

**ADDENDUM #3**Bid Number: #140-2017

Date: October 19, 2017

Subject: West Hickman 7 Wet Weather Storage
Facilities Improvements (Contract No. 2)Address inquiries to:
Brian Marcum
brianm@lexingtonky.gov
(859) 258-3325**TO ALL PROSPECTIVE SUBMITTERS:**

Please be advised of the following clarifications to the above referenced Bid:

1. QUESTIONS

	Questions	Answers
1.	Who confirms MWDBE Certifications? (Pre-bid meeting question)	See WMDBE information in Specification Section 00300-1.22 & 1.24. These forms as well as the EPA forms listed in the Bid Form Section 00410 shall be included in all submitted bids.
2.	What Contractor has responsibility of restoration of Contract No. 1? (Pre-bid meeting question)	See Clarifications Item D. below for an explanation.
3.	Does Contract No. 1 have access thru the Pump Station site? (Pre-bid meeting question)	No, Contract No. 1 access on the Wet Weather Pump Station site is off of the exit ramp from New Circle Road.
4.	Are local permits required? (Pre-bid meeting question)	Yes. See Sheet 00G-03 Permits for a list of local permits.
5.	Can an estimate of construction cost be provided? (Pre-bid meeting question)	No
6.	Is the KYTC permit available for Contract No. 2? (Pre-bid meeting question)	KYTC permit was provided in Addendum No. 2.
7.	Does Contract No. 1 Contractor have use of Contract No. 2 site?	Contract No. 1 will not have the use of Contract No. 2 site except for material storage and/or construction staging. Both Contracts require Engineer approved submittals for these locations.
8.	In hardware sets specified it indicates that locking of doors will be by padlock.	Door hardware sets in Section 08710 are revised as indicated below.



9.	Doors leading from Electrical Room PSB-4 and STB-4 do not show panic hardware.	Revisions to the hardware set in Section 08710 are revised to add panic hardware as shown in Section 08710 below.
10.	Will the owner be purchasing the chemicals for the demonstration period?	See response in Specification Section 13209 Chemical Feed System revision below.
11.	Is the Generator Pad in Storage Tank Building's to be at a 1'-0" higher elevation than the rest of the slab like as specified on the Pump Station?	No
12.	The SOG @ Elev 997.5 in the Storage Tank Building is not specific on the reinforcing. Please clarify that you would like #4 each way?	Information is provided concerning reinforcing. See revised Sheets.
13.	Please provide details for the Reinforcing and Thickness of the 4'-0" Containment Wall around the Chemical Storage Tank and the Chemical Fill Containment Box?	Details are added for the Containment Wall and Chemical Fill Containment Box. See revised Sheets.
14.	What stone profile are we expected to install under the slab on grade of the Storage Tank? Per structural general note G4.4 calls for 4" of sand and 8" of #57 stone. Note 4 on drawing 02D-01 calls for 12" of No. 2 stone and 4" of #57 stone. Please clarify.	The Wet Weather Storage Tank foundation shall follow the Notes listed on Sheet 02D-01.
15.	The top of bedrock elevation of 972.2' shown in section on Sheet 02S-03 appears in error. In reviewing the Geotech Report, the elevation of bedrock is this location should be +/- 989.0. Please review and confirm our findings to be correct.	Note in question is revised. See revised Sheet.
16.	Drawing 02S-01 and 02S-03 details a top of footer at 993.33 for the storage tank building foundation. Drawing 02D-12 details the 20" odor control piping and 8" air piping penetrating the concrete foundation walls at centerlines of 992.67 and 993.00. Drawing 02S-01 does not indicate any stepped footings or changes in footing elevations and wall heights. Is the intent to step the south footers down to an elevation to allow for these piping penetrations?	Detail/note added for requirements of pipe passing through footer. See revised Sheet.



17.	Drawing 02D-12 details the 6" drain in the odor control and chemical fee rooms as being ductile. Drawing 02P-01 details the drain piping as 4" with specification 15410 detailing the pipe as cast iron. Please clarify which drawing is correct.	The drain lines shall be 6" and ductile iron. Sheet 02P-01 will be revised. See attached.
18.	Will the owner be purchasing the chemicals for the demonstration period?	Contractor shall purchase chemicals. See revised Section 13209 language below.
19.	Jet Aeration System – I would ask that you consider including Fluidyne Corporation.	This equipment will be reviewed for consideration on a future project. The approved Jet Mixing System manufacturers for this project are Evoqua Jet Tech, KLA & Mass Transfer as listed on Specification Section 0041-0, page 32.
20.	Interior tank coatings – Specification 13200 paragraph 2.11 B indicates to coat the interior of the tank with two coats of Tnemec Potapox. What surfaces require coating? Floor, wall, and underside of dome?	The requirement of coating the interior of the tank will be removed from the specifications. See below.

2. CLARIFICATIONS

- A. Construction is scheduled to be completed by December 31, 2018. This is revised from Addendum #2.
- B. No signature is required for Addendum No. 1. A clarification was made to the bid notification form issued on Ionwave, the software identifies any changes as addenda, therefore this clarification was identified as Addendum No.1 although it was not a change to the issued plans and specifications therefore no signature is required.
- C. Final restoration shall follow Non-pavement Site Restoration as shown on Sheet 00G-04. This includes the use of a Rock Rake. Final payment shall not be made until completed.
- D. The Land Disturbance Permit (LDP) and the Erosion and Sediment Control (ESC) plan and approvals for Contract No. 1 shall be assigned to the Contract No. 2 Contractor upon mobilization of Contract No. 2 Contractor. Contract No. 2 Contractor shall maintain all ESC controls from mobilization to completion of Contract No. 2. Restoration requirements for Contract No. 2 Contractor shall include the entire Wet Weather Pump Station site including those areas disturbed by Contract No. 1 and the gravel areas on the right-of-way of New Circle Road exit ramp. This will allow Contract No. 2 Contractor to reuse the construction entrance off of the exit ramp. Pavement restoration will be the responsibility of the Contractor that created the damage.



2. DRAWINGS

- A. Sheet 01D-01, Pump Station Upper Floor Plan, the **Floor Plan** shall be revised to add a pre-filter for the odor control system, revise odor control piping size, and add a floor drain at the odor control pre-filter. See Attached.
- B. Sheet 01D-02, Pump Station Lower Plan, the **Lower Plan** shall be revised to identify the change in odor control piping size. See Attached.
- C. Sheet 01D-03, Pump Station Section, **Section 1** shall be revised to identify the change in odor control piping size. See Attached.
- D. Sheet 01D-04, Pump Station Sections, **Section 1 and 2** shall be revised to add a pre-filter for the odor control system, revise odor control piping size, and add a floor drain. See Attached.
- E. Sheet 02D-11, Storage Tank Building Floor Plan, the **Floor Plan** shall be revised to add a floor drain at the pre-filter and a containment wall around the chemical storage tanks. See Attached.
- F. Sheet 02D-12, Storage Tank Building, **Section 1** shall be revised to add a floor drain at the odor control pre-filter. See Attached.
- G. Sheet 00S-04, Pump Station/Storage Tank Structural Standard Details, **Detail 4 Lintel Schedule** was revised. See Attached.
- H. Sheet 01S-02, Pump Station, Upper Foundation Plan, Plan and Key Notes were revised. See Attached.
- I. Sheet 02S-01, Storage Tank Building Foundation Plan, Plan and Key Notes were revised. See Attached.
- J. Sheet 02S-03, Storage Tank Building Sections, **Section 1** note and **Section C Typical Detail Bean/Footing Step Detail** was revised or added. See Attached.
- K. Sheet 02S-04, Mixing Pump Station Plans and Sections, the **Upper Plan** shall be revised to identify the correct reference. See Attached.
- L. Sheet 03A-02, Building Details and Schedules, **Door and Frame Schedule** and **Room Finish Schedule** note is revised concerning hardware material. See attached.
- M. Sheet 01P-01, Pump Station Building Plumbing Plan, shall be revised to add an equipment drain and revise the main sanitary line to 6". See Attached.
- N. Sheet 02P-01, Storage Tank Building Plumbing Plan, shall be revised to add an equipment drain and revise the main sanitary line to 6". See Attached.
- O. Sheet 03P-01, Plumbing Details, Legend and Schedules, Note 18. is revised to provide for ductile iron versus cast iron piping. See Attached.

