flange. Grounding electrodes or straps are not an acceptable alternative. Materials of construction shall be Type 316L stainless steel, Hastelloy C, or Zirconium as chemically compatible with the measured media.

J. The flow metering equipment manufacturer and model shall be the following or equal:

1. Emerson/Rosemount 8750W with remotely mounted 8712E transmitter for utility, water, and wastewater applications.

2.11 PRESSURE TRANSMITTER

A. Operational

1. Input range: As required
2. Output: 4-20 mAdc, 2-wire, linear and proportional to level

3. Power Supply: 10-36 VDC externally loop powered

B. Performance

1. Accuracy: 0.25% of full scale, including the effects of linearity, hysteresis, and repeatability.
2. Process temperature range: -22 to 248°F
3. Ambient temperature range: -13 to 185°F
4. Maximum working pressure: Two times full range

C. Construction

1. Housing: NEMA 4X Stainless Steel

D. Accessories:

1. Transducer to be provided with factory installed carbon steel/PVC isolation diaphragm with low temperature silicone fill, for lightning and surge protection.

- E. Pressure transducer to be Rosemount 3051 Pressure Transmitter or approved equal. Typical of one (1) pressure transmitter required.

2.12 CHART RECORDER

- A. The Contractor shall furnish and install, ready to operate, a single chart recorder, complete with all necessary accessories, to record flow & pressure (analog signals) as specified herein and shown on Contract Drawings.

B. General:

1. Microprocessor based
2. Minimum 12-inch circular chart with 10 mm calibrated width.
3. Digital display – 40 character, two line display.
4. Digital accuracy of 0.02 percent of operating span.
5. Input resolution of 0.01 percent of operating gain span.
6. Pen position resolution of 0.2 percent of chart range
7. Channel update, each channel scanned every 500 msec.
8. Display accuracy of 0.02 percent of operating gain span
9. Output isolation
10. Input isolation

11. Operating voltage of 120VAC
12. Analog inputs – one for each pen
- C. Pen offset for all pens, configurable in any formation.
- D. Integral analog signal re-transmission for each analog input provided.
- E. Provide five hundred (500) 12-inch thermal sensitive charts.
- F. Provide as two (2) pen configuration for monitoring/trending both flow and pressure.
- G. Provide as ABB, Commander 1900R or approved equal.

2.13 AUTO-DIALER

A. General:

1. The specified Automatic Telephone Dialer assembly has been custom designed specifically for OWNER's use to permit integration with the OWNER's existing Alarm Server at North Yonkers Pump Station. The specified Automatic Telephone Dialer assembly can only be purchased through the OWNER's Authorized RACO Distributor. CONTRACTOR shall be required to purchase the Automatic Telephone Dialer assembly hardware from the OWNER's Authorized RACO Distributor. No exceptions shall be permitted.
2. Programming of the Automatic Telephone Dialer shall be in accordance with OWNER standards. CONTRACTOR shall retain services of an authorized manufacturer representative to provide on-site services for start-up and training of dialer, integration of dialer at OWNER's existing Alarm Server, and communications testing between station and OWNER's existing Alarm Server. CONTRACTOR shall be required to retain services of manufacturer representative from OWNER's Authorized RACO Distributor. No exceptions shall be permitted.
3. OWNER's Authorized RACO Distributor shall be the following:
 - a. Miller Energy, Inc., 3200 So. Clinton Avenue, South Plainfield, NJ 07080
 - b. Contact: James Pefanis, Email: jpefanis@millerenergy.com, Office: 908-755-6700, Mobile: 908-210-7573
4. Automatic Telephone Dialer signal input list shall be coordinated with OWNER and arranged in order required by OWNER. Any unused dialer inputs shall be prewired to spare terminal blocks in station's control panel for future use.

B. Features:

1. NEMA 1 housing
2. Housing dimensions: 11-7/8" H x 9-3/4" W x 5" D
3. Power supply: 120 VAC, 60 Hz

4. Operating Temperature: 20°F to 130°F
5. Operating Humidity: 0 to 95 percent non-condensing
6. Signal inputs:
 - a. 32 digital inputs.
 - b. 4 analog inputs.
7. Phone line input for standard “dial-up” telephone line connection through 4-pin modular jack (RJ11).

C. Product and Manufacturer:

1. RACO, Verbatim Series Autodialer Assembly with the following factory installed components:
 - a. Verbatim 32-channel Autodialer unit, Part No. 304VSS-32C.
 - b. Verbatim SCADA card, Part No. 460VSCADA.
 - c. Verbatim daughter card, Part No. 345VDCA-1.
 - d. Verbatim 4-Analog Signal Input card (4-20mA), Part No. 360V4A-1E/4-20mA.
2. No substitution permitted.

D. Automatic Telephone Dialer signal input list shall be coordinated with OWNER and arranged in order required by OWNER. Any unused dialer inputs shall be prewired to spare terminal blocks in station’s control panel for future use. The proposed input list and order shall be submitted within the submittal packaged for Owner and Engineer review.

1. Provide two (2) days of manufacturer representative startup and training services. Intent is to test, troubleshoot, and aid in the installation of the auto-dialer system.

E. Provide internal to station control panel.

2.14 SPARE PARTS

A. The following spare parts shall be provided:

1. One (1) PLC CPU of each type
2. One (1) PLC power supply of each type
3. One (1) PLC I/O module of each type
4. One (1) 24VDC panel power supply of each type
5. Two (2) surge protectors of each type
6. Five (5) fuses of each type

7. Five (5) pilot light bulbs of each type
8. Five (5) miniature circuit breakers of each type/size
9. One (1) AC air compressor (used for Bubbler System)
10. One (1) pen for specified chart recorder
11. One (1) set of backup floats (6 in total)

2.15 I/O TABLE

- A. The below I/O table is to provide systems integrator with a general idea of I/O quantity. I/O table below lists all signals remote from JA-SCP. Typical signals internal to JA-SCP components (such as UPS failure/low battery, power supply failure, etc.) to be included with overall I/O counts (not listed below for clarity). Refer to contract drawings, specifications, and coordinate with Owner/Engineer for final I/O counts. In addition, refer to above auto-dialer article for various PLC outputs to the auto-dialer. Refer to quality assurance section above for control panel spare capacity requirements.

Equipment	Function	Signal	Homerun
JA-IP-1 Soft Starter Influent Pump 1	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
JA-IP-2 Soft Starter Influent Pump 2	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
JA-IP-3 Soft Starter Influent Pump 3	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
JA-IP-4 Soft Starter Influent Pump 4	Run Indication	Discrete Input	JA-SCP
	Common Failure Indication	Discrete Input	
	Start/Stop Control	Discrete Output	
	In Auto	Discrete Input	
	In Bypass Mode	Discrete Input	
Influent Pump/Motor 1 (Relayed thru Soft Starter)	Motor Winding High Temperature	Discrete Input	JA-SCP
	Pump Seal Leak	Discrete Input	
Influent Pump/Motor 2	Motor Winding High Temperature	Discrete Input	JA-SCP

Equipment	Function	Signal	Homerun
(Relayed thru Soft Starter)	Pump Seal Leak	Discrete Input	
Influent Pump/Motor 3 (Relayed thru Soft Starter)	Motor Winding High Temperature	Discrete Input	JA-SCP
	Pump Seal Leak	Discrete Input	
Influent Pump/Motor 4 (Relayed thru Soft Starter)	Motor Winding High Temperature	Discrete Input	JA-SCP
	Pump Seal Leak	Discrete Input	
Bubbler System	Primary Level Control	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
LSH-1 Drywell Flood/Water	Alarm	Discrete Input	JA-SCP
LSH-2 Influent Rm. Flood/Water	Alarm	Discrete Input	JA-SCP
LE-1 Pressure Transducer Wet Well 1	Secondary Level Control	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
LE-2 Pressure Transducer Wet Well 2	Secondary Level Control	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
Gas Detection Panel	Combustible Gas (LEL) Concentration Level	Analog Input	JA-SCP
	Oxygen (O2) Concentration Level	Analog Input	
	Hydrogen Sulfide (H2S) Concentration Level	Analog Input	
	Carbon Monoxide (CO) Concentration Level	Analog Input	
	Common Failure Indication	Discrete Input	
Gas Detection Alarm Relay Cabinet	Gas Detected / Alarm	Discrete Input	JA-SCP
BUFCP Backup Float Control Panel	LS-HH-1 High-High Level	Discrete Input	JA-SCP
	LS-LL Low-Low Level	Discrete Input	
	Float Control Mode Active	Discrete Input	
Emergency Generator System	Running	Discrete Input	JA-SCP
	Common Failure	Discrete Input	
	Low Fuel	Discrete Input	
	Fuel Leak	Discrete Input	

Equipment	Function	Signal	Homerun
Chart Recorder	Flow	Analog Output	JA-SCP
	Pressure	Analog Output	
Ventilation Alarm Relay Cabinet	Supply Fan Fail	Discrete Input	JA-SCP
	Exhaust Fan Fail	Discrete Input	
Dry Well Entry Door	Door Contact	Discrete Input	JA-SCP
Electrical Room Entry Door 1 (Single Door)	Door Contact	Discrete Input	JA-SCP
Electrical Room Entry Door 2 (Double Door)	Door Contact	Discrete Input	JA-SCP
	Door Contact	Discrete Input	
Wet Well Entry Door	Door Contact	Discrete Input	JA-SCP
Wet Well Hatch	Door Contact	Discrete Input	JA-SCP
FE/FIT-1 Flow Meter	Flow	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
PIT-1 Pressure Transmitter	Pressure	Analog Input	JA-SCP
	Common Failure Indication	Discrete Input	
Fire Alarm Relay Panel	Smoke Detector Alarm	Discrete Input	JA-SCP
	Heat Detector Alarm	Discrete Input	
Drywell Ventilation Control Panel	Supply Fan Running	Discrete Input	JA-SCP
	Supply Fan Fail	Discrete Input	
	Exhaust Fan Running	Discrete Input	
	Exhaust Fan Fail	Discrete Input	
Wetwell Ventilation Control Panel	Supply Fan Running	Discrete Input	JA-SCP
	Supply Fan Fail	Discrete Input	
	Exhaust Fan Running	Discrete Input	
	Exhaust Fan Fail	Discrete Input	
ATS Three Phase Monitor	ATS Normal Switch Position	Discrete Input	JA-SCP
	ATS Emergency Switch Position	Discrete Input	
Auto-Dialer	Refer to Auto-Dialer Article Above		JA-SCP
Telemetry Control Panel	Communication Link	Ethernet	JA-SCP

2.16 NETWORK/TELEMETRY PANEL

A. General

1. Provide one network/telemetry panel for installation in the electrical room, as illustrated on the Contract Drawings.
2. Network panel shall be comprised of a wall mounted enclosure sized as illustrated on the Contract Drawings, and containing the following equipment:
 - a. Ethernet Switch – Furnished by Owner and installed by the contractor.
 - b. UPS – Specified herein.
 - c. County Modem – Furnished by Owner and installed by the contractor.
3. Cooling Requirements:
 - a. Perform an itemized analysis of the total heat output of all the components that comprise the Network Interface Cabinet, including heat loads and cooling requirements of equipment supplied under the computer hardware allowance. Calculations shall take into consideration average ambient temperatures of the environment in which the control panel will be installed during summer months. Calculations shall be in units of BTU per hour and based upon all equipment operating at full capacity. Utilizing these calculations, design the cooling requirements for the Network Interface Cabinet as required to maintain each component's manufacturer recommended continuous operating temperature. If passive cooling cannot achieve the manufacturer recommended continuous

operating temperature, design and provide an enclosure network cabinet with an air conditioning unit.

- b. Provide a filter for each fan where forced ventilation fans are provided.

B. Enclosure (Wall-mount)

1. Specifications

- a. Lockable black factory-painted ventilated steel cabinet with glass viewing window in front door.
- b. NEMA 12
- c. Wall-mounted
- d. Cable management via wire through and reusable fabric cable ties.
- e. Include the 4-inch supply and exhaust fans as necessary to dissipate calculated heat gain.
- f. Minimum dimensions are as illustrated on the Contract Drawings and a minimum of 18-inches deep.

- 2. Provide with surge protected outlet strip with an illuminated on/off switch with four spare outlets available.
- 3. Reserve room within the network panel for installation of Owner provided equipment.
- 4. Provide Category 6 snagless patch cords for all copper ports on ethernet switches.
- 5. Provide all necessary mounting brackets and hardware.
- 6. Panel interior shall be assembled and configured in a neat, organized, and professional manner while adhering to manufacturer recommended guidelines for equipment and cabling installation.
- 7. Size enclosure height to allow for future installation of one additional network device. Size enclosure to keep bottom of enclosure available with 8-inches of head space below the bottom device.
- 8. Provide networking panels as required by the Contract Drawings.
- 9. Manufacturer – Hoffman, or equal.

C. Enclosure Nameplates – Provide enclosure that reads “PS-JKA-NP”.

D. Uninterruptible Power Supply

1. Provide one UPS for each network interface cabinet as illustrated on the Contract Drawings.
2. Specifications:
 - a. Four 120 volt, 5-15R, output receptacles, minimum.
 - b. Alarms – Battery backup operation, low run time remaining, and overload.
 - c. Automatic current and over-voltage output protection.
 - d. Operating Input Voltage – 99 VAC to 138 VAC.
 - e. No interruption (no transfer time for normal power to battery backup) of power to the system.
 - f. Efficiency – 95 percent.
 - g. Brownout protection for input voltages of 88 VAC without the use of the batteries.
 - h. Lightning and Surge Protection – ANSI/IEEE C62.41 Categories A and B with 0.3 percent to 0.7 percent.
 - i. Radio Frequency Noise Isolation – 38 dB common mode, 47 dB normal mode.
 - j. Power Reserve Time at Full Power Draw – One hour, minimum. SCADA system supplier shall submit calculations to substantiate sizing.
 - k. Provide ethernet communication module for the selected UPS so that the UPS status may be monitored over the network.
 - l. Manufacturer – Liebert, APC (pure sine wave), or equal.
 - m. UPS Bypass Switch – Provide UPS bypass switch that gives the ability to transition between UPS backup power and panel incoming line power without any power interruption. Model: Liebert MicroPOD, or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. When a change from normal power to emergency power occurs and vice versa all equipment to be restarted automatically. Final requirements to be coordinated with the Engineer. Provide as required.
- B. Install equipment at locations indicated on the drawings.
- C. Provide all necessary cable, conduits, and fittings as required to provide a fully operable system. All wiring external to control panels shall be in conduit or sealtite. Refer to the raceway schedule on the contract drawings for additional information/requirements.
- D. Refer to the contract drawings for all field wiring specifications/requirements.

- E. Coordinate all circuitry (conduit & conductor) requirements closely with the electrical drawings and specifications (Division 16).
 - 1. Contractor to provide/install all circuitry from control panel to control panel and from control panel to equipment/devices per the Contract Drawings. As part of this specification all wiring is to be terminated within the applicable control panel. Electrical trade to install the wire and this contract is to terminate all wiring within the specified control panel, as necessary.
- F. Point test all PLC I/O to verify that all I/O modules are correctly wired to the terminal strips and that the PLC I/O modules function properly. Testing shall be performed between terminal points on the I/O module to the terminal strip that the field device is terminated on.
- G. Contractor to perform point-to-point wire testing on all circuitry entering/leaving the JA-SCP. Verify wire integrity, continuity, and proper transmission of signal. Close coordination with electrical trade required.

3.02 GRAPHIC DISPLAYS/SCREEN DEVELOPMENT

- A. Systems integrator responsible for developing all screens associated with each control panel specified as part of this section and loading onto control panel as required. Coordinate with the Owner and Engineer.
 - 1. Note, the programming/logic to accomplish the sequence outlined within this specification has largely been developed. The County will turn the programs over to the successful contractor/CSI. The Contractor/CSI will then be responsible to alter and modify these programs as necessary to be site specific and comply with the specifications herein.
 - 2. In similar fashion the County has specific OIT standards that need to be adhered to while developing the graphics and screens. Final requirements to be outlined during the coordination meetings specified above. The below outline to serve as a basis for bidding purposes.
 - 3. Programmer to conform to all requirements set forth in the latest copy of Westchester County's SCADA programming standards. Coordinate final requirements closely with the Owner/county.
- B. General Requirements:
 - 1. All displays shall contain and continuously update the displayed process variables, date, and time of day. All process values shall be displayed in Engineering units. All displays shall incorporate references to both instrumentation tag numbers and plant equipment numbers. All process variables shall be displayed on their associated display(s) with correct Engineering units. Process variables shall display their associated data quality flags.
 - 2. All operator commands related to controlling field devices or system attributes shall require multiple keystrokes or mouse actions to protect against inadvertent operations. The operator shall receive confirmation of the selected point to be controlled, at which time a cancellation of the control can be affected.

3. Process graphic displays, shall be based on the site plan drawings, mechanical drawings and electrical drawings included as part of these Contract Documents. The graphic displays shall depict process flow streams, process structures, and all major items of process equipment and control devices in a schematic format.
4. All main graphical screens shall include a title bar, main graphic area, navigational buttons, and alarm summary bar. Title bar shall be displayed on the top of each screen and include display name, description, and time/date. The main graphical area shall contain primary screen data in graphical format. Navigational buttons shall include a minimum of main menu, trends, main alarm summary, and security log in. The alarm summary bar shall display the last three valid alarms on the bottom of each screen.
5. Animation shall be provided to mimic level changes in tanks or vessels, and to mimic rotation of rotating equipment when running. Valve colors shall change when opened and closed.
6. Unless specifically noted, all timers, setpoints, alarm actuation levels, etc., shall be adjustable from the operator interface.
7. The system shall show field conditions with text that can alternate (i.e., OPEN/CLOSE, START/STOP, HIGH/LOW) and change color correspondingly. Field devices that are tri state must be represented in three conditions.
8. Conditions in the field designated as alarm conditions shall report to the operator workstation, actuate an audible alarm, and provide a visual blinking image on the associated graphic page. All alarms and events shall be displayed on the screen and archived.
9. All interlocks that affect equipment operation shall be identified both by alarm and by OIT indication.
10. All analog inputs shall be checked for out of range (via high and low limit checks) and alarmed.
11. All process flow streams shall be labeled and color coded. All structures and equipment shall be identified by name and appropriate equipment and loop tags.
12. Color coding for equipment status, pilot lights, and alarms shall be as follows:
 - a. Green for on, open, or running
 - b. Red for off, closed, or stopped
 - c. Amber for indication of malfunction, trouble, or alarm
 - d. Blue for indication of electrical power on
13. Automatically record all alarm and events should any of the following sequences or events occur:
 - a. Date/Time entry

- b. Limit changes
- c. Any commanded or un-commanded change of any point
- d. Alarm conditions
- e. PLC activation or deactivation
- f. Operator login or logout activity

C. Specific Requirements:

1. Water overview screen shall include a site plan representation, indicating the geographic location of each process, and each building.
2. Main menu screen shall be developed to link to all screens and process areas. The screen shall be a complete and logical listing of the names and number of all screens
3. Overall plant process block flow diagram screen shall show all major processes in block form with flow arrows. Each block shall include a text description of key individual treatment processes. Navigational buttons to the individual treatment processes shall be performed by pressing on the text description.
4. Individual treatment process screens shall graphically screen key process variables and equipment. No operator entries shall be done from these screens. Individual process flow screens for each process shall include all process components, including tanks, pumps, blowers, mixers, drives, flow meters, valves, mechanical devices, as well as manual shutoff and isolation valves. These diagrams shall be generally depicted from the contract drawings and there shall be at least 1 screen per contract drawing on average.
5. Individual unit process screens depicted from the contract drawings are used for control and screen of each major item of process equipment, process variables, and control devices, including pumps, blowers, valves, gates, mixers, drives etc. Navigational buttons shall consist of the contract drawing flow arrows to other individual unit processes. The unit process screens shall provide the ability for the operator to go to individual equipment popup screens. These diagrams shall be generally depicted from the drawings and there shall be at least 2 screens per contract drawing on average.
6. Popup screens shall be provided for each piece of equipment to start/stop equipment, open/close valves, implement automatic control, adjust set points, establish, and adjust tuning parameters, set alarm limits, and initiate a sequence.
7. PLC system diagnostic screens, showing the operational status, and fault conditions of all PLC components, including processors, I/O modules, OIT's, power supplies and UPS units.
8. Communications diagnostic screens, showing the details of network status, communications status of all major components including Operator Workstations, peripheral devices, and network components.

9. Maintenance screens shall screen the raw value for each analog and digital I/O point in the system. They shall also allow the operators/maintenance personnel to enter an override value for an analog point that is then used by the system instead of the value read from the input card / communications link.
10. Trend screens with the capability to screen up to eight, operator assigned, analog and/or digital process variables. Each analog value will be shown on a trend screen.
11. Main alarm summary screen shall screen the following information on each alarm: Time, tag name, description, alarm type, current value, and status. An acknowledge alarm button shall acknowledge all new unacknowledged alarms. The acknowledged and unacknowledged alarms shall be different colors. Acknowledged alarms shall clear automatically after the condition is corrected.
12. Analog variable screens showing a tabular summary of all plant process variables, in operator assigned groupings.

D. Security:

1. The system shall be configured and implemented with security to prevent unauthorized access. The system shall allow authorized changes to system operation through defined user accounts and password verification.
2. Coordinate with Owner user account information, including login name and password for each account.
3. Security levels of "display only", "operator mode", "supervisor mode", and "Engineer mode" shall be available through assignable passwords. On system startup, the "display only" security level shall automatically be entered. In the "display only" mode, information is available to be displayed on the screen, but no changes may be made. In the "operator mode", changes may be made to process set points, times, etc.; however, the overall control concepts may not be modified. In the "supervisor mode", all operator functions can be modified, and any special reports or critical process set points (data can be modified; however, the overall control concepts may not be modified). In the "Engineer mode" level, all user modifiable parameters of the system shall be available for modification.

E. Alarm/Equipment Status Reporting:

1. The alarm log shall display all alarms as they occur. The alarm message shall include the time of occurrence, tag name, tag number, and whether it is a low, high, or failure alarm. When the point in alarm returns to normal, the time, point identification number, and return to normal shall be displayed. All reports shall include the plant equipment number of the associated device.
2. The equipment status shall be logged whenever a change in status occurs (i.e., start, stop). The equipment status log shall include the time, equipment name, tag number, and the change in status.

F. Historical Data Management:

1. Each system point (analog or digital, real or pseudo) shall have the capability of being historically logged. A point shall have the capability of being deleted from historical log at any time. It shall be easy to add or delete system points using minimal keystrokes.
2. All process analogs and all flow totals and run time indications of all primary process equipment motors shall be sampled and stored in the historical data management system.
3. Data Processing: The real time instantaneous values shall be stored in a historical log file on the hard disk at defined sampling rates.
4. Data Correction: Historical data shall be manually modifiable by personnel with appropriate security levels. Such data shall be differentiated from actual monitored values on reports, in the database and in trends.
5. Data Quality: Data Quality flags shall propagate to the next higher level of the history based on user selectable percentage determining tolerance levels for averages and totals. If the percentage of suspect data exceeds the tolerance level, the suspect data flag propagates to the next higher level. Maximums and minimums shall be taken from good data.
6. Manual Input Data Handling: This data shall consist of additional values not obtainable by the system such as laboratory analysis for use in reports. All manually entered data shall be entered and stored in the appropriate Engineering units. All data entered shall be displayed for confirmation on the display prior to incorporation to the database.

3.03 FACTORY ACCEPTANCE TESTING (FAT)

- A. To verify that all PLCs are ready for system programming, the system's integrator shall perform the following shop testing prior to shipment to the site:
1. System integrator shall create and install a basic program in the PLC CPU to monitor the status of all physical PLC I/O.
 2. Utilize one copy of the Engineer-approved PLC shop drawing I/O module wiring diagrams as a checklist and simulate I/O states on the field side of the PLC enclosure terminal strip.
 3. Document testing by marking up each point on the respective PLCs shop drawing. Supply the marked-up shop drawing to the Engineer for approval before panel shipment.
 4. Perform a test configuration on all PLC modules to verify that all PLC CPUs communicate with the associated I/O modules, including inter-rack communication.

5. Install the battery backup, UPS, and power supplies, simulate all device outputs to the PLC, and verify that the signals are read properly at the PLC. As part of the testing of the UPS, fully charge the UPS battery and disconnect line power from the UPS and verify that:
 - a. "Power Loss" is sensed by the PLC when line power is disconnected.
 - b. Verify that when the UPS battery low that "Low UPS Battery" is sensed by the UPS.
 - c. Record the time it takes for the UPS battery to completely drain from full charge once line power is disconnected from the PLC panel.
 6. Point test all PLC I/O to verify that all I/O modules are correctly wired to the terminal strips and that the PLC I/O modules function properly. Testing shall be performed between terminal points on the I/O module to the terminal strip the electrician will terminate field wiring to.
 - a. Discrete Input (DI) Module Testing - Simulate each DI from the field-side terminal block.
 - b. Discrete Output (DO) Module Testing - Use PLC program to force each DO. Using a digital multi-meter (DMM), witness contact closure on field-side terminal block.
 - c. Analog Input (AI) Module Testing – Simulate 4 mA, 12 mA, 20 mA values using a DMM. Verify 24 VDC loop power is provided on analog inputs connected to field instruments that require 24 VDC loop power on their 4-20 mA AI.
 - d. Analog Output (AO) Module Testing – Source 4 mA, 12 mA, and 20 mA currents from the AO module. Witness values are received in DMM.
 7. Using elementary diagrams, test each individual circuit breaker, fuse, DC power supply, and panel incoming power line one at a time and verify the appropriate circuits and devices are powered.
 8. Verify the individual DC power supplies are outputting power within 0.10 V.
 9. Leave all configuration programs in the PLC CPU.
 10. Perform testing to verify that the Ethernet communication between the PLCs is in accordance with the manufacturer's requirements.
 11. Confirm PLC retains the PLC program on power cycle.
- B. After all testing has been successfully completed, contact the Engineer to schedule an in-shop inspection by the Engineer and Owner. Contractor shall have the personnel that performed the testing present to perform random verification of the tests performed by the integrator. The test witnessed by the Engineer and Owner shall be performed just as the integrator performed in-house. With all issues caught and resolved the first time by the integrator, it is expected that the witnessed FAT will go smoothly and quickly.
- C. Submit a written report to the Engineer prior to scheduling Engineer's in-shop inspection.

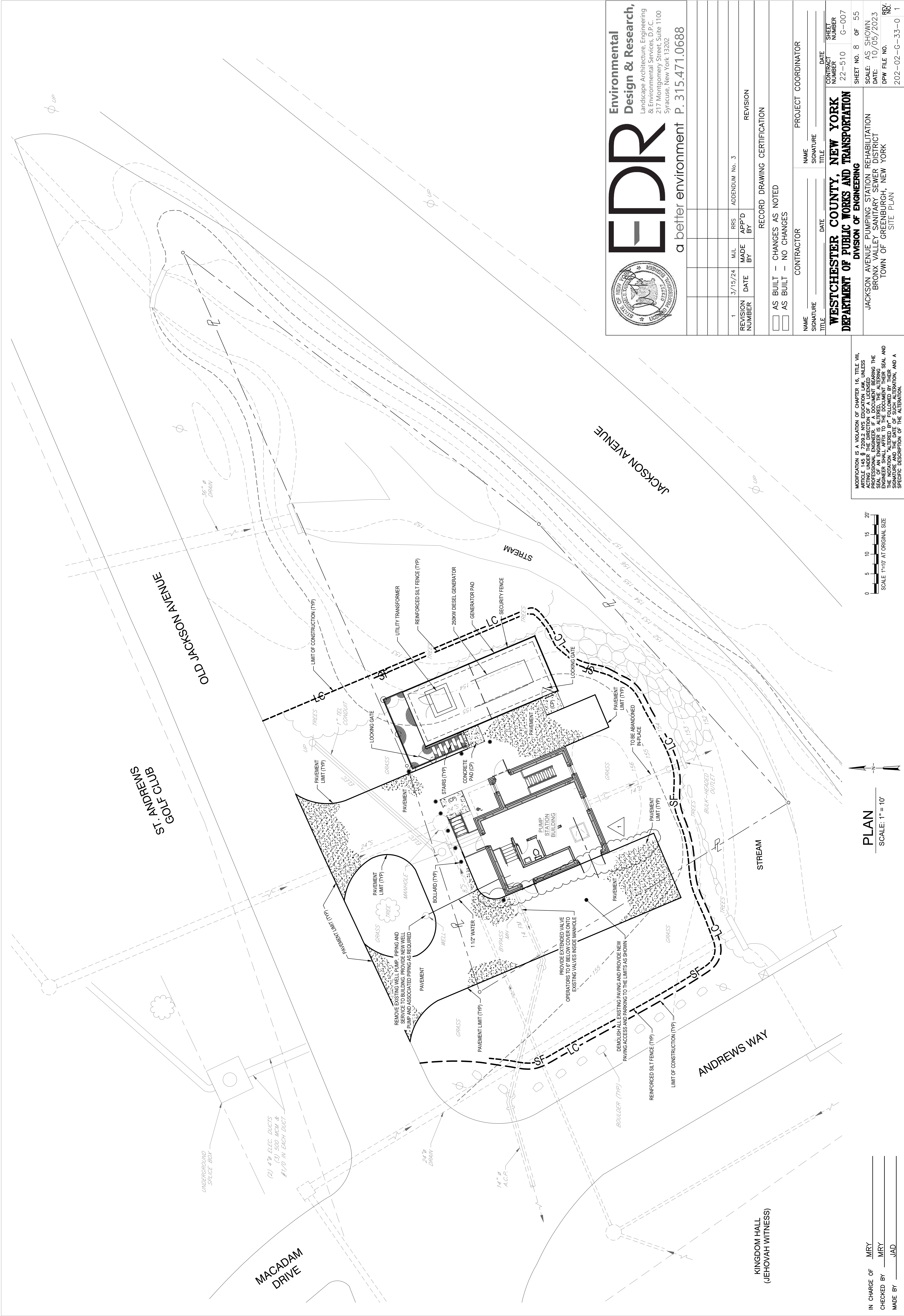
- D. FAT shall not be approved and authorized for shipment from the fabricator's facility until PLC wiring diagrams are updated to reflect "As Fabricated" conditions and marked "As Built."


3.04 START-UP SERVICE

- A. The system integrator/supplier shall provide the services of a qualified service technician/Engineer to perform the following service duties.
 - 1. Provide a minimum of two (2) days on-site services to provide installation instruction to the contractor on all aspects of equipment installation.
 - 2. Provide a minimum of three (3) days of onsite startup services to provide a final system calibration, programming, and testing after completion of equipment installations.
 - 3. Provide a minimum of two (2) 4-hour session at the job site to provide instruction to facility personnel in the operation, proper maintenance, trouble shooting, and repair of the equipment. Contractor to demonstrate proper operation of system to Owner.
 - 4. Following system startup, contractor is to correct any deficiencies at no additional cost to the Owner.
- B. Following completion of the above services, the supplier shall provide an affidavit to the facility, certifying that the system is installed and operating in accordance with the contract documents.

END OF SECTION

ATTACHMENT 4





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REVISION NUMBER	DATE	M.A.I.	APP'D BY	ADDENDUM No. 3	REVISION
1	3/15/24				

☐ AS BUILT -- CHANGES AS NOTED

☐ AS BUILT -- NO CHANGES

RECORD DRAWING CERTIFICATION

NAME

SIGNATURE

CONTRACTOR

DATE

PROJECT COORDINATOR

SIGNATURE

DATE

TITLE

CONTRACT NUMBER

22-510

SHEET NUMBER

G-007

SHEET NO.

8

OF

55

SCALE: AS SHOWN

DATE: 10/05/2023

DPW FILE NO.

NO.

WESTCHESTER COUNTY, NEW YORK

DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

DIVISION OF ENGINEERING

JACKSON AVENUE PUMPING STATION REHABILITATION

BRONX VALLEY SANITARY SEWER DISTRICT

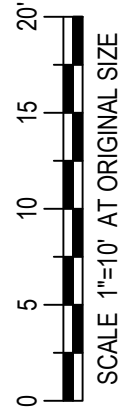
TOWN OF GREENBURGH, NEW YORK

SITE PLAN

MODIFICATION IS A VIOLATION OF CHAPTER 16, TITLE VIII, ARTICLE 145 § 7209.2 NYS EDUCATION LAW, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ANY ENGINEER SIGNING THE SEAL OF AN ENGINEER IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE DOCUMENT THEIR SEAL AND SIGNATURE, AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

IN CHARGE OF MRY
CHECKED BY MRY
MADE BY JAD

PLAN
SCALE: 1" = 10'



ATTACHMENT 5

GENERAL CONCRETE CONSTRUCTION NOTES

- A. Reinforced concrete design follows ACI 318-14 except for liquid containment structures which are designed in accordance with ACI 308-06, "Code Requirements for Environmental Engineering Concrete Structures and Commentary".
- B. Unless noted otherwise, all concrete shown is structural concrete with a 4500 psi 28-day compressive strength and Type II Portland Cement. Refer to Section 03300 of specifications.
- C. Reinforcement will be new Billet Steel, conforming to ASTM A-615 Grade 60, deformed.
- D. Detail, fabricate and erect reinforcing bars in accordance with "Details and Detailing Concrete Reinforcement," (ACI 315R-18).
- E. Unless otherwise shown, all reinforcing steel shall be provided with minimum concrete cover as follows:
- | | |
|-------------------------|--------|
| Slabs on grade: | 1 1/2" |
| - top reinf. (interior) | 2" |
| - top reinf. (exterior) | 3" |
| - bottom reinf. | |
- Foundation slab/footing
- | | |
|-----------------|----|
| - top reinf. | 2" |
| - bottom reinf. | 3" |
- Beams and columns
- | | |
|-----------------|----|
| - top reinf. | 2" |
| - bottom reinf. | 2" |
- Walls
- F. Lap splices and embedments for reinforcement shall follow the chart shown on this drawing unless otherwise indicated on the drawings.
- G. Any revisions to joint placement, pour sequencing or reinforcing splices must be submitted to the engineer for review and approval prior to submittal of reinforcing steel shop drawings.
- H. Cure concrete at a minimum temperature of 50° F for seven days, following the criteria of ACI 308.1-11.
- I. Concrete surfaces shall be finished per Section 03300 of the specifications.
- J. Chamfer exposed concrete edges 3/4" x 3/4", unless otherwise noted.
- K. Equipment pad dimensions, housekeeping pad dimensions and openings for hatches, ducts and pipes must be coordinated with approved equipment shop drawings, and with the requirements shown on other drawings, this project set.
- L. The contractor is responsible for maintaining stability and preventing floatation of structures during all phases of construction.

1 - NO SCALE

CONCRETE CONSTRUCTION NOTES

GENERAL MASONRY CONSTRUCTION NOTES

- A. Masonry design follows The Masonry Standards Joint Committee report on "Building Code Requirements for Masonry Structures," TMS 402-13 and the requirements of 2020 Building Code of New York State. Masonry is designed in accordance with the Working Stress Design Method.
- B. All masonry will have a minimum net area compressive strength of concrete masonry units equal to 2650 psi. Masonry assembly will use Type N mortar to develop a net area compressive strength of masonry f_m = 2000 psi.
- C. Masonry grout will conform to the requirements of ASTM C476. Grout shall reach a minimum compressive strength of 2000psi at 28 days. Maximum grout pour height per pour shall be 5 feet.
- D. Reinforcing steel will be new Billet Steel, and conform to ASTM A-615 Grade 60, deformed.
- E. Reinforcement embedded grout shall have a thickness of grout between the reinforcement and masonry units not less than 1/2 inch.
- F. Reinforcing bars will have a masonry cover not less than the following:
- | | |
|--|----------------|
| Masonry face exposed to earth or weather | - 2 inches |
| Masonry not exposed to earth or weather | - 1 1/2 inches |
- G. Masonry reinforcement standard hooks, splices and embedments as follows:
- | | | | |
|----|-----------------|--------------------|---------------|
| #5 | 7 1/2 inches | 30 inches | 22 1/2 inches |
| | Min. Lap Splice | Min. Embed. Length | |
- H. Unless shown otherwise, vertical reinforcement shall consist of a foundation dowel and horizontal reinforcement. Vertical reinforcement shall be provided at all locations as shown on the structural Top Plan, and on the Sections as shown on the A-series and S-series drawings.
- I. Vertical reinforcement shall be provided at locations as shown on the Top Plan. Reinforcement shall be located at corners, within 16" of each side openings, within 8" of all joints and at a maximum spacing as indicated on the Top Plan.
- J. Horizontal reinforcement shall be consist of 2 wires W1.7 spaced at 16". Horizontal reinforcement shall be located at the top and bottom of wall openings and extend 24" past the openings.
- K. Masonry wall openings for windows, doors, louvers, HVAC equipment, ducts, mechanical process equipment and pipes must be coordinated with approved shop drawings and with the requirements shown on other drawings, this project.
- L. The contractor is responsible for maintaining stability of structures during all phases of construction.

2 - NO SCALE

MASONRY CONSTRUCTION NOTES

IN CHARGE OF MET
CHECKED BY BCS
MADE BY KAD

STRUCTURAL DESIGN DATA

- Loads in accordance with 2020 Building Code of New York State and ASCE 7-16
- Roof Live Load, L_r = 20 psf
- Floor Live Load = 250 psf
- Collateral Load = 10 psf
- Roof Snow Load
- Snow exposure factor C_e = 1.1
- Snow load importance factor I_s = 1.1
- Fat roof snow load P_f = 25.41 psf
- Wind Load
- Basic wind speed V = 125 mph
- Risk Category III
- Wind exposure - Category C
- Equivalent Lateral Force Procedure
- Response Modification Coefficient R = 2.0
- Internal pressure coefficient C_{pi} = ±0.18
- Earthquake Design Data
- Seismic importance factor, $I = 1.25$
- Risk Category III
- Mapped acceleration parameters:
- $S_s = 0.296$
- $S_{D1} = 0.061$
- Site Class D
- Spectral response coefficients:
- $S_{R1} = 0.309$
- $S_{R2} = 0.098$
- Seismic Design Category B
- Basic seismic-force-resisting system:
- Ordinary reinforced masonry
- Design base shear, V = 18K

3 - Scale: NO SCALE

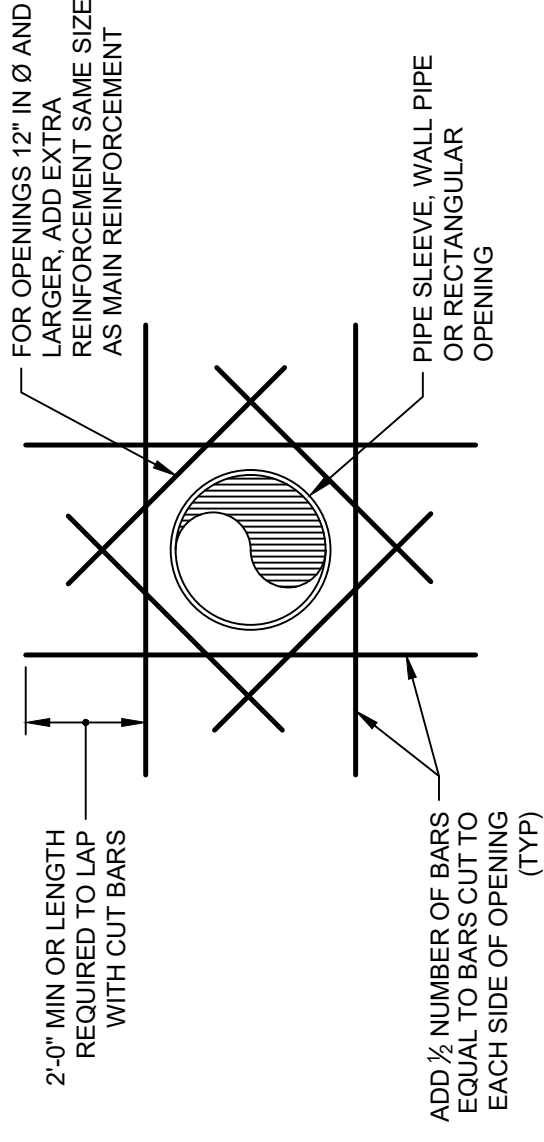
STRUCTURAL DESIGN DATA

BAR SIZE	MIN LAP SPlice LENGTH (INCHES)		MIN EMBEDMENT LENGTH (INCHES)	
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
3	16	12	12	12
4	20	14	14	12
5	24	18	18	14
6	28	21	21	18
7	45	36	36	27
8	57	45	45	36
9	72	56	56	45
10	90	69	69	54
11	108	84	84	64

- NOTES:
- A. F_c = 4500 PSI (NORMAL WEIGHT CONCRETE), F_y = 60,000 PSI.
- B. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12" DEPTH OF CONCRETE CAST BELOW THE REINFORCEMENT.
- C. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12" DEPTH OF CONCRETE CAST BELOW THE REINFORCEMENT.
- D. MINIMUM CLEAR COVER IS 1.5 INCHES. MINIMUM SPACING IS 4 INCHES.

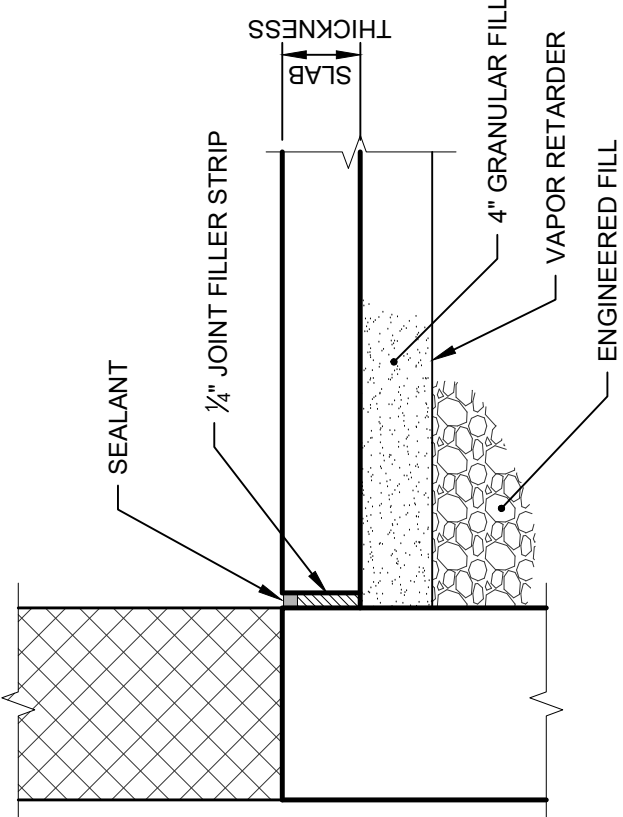
4 - 4500 psi

SPLICE AND EMBEDMENT CHART



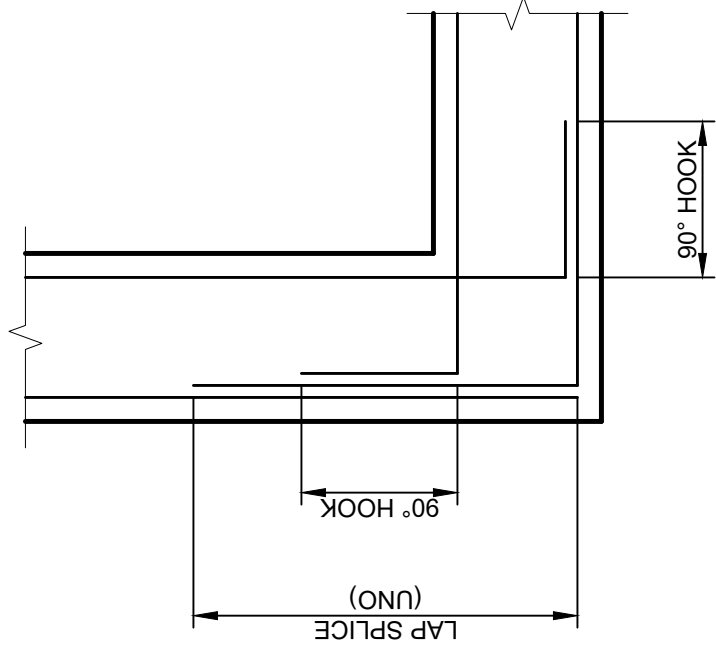
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WALL / SLAB OPENING REINFORCEMENT