**3. SPECIFICATIONS**

- A. Section 00410, Bid Form, **West Hickman 7 WWS (Contract No. 2) Equipment Manufacturer (Circle one) – Bid Basis** page 00410-32 item Odor Control Absorber shall be revised to remove Pure Air Filtration and Other (list), and add Evoqua. Attached is revised page 00410-32.
- B. Section 00890, Permits. Add Kentucky Division of Water stream crossing permit dated October 16, 2016. See attached.
- C. Section 02531, Sewage Force Mains, Part 2 - Products, Subpart 2.01 **Polyvinyl Chloride (PVC) Plastic Pressure Pipe** and 2.02 **Restraint Devices for Polyvinyl Chloride Plastic (PVC) Pipe** shall be deleted.
- D. Section 05530, Grating and Floor Hatches, Part 2 – Products, Paragraph 2.03 **Materials** shall be revised by adding Paragraph C. Safety Grates as follows:

“C. Safety Grates:

- 1. Safety grates shall be designed to meet OSHA standards for rigid fall through protection.
- 2. Grates shall be aluminum rated to withstand a live load of 300 pounds per square foot locked separately from the main hatch.
- 3. All hardware shall be stainless steel and flush mounted.
- 4. Contractor to coordinate all required opening hatch sizes to accommodate the Safety Grates and allow pump and valve removals.”

- E. Section 08710, Finish Hardware, Part 3 – Execution, Subpart 3.03 **Hardware Schedule**, Paragraph D. shall be deleted and replaced as follows:

“D. Acceptable Manufacturers: The numbers given in the schedule are of the following first listed manufacturers.

HARDWARE SET #1

DOORS# PS-7, ST-4

6 HINGES	BB1191 NRP 4.5 X 4.5	626	HAGER
1 FLUSH BOLT	FB458 12" (TOP)	26D	IVES
1 LOCKSET	ML2065 CSA M26 SA114 CL6	626	CORBIN



1 LOCK CORE	8000
2 CLOSERS	D4551 HCS
1 THRESHOLD	425HD 72"
2 SWEEPS	92TWHA 36"
1 DRIP	16A 76"
1 SET SEALS	5050CL 21'
ASTRAGAL BY DOOR MANUFACTURER	

626	CORBIN
689	STANLEY
AL	NGP
AL	NGP
AL	NGP
CL	NGP

HARDWARE SET #2

DOORS# PS-9, ST-5

3 HINGES	BB1191 NRP 4.5 X 4.5
1 LOCKSET	ML2065 CSA M26 SA114 CL6
1 LOCK CORE	8000
1 CLOSER	D4551 HCS
1 THRESHOLD	425HD 36"
1 SET SEALS	5050CL 20'

626	HAGER
626	CORBIN
626	CORBIN
689	STANLEY
AL	NGP
CL	NGP

HARDWARE SET #3

DOORS# PS-1, PS-10, ST-1, ST-8

3 HINGES	BB1191 NRP 4.5 X 4.5
1 LOCKSET	ML2065 CSA M26 SA114 CL6
1 LOCK CORE	8000
1 CLOSER	D4551 HCS
1 THRESHOLD	425HD 36"
1 SWEEP	92TWHA 36"
1 DRIP	16A 40"
1 SET SEALS	5050CL 20'

626	HAGER
626	CORBIN
626	CORBIN
689	STANLEY
AL	NGP
AL	NGP
AL	NGP
CL	NGP

HARDWARE SET #4

DOORS# PS-6, ST-10

3 HINGES	BB1191 NRP 4.5 X 4.5
1 EXIT DEVICE	2108 4908B S458
1 CYLINDER	3080 178

626	HAGER
626	PHI
626	CORBIN



1 LOCK CORE	8000	626	CORBIN
1 CLOSER	D4551 HCS	689	STANLEY
1 THRESHOLD	425HD 36"	AL	NGP
1 SWEEP	92 TWH 36"	AL	NGP
1 DRIP	16A 40"	AL	NGP
1 SET SEALS	5050CL 20'	CL	NGP

HARDWARE SET #5

DOORS# PS-5, ST-3

6 HINGES	BB1191 NRP 4.5 X 4.5	626	HAGER
1 FLUSH BOLT	FB458 12" (TOP)	26D	IVES
1 EXIT DEVICE	2308 M4908B S982	626	PHI
1 CYLINDER	1080 112 A02	626	CORBIN
1 LOCK CORE	8000	626	CORBIN
2 CLOSERS	D4551 HCS	689	STANLEY
1 THRESHOLD	425HD 72"	AL	NGP
2 SWEEPS	92 TWH 36"	AL	NGP
1 DRIP	16A 76"	AL	NGP
1 SET SEALS	5050CL 21'	CL	NGP

ASTRAGAL BY DOOR MANUFACTURER"

F. Section 10210, Metal Wall Louvers, Part 2 – Products, Subpart 2.01 **Manufacturers**, Paragraph B. shall be revised to include Greenheck as an acceptable alternate manufacturer.

G. Section 13200, Prestressed Concrete Storage Tank, Part 2 – Products, Paragraph 2.11 **Coatings**, subparagraph A. and B. shall be deleted and replaced with A. only as follows:
(Coating of the tank interior is not required)

"A. Exterior coating system shall consist of the following:

1. One coat of cementation waterproofing (Thoroseal) and Two coats (4 – 6 mils per coat) Tnemec Series 156 Enviro-Crete Modified Waterborne Acrylate, The Sherwin-Williams Company Loxon or Loxon XP, or approved equal.
2. Color shall be determined by the Engineer and Owner.



- H. Section 09961, **High Performance Paints and Coatings – Wastewater** shall be deleted in its entirety and replaced. See Attached.
- I. Section 13209, Chemical Feed System, Part 1 – General, Subpart 1.1 **Work Included**, Paragraph C. shall be added as follows:
 - “C. The Contractor shall provide 200 gallons of chemical (100 gallons in each 3,000 gallon tank) to be used for testing of all chemical odor control equipment which shall be included in the bid price. The cost of topping off the two (2) 3,000 gallon chemical tanks will be covered through LFUCG’s chemical vendor contract once the equipment has passed testing and Beneficial Occupancy of the project has been issued.”
- J. Section 13252, **Activated Carbon Adsorber Odor Control System** shall be deleted in its entirety and replaced. See Attached.

Todd Slatin, Director
Division of Central Purchasing

All other terms and conditions of the Bid and specifications are unchanged.
This letter should be signed, attached to and become a part of your Bid.

COMPANY NAME: _____

ADDRESS: _____

SIGNATURE OF BIDDER: _____

SIGN-IN SHEET

Pre-Bid Meeting 140-2017 West Hickman 7 Pump Station & Wet Weather Storage Tank

October 13, 2017 @ 10:00 AM

Representative	Company Name	DBE/MBE/WBE/ Veteran	Phone#	Email Address
Brian Marcum	LFUCG		859-258-3320	brianm@lexingtonky.gov
Sherita Miller	LFUCG		859-258-3323	smiller@lexingtonky.gov
Yorman Aguado	DWP		859 465 2438	waguado@lexingtonky.gov
Jon Setthavong	Hygen and Sinks		(859) 219-1121	jsetthavong@hazenandsays.com
Roy Burger	Hazen and Sawyer		859-281-1264	rburger@hazenandsays.com
Eric Smith	Building Crafts		859-781-9500	Estimating @ Building Crafts
Greg Shirley	Truuby const.		931-526-5158	bids@truubyconstruction.com
MARK DOMBICKY	THIENEMAN CONSTRUCTION		317-867-3462	ESTIMATING@T-C-I.NET
TAL MICEY	CRON LLC	NO	352 262 4121	tbm@croncorp.com
Billy Holcomb			502 502 502-6808080	SNWIT@compfor
Brian Brockman	Sherwin-Williams		859-338-7260	sw1929@sherwin.com
Nathan Nelson	Babson Inc		859-623-3848	Nelson@be-ky.com
Michael Bailey	W. ZOLERS		859-231-6290	MICHAEL@ZOLERS.COM
Ted Wagner	Dugan & Meyers LLC		502-894-4481	twagner@dugan-meyers.com
Tim Leary	Dugan & Meyers		502 99 0506	leary@dugan-meyers.com
D.S. HLF	Blue Tank Rental		859 631 6331	dthoff@bluetankandpump.com
Tom Cicale	Team Cicale, Inc	MBE (Electrician)	502-459-0101	tel@teamcicale.com
Lance McElvain	Judy Construction Company		859-588-5967	lmcilvain@judyconstruction.com