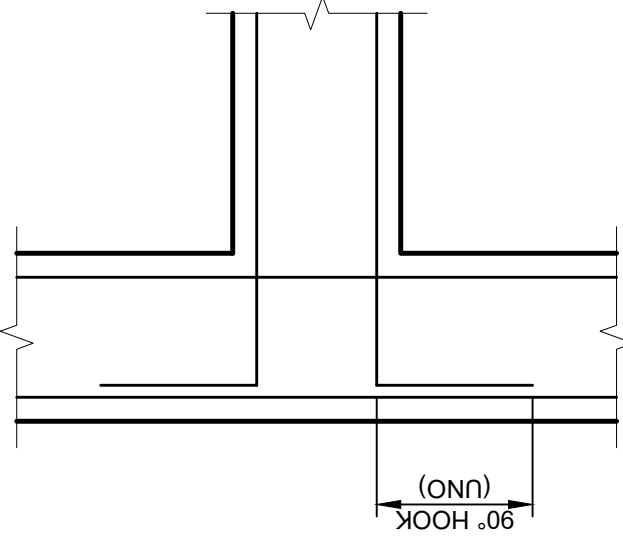
6 - NO SCALE

ISOLATION JOINT DETAIL



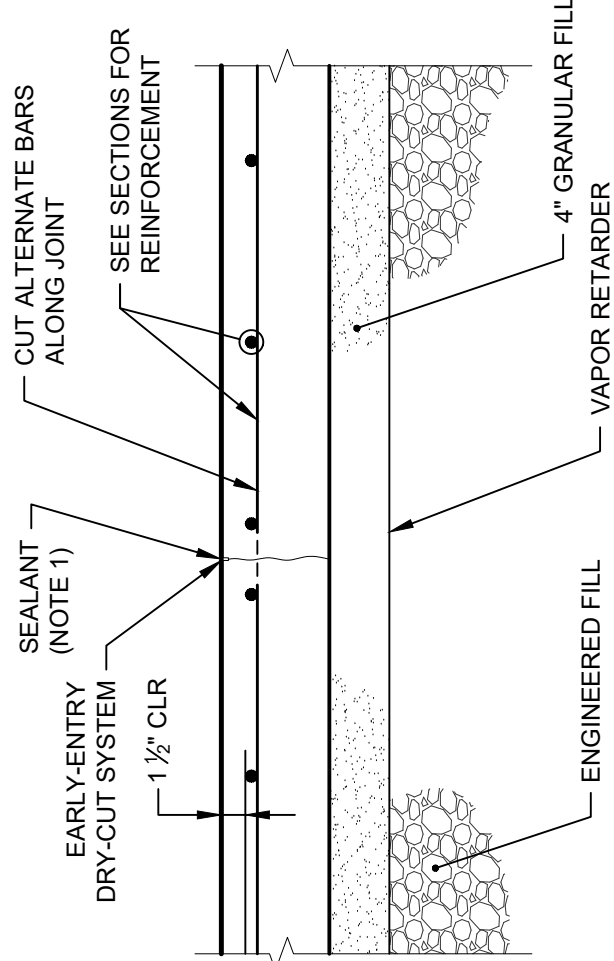
7 - NO SCALE

CORNER WALL REINFORCEMENT DETAIL



8 - NO SCALE

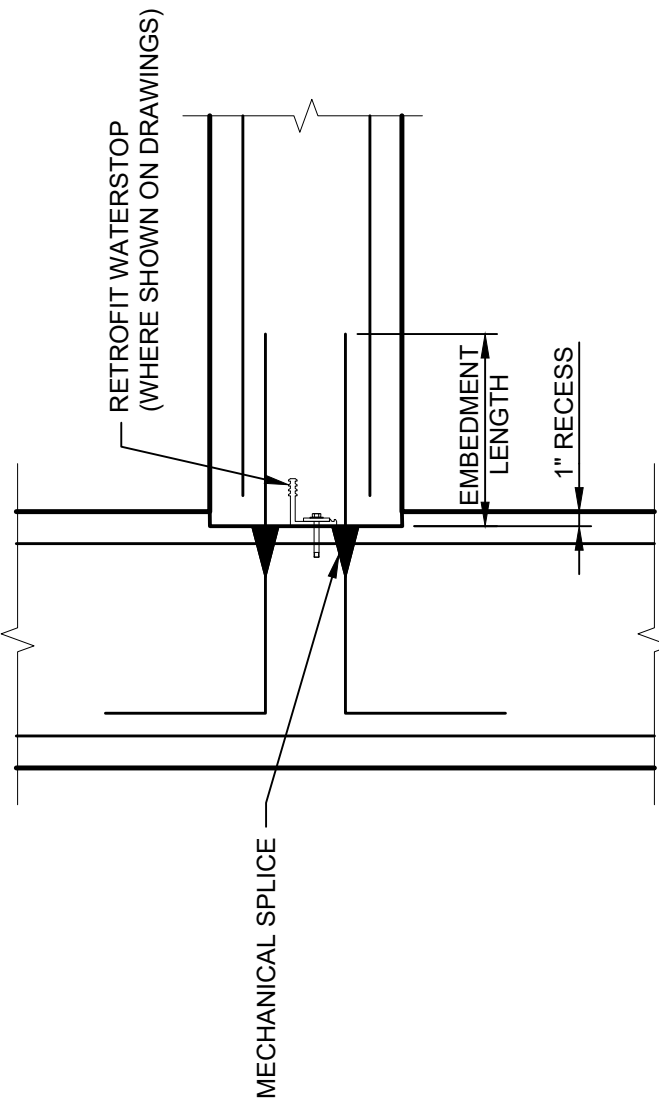
WALL INTERSECTION REINFORCEMENT DETAIL



- NOTES:
1. COORDINATE SEALANT WITH JOINT SYSTEM MANUFACTURER'S RECOMMENDATIONS.
2. COORDINATE TIMING AND DEPTH OF CUT WITH MANUFACTURER'S CRITERIA.

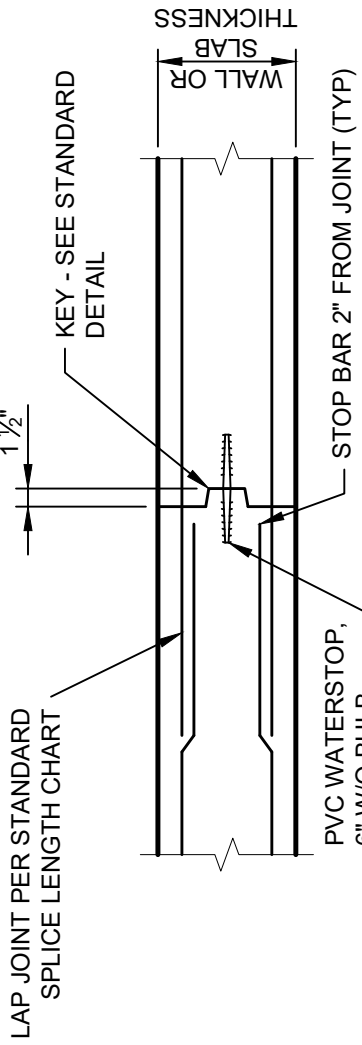
9 - NO SCALE

CONTROL JOINT DETAIL

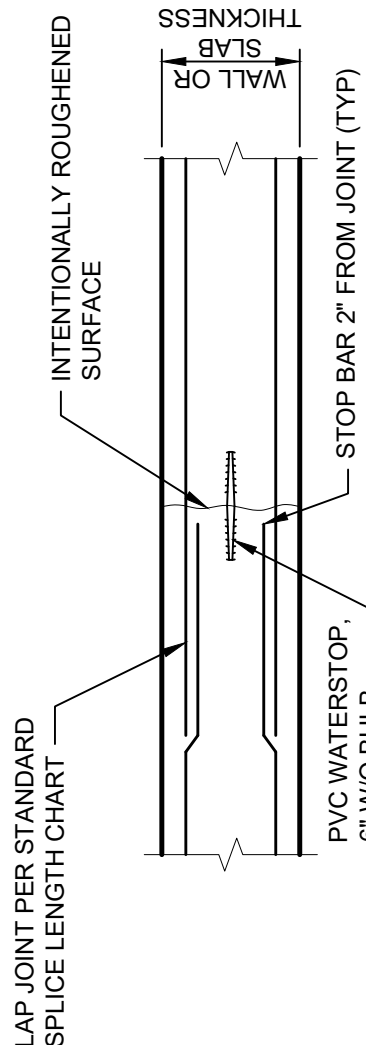


13 - NO SCALE

RECESSED CONSTRUCTION JOINT DETAIL



KEYED CONSTRUCTION JOINT

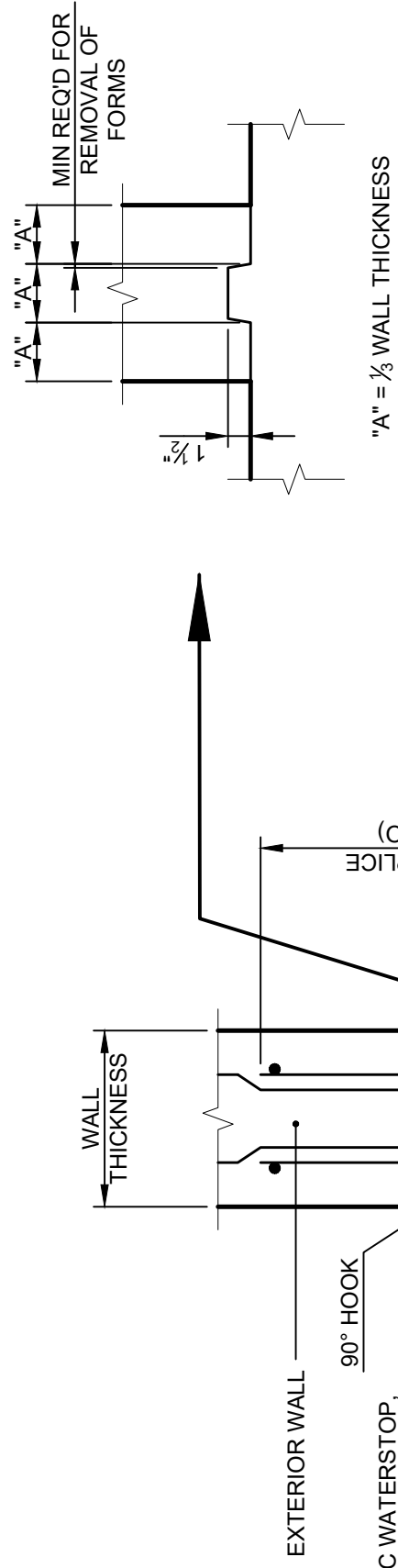


ROUGHENED CONSTRUCTION JOINT

- NOTES:
1. USE PVC WATERSTOP, 6" W/O BULB, FOR ALL CONSTRUCTION JOINTS EXCEPT WHERE OTHERWISE INDICATED.
2. SEE PLAN FOR REQUIRED CONSTRUCTION JOINT LOCATIONS.
3. EACH SLAB SECTION SHALL BE CURED FOR 3 DAYS BEFORE ADJACENT SECTION IS PLACED. REFER TO SPEC SECTION 03250.

11 - NO SCALE

CONSTRUCTION JOINT DETAIL



12 - NO SCALE

KEYED WALL / SLAB JOINT DETAIL

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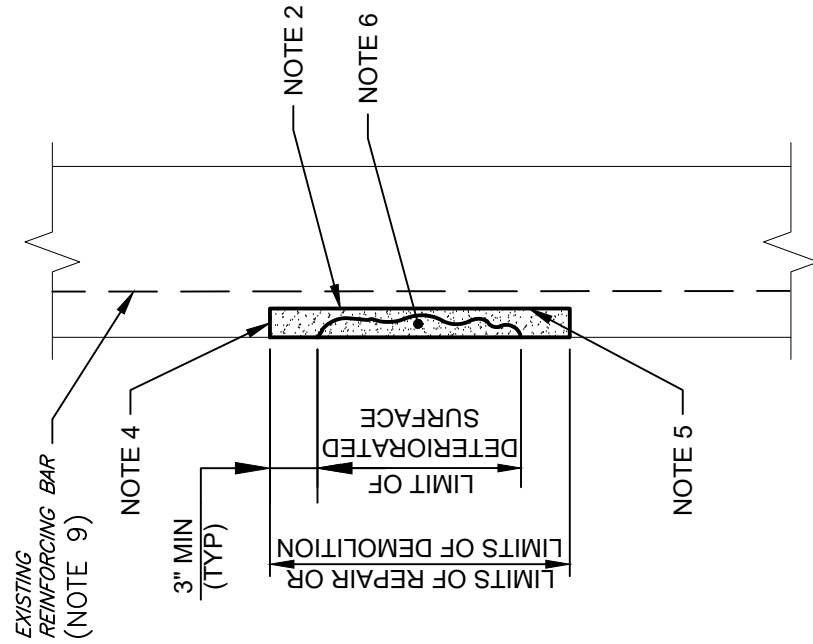
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REVISION						
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PROJECT COORDINATOR						
NAME		SIGNATURE		DATE		
TITLE		TITLE		CONTRACT NUMBER		
WESTCHESTER COUNTY, NEW YORK DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION DIVISION OF ENGINEERING						
SHEET NO. 17 OF 55 SCALE: AS SHOWN DATE: 10/05/2023 DPW FILE NO. REV. 202-02-S-42-0 1						
JACKSON AVENUE PUMPING STATION REHABILITATION BRONX VALLEY SANITARY SEWER DISTRICT TOWN OF GREENBURGH, NEW YORK GENERAL NOTES AND DETAILS						

ATTACHMENT 6

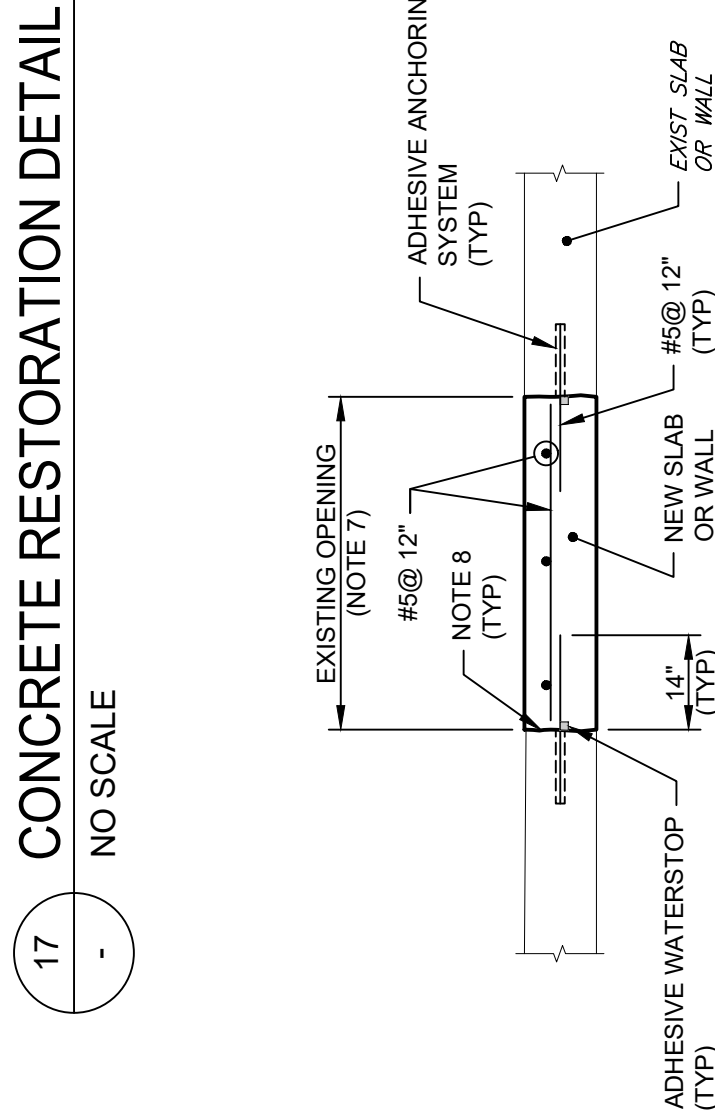
BEAM SCHEDULE													
BEAM MARK	BEAM DIMENSIONS		BEAM TYPE	MAIN REINFORCEMENT				STIRRUPS & SPACING (SEE NOTE 3)		SKIN BARS (SEE NOTE 4)	REMARKS		
	W	D		E	a	b	c	d	LEFT END			TYPICAL STIRRUPS	RIGHT END
B-1	12	39	-	(3)#6	-	(2)#6	-	-	-	(3)# @ 12	△	(4)#4	-
B-2	12	39	-	(3)#9	-	(2)#9	-	(3)# @ 10	(3)# @ 12	(3)# @ 10	△	(4)#4	-
B-3	14	39	-	(4)#9	-	(4)#9	-	(3)# @ 10	△	(3)# @ 12	△	(4)#4	-
B-4	12	39	-	(2)#7	-	(2)#7	-	(2)#7	(3)#7	(2)#7	△	(4)#4	-
B-5	16	60	-	(5)#9	-	(2)#9	-	(4)# @ 12	△	(4)# @ 12	△	(6)#4	SKIN BARS AT TOP HALF OF BEAM



CONCR	NO SCALE
16	-



RETRO	NO SCALE
14	-



CONCR	NO SCALE
17	-

18	OPENING
-	NO SCALE



- 19

ARTICLE 145 § 7209.2 NYS EDUCATION LAW, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. IF A DOCUMENT BEARING THE SEAL OF AN ENGINEER IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE DOCUMENT THEIR SEAL AND THE NOTATION "ALTERED BY," FOLLOWED BY THEIR SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

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RECORD DRAWING CERTIFICATION

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PROJECT COORDINATOR

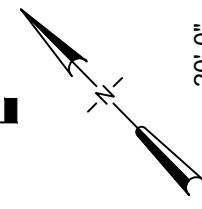
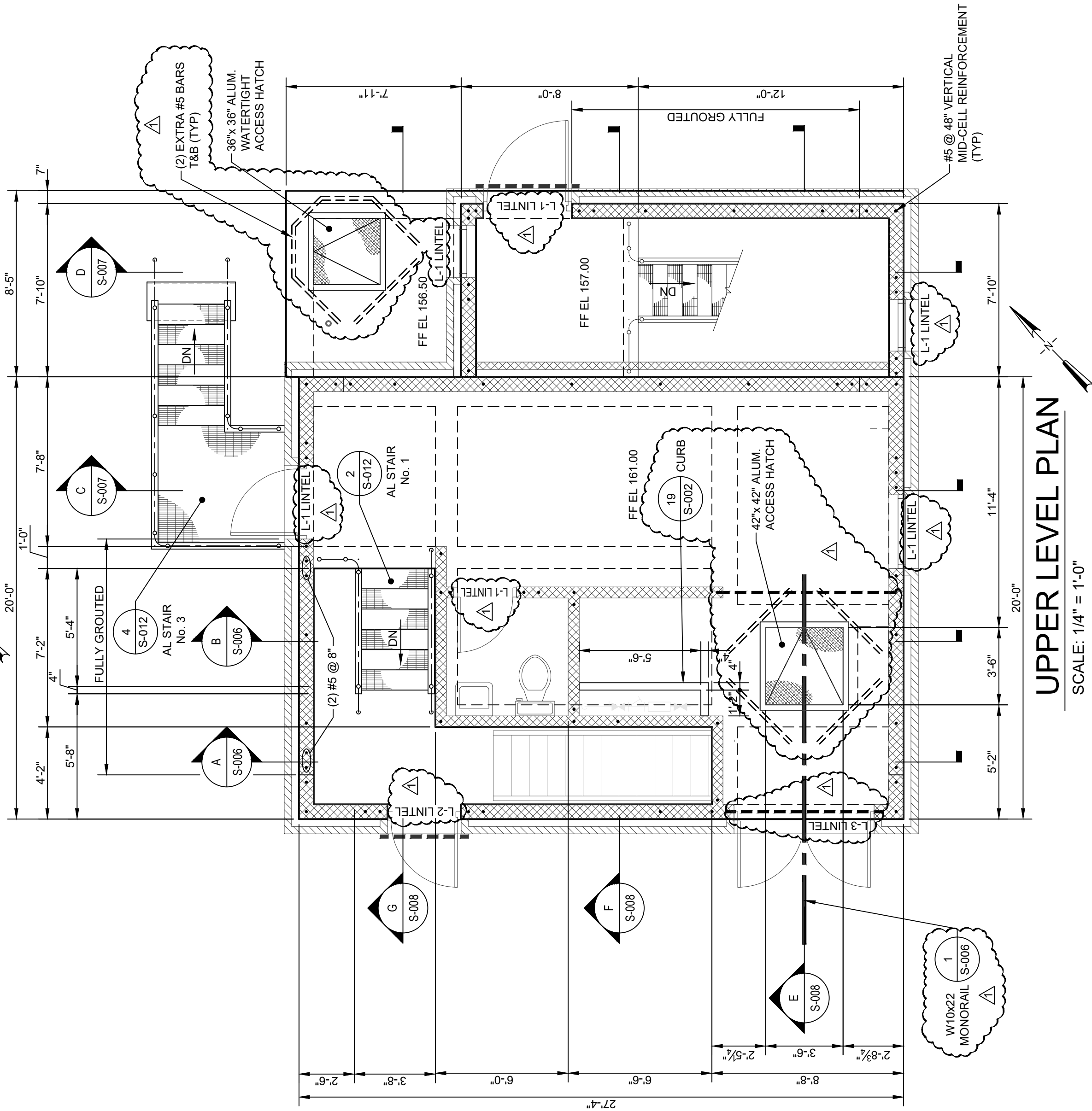
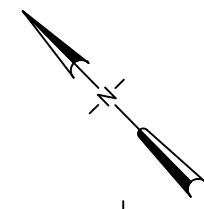
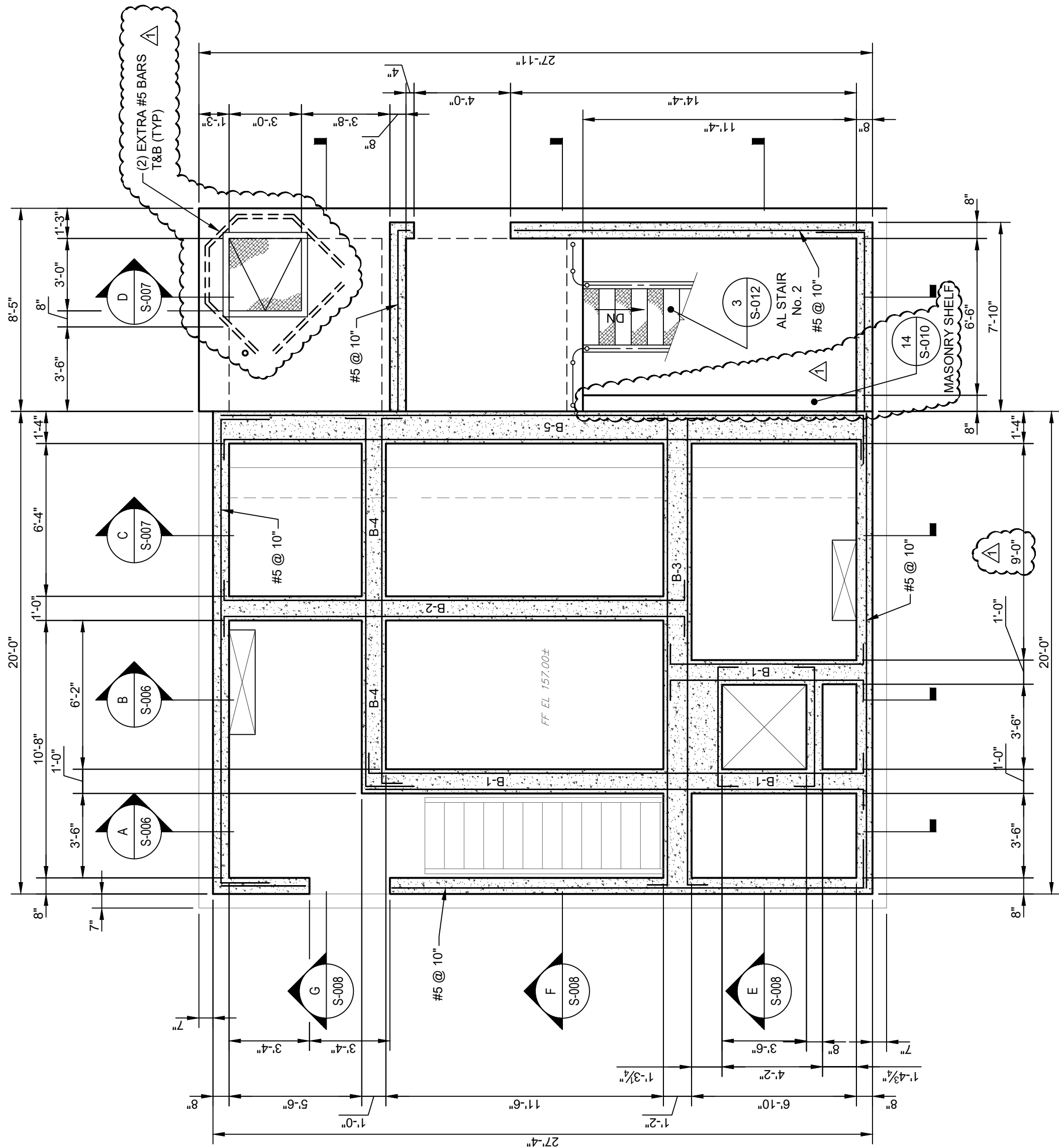
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 SIGNATURE _____ SIGNATURE _____
 TITLE _____ TITLE _____ DATE _____ DATE _____

**WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
DIVISION OF ENGINEERING**

JACKSON AVENUE PUMPING STATION REHABILITATION
BRONX VALLEY SANITARY SEWER DISTRICT
TOWN OF GREENBURGH, NEW YORK

GENERAL NOTES AND DETAILS

ATTACHMENT 7



NOTES:

1. REFER TO DRAWING S-001 AND S-002 FOR CONCRETE NOTES AND DETAILS.
2. COORDINATE PIPE AND EQUIPMENT LOCATIONS WITH EQUIPMENT MANUFACTURER'S REQUIREMENTS AND DRAWINGS OF OTHER DISCIPLINES.
3. PROVIDE WALL/SLAB OPENINGS REINFORCEMENT IN ACCORDANCE WITH DETAIL ON DRAWING S-001.
4. PROVIDE SPLICE @ ONE-THIRD POINT. ALTERNATE SPLICES IN EACH ROW.



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[illegible]

PROJECT COORDINATOR

NAME _____ SIGNATURE _____ TITLE _____ DATE _____

**WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
DIVISION OF ENGINEERING**

JACKSON AVENUE PUMPING STATION REHABILITATION
BRONX VALLEY SANITARY SEWER DISTRICT
TOWN OF GREENBURGH, NEW YORK

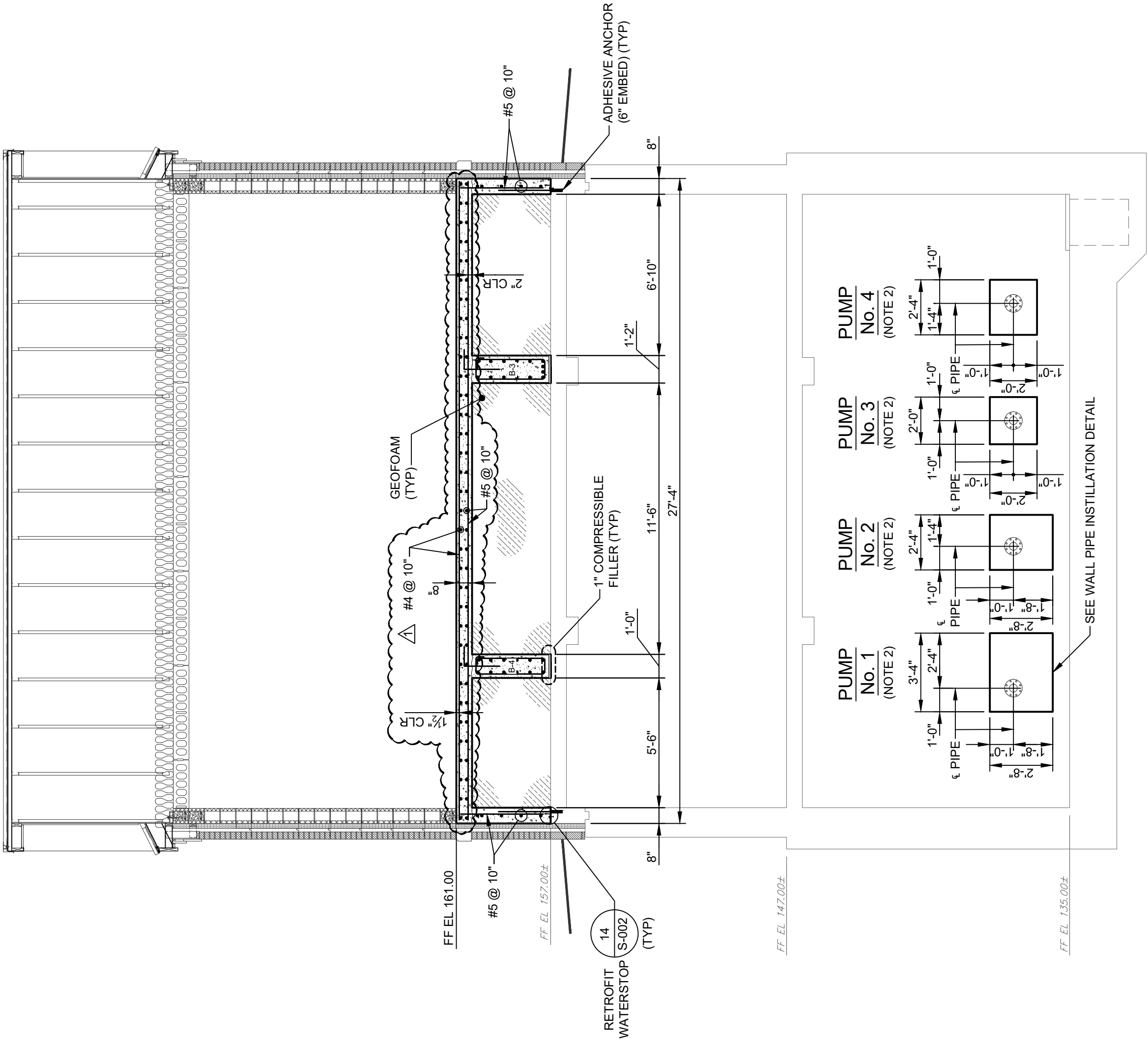
SCALE: AS SHOWN
DATE: 10/05/2023



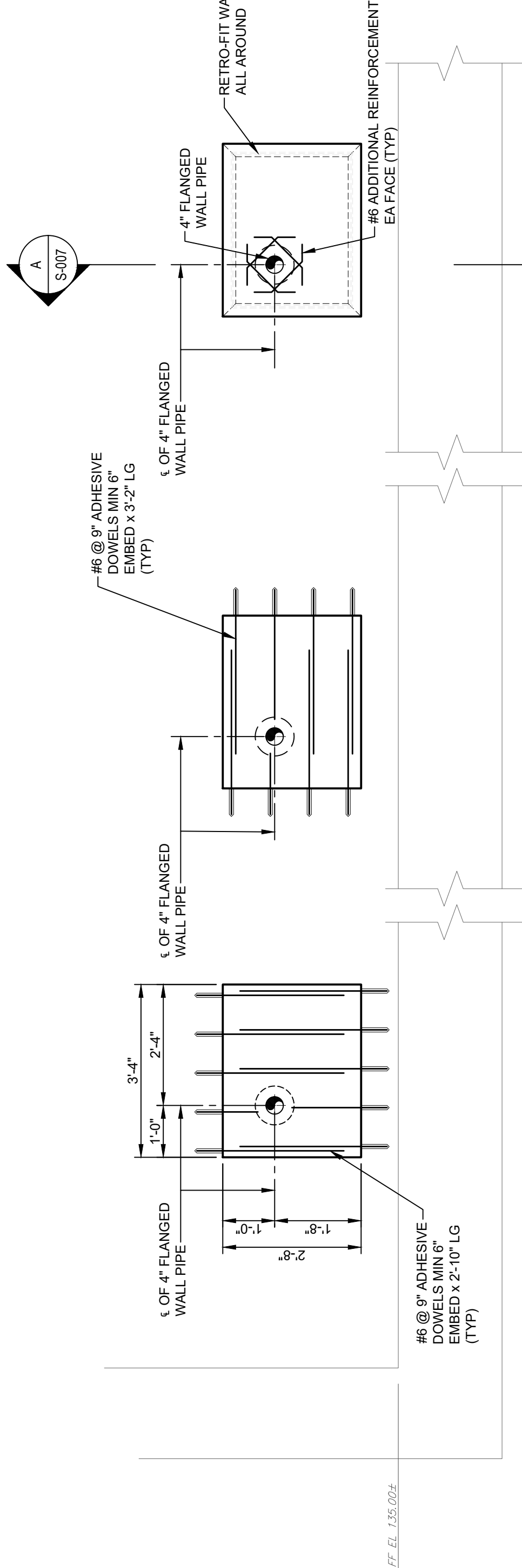
MODIFICATION IS A VIOLATION OF CHAPTER 16, TITLE VIII, ARTICLE 145 & § 7209.2 NYS EDUCATION LAW, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. IF A DOCUMENT BEARING THE SEAL OF AN ENGINEER IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE DOCUMENT THEIR SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY THEIR SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

ATTACHMENT 8

ATTACHMENT 9

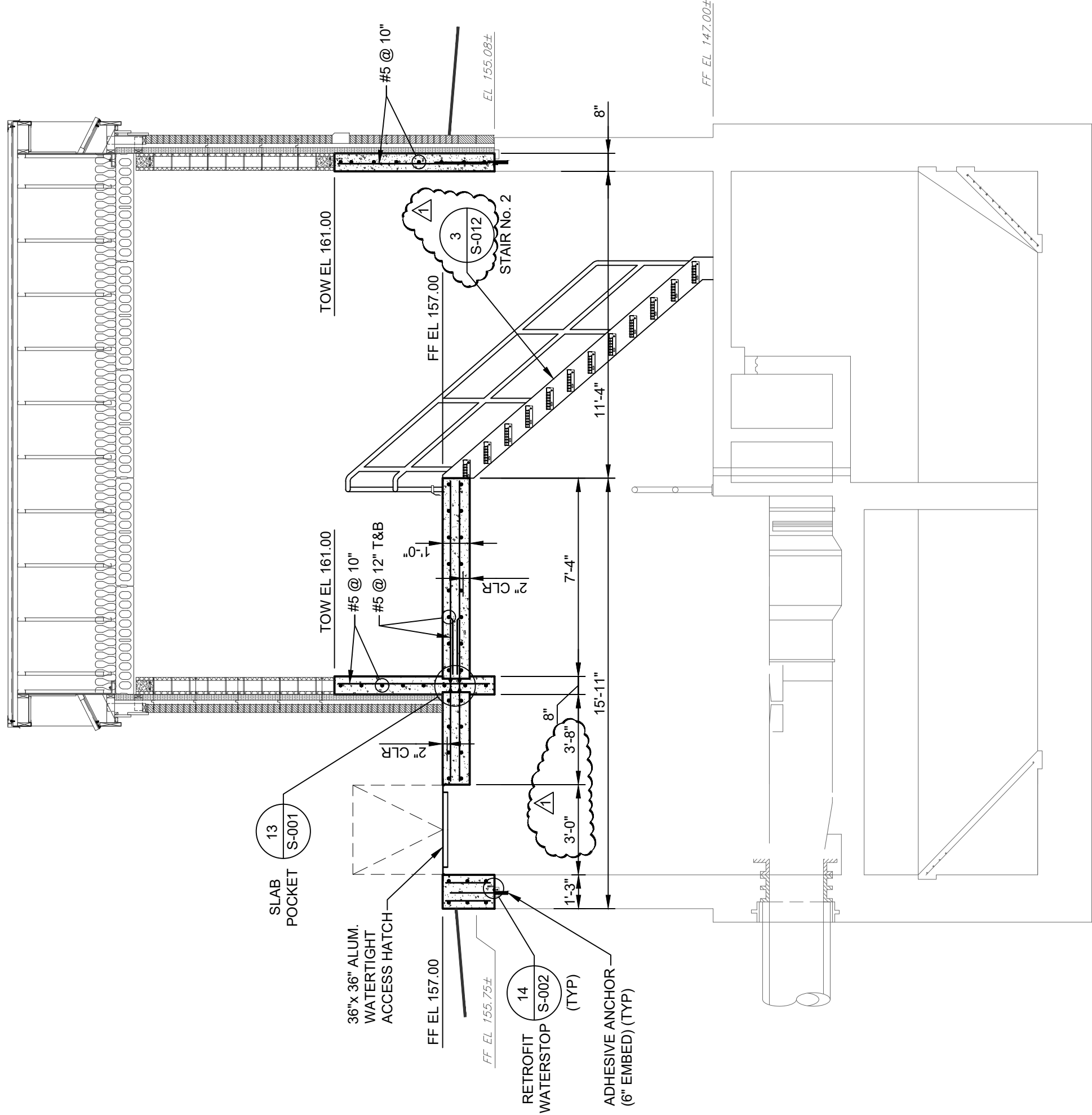


C SECTION
S-005 SCALE: 1/4" = 1'-0"

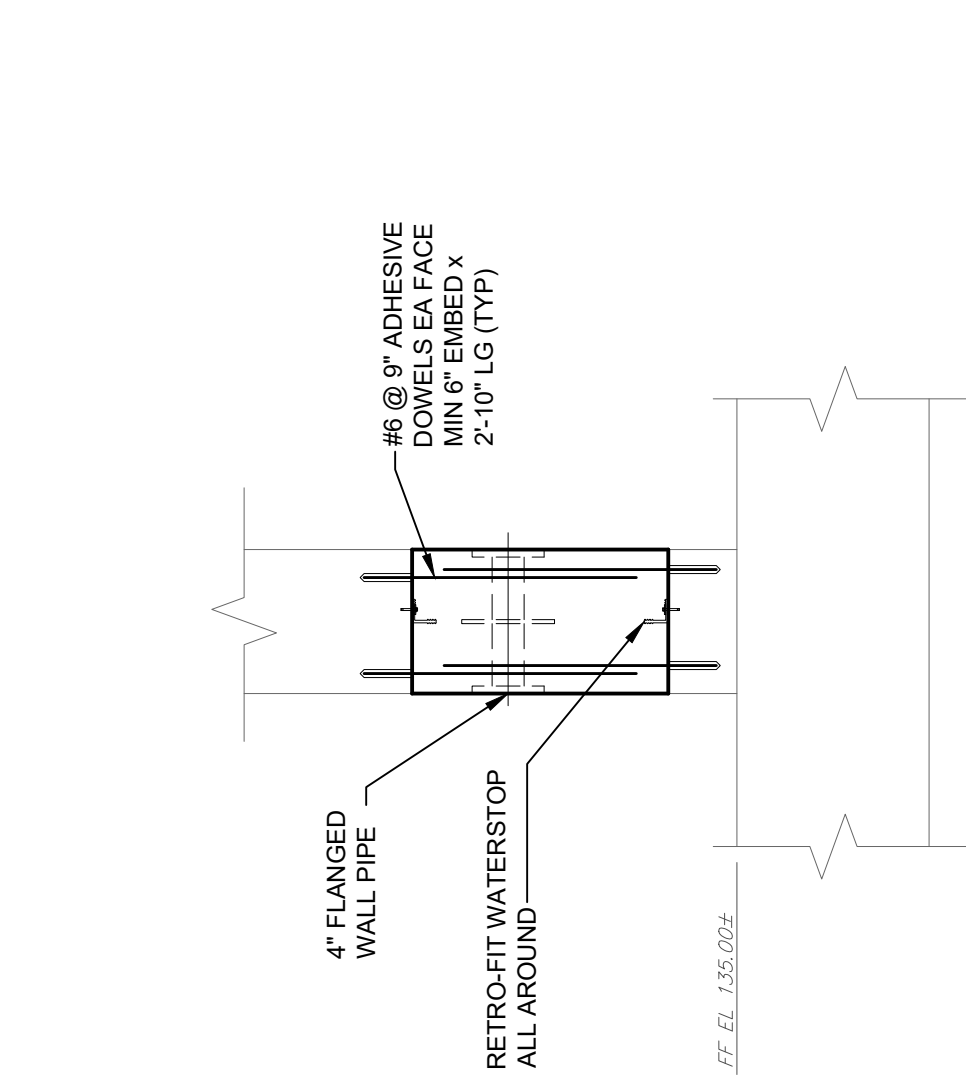


WALL PIPE INSTALLATION DETAIL

SCALE: 1/2" = 1'-0"
(INSTALLATION FOR PUMP No. 1 SHOWN. INSTALLATION FOR PUMPS No. 2, No. 3 AND No. 4 SIMILAR)



D SECTION
S-005 SCALE: 1/4" = 1'-0"



A SECTION
S-007 SCALE: 1/2" = 1'-0"

0 2'-0" 4'-0" 6'-0" 8'-0"
SCALE: 1/4"=1'-0" AT ORIGINAL SIZE
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IN CHARGE OF M/J
CHECKED BY BCS
MADE BY KAD

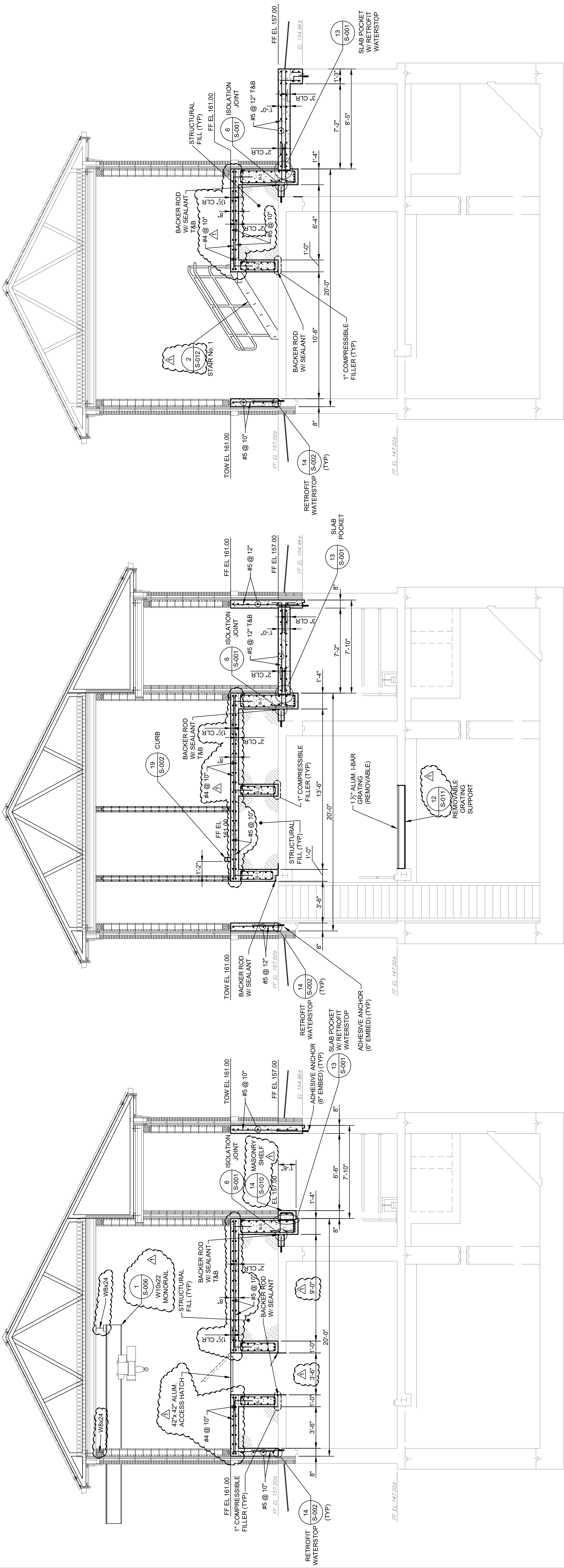
- NOTES:**
1. REFER TO DRAWING S-001 AND S-002 FOR CONCRETE NOTES AND DETAILS.
 2. COORDINATE PIPE AND EQUIPMENT LOCATIONS WITH EQUIPMENT MANUFACTURER'S REQUIREMENTS AND DRAWINGS OF OTHER DISCIPLINES.
 3. PROVIDE WALL SLAB OPENINGS REINFORCEMENT IN ACCORDANCE WITH DETAIL ON DRAWING S-001.
 4. PROVIDE SPLICE @ ONE-THIRD POINT. ALTERNATE SPLICES IN EACH ROW.