SIGN-IN SHEET

Pre-Bid Meeting 140-2017 West Hickman 7 Pump Station & Wet Weather Storage Tank
 October 13, 2017 @ 10:00 AM

Representative	Company Name	DBE/MBE/WBE/ Veteran	Phone#	Email Address
Chad Bezold	Ohio CAT Pump and Shoring	No	513-814-7851	Cbezold@ohiocat.com
Josh Mangano	Allied Pump Rentals	No	859-321-1578	Josh.Mangano@AlliedPumpRentals.com
Owen S. Yocum	Jord Construction Co.	No	859-234-0900	Owen@JordConstructionCo.com
Steve Judy	Judy Construction Co,	No	859-234-0900	Steve@JudyConstructionCo.com
Jeff Courthoey	Faust Elect.	No	859-948-2663	Faust Paul@gmail.com
Brian GATWOOD	Delaney & Associates, Inc	No	859-342-4444	Brian@delaneyandassociatesinc.com
Rick Chingester	HABEN CONSTRUCTION	No	868-263-5561	RICK@HABENCONSTRUCTION.COM
Pat O'BAMA	CRON	No	352-2624134	Pat fibarra@comcast.com
Michael Harris	Commodore Systems	No	502-453-9397	Michael@Commodore.com
BARRY TANNING	TRINA TECH	No	859-585-0374	barry.tanning@trinatech.com
Brian Munn	LFUC	No	859-258-3320	brian@lehighh.com
STEVE MUELLER	UTAS	No	859-258-3328	smueller@lexingtonky.gov
KURT ZELINDER	HAZEN	No	859-286-1265	Kzelinder@hazenandmeyer.com

West Hickman 7 WWS (Contract No. 2) Equipment Manufacturer (circle one) – Bid Basis	
Solids Handling Submersible & Dry Pit Pumps	ABS Flygt KSB
Mechanical Bar Screen	Headworks Huber Duperon
Screenings Compactor	Headworks Huber Duperon
Screening Conveyor	Headworks Huber Duperon
Sump Pumps	Myers Flygt Hydromatic Zoeller
Odor Control Absorber	ECS Environmental Solutions/Calgon Daniel Company Evoqua
Odor Control Chemical Feed System	Evoqua Continental Carbon Group
Check Valves	Apco Golden Anderson Val-matic
Modulating Plug Valve	Dezurik Golden Anderson Henry Pratt
Slide/Sluice Gates	Aquanox Waterman Golden Harvest
Electric Actuators	Limitorque Auma EIM
Generator	Generac Caterpillar Cummins/ONAN MTU/Detroit Diesel Kohler
Level Transmitters	Endress+Hauser Foxboro Siemens Yokogawa
VFDs	Square D Eaton Allen Bradley
SCADA PLC's	Allen Bradley Compactlogix
Motor Control Centers	Square D Cutler Hammer Allen Bradley
Blowers	Aerzen Kaeser
Jet Mixing System	Evoqua Jet Tech K _L a Mass Transfer
Ground Storage Tank	Crom Precon Preload



STEVEN L. BESHEAR
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE, 4TH FLOOR
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

LEONARD K. PETERS
SECRETARY

October 16, 2016

LFUCG - Division of Water Quality/West Hickman Sewer Trunk
125 Lisle Industrial Ave Ste 180
Lexington, KY 40511

RE: Installation of subfluvial utility crossing of a 20" force main and a 16" gravity sewer line adjacent and 6' apart by open cut method across the floodplain of West Hickman Creek at about stream mile 1.6, with coordinates of 38.014033, -84.459258, in Lexington, Fayette County. AI: 123077

Dear LFUCG - Division of Water Quality:

A construction permit pursuant to KRS 151.250 is not required for a subfluvial utility or pipe crossing provided that the construction of the crossing meets specific criteria (see enclosed sheet, Section 2) set forth by Administrative Regulations 401 KAR 4:050. We have reviewed the construction drawings and other submitted information for the referenced project and determined that all the exemption criteria will be met. *Therefore, a stream construction permit will not be required.* Any deviation from the project scope shall require a revised application which may result in the issuance of a permit should it be required.

If this activity will result in a discharge of dredged or fill material into waters of the United States, additional permits may be required from the U.S. Army Corps of Engineers and the Kentucky Division of Water. Examples of discharges include but are not limited to placement of dirt, culverts, rock or pipelines in a stream or wetland. Please contact the Water Quality Certification Section staff at 502/564-3410 for additional information.

This exemption is issued from the standpoint of stream obstruction only and does not constitute certification of any other aspect of proposed construction. The applicant is liable for any damage resulting from the construction, operation or maintenance of the project and is responsible for obtaining any other permits or licenses required by this cabinet and other state, federal and local agencies. This document is being furnished to you in lieu of a Stream Construction Permit for the referenced activity.

If you have any questions, please call Soheyl Bigdeli at (502) 564-3410.

Sincerely,

Ron Dutta, P.E., Supervisor
Floodplain Management Section
Surface Water Permit Branch
Division of Water

SB/RD

Copies: Copies: Frankfort Regional Office
Doug Burton – Fayette County Floodplain Coordinator
Kevin Levesque, agent by email: klevesque@lexingtonky.gov
Benton Hanson, engineer by email: Benton.Hanson@hdrinc.com
File

401 KAR 4:050, Section 2

A construction permit pursuant to KRS 151.250 shall not be required for a subfluvial utility or pipeline crossing provided that the construction of the crossing meets the following criteria:

- 1) During the construction of the crossing, no material may be placed in the stream or in the floodplain of the stream to form construction pads, coffer dams, access roads, etc., unless prior approval has been obtained from the Cabinet.
- 2) The trench shall be backfilled as closely as possible to the original contour. All excess material from construction of the trench shall be disposed of outside of the floodplain unless the applicant has received prior approval from the Cabinet to fill within the floodplain.
- 3) For subfluvial crossings of erodible channels, there shall be at least thirty (30) inches clear to the top of the pipe or conduit at all points.
- 4) For subfluvial crossings of non-erodible channels, there shall be at least six (6) inches of clear cover above the top of the pipe or conduit at all points, and the pipe or conduit shall be encased on all sides by at least six (6) inches of concrete.
- 5) The weight of a pipe and its contents during normal operating conditions at all points must exceed that of an equal volume of water, or the applicant must provide the Division with sufficient information to show that the pipe and joints have sufficient strength.

SECTION 09961 - HIGH PERFORMANCE PAINTS AND COATINGS - WASTEWATER

PART 1- GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment and services for furnishing and installing the finishes as indicated on drawings and schedules, and as herein specified.
- B. Work includes painting and finishing of interior and exterior exposed items and surfaces throughout project, except as otherwise indicated. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
- C. Work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work, except as otherwise indicated. In addition, the Contractor shall provide for the use of deep tone colors to be applied in selected areas as wall graphics, stripes and visual accents. The areas and colors shall be selected by the Architect-Engineer and shall not exceed 15% of the total wall surface area to be painted.
- D. "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- E. Surfaces to be Painted: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designated in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect-Engineer will select these from standard colors or finishes available.
- F. Following categories of work are not included as part of field- applied finish work.
 - 1. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing is specified for such items as (but not limited to) toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, and finish mechanical and electrical equipment, including light fixtures, switchgear, and distribution cabinets.
 - 2. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, furred areas, pipe spaces, and duct shafts.
 - 3. Finished Metal Surfaces: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
 - 4. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.
- G. Following categories of work are included under other sections of these specifications.
 - 1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work and similar items.

2. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories is included under other sections of these Specifications.
- H. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
- I. PVC plastic process piping shall not be painted, but shall be stenciled and labeled or tagged for identification surfaces. Each type of process piping using PVC pipe shall be installed using the same color pipe.
- J. Repainting of existing structures, tanks, piping, and all other existing items shall not be part of this Contract unless otherwise noted or altered by this work. Areas that have been directly altered or damaged by construction shall be repainted to match existing conditions using the appropriate painting system. Repainting shall include the entire length of a system including piping, equipment, and accessories. Walls and structural items altered shall be painted for their entire length and height.

1.02 RELATED DOCUMENTS

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

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use. Provide MSDS sheets for each item submitted.
- B. Samples: Prior to beginning work, submit color chips for surfaces to be painted. Use representative colors when preparing samples for review. Submit samples for Architect-Engineer's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.

1.04 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Coordination of Work: Review other sections of these Specifications in which prime paints are to be provided to ensure compatibility of total coatings systems for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.05 DELIVERY AND STORAGE

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
 1. Name or title of material.
 2. Fed. Spec. number, if applicable.

3. Manufacturer's stock number, batch number, and date of manufacturer.
 4. Manufacturer's name.
 5. Contents by volume, for major pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.06 JOB CONDITIONS

- A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C), unless otherwise permitted or restricted by paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F (7 degrees C) and 95 degrees F (35 degrees C), unless otherwise permitted or restricted by paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist, or when relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted or restricted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
- D. Paint only when the surface temperature is at least 5 degrees F above the dew point, unless otherwise permitted by paint manufacturer's printed instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 1. Tnemec Company, Inc. (Tnemec)
 2. The Sherwin-Williams Company
 3. Carboline

2.02 MATERIALS

- A. Material Quality: Provide best quality grade of various types of coatings as regularly

manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

- B. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.
- C. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
 - 1. Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total non-volatile (dry-film) of paint by weight.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator and coating manufacturer.
- B. Starting of painting work will be construed as acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.02 SURFACE PREPARATION

- A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect-Architect-Engineer in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
 - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
 - 3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning per SSPC SP-1. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
 - 4. Abrasives for blasting shall be sharp, washed, salt free, angular, and free from feldspar or other constituents that tend to breakdown and remain on the surface.
 - 5. Concrete floors shall be dry as indicated by testing in accordance with ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- B. Cementitious Materials: Per ASTM D4261, Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating, prepare cementitious surfaces of concrete block to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to

remove glaze. Per ASTM D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces, determine alkalinity of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Test the surface for moisture and do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions. Concrete surfaces shall be prepared in accordance with SSPC-13 – Concrete Surface Preparation. Prepare concrete to remove contaminants, open bugholes, surface voids, air pockets, and other subsurface irregularities. Do not expose underlying aggregate. Use dry, oil-free air for blasting operations. Surface texture after blasting shall be similar to that of medium grit sandpaper. Remove residual abrasives, dust, and loose particles by vacuuming or blowing with high pressure air.

- C. Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
 - 1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
 - 2. When transparent finish is required, use spar varnish for backpriming.
- D. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, and other foreign substances by solvent cleaning per SSPC SP-1. Mechanical cleaning shall be in accordance with SSPC-SP6 Commercial Blast Cleaning specifications for non-immersion surfaces and SSPC-SP10 Near White Metal Blast Cleaning for immersion in potable or non-potable water.
- E. Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent cleaners such as Clean 'N' Etch or equivalent.
- F. Shop Primed Surfaces: Prepare shop-applied prime coats wherever damaged or bare as required by other sections of these Specifications. Clean and touch-up with same type shop primer.

3.03 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.04 APPLICATION

- A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Painting requirements, surface treatments, and finishes, are indicated in "schedules" of the contract documents and as noted in Paragraph 3.11 hereinafter.

2. Provide finish coats which are compatible with prime paints used.
 3. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently- fixed equipment or furniture with prime coat only before final installation of equipment.
 5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 6. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
 7. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
 8. Sand lightly between each succeeding enamel or varnish coat.
 9. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
- B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness (DFT) as indicated or, if not indicated, as recommended by coating manufacturer. Coatings to be in immersion or a severe environment shall be tested for dry film thickness. Testing shall be accomplished by methods recommended by coating manufacturer. Record DFT for each 100 square feet of surface area using the average of three readings within each 100 square feet. Additional coats of paint shall be applied where minimum DFT is not achieved.
- D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces.
1. Mechanical items to be painted include, but are not limited to, the following:
 - a. Piping, pipe hangers, supplementary steel and supports except galvanized surfaces.
 - b. Heat exchangers.
 - c. Tanks.
 - d. Ductwork, insulation.
 - e. Motor, mechanical equipment, and supports.
 - f. Accessory items.

2. Electrical items to be painted include, but are not limited to, the following:
 - a. Conduits and fittings except galvanized surfaces.
 - b. Switchgear.
 - c. Hanger and support except galvanized surfaces.
- E. Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- F. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable. Holiday test coated steel in immersion areas in accordance with NACE International RP SP 0188-90.
- G. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats, unless otherwise indicated.
- H. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.05 FIELD QUALITY CONTROL

- A. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:
 1. The Owner's Resident Project Representative shall check paint film thickness with an approved paint mil thickness tester.
 2. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
 3. Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.
- B. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

3.06 CLEAN-UP AND PROTECTION

- A. Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.
- B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to

scratch or otherwise damage finished surfaces.

- C. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect-Architect-Engineer. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

3.07 PAINTING SYSTEMS

Product names and numbers are based on Tnemec products.

A. Ferrous Metals - Structural, Tanks, Pipes and Equipment

1. Exterior, Non-Immersion	<u>Dry Mils</u>
Sur. Prep.: SSPC-SP6 Commercial Blast Cleaning	
1st Coat: 1 Series 1 Omnithane	2.5 - 3.5
2nd Coat: N 69 High-Build Epoxoline II	2.0 - 3.0
3rd Coat: 1074- Endura-Shield	2.0 - 3.0
1st Coat: Corothane I Galvapak	2.5 - 3.5
2nd Coat: Macropoxy 646 FC	2.0 - 3.0
3rd Coat: HS Polyurethane	2.0 - 3.0
2. Interior, Non-Immersion	
Sur. Prep.: SSPC-SP6 Commercial Blast Cleaning	
1st Coat: 1 Series 1 Omnithane	2.5 - 3.5
2nd Coat: N 69 High-Build Epoxoline II	4.0 - 6.0
Finish Coat: N 69 High-Build Epoxoline II	2.0 - 3.0
1st Coat: Corothane I Galvapak	2.5 - 3.5
2nd Coat: Macropoxy 646 FC	4.0 - 6.0
3rd Coat: Macropoxy 646 FC	2.0 - 3.0
3. Immersion, Potable or Non-Potable Water	
Sur. Prep.: SSPC-SP10 Near-White Blast Cleaning	
1st Coat: 1 Series 1 Omnithane	2.5 - 3.5
2nd Coat: N 69 High-Build Epoxoline II	4.0 - 6.0
3rd Coat: N 69 High-Build Epoxoline II	4.0 - 6.0
1st Coat: Corothane I Galvapak	2.5 - 3.5
2nd Coat: Macropoxy 646 FC / SherGlass FF	4.0 - 6.0
3rd Coat: Macropoxy 646 FC / SherGlass FF	4.0 - 6.0
4. Factory Primed Interior (Refer to Piping Specifications)	
Sur. Prep.: Surface shall be clean and dry	
Int. Coat: N 69 High-Build Epoxoline II	2.0 - 3.0
Finish Coat: N 69 High-Build Epoxoline II	2.0 - 3.0
2nd Coat: Macropoxy 646 FC	2.0 - 3.0
3rd Coat: Macropoxy 646 FC	2.0 - 3.0

5. Factory Primed, Exterior (Refer to Piping Specifications)

Sur. Prep.:	Surface shall be clean and dry	
1st Coat:	N69 Epoxoline II	4.0 – 6.0
2nd Coat:	1074- Endura-Shield	2.0 - 3.0
1st Coat:	Macropoxy 646 FC	4.0 - 6.0
2nd Coat:	HS Polyurethane	2.0 - 3.0

6. Primed Steel (Doors, Frames, etc.)

Touch up:	1 Series 1 Omnithane	
1st Coat:	N 69 High-Build Epoxoline II	2.0 - 3.0
2nd Coat:	N 69 High-Build Epoxoline II	2.0 - 3.0
Touch up:	Corothane I Galvapac	
1st Coat:	Macropoxy 646 FC	2.0 - 3.0
2nd Coat:	Macropoxy 646 FC	2.0 - 3.0

7. Hydrogen Sulfide Exposed

Sur. Prep:	SSPC-SP5	
1st Coat:	435 Perma-Glaze	15.0 - 20.0
2nd Coat:	435 Perma-Glaze	15.0 - 20.0
1st Coat:	Dura-Plate 5900	15.0 - 20.0
2nd Coat:	Dura-Plate 5900	15.0 - 20.0

B. Galvanized Steel - Pipe and Miscellaneous Fabrications

1. Exterior, Non-Immersion

Sur. Prep.:	SSPC-SP1 Solvent Cleaning and Etch	
1st Coat:	N69 Epoxoline II	2.0 - 3.0
2nd Coat:	1074-Color Endura-Shield	2.0 - 3.0
1st Coat:	Macropoxy 646 FC	2.0 - 3.0
2nd Coat:	HS Polyurethane	2.0 - 3.