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REVISION NUMBER	DATE	MADE BY	APP'D BY	MSD	ADDENDUM No.	REVISION
1	3/15/24	KAD			3	
RECORD DRAWING CERTIFICATION						
<input type="checkbox"/> AS BUILT -- CHANGES AS NOTED						
<input type="checkbox"/> AS BUILT -- NO CHANGES						

NAME	SIGNATURE	DATE	TITLE	PROJECT COORDINATOR
WESTCHESTER COUNTY, NEW YORK DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION DIVISION OF ENGINEERING				
JACKSON AVENUE PUMPING STATION REHABILITATION BRONX VALLEY SANITARY SEWER DISTRICT TOWN OF GREENBURGH, NEW YORK				
CONTRACT NUMBER		SHEET NUMBER		SHEET OF
22-510		S-007		55
SCALE: AS SHOWN		DATE: 10/05/2023		REV. NO.
202-02-S-48-0		1		

ATTACHMENT 10



E SECTION
S-005 SCALE: 1/4" = 1'-0"

F SECTION
S-005 SCALE: 1/4" = 1'-0"

G SECTION
S-005 SCALE: 1/4" = 1'-0"

- NOTES:
1. REFER TO DRAWING S-001 AND S-002 FOR CONCRETE NOTES AND DETAILS.
 2. COORDINATE PIPE AND EQUIPMENT LOCATIONS WITH EQUIPMENT MANUFACTURER'S REQUIREMENTS AND DRAWINGS OF OTHER DISCIPLINES.
 3. PROVIDE WALL/SLAB OPENINGS REINFORCEMENT IN ACCORDANCE WITH DETAIL ON DRAWING S-001.
 4. PROVIDE SPLICE @ ONE-THIRD POINT. ALTERNATE SPLICES IN EACH ROW.



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REVISION

RECORD DRAWING CERTIFICATION

- ☐ AS BUILT -- CHANGES AS NOTED
☐ AS BUILT -- NO CHANGES

CONTRACTOR		PROJECT COORDINATOR	
NAME		NAME	
SIGNATURE		SIGNATURE	
TITLE		TITLE	

CONTRACT NUMBER	DATE	SHEET NUMBER	SHEET OF
22-510		S-008	55

**WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
DIVISION OF ENGINEERING**

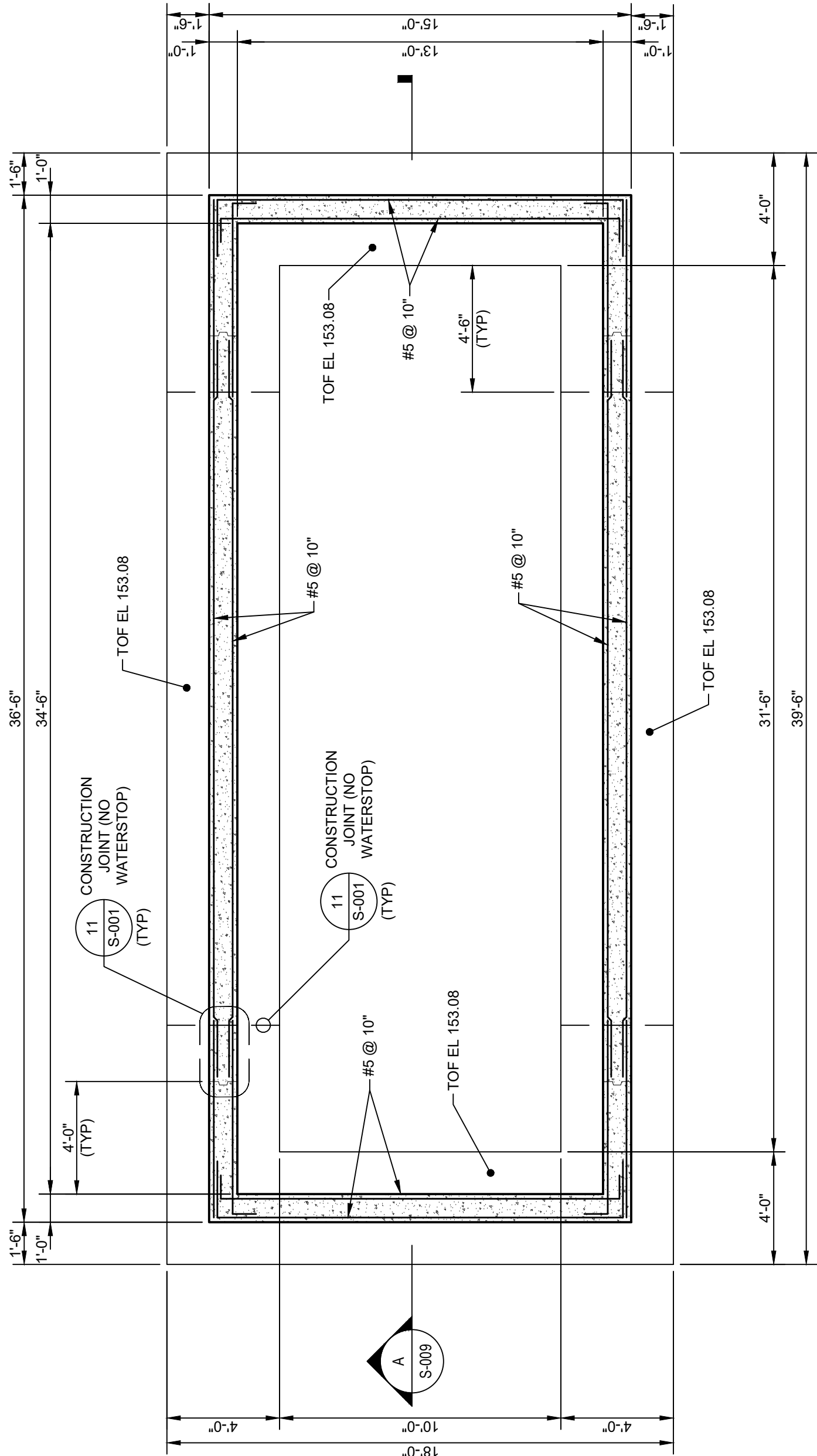
JACKSON AVENUE PUMPING STATION REHABILITATION
BRONX VALLEY SANITARY SEWER DISTRICT
TOWN OF GREENBURGH, NEW YORK

SCALE: AS SHOWN
DATE: 10/05/2023
DPW FILE NO.
REV. NO.

SECTIONS

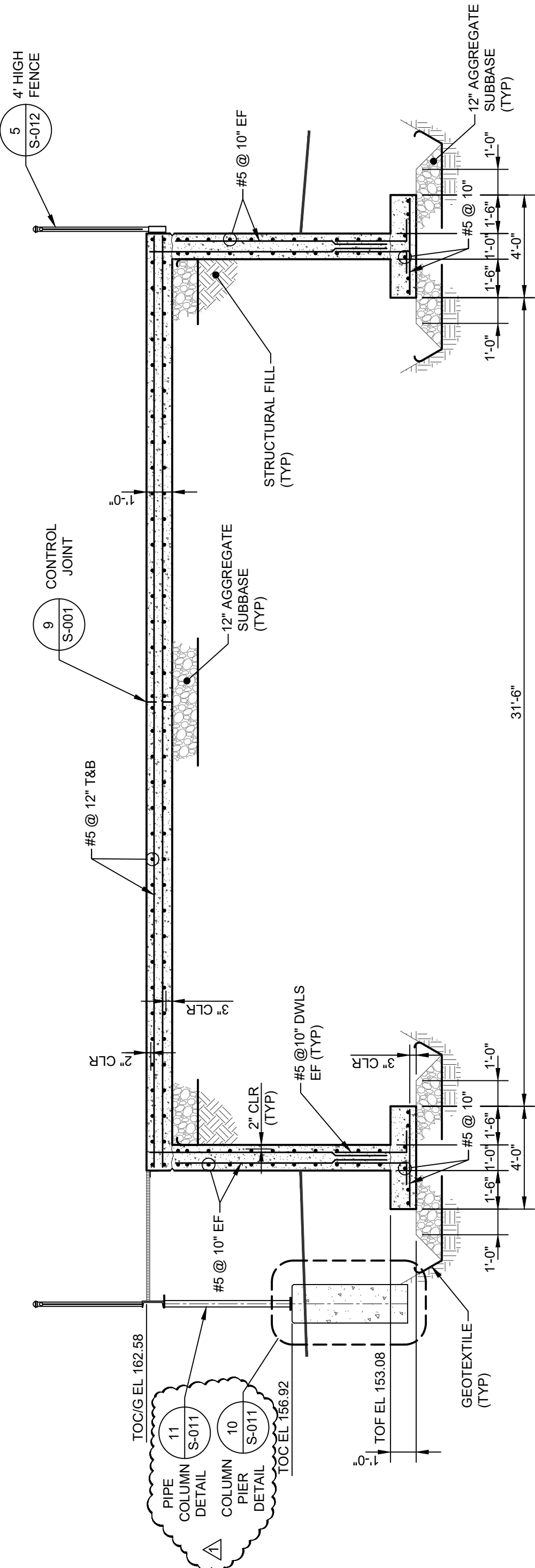
IN CHARGE OF MET
CHECKED BY BCS
MADE BY KAD

ATTACHMENT 11



FOUNDATION PLAN

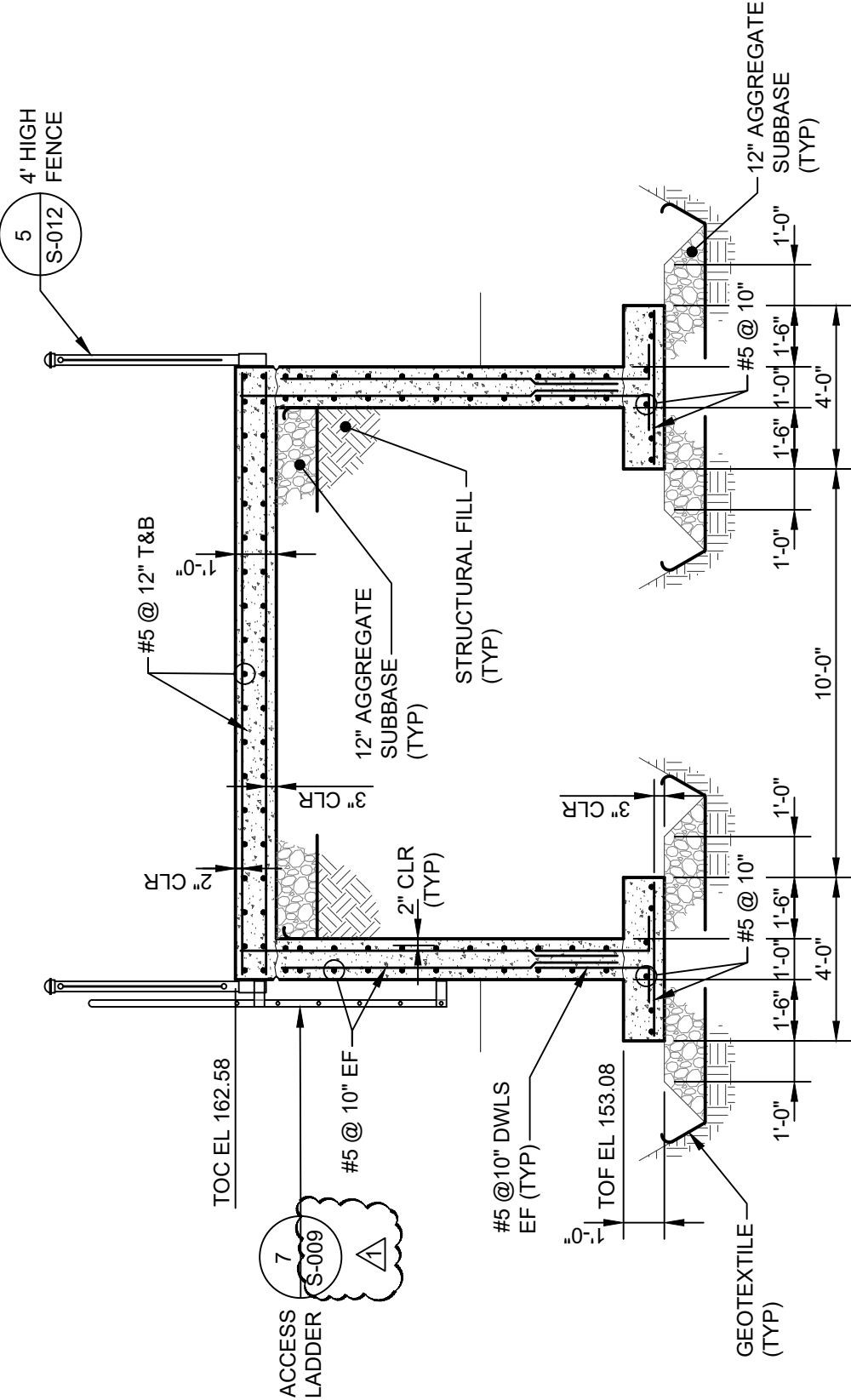
SCALE: 1/4" = 1'-0"



SECTION A

S-009

SCALE: 1/4" = 1'-0"



SECTION B

S-009

SCALE: 1/4" = 1'-0"

SECTION 7

S-009

SCALE: 1/4" = 1'-0"

SECTION C

S-009

SCALE: 1/4" = 1'-0"

SECTION 5

S-012

SCALE: 1/4" = 1'-0"

SECTION 9

S-001

SCALE: 1/4" = 1'-0"

SECTION 11

S-011

SCALE: 1/4" = 1'-0"

SECTION 10

S-011

SCALE: 1/4" = 1'-0"

SECTION 12

S-011

SCALE: 1/4" = 1'-0"

SECTION 13

S-011

SCALE: 1/4" = 1'-0"

SECTION 14

S-011

SCALE: 1/4" = 1'-0"

SECTION 15

S-011

SCALE: 1/4" = 1'-0"

SECTION 16

S-011

SCALE: 1/4" = 1'-0"

SECTION 17

S-011

SCALE: 1/4" = 1'-0"

SECTION 18

S-011

SCALE: 1/4" = 1'-0"

SECTION 19

S-011

SCALE: 1/4" = 1'-0"

SECTION 20

S-011

SCALE: 1/4" = 1'-0"

SECTION 21

S-011

SCALE: 1/4" = 1'-0"

SECTION 22

S-011

SCALE: 1/4" = 1'-0"

SECTION 23

S-011

SCALE: 1/4" = 1'-0"

SECTION 24

S-011

SCALE: 1/4" = 1'-0"

SECTION 25

S-011

SCALE: 1/4" = 1'-0"



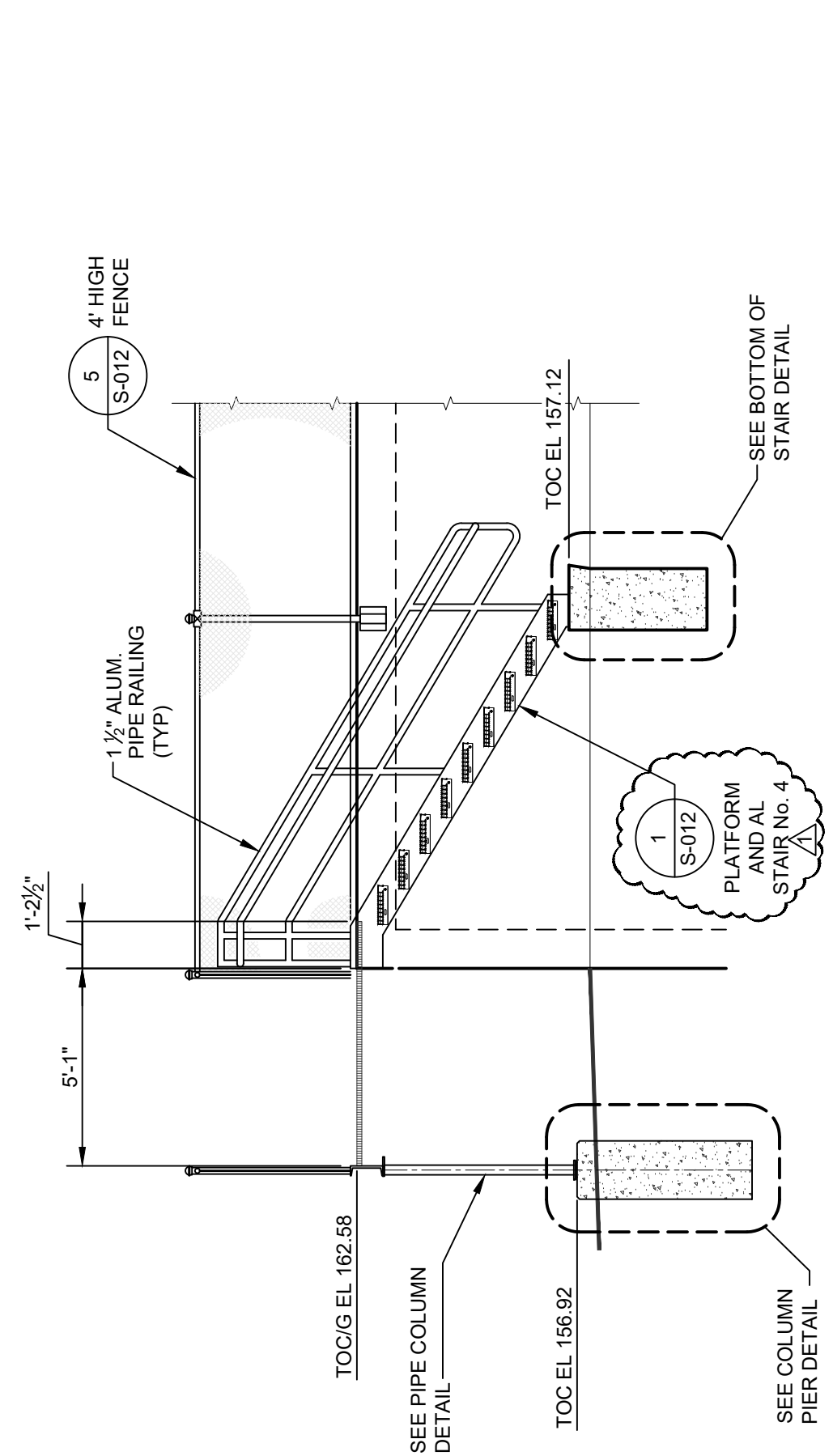
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REVISION NUMBER	DATE	MADE BY	APP'D BY	MSD	ADDENDUM No.	REVISION
1	3/15/24	KAD			3	

RECORD DRAWING CERTIFICATION						
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CONTRACTOR		PROJECT COORDINATOR	
NAME	SIGNATURE	NAME	SIGNATURE
TITLE	TITLE	TITLE	TITLE

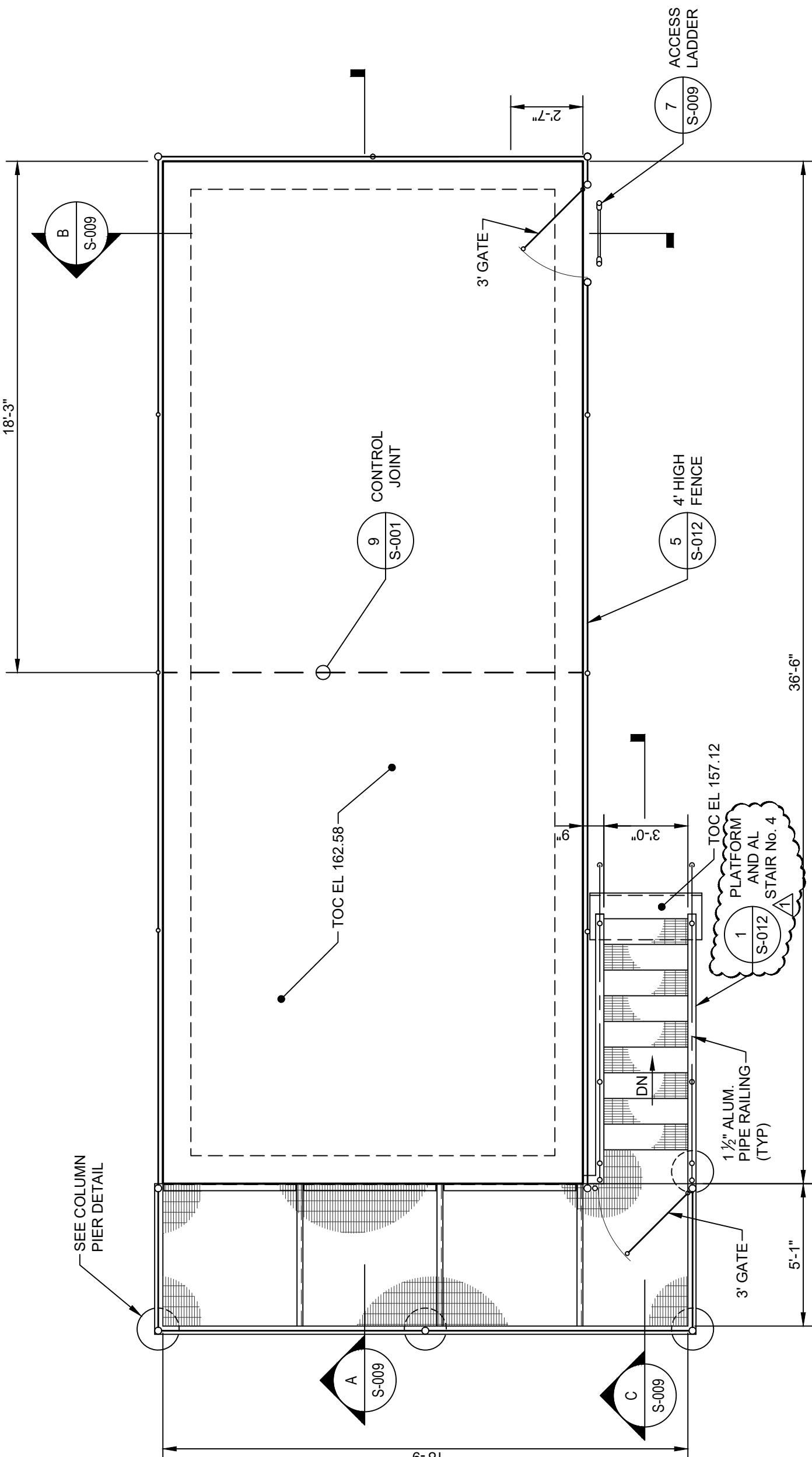
WESTCHESTER COUNTY, NEW YORK DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION DIVISION OF ENGINEERING			
JACKSON AVENUE PUMPING STATION REHABILITATION BRONX VALLEY SANITARY SEWER DISTRICT TOWN OF GREENBURGH, NEW YORK GENERATOR PAD		CONTRACT NUMBER 22-510	SHEET NUMBER S-009
PLANS AND SECTIONS		SHEET NO. 25 OF 55	SCALE: AS SHOWN
DATE: 10/05/2023		REV. NO.	REV.
202-02-S-50-0		1	1