2. Interior, Non-Immersion (Doors, Frames, etc.)

Dry Mills

Sur. Prep.:	SSPC-SP1 Solvent Cleaning and Etch	
One Coat:	N69 Epoxoline II	2.0 - 3.0
2nd Coat:	N 69 High-Build Epoxoline II	2.0 - 3.0
1st Coat:	Macropoxy 646 FC	2.0 - 3.0
2nd Coat:	Macropoxy 646 FC	2.0 - 3.0

3. Immersion, Potable or Non-Potable Water

Sur. Prep.:	SSPC-SP1 Solvent Cleaning followed by abrasive blast (SSPC-SP 16)	
1st Coat:	N69 Epoxoline II	3.0 - 5.0
2nd Coat:	N69 Epoxoline II	4.0 - 6.0
1st Coat:	Macropoxy 646 FC / SherGlass FF	3.0 - 5.0
2nd Coat:	Macropoxy 646 FC / SherGlass FF	4.0 - 6.0

C. Porous Masonry - Concrete Masonry Units

1. Interior

Sur. Prep.:	Surface shall be clean and dry	
1st Coat:	130 Envirofill (Spray & Back Roll to Fill Porosity)	80 - 100 sf/gal.
2nd Coat:	84 Ceramlon ENV	4.0 - 6.0
3rd Coat:	84 Ceramlon ENV	4.0 - 6.0
1st Coat:	Cement Plex 875 (Spray & Back Roll to Fill Porosity)	80 - 100 sf/gal.
2nd Coat:	ProIndustrial HD Epoxy	4.0 - 6.0
3rd Coat:	ProIndustrial HD Epoxy	4.0 - 6.0

D. Cast-In-Place and Precast Concrete

1. Concrete Walls & Precast Concrete Ceilings (Interior)

Sur. Prep.:	Abrasive Blast (SSPC-SP13) Fill bugholes and voids with coating manufacturer's epoxy filler.	
1st Coat:	N69 Epoxoline II	4.0 - 6.0
2nd Coat:	N69 Epoxoline II	4.0 - 6.0
1st Coat:	Macropoxy 646 FC	4.0 - 6.0
2nd Coat:	Macropoxy 646 FC	4.0 - 6.0

2. Concrete Walls, Tanks and Basins (Exterior, Exposed) – Do Not Paint

3. Concrete Floors (Interior, Heavy Traffic and Chemical Exposure)

Sur. Prep.:	SSPC-SP 13/NACE 6	
Primer:	237 Power-Tread, double broadcast	1/8 inch
1st Coat:	280 Tneme-Glaze	6.0 – 8.0
2nd Coat:	290 CRU	2.0 – 3.0
Primer:	SW GP 3561	1/8 inch
1st Coat:	SW GP 3746	6.0 – 8.0
2nd Coat:	SW GP 4638	2.0 – 3.0

4. Concrete Tanks & Basins (Immersion and Exposed, Interior) – Do Not Paint

5. Chemical Containment Areas

Sur. Prep.:	Abrasive Blast (SSPC-SP13, Severe Service) Fill bugholes and voids with recommended coating manufacturer's epoxy filler.	
1st Coat:	201 Epoxoprime	6.0 - 8.0
2nd Coat:	275 Stranlock	25.0 – 40.0
Finish Coat:	282 Tneme-Glaze	8.0 – 12.0
1st Coat:	Corobond 100 Primer	6.0 - 8.0
2nd Coat:	CorCote HCR FF	15.0 – 20.0
Finish Coat:	CorCote HCR	8.0 – 12.0

6. Concrete Tanks and Basins (Below Grade) – Do Not Paint

E. Wood

Interior or Exterior

Sur. Prep.:	Surface shall be clean and dry	
1st Coat:	151-1051 Elasto-Grip FC	1.0 - 1.5
2nd Coat:	29 Tufcryn	2.0 - 3.0 - 3.5
3rd Coat:	29 Tufcryn	2.0 - 3.0
1st Coat:	Premium Wall & Wood Primer	1.0 - 1.5
2nd Coat:	ProClassic WB	2.0 - 3.0 - 3.5
3rd Coat:	ProClassic WB	2.0 - 3.0

F. Insulated Pipe

Sur. Prep.:	Surface shall be clean and dry	
1st Coat:	6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat:	6-Color Tneme-Cryl	2.0 - 3.0
1st Coat:	DTM Primer / Finish	2.0 - 3.0
2nd Coat:	DTM Primer / Finish	2.0 - 3.0

G. Gypsum Board

1. Interior Drywall - Architectural

Sur. Prep.:	Surface shall be clean and dry	
1st Coat:	151-1051 Elasto-Grip FC	1.0 - 1.5
2nd Coat:	6-Color Tneme-Cryl	2.0 - 3.0
1st Coat:	ProMar 200 0 VOC Primer	1.0 - 1.5
2nd Coat:	DTM Primer / Finish	2.0 - 3.0

2. Interior Drywall - Severe Exposure

Sur. Prep.:	Surface shall be clean and dry	
Prime Coat:	151-1051 Elasto-Grip FC	1.0 - 1.5
1st Coat:	113 H.B. Tneme-Tufcoat	2.0 - 3.0
2nd Coat:	113 H.B. Tneme-Tufcoat	2.0 - 3.0
Prime Coat:	ProMar 200 0 VOC Primer	1.0 - 1.5
1st Coat:	ProIndustrial WB Epoxy, B73 Series	2.0 - 3.0
2nd Coat:	ProIndustrial WB Epoxy, B73 Series	2.0 - 3.0

H. PVC Piping – Do Not Paint

I. Aluminum Windows, Doors, Handrails & Grating – Do Not Paint

J. Fiberglass Reinforced Plastic Doors & Windows – Do Not Paint

K. Building Floor – Do Not Paint

L. Stainless Steel Items– Do Not Paint

M. Chemical Storage Tanks – Do Not Paint

N. Items to be Painted:

- a. Interior walls
- b. Interior ceiling

- c. Ferrous metal doors and frames
- d. Ferrous metal door and window trim
- e. Ferrous metal pipe and valves
- f. All ferrous metal materials, immersed and non-immersed
- g. Ferrous metal equipment

3.08 PIPING COLOR CODE

To facilitate identification of piping in plants and pumping stations it is recommended that the following color scheme be utilized:

WATER LINES

Filtered or Finished Water	Dark Blue
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CHEMICAL LINES

Acid	Red
Ammonia	White
Caustic	Yellow w/ green band
Chlorine	Yellow
Coagulant	Orange
Fluoride	Light Blue w/ red band
Polymer	Orange w/ green band

WASTE LINES

Overflow (Backwash waste)	Light Brown
Sewer (Sanitary or Other)	Dark Gray

OTHER

Compressed Air	Dark Green
Other Lines	Light Gray

3.09 STENCILING

- A. The Contractor shall supply all materials and labor necessary for stenciling of legends on pipes. The legend shall show the name of the contents. Review by the Architect-Engineer of legends will be required. Names shall be "plainly visible". Arrows showing direction of flow shall also be stenciled on pipes. The legends shall be located not more than 10 feet apart and, in general, at each valve and piece of equipment. The size and location of the legend shall be in general accordance with ANSI A13.1-1981 "Scheme for the Identification of Piping Systems". All visible piping 6" in diameter and larger shall be color-coded and stenciled. "Stick-on" labels are not acceptable.