SECTION C

S-009

SCALE: 1/4" = 1'-0"



TOP PLAN

SCALE: 1/4" = 1'-0"

IN CHARGE OF
CHECKED BY
MADE BY

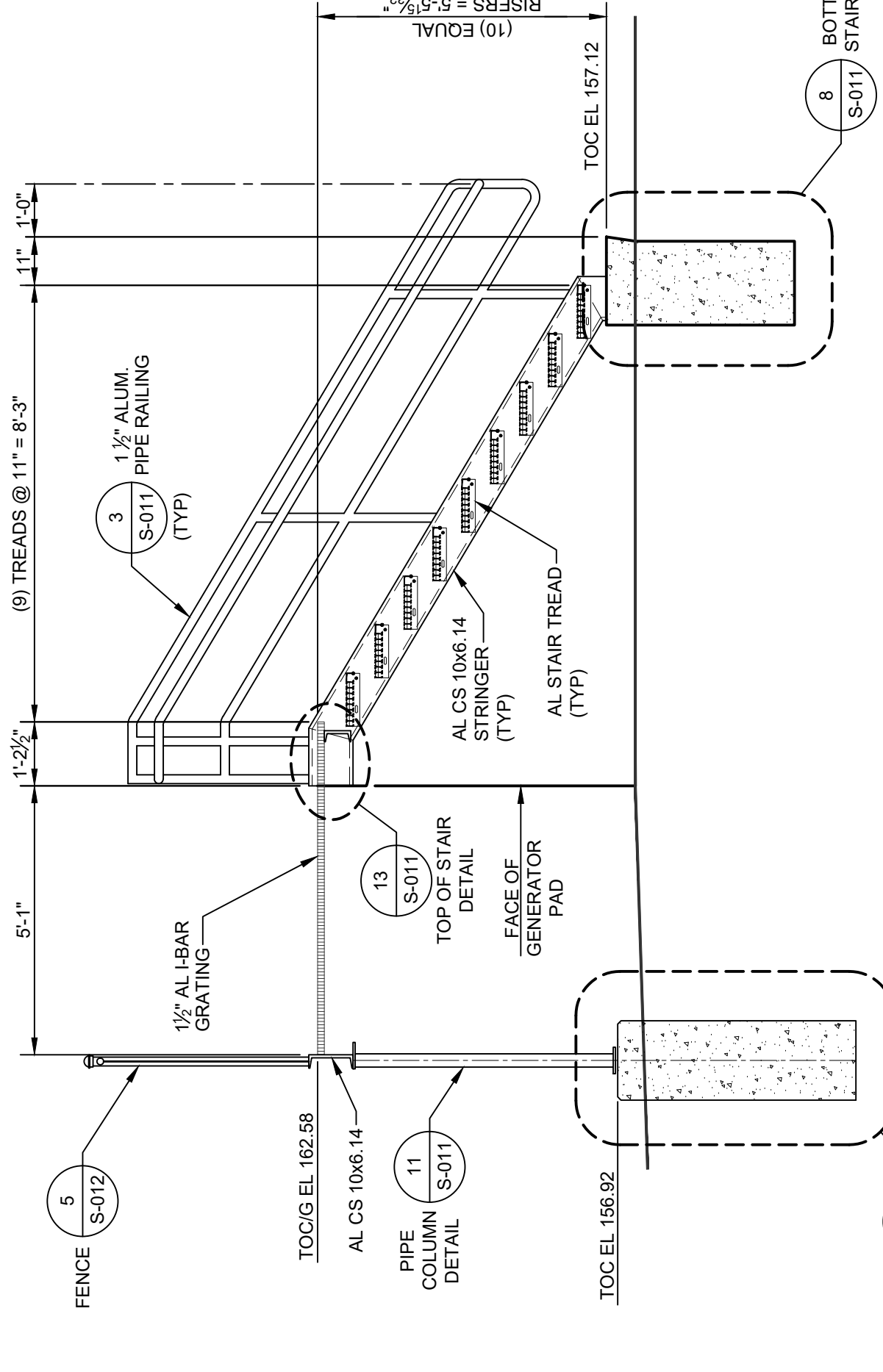
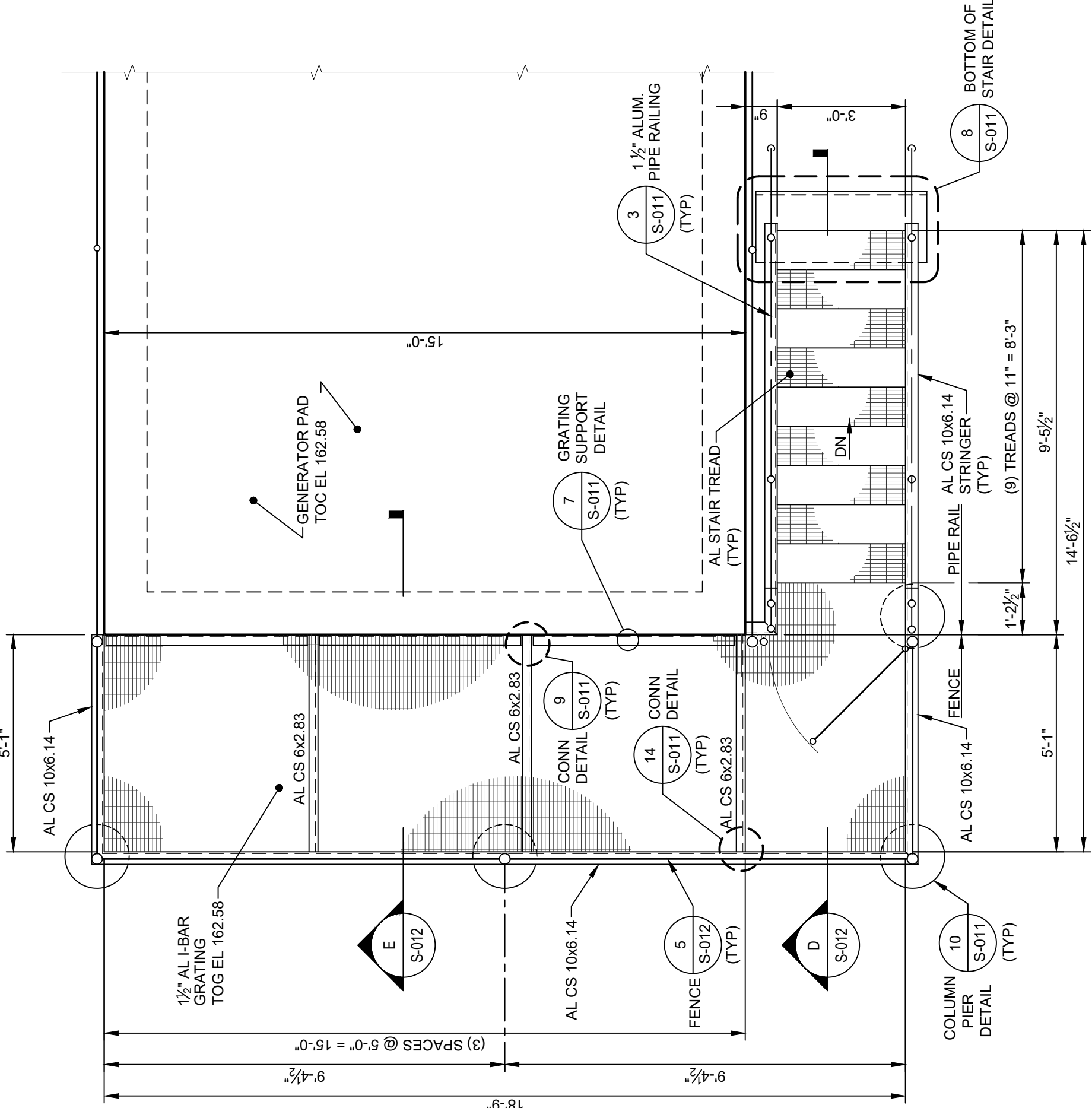
MET
BCS
KAD

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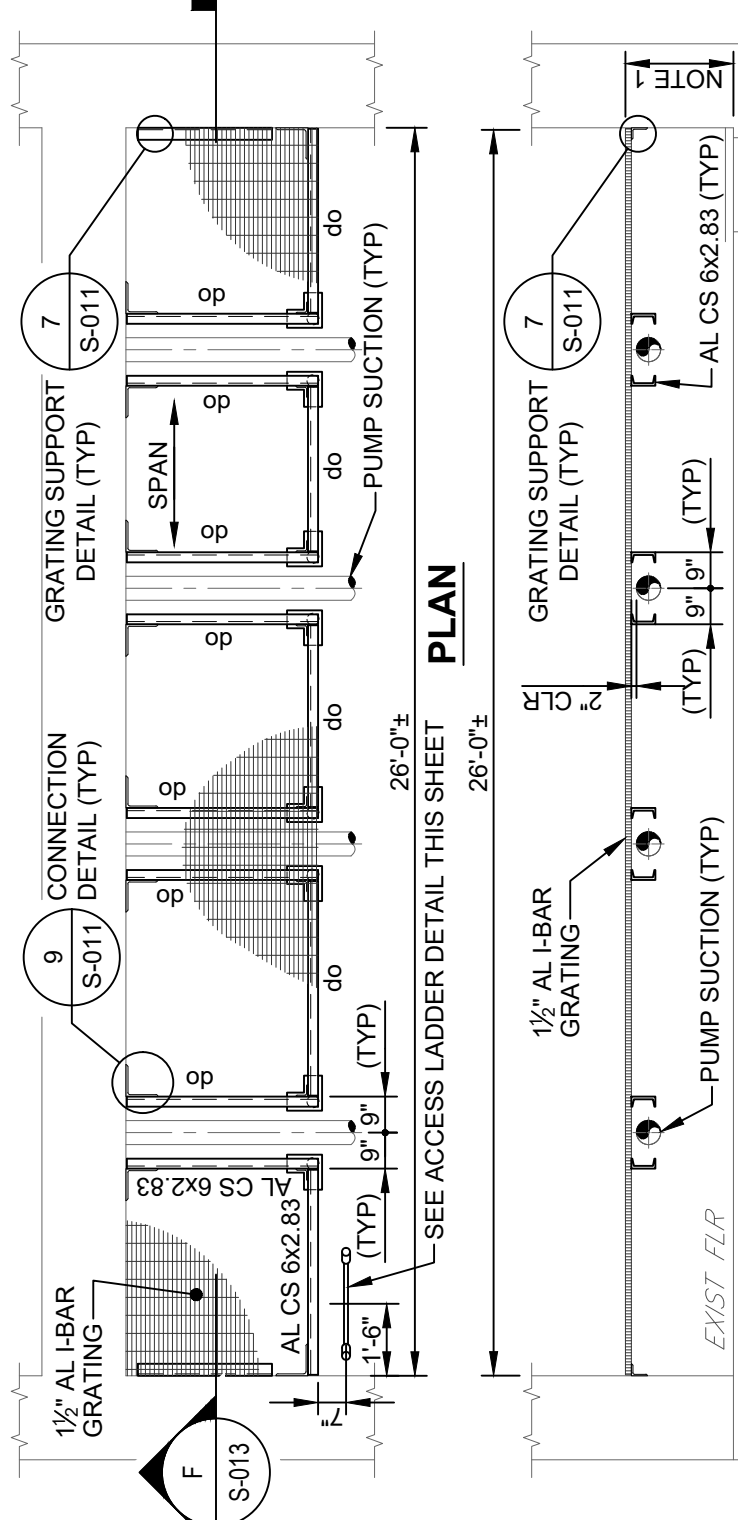
ATTACHMENT 12

ATTACHMENT 13

ATTACHMENT 14

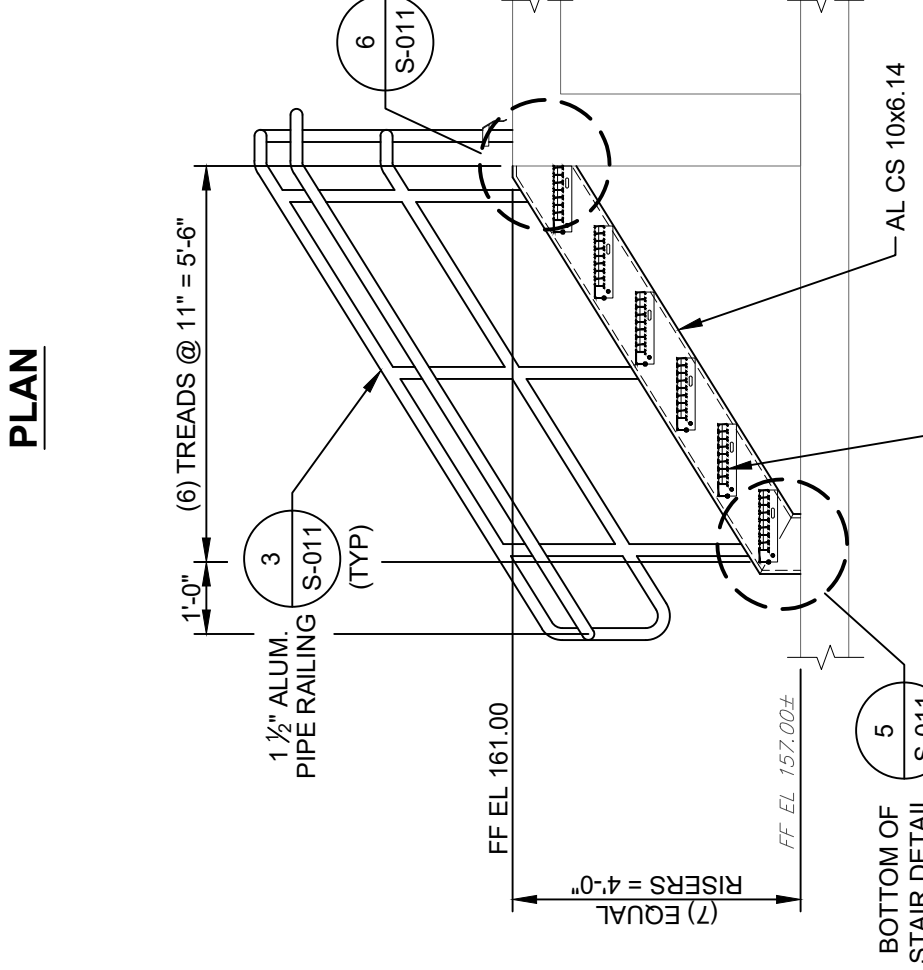
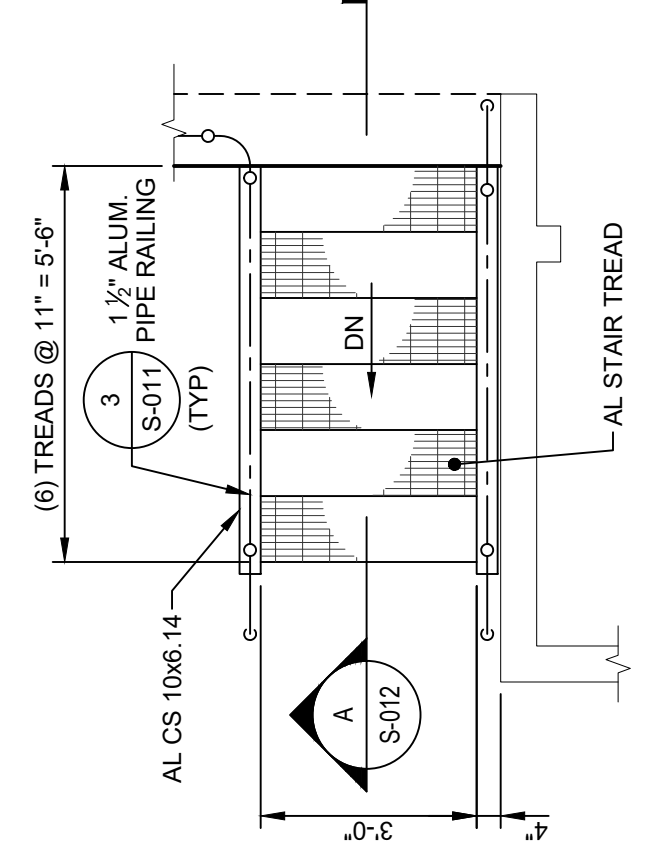


SECTION "D"
GENERATOR PLATFORM & AL STAIR No. 4 DETAIL
Scale: 3/8" = 1'-0"

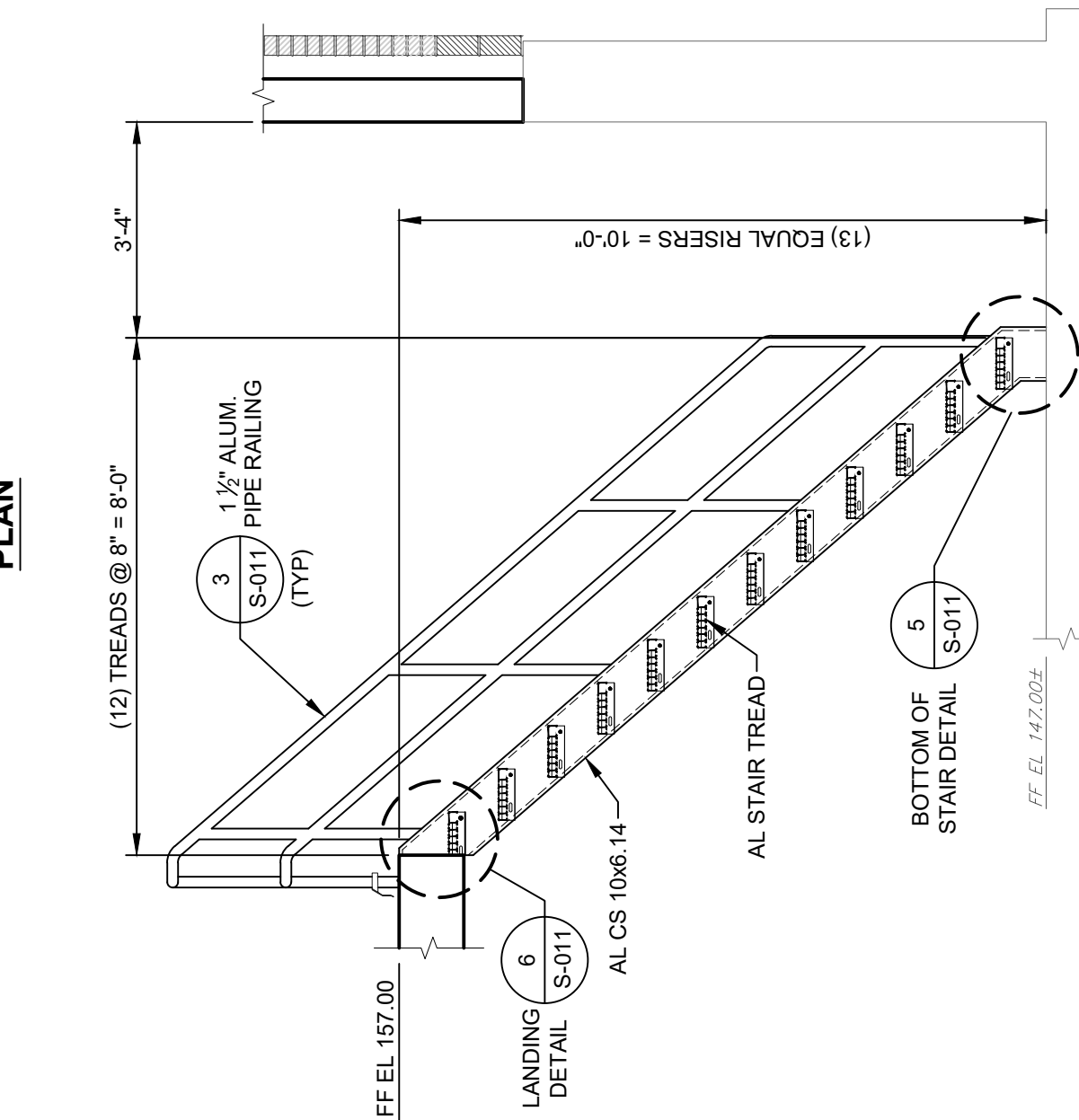
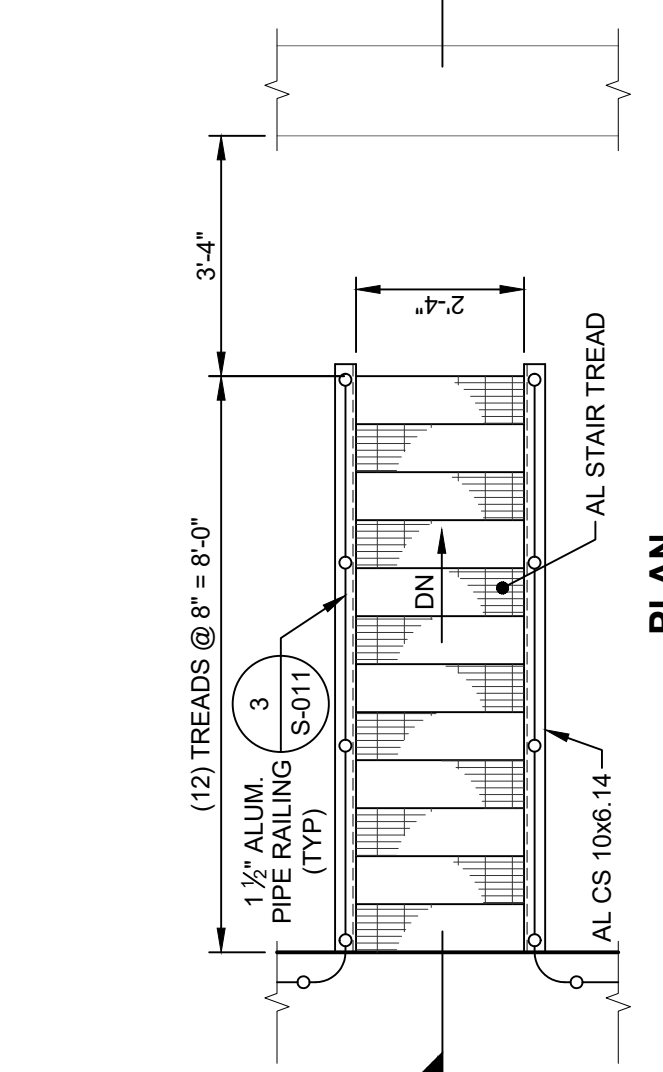


IN CHARGE OF MET
CHECKED BY BCS
MADE BY KAD

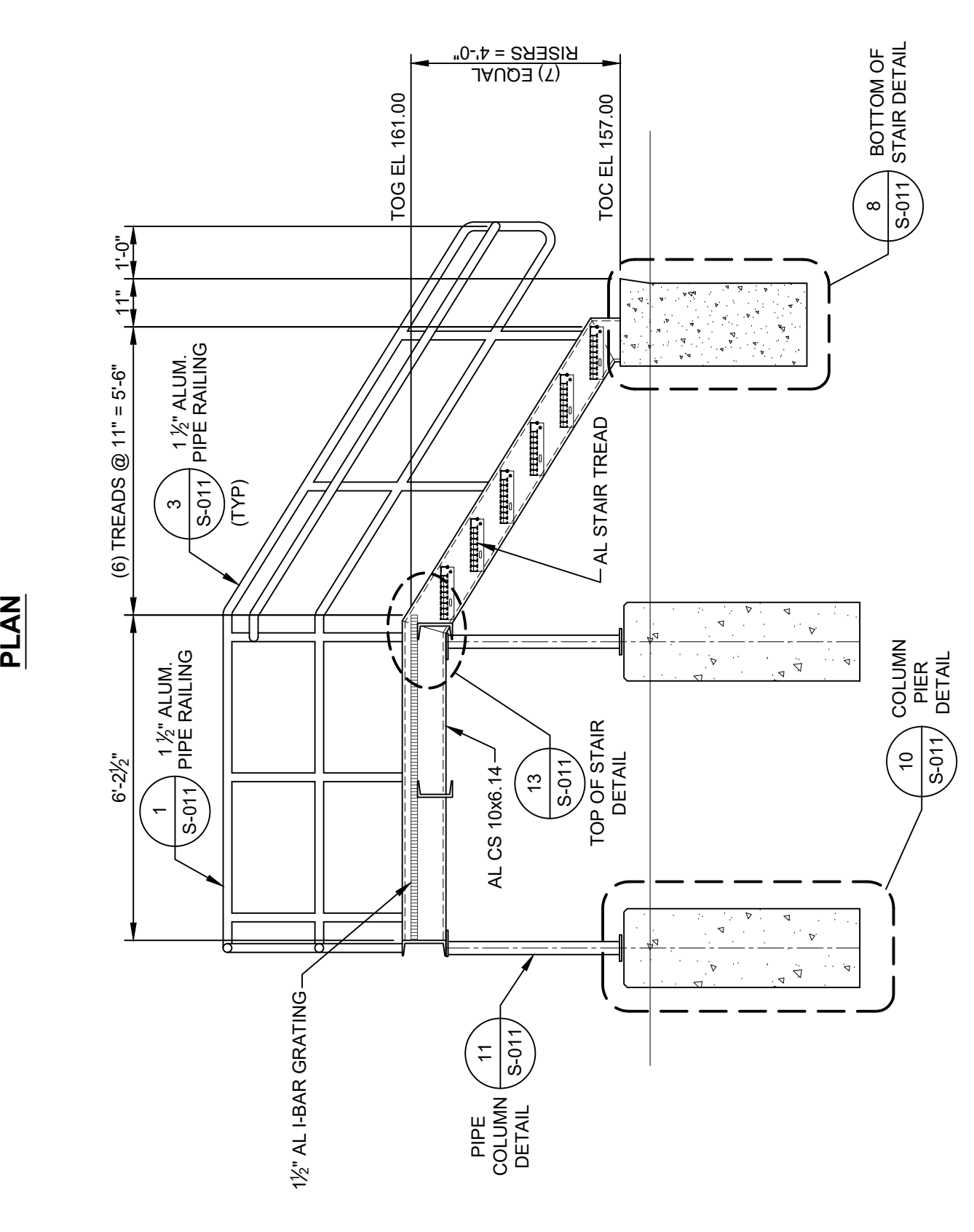
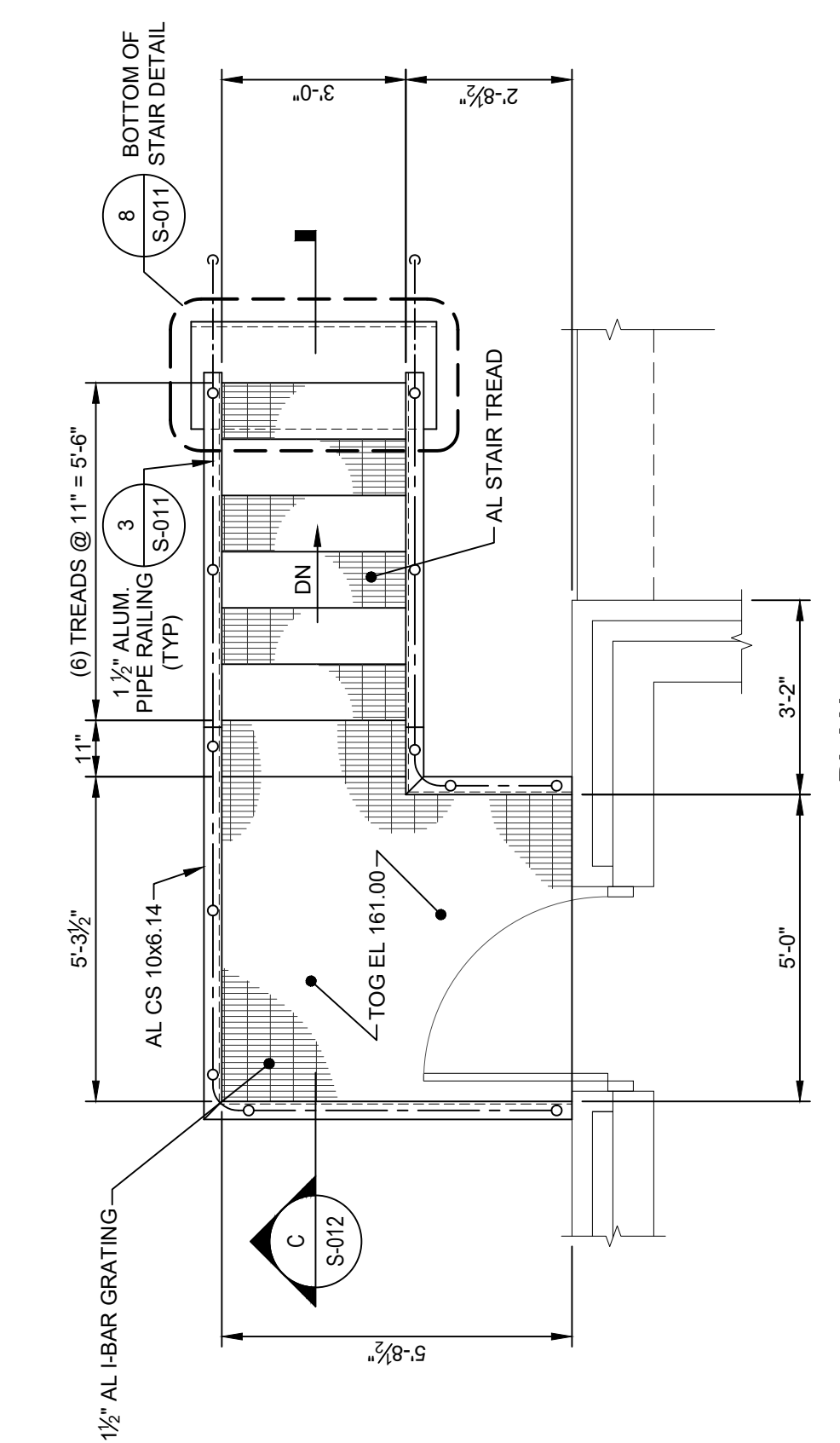
ACCESS LADDER DETAIL
SCALE: 1/4" = 1'-0"



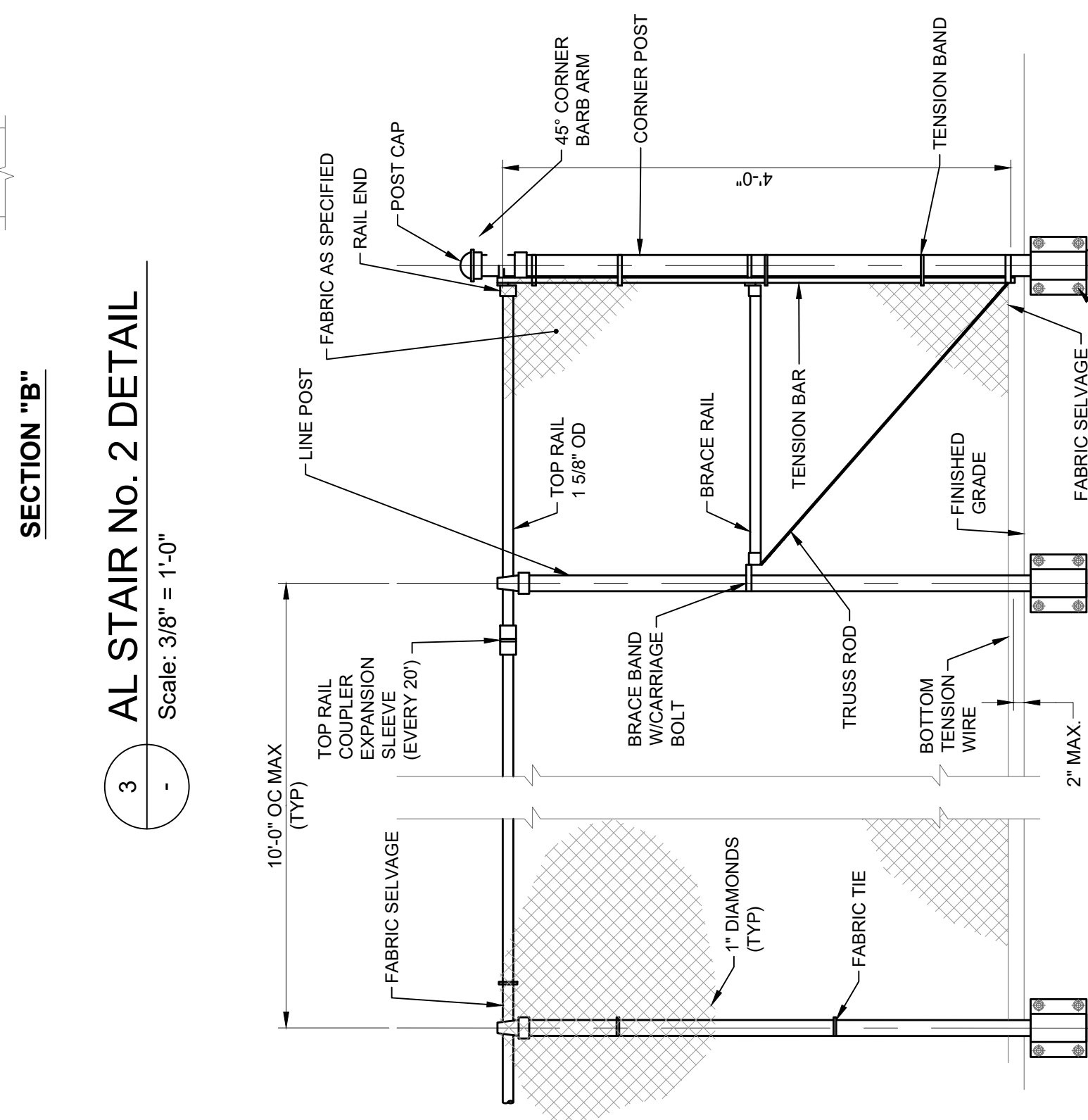
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AL STAIR No. 1 DETAIL
Scale: 3/8" = 1'-0"



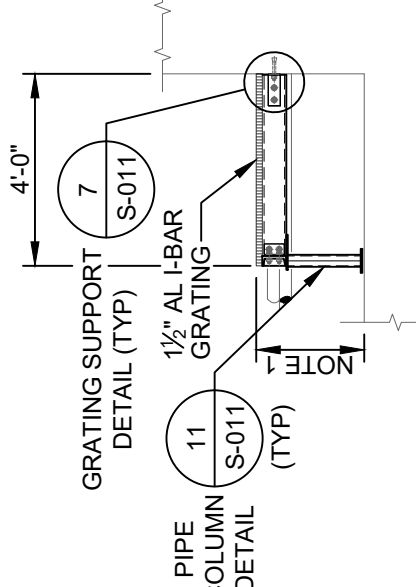
SECTION "B"
AL STAIR No. 2 DETAIL
Scale: 3/8" = 1'-0"



SECTION "C"
AL STAIR No. 3 DETAIL
Scale: 3/8" = 1'-0"



FENCE
Scale: NO SCALE



TYPICAL SECTION
Scale: 1/4" = 1'-0"