3.10 PLASTIC IDENTIFICATION MARKERS

- A. All visible piping 3/4" and greater and less than 6" which is accessible for maintenance operations shall be color-coded and identified with semi-rigid plastic identification markers equal to SETMARK Pipe Markers as manufactured by Seton Name Plate Corporation, New Haven, Conn.; T & B/Westline, Los Angeles, California; or equal. Direction of flow arrows are to be included on each marker, unless otherwise specified.
- B. Each marker background is to be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identification of Piping Systems" (ANSI A 13.1 - 1981).
- C. For pipes under 3/4" O.D. (too small for color bands and legends), brass identification tags

1-1/2" in diameter with depressed 1/4" high black-filled letters above 1/3" blackfilled numbers shall be fastened securely at specified locations.

- D. All electrical conduits, which are accessible for maintenance operations, shall be identified with semi-rigid identification markers similar to those specified above.
- E. Each marker background is to be color-coded with a clearly printed legend to identify the conductor. Size of markers and sizes of lettering to generally conform with the "Scheme for Identification of Piping Systems" (ANSI A 13.1 - 1981)
- F. Locations for pipe and electrical markers to be as follows:
 - 1. Adjacent to each valve and fitting (except on plumbing fixtures and equipment).
 - 2. Each branch and riser take-off.
 - 3. Each pipe passage through wall, floor and ceiling construction.
 - 4. Each pipe passage to underground.
 - 5. All horizontal pipe runs-marked every 25 feet.

END OF SECTION

SECTION 13252 - ACTIVATED CARBON ADSORBER ODOR CONTROL SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish and install two (2) deep bed activated carbon adsorber odor control systems as shown on the Drawings and as specified herein.
- B. All equipment located within this room shall be suitable for a Class I, Division 2, Group D location.
- C. All carbon required, to fill each unit, for the two (2) carbon adsorbers shall be included in the bid price.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 01300
- B. Operations and Maintenance Manuals: Section 01780
- C. Electrical: Division 16
- D. Instrumentation: Division 17

1.03 OPERATING CONDITIONS

- A. Wet Weather Pump Station Building

Parameter	Value
Number of units	1
Type	Single bed
Vessel diameter, maximum (feet)	9.0
Vessel height, maximum (feet), without stack	8.0
Air flow rate, minimum (scfm)	2,750
Carbon bed depth, minimum (feet)	3.0
Carbon capacity, minimum (ft ³)	151
Minimum Empty Bed Contact Time - EBCT (seconds)	3.29
Air velocity through scrubber, maximum (fpm)	55
Inlet H ₂ S concentration, average (ppm)	15.0
Inlet H ₂ S concentration, peak (ppm)	100.0
H ₂ S Removal efficiency, minimum (%)	99
Pressure drop through vessel, maximum (inches W.C.)	4.8
Drain connection size, minimum (inches)	2
Number of exhaust fans	1 Duty
Exhaust fan design capacity, Each (scfm)	2,750 @10"W.C.
Static Pressure (inches W.C.)	12.5
Max. Fan Speed (rpm)	2,400
Min. Fan Inlet Diameter (inches)	20
Max. Motor Horsepower (hp)	10

Max. Motor Speed (rpm)	1,800
Drive	Belt

B. Wet Weather Storage Tank Building

Parameter	Value
Number of units	1
Type	radial flow
Vessel diameter, maximum (feet)	9.0
Vessel height, maximum (feet), without stack	10.0
Air flow rate, minimum (scfm)	5,000
Carbon bed depth, minimum (feet)	2.5
Carbon capacity, minimum (ft ³)	300
Minimum Empty Bed Contact Time - EBCT (seconds)	3.60
Air velocity through scrubber, maximum (fpm)	60
Inlet H ₂ S concentration, assumed average (ppm)	50
Inlet H ₂ S concentration, peak (ppm)	100.0
H ₂ S Removal efficiency, minimum (%) ¹	99
Pressure drop through vessel, maximum (inches W.C.)	4.8
Drain connection size, minimum (inches)	2
Number of exhaust fans	1 Duty
Exhaust fan design capacity, Each (scfm)	5,000 @ 10" W.C.
Static Pressure (inches W.C.)	10.0
Max. Fan Speed (rpm)	2,600
Min. Fan Inlet Diameter (inches)	20
Max. Motor Horsepower (hp)	15
Max. Motor Speed (rpm)	2,080
Drive	Belt

Notes: ¹ or maximum outlet concentration of 0.05 ppm.

1.04 MANUFACTURER

- A. The Manufacturer shall be responsible for the coordination of all equipment specified herein. The activated carbon adsorber odor control systems shall consist of one deep bed up flow unit and one radial flow carbon system as manufactured ECS Environmental Solutions/Calgon, Daniel Company, or Evoqua. The basis of design is the ECS V1-96-2750 package adsorber unit at the Wet Weather Pump Station and ECS VX-5000 system at the Wet Weather Storage Tank Building.
- B. The materials covered by these Specifications are intended to be standard equipment of proven reliability and as manufactured by reputable manufacturers having experience in the production of such equipment. The equipment furnished shall be designed, constructed, and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the Contract Drawings and operated per manufacturer's recommendations.
- C. The Manufacturer shall be responsible for coordination of the design and fabrication of the odor control system shown on the Drawings and specified herein. All named vendors must provide a product that is in strict accordance with the specification, customization may be necessary.

- D. The Manufacturer shall coordinate and review installation procedures under other Sections and coordinate the installation of items that must be installed to comply with the requirements of the Work specified under this Section.
- E. All components of the activated carbon adsorber odor control system shall be supplied by a single manufacturer fully experienced, reputable, and qualified in the manufacture of the equipment to be furnished.
- F. Manufacturer shall have at least five (5) years' experience in the design and fabrication of the specified odor control system and shall, at the Engineer's request, provide a list of at least five (5) successful installations operating for a minimum of three (3) years of comparable size (greater than or equal to 2,750 cfm) for the single deep bed and at least five greater or equal to 5000 cfm for the radial - and application, with references including valid current contact names and phone numbers.

1.05 SUBMITTALS

- A. In addition to the submittal requirements specified in Section 01300, Submittals, submit the following for each odor control system:
 - 1. Performance Affidavit
 - 2. Operation and Maintenance Information (per Section 01780).
 - 3. Complete electrical schematic wiring diagram drawings.
 - 4. Horsepower, voltage, and rotative speed of the motor.
 - 5. Manufacturer's literature, illustrations, specifications and engineering data including dimensions, materials, size and weight of all components and complete assembly.
 - 6. Complete erection, installation, and adjustment instructions and recommendations.
 - 7. Drawings showing plans and sections of the equipment to demonstrate proper coordination between components, fabrication methods, assembly and accessories.
 - 8. Detailed calculations confirming the structural integrity of the vessel under full water loading conditions and structural design of the vessel.
 - 9. Carbon media MSDS and specification sheet.
 - 10. Performance test procedure(s) for system.

1.06 GUARANTEE PERIOD

- A. After successful completion of tests and trials under operating conditions on all equipment, the Contractor shall guarantee all equipment, materials and workmanship from undue wear and tear, from mechanical and electrical defects, and from any failure whatever, for a minimum of one (1) year. This one (1) year minimum shall not replace a standard manufacturer's guarantee if it exceeds one (1) year.

1.07 WARRANTY

- A. Manufacturer shall guarantee that the odor control system shall perform as specified and shall warrant the system, complete, to be free from defects in materials and workmanship for a period of twelve (12) months from the date of Substantial Completion or eighteen (18) months

from shipment, whichever occurs first. The system manufacturer shall repair or provide replacement for any defective components under this warranty.