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1	3/15/24	KAD			3	

AS BUILT -- CHANGES AS NOTED		RECORD DRAWING CERTIFICATION	
AS BUILT -- NO CHANGES			

NAME	SIGNATURE	NAME	SIGNATURE
CONTRACTOR		PROJECT COORDINATOR	

DATE	TITLE	DATE	TITLE
22-510	S-012	22-510	S-012

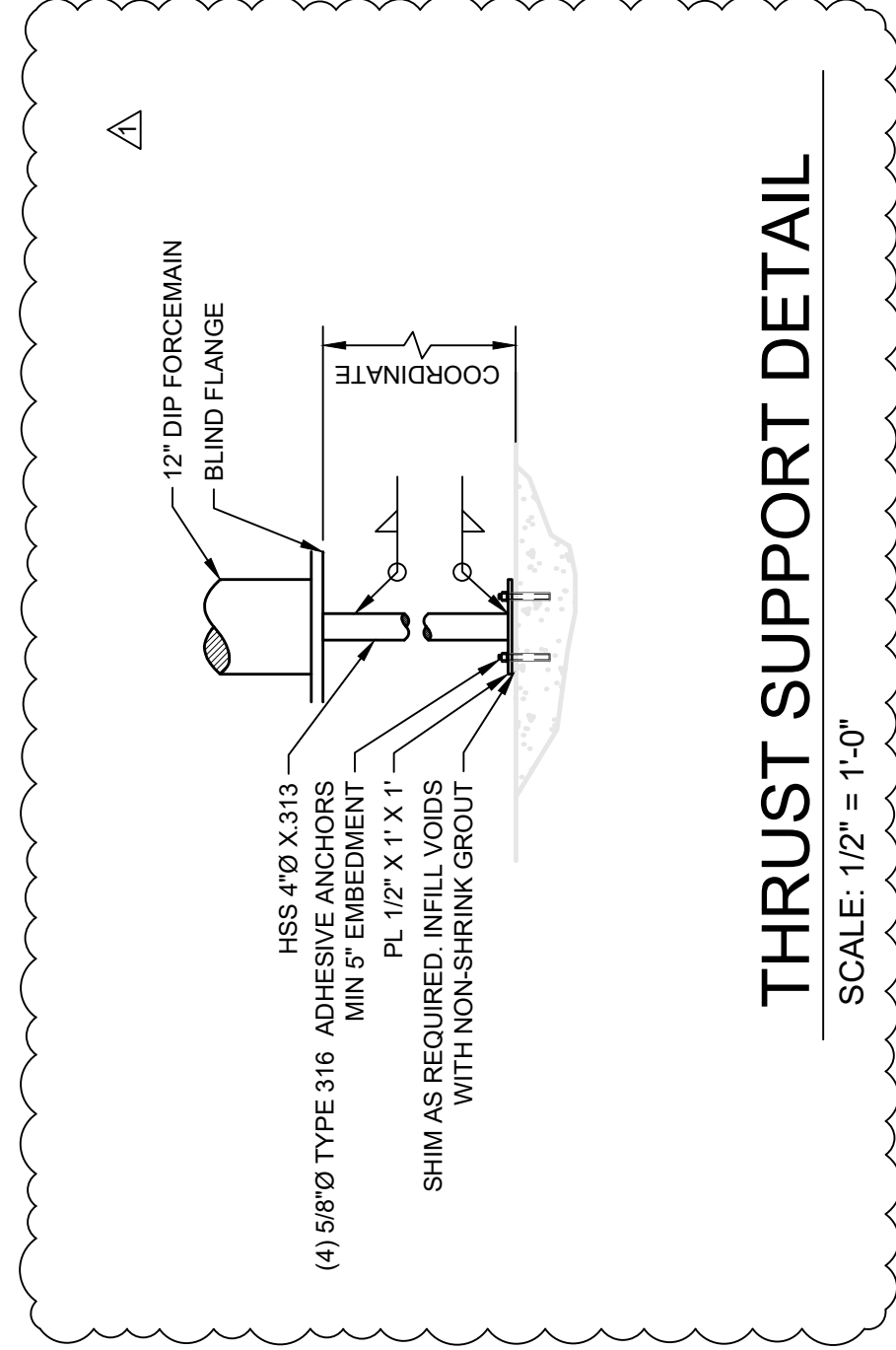
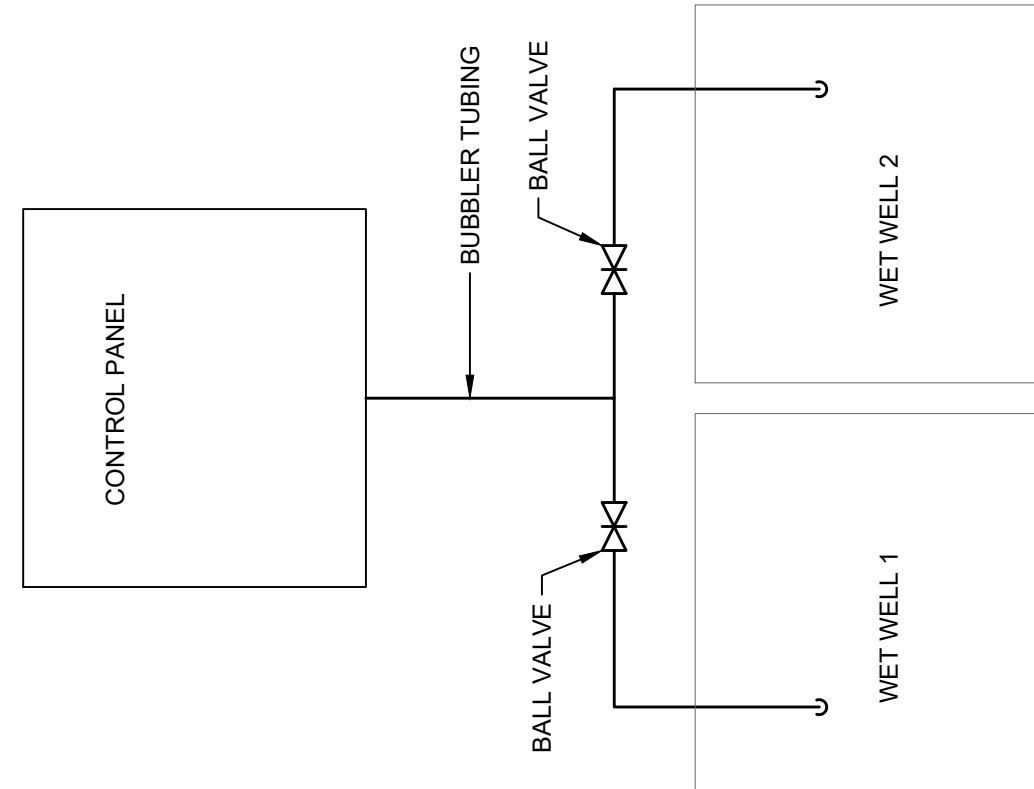
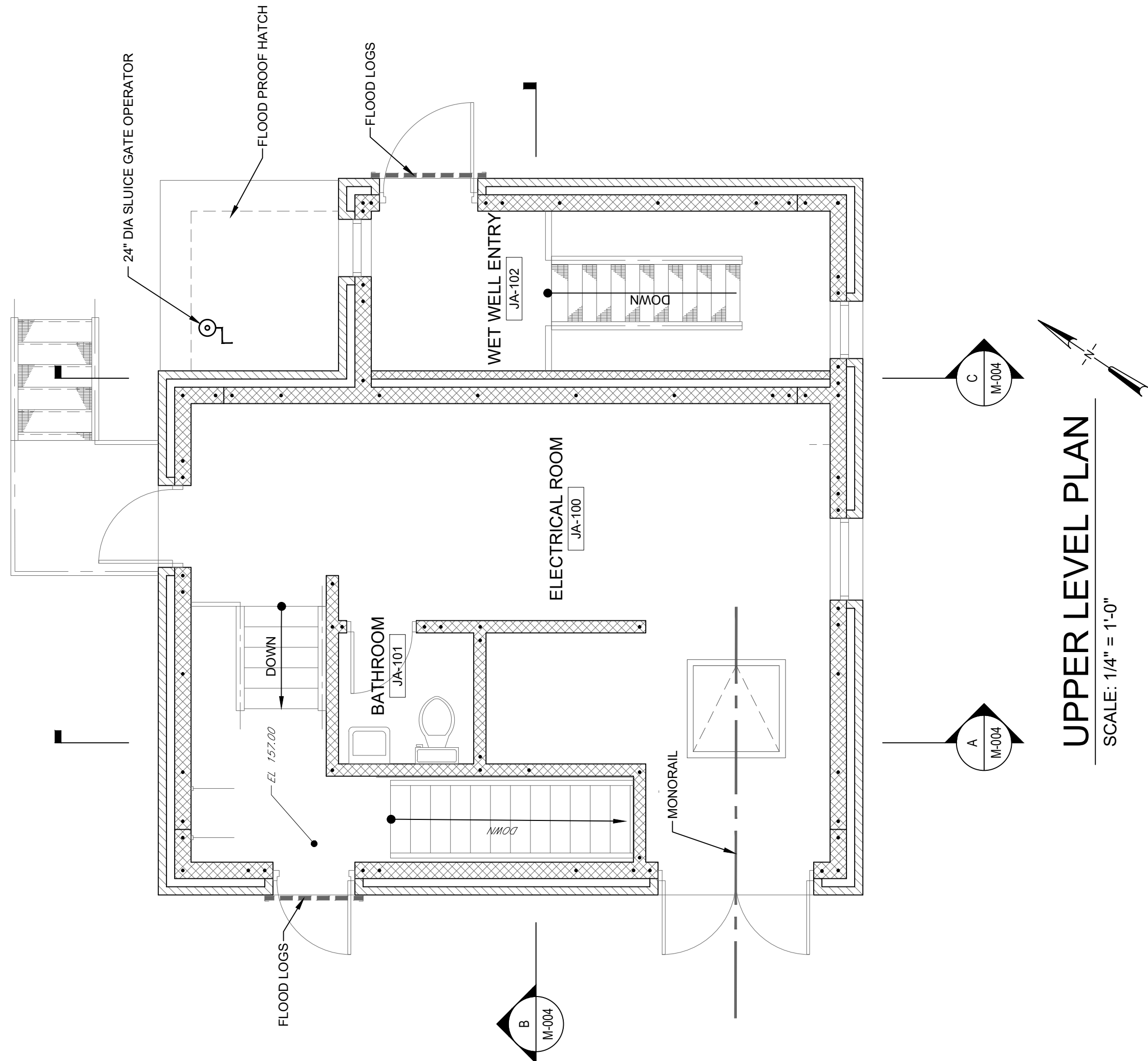
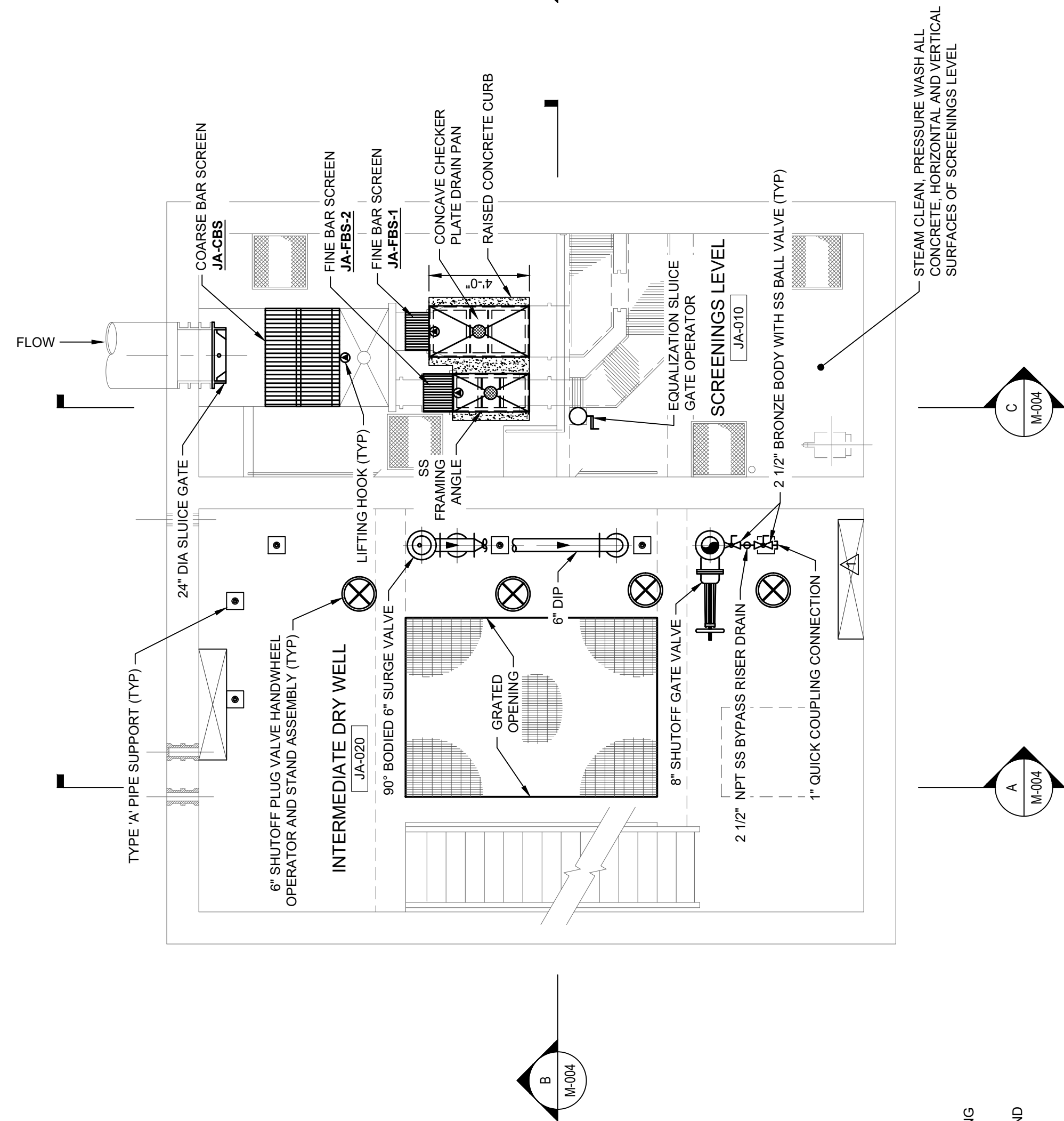
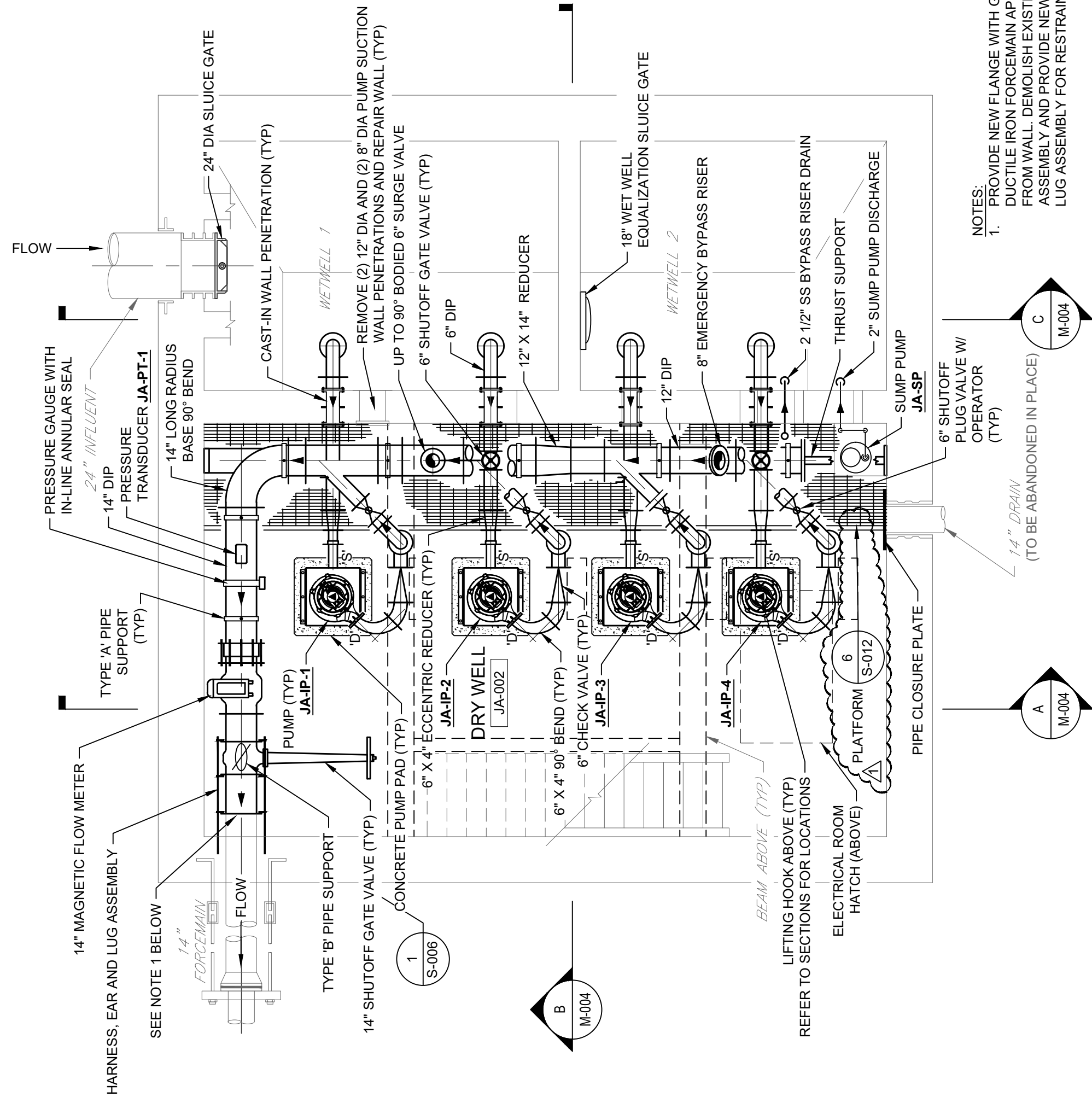
SHEET NO.	28	OF	55
SCALE:	AS SHOWN		
DATE:	10/05/2023		
DPW FILE NO.			
REV. NO.			

JACKSON AVENUE PUMPING STATION REHABILITATION
BRONX VALLEY SANITARY SEWER DISTRICT
TOWN OF GREENBURGH, NEW YORK

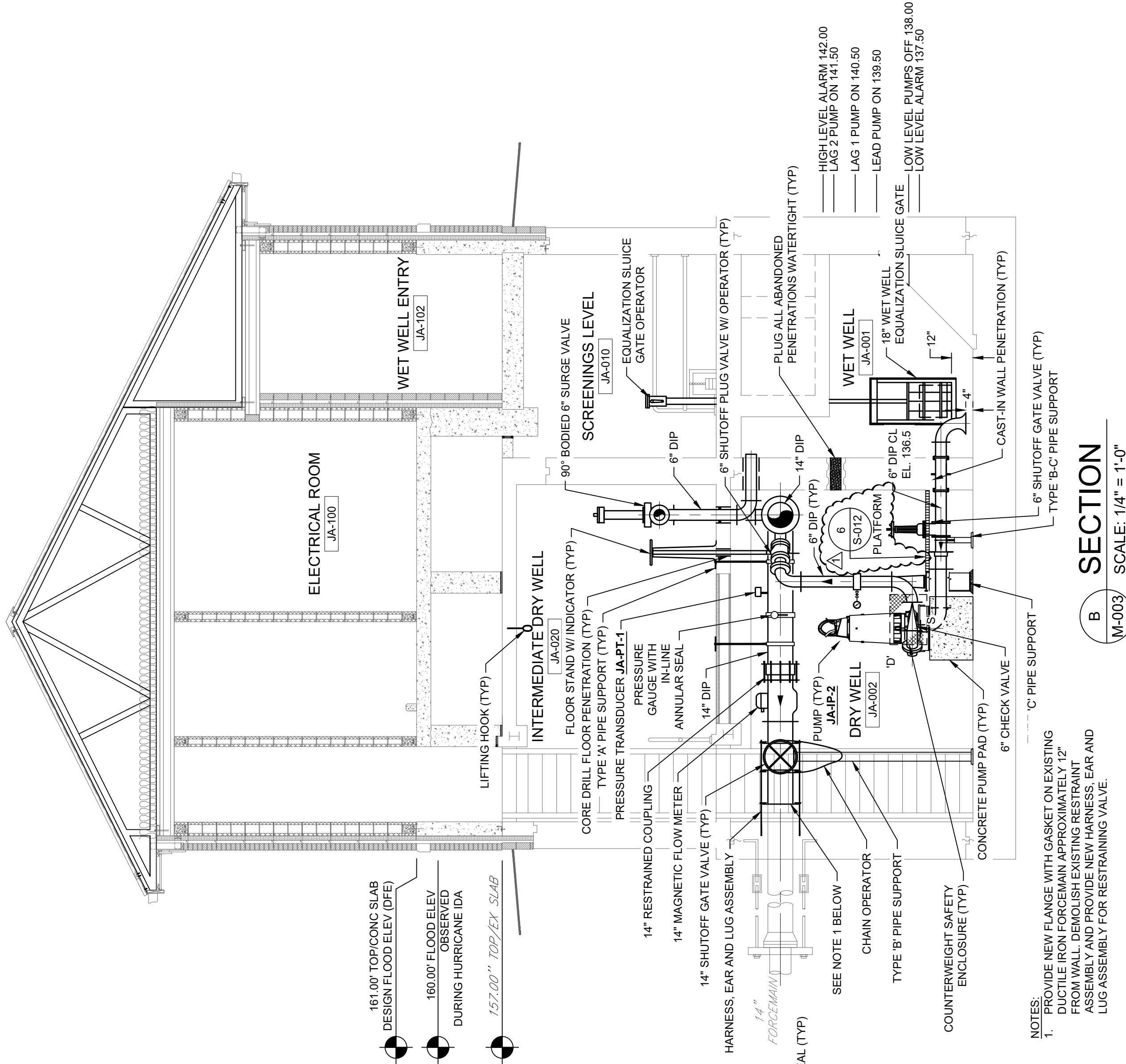
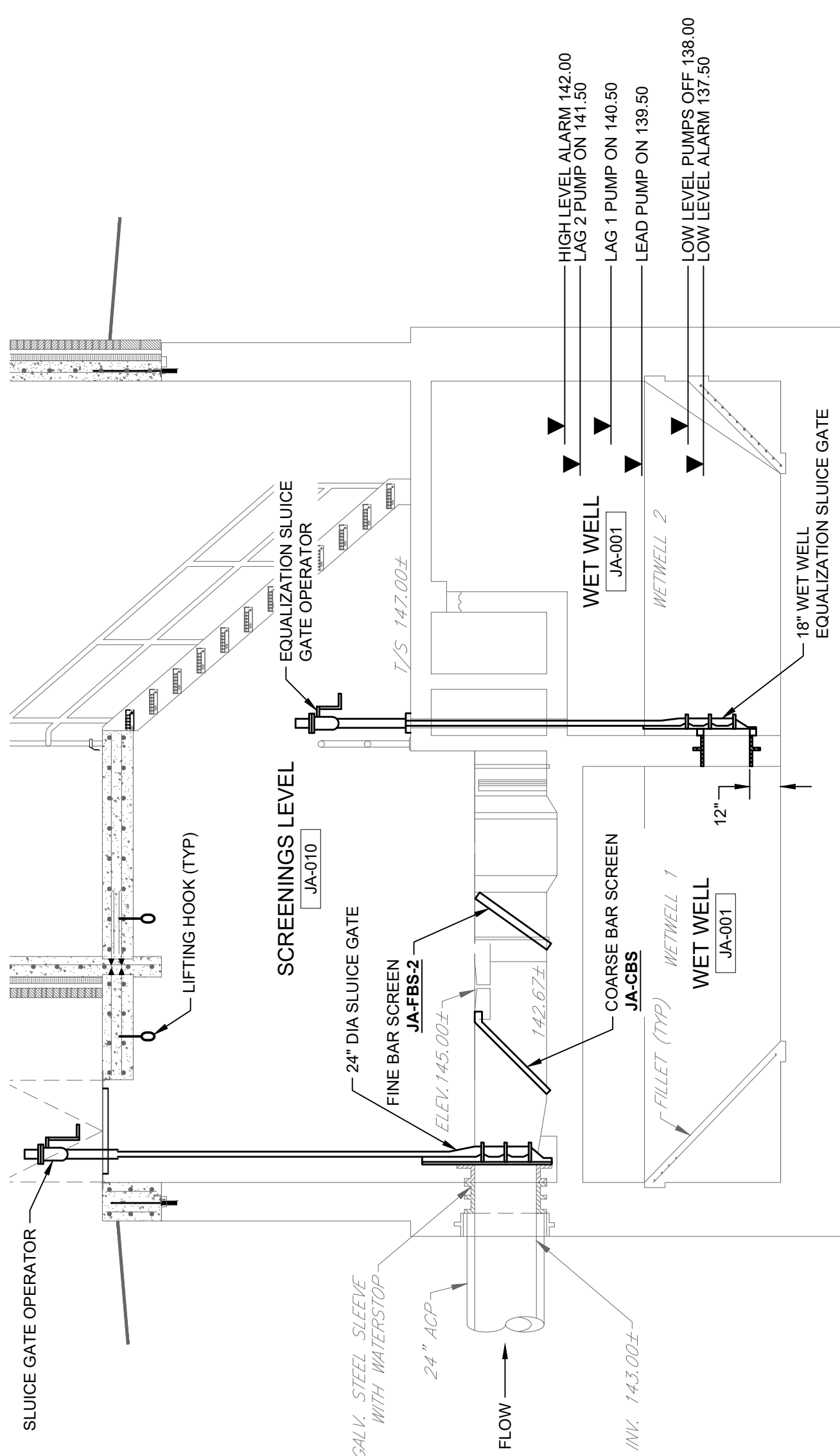
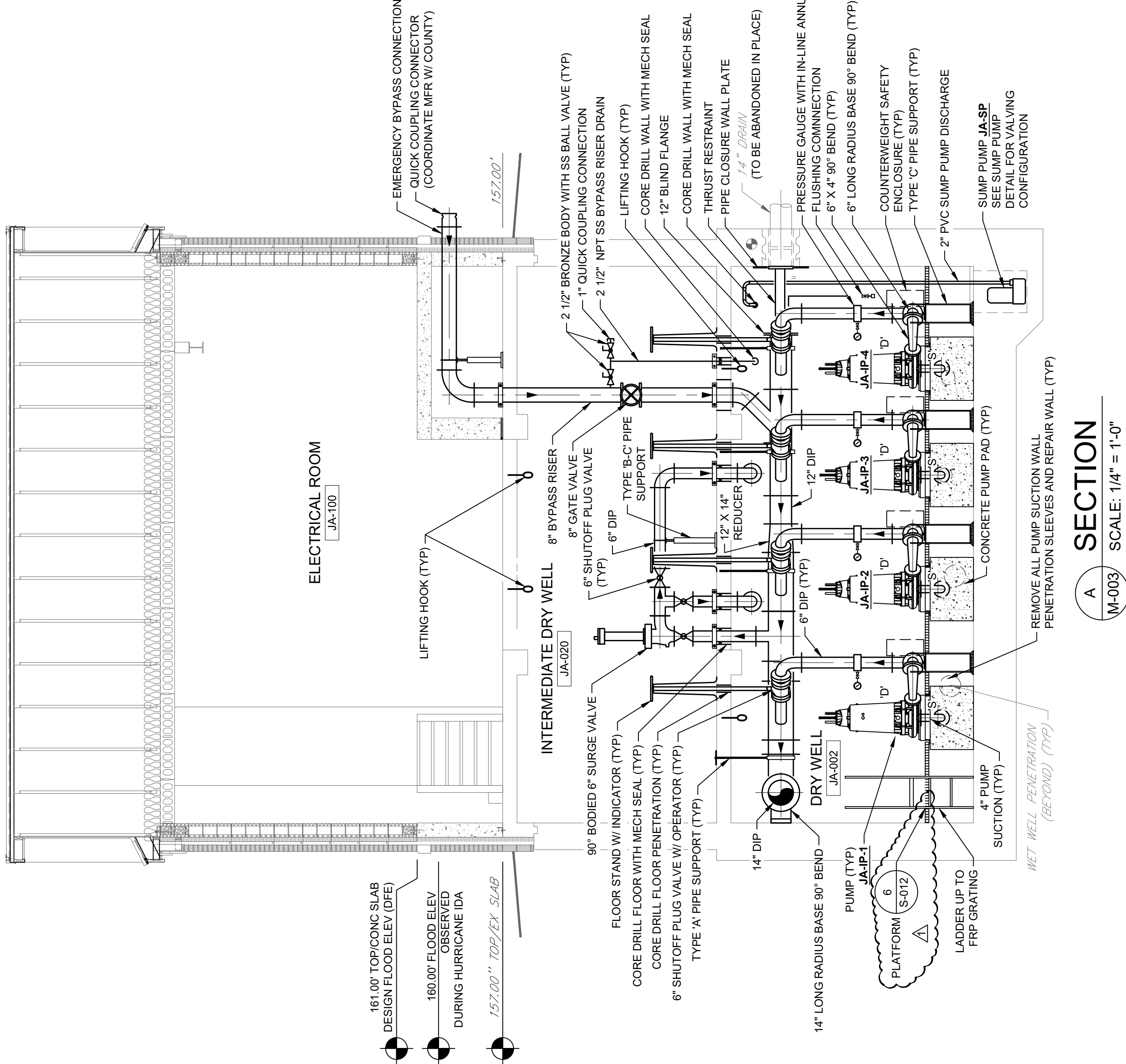
MISCELLANEOUS DETAILS

WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION
DIVISION OF ENGINEERING

ATTACHMENT 15



ATTACHMENT 16



IN CHARGE OF MET
CHECKED BY RS
MADE BY MRY

C
SECTION
M-003
SCALE: 1/4" = 1'-0"

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1	3/15/24	KAD			3

REVISION	RECORD DRAWING CERTIFICATION
AS BUILT -- CHANGES AS NOTED	
AS BUILT -- NO CHANGES	

NAME	SIGNATURE	DATE	TITLE
CONTRACTOR			
PROJECT COORDINATOR			

CONTRACT NUMBER	SHEET NUMBER	SHEET NO.	OF
22-510	M-004	32	55

SCALE: AS SHOWN	DATE: 10/05/2023	REV. NO.
JACKSON AVENUE PUMPING STATION REHABILITATION BRONX VALLEY SANITARY SEWER DISTRICT TOWN OF GREENBURGH, NEW YORK	SECTIONS	202-02-M-57-0 1