PART 2 - PRODUCTS

2.01 OVERALL SYSTEM REQUIREMENTS

- A. Each activated carbon adsorber odor control system shall consist of the principal components listed below:
 - 1. Carbon reactor vessel
 - 2. Activated carbon
 - 3. Odor control fan
 - 4. Grease filter/mist eliminator
 - 5. Odor control system ducting as shown on the drawings
 - 6. Exhaust stack(s)
 - 7. Isolation dampers
 - 8. Hydrogen sulfide carbon saturation indicators
 - 9. Local Control Panel with variable frequency drive
 - 10. Instrumentation and controls as follows:
 - a. Pressure gauges
 - b. Pressure differential indicators/switches
 - c. Pressure transmitters
 - d. Airflow meter
- B. All materials shall be new and suitable for the service to which they are subjected.
- C. Sizes and capacities of equipment components specified shall be understood to establish minimum requirements only and do not relieve the equipment supplier of responsibility for providing a properly functioning system.
- D. The activated carbon adsorber shall be capable of removing hydrogen sulfide and associated sewage odors from the foul air stream by adsorption to the carbon media.

2.02 VESSEL CONSTRUCTION

- A. The vessel shall be designed using a minimum structural safety factor of 10 to 1 for pressure and 5 to 1 for vacuum. The vessel shall have bottom knuckle reinforcement and be designed for hydrostatic head load 10 feet above the top of the inlet.
- B. Vessel housing shall be designed for full bottom support and shall be provided with a minimum of four (4) Type 316 stainless steel hold down lugs. All hold down lugs shall be

designed to account for all anticipated loads and shall comply with local code requirements. Furnish all anchor bolts, nuts, and washers which shall be Type 316 stainless steel.

- C. The odor control system shall be manufactured of FRP in accordance with these specifications. All integrally molded connections shall be manufactured of the same material.

D. Fiberglass Reinforced Plastic (FRP) Vessel Construction:

1. Vessels shall be either contact-molded in accordance with ASTM D4097, Grade I, or Type I, Filament-Wound in accordance with ASTM D3299-88, Grade 1. Portions of the vessel, including joints and duct connections shall be fabricated by contact molding. Contact molded laminates shall be in accordance with ASTM C582, Table 1.

2. Vessel wall thickness shall be as required by structural design but not less than ¼ inch.

3. Resins

- a. Resins used in laminate shall be premium corrosion resistant and fire retardant brominated bisphenol A vinylester resins to achieve a 25 or less flame spread rating in accordance with NFPA 91.
 - 1) Resin shall be Hetron FR992 or FR992SB, or Derakane 510A or 510C as manufactured by Ashland Chemical Company, Dion FR 9300 as manufactured by Reichold, Vipel K022-CC or K022-CN, as manufactured by AOC, or approved equal.
 - 2) Antimony trioxide may be added to the structural layer, if required to obtain the required Class 1 flame spread rating of 25 or less. Antimony trioxide addition shall not exceed 3% and shall not be added to the interior liner of the vessel.
 - 3) Selected resin shall be used for fabrication throughout the entire vessel. Use of more than one resin during fabrication is not acceptable.
 - 4) No dyes, pigments or colorants shall be used except in the exterior coat.
 - 5) The resin shall not contain fillers or thixotropic agents unless otherwise specified.
- b. Ultraviolet absorbers shall be added to the surfacing resin to improve weather/UV resistance of the vessel. No fillers or thixotropic agents shall be added. Exterior coating shall not be applied until after inspection of the laminate has been completed.
- c. All cut edges shall be sealed with a resin coating of the same resin as used in the fabrication. The resin shall contain paraffin.

4. Reinforcement:

- a. Synthetic surfacing veil shall be Veil-Nexus 1012 (apertured) as manufactured by Burlington Industries or equivalent.
- b. Chopped strand mat shall be Type E glass, minimum 1-1/2 ounces per square foot, with silane finish and styrene soluble binder.
- c. Continuous roving used in chopped gun shall be Type E glass.
- d. Woven roving shall be Type E glass, nominal 24 ounces per square yard, with a 4 by 5 weave and a silane type finish.
- e. Continuous roving used for filament winding shall be Type E glass, nominal 110 strand yards per pound, with a silane type finish.

5. Laminates:

- a. Laminates shall consist of a corrosion resistant resin-rich inner surface, an interior corrosion barrier, an interior structural layer and an exterior layer. Composition specified for inner surface and interior corrosion barrier is intended to achieve optimum chemical resistance.
- b. Corrosion resistant resin-rich inner surface shall be reinforced using a single apertured Nexus synthetic veil. Minimum resin-rich inner surface thickness shall be 10-20 mils. Thixotropic agents shall not be used for this service. Glass content of resin-rich inner surface shall be 10 percent plus or minus 5 percent by weight.
- c. Interior corrosion barrier shall be a minimum of 100 mils of Type E chopped strand mat to a total of 3 oz/sq. ft. The interior corrosion barrier shall be applied by either the hand laid up technique, filament winding or chopper gun. Chopper gun is only permitted if an automated process is used. Manual operation of chopper gun shall not be permitted. Glass content of interior corrosion barrier shall be 25 percent plus or minus 5 percent by weight.
- d. Interior structural layer shall be of sufficient thickness to meet minimum thickness requirements as specified. Vessel thickness design should be supported by signed, stamped calculations by a Professional Engineer, which shall be submitted in accordance with Section 01300, Submittals. Glass reinforcements shall be in accordance with the appropriate standards of construction. Interior structural layer shall be fabricated using either the hand lay up, filament wound technique or approved chopper gun technique. Glass content of interior structural layer shall be 60 percent plus or minus 5 percent by weight.
- e. Exterior layer shall be reinforced using a single "A" glass veil with a layer of surfacing "Nexus" veil followed by a clear resin rich 10 mil thick coating similar to the inner surface. Topcoat shall be pigmented parafinized gel-coat with ultraviolet inhibitors. The pigmentation shall be colored as selected by the Owner. There shall be no glass fibers exposed.
- f. Vessel shall be cured using a MEKP procedure and in accordance with the recommendations of the resin manufacturer.
- g. Vessel wall shall be reinforced around all openings and connections.
- h. Laminates shall meet the requirements of the mechanical properties and visual acceptance criteria in ASTM D2563, Level I.

2.03 ACTIVATED CARBON ADSORBER SYSTEM

- A. The reactor vessel design shall be capable of processing odorous air at such a velocity that the empty bed contact time (EBCT) across the activated carbon bed shall not be less than the value specified.
- B. Carbon Vessel
 1. Each carbon vessel shall have the following standard features, at a minimum:
 - a. NBS PS 15-69 flanged nozzle air inlet: size as shown on Drawings
 - b. Plain end nozzle outlet with no-loss discharge stack: size as shown on Drawings,

- c. Carbon sample port: 1.5-inch maximum
 - d. Three (3) air sample ports: 1-inch maximum, spaced evenly through each carbon bed
 - e. One (1) drain connection with blind flange and ball valve: 2-inch minimum
- C. The adsorber system shall provide continuous treatment when the fan is in service. The fan shall be supplied as specified herein.
- D. Carbon Support System - The support system for the carbon bed shall be as recommended by the odor control vessel supplier and approved by the Engineer. The carbon bed shall be supported by a polypropylene screen basket resting on a support system. The carbon bed screen and support system shall be removable through access manways. The support system shall be capable of withstanding a load of not less than 300 pounds/square foot with a deflection not greater than 1/4-inch under any operating condition. All components of the support system shall be constructed of materials resistant to the chemical service conditions specified for corrosion. Pall rings or dump packing shall not be used to support the carbon beds.
- E. The carbon adsorber vessel shall have a removable top for ease of carbon replacement and a minimum of one (1) top mounted manway. Four crescent-shaped access ports should be installed on the radial flow unit to reduce labor during carbon removal. Ports should be flanged and expose 80% of the carbon column when the blinds are removed.

2.04 ODOR CONTROL SYSTEM ACCESSORIES

- A. All necessary connections for piping, instrumentation, sampling, and ductwork shall be provided as shown on the Drawings or required. Suitable EPDM gaskets shall be provided. The manufacturer shall provide the following appurtenances with the vessel:
- 1. Drain assembly, sized as specified in Paragraph 2.02 E above, with Schedule 80 CPVC ball valve.
 - 2. One (1) 1-1/2-inch diameter sample probe with ball valve adjacent to the carbon bed which shall extend a minimum of 6 inches into the carbon bed. Probe shall be adequate to provide suitable extraction of carbon samples from the carbon bed and be non-binding. Probes shall extend outside the vessel wall and be blocked off with ball valves. One (1) additional 1-inch diameter sample probe with ball valve shall be installed on the discharge stack and tubing shall extend down and adjacent to the other probes and one (1) 1-inch diameter sample probe with ball valve shall be installed on the fan discharge. Probes and ball valves shall be constructed of Schedule 80 CPVC.
 - 3. Manufacturer shall provide factory mounted pipe supports for outlet air sample ports, bottom drain connection, and overflow piping.
 - 4. Flanges for air inlet and outlet shall be manufactured by hand lay-up method and shall conform to NBS-PS 15-69, standard dimensions for bolting, but in no case shall the thickness be less than 3/4-inch thick. Flange nozzles for piping connections shall conform to ASTM D 3299, all nozzles up to and including 8 inch diameter shall be reinforced with blade type gussets. Flanges for piping connections shall be ANSI 150-lb dimensions. All flanges shall be pre-drilled. Flanges shall be checked for alignment, thickness and mating prior to shipment to field. Area on the back of all flanges around each bolt hole shall be the diameter of a standard washer and shall be flat and parallel to flange face. This area shall be spot faced, if necessary, to meet this requirement.
- B. Grounding System: Contractor shall properly bond the carbon bed to the grounding electrode system per manufacturer's recommendations.

- C. Lifting Lugs: Lifting lugs shall be capable of withstanding weight of the empty vessel with a minimum safety factor of 5 to 1. A minimum of three lugs shall be furnished per vessel. Lifting lugs shall be Type 316 stainless steel or FRP and attached to the vessel wall with hand lay-up laminate equal to or greater than the vessel wall thickness.
- D. Mounting Lugs: Mounting lugs shall be suitable for mounting electrical junction boxes. Mounting lugs shall be Type 316 stainless steel or FRP and attached to the vessel wall with hand lay-up laminate equal to or greater than the vessel wall thickness.
- E. Transition Pieces: Manufacturer shall provide a transition piece for connecting the flanged air inlet on the carbon vessel to the inlet FRP ductwork as shown on the Contract Drawings.
- F. Isolation Dampers: Isolation dampers shall be provided and installed on the carbon vessel inlet, as shown on the Drawings and in accordance with 15892, FRP Piping Systems.
- G. Hydrogen Sulfide Monitor: Each system shall be furnished with four (4) hydrogen sulfide monitors, per carbon bed, capable of visual detection of H₂S breakthrough. The monitors shall be mounted on the exhaust duct of the vessel and at 3 locations equally spaced throughout each carbon bed. The monitor shall have replaceable tubes. The monitors shall have a fitting to attach to any carbon bed sampling port.
- H. Interconnecting Ductwork: Ductwork from exhaust fan to the carbon treatment vessel shall be in accordance with Division 15. Ducts shall be of sufficient diameter and design to move the air without undue pressure loss or as shown on the Drawings. The pressure loss of the combined odor control system and the duct work shall not exceed the maximum pressure available from the blower at the specified air flow rate operating at nonoverloaded conditions.
- I. Duct Supports: The odor control system manufacturer shall be responsible for the design of all duct supports furnished for the ductwork specified under "H" above. Duct and exhaust stack support details and layout shall be submitted in the shop drawings. Proposed duct supports shall be in accordance with the Drawings and shall comply with Division 15.
- J. Carbon Sampling Device: One grain thief sampling device shall be provided for each odor control unit. The device shall be a Fisher Scientific Model 14-208Q, or equal.
- K. Rain Cap: One (1) FRP or polyethylene "no loss" high dispersion discharge stack, factory installed for each unit. Provide 316 SST Bird Screen on each discharge stack.
- L. Expansion Joint: As shown on the Drawings, provide in accordance with 15892, FRP Piping Systems.

2.05 ACTIVATED CARBON

- A. Sufficient activated carbon shall be provided to fill the reactor vessel to the volume previously specified. The activated carbon shall be unimpregnated new granular activated carbon, derived from bituminous coal or coconut shell. Wood or lignite based carbon are not acceptable. The activated carbon shall be suitable for the vapor phase adsorption of sewage treatment odors and have been used for a minimum of five years under the same conditions.. No chemical impregnation of the carbon is permitted, the engineer may require a sample from the delivered batch be sent to a lab for PIXE analysis at the odor control vendors expense if chemical impregnation is suspected.
- B. Activated carbon shall be Midas OCM as manufactured by Evoqua Water Technologies, Calgon Minotaur, or equivalent, and shall have the following specifications:

- 1. Minimum Butane Activity (weight %)

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2. Minimum Iodine Number, mgI_2/g	1,050
3. Maximum Moisture (weight % as packed)	4
4. Minimum Hardness Number	95
5. Minimum Apparent Density (g/mL)	0.48
6. Maximum Mean Particle Diameter (mm)	4.0
7. Minimum H_2S Breakthrough Capacity ($\text{g H}_2\text{S removed/cc carbon}$) ¹	0.30

¹ The determination of H_2S breakthrough capacity will be made by passing a moist (85% R.H.) air stream containing 1% H_2S at a rate of 1,450 cc/min through a 1 inch diameter by 9 inch deep bed of uniformly packed activated carbon and monitored to 50 ppm breakthrough per ASTM D6646. Engineer may require that a random sample of the delivered carbon be sent to WECK or Modern labs to confirm H_2S capacity. If so this shall be done at the odor control vendors expense.

2.06 GREASE FILTER/MIST ELIMINATOR

- A. The odor control system manufacturer shall provide one (1) grease filter/mist eliminator, manufactured by the odor control system manufacturer.
- B. At the design gas flow rate, the external demisters shall remove a minimum of 99.9% of droplets 10 microns and larger and a minimum of 90% of droplets between 5 microns and 10 microns.
- C. Pressure drop through the demisters shall not exceed 1.0 inches W.C. at the design airflow rate when the pad is dirty, or 0.5 inches W.C. at the design airflow when the pad is clean.
- D. Construction
 1. External demisters shall contain a horizontal grease filter and mist eliminator constructed of PVC with 316 stainless steel or FRP frames. Provide two nested modules suitable for operation at the design gas flow rate for each scrubber system.
 2. The grease filter/mist eliminator shall be enclosed in a FRP housing. The housing shall be of hand lay-up construction with the same resins and reinforcements as specified for the odor control vessel. Minimum thickness of the housing shall be 0.5 inches. The FRP shall be pigmented beige. The housing section coming in contact with the pad assemblies shall have a high-density polyethylene liner to prevent damage to the FRP corrosion liner during pad removal and installation.
 3. The grease filter pad shall be minimum 2 inches thick and constructed of woven 316L stainless steel.
 4. The mist eliminator pad shall be minimum 4 inches thick and constructed of woven polypropylene.
 5. Provide a side mounted module access cover. Cover should be hinged to the body and sealed with 316 stainless toggle clamps for easy access. Bolt-on access ports or other securing mechanisms that require tools for pad removal are not acceptable.
 6. Gas inlet and outlet connections shall be circular, flanged connections the same size as the connecting ductwork. Flanges shall be of hand lay-up construction in accordance with NBS PS 15-69 and shall be sized to match the adjoining equipment.

7. Provide a flanged, ¾ inch diameter drain connection with p-trap and isolation ball valve at the bottom of the FRP housing. P-trap shall be of sufficient depth to overcome the negative or positive pressure rating of the fan. Connection shall be installed in a 2" wide by 2" deep horizontal sump running the prefilter body with. Prefilter pad should sit on a perforated plate so no part of the mesh pad is in contact with the prefilter drain.

2.07 CONTROLS

A. Field Control Equipment:

1. Odor control system manufacturer shall review the electrical drawings to determine the hazardous area ratings of the area and shall provide appropriately-rated instruments of intrinsically-safe barriers as appropriate for the devices located in hazardous areas.
2. Manually-operated dampers shall be provided to allow isolation of the exhaust fan, grease filter/mist eliminator, odor control system and bypass ducts as shown on the Drawings.
3. Pressure gauges shall be provided for each system in accordance with Division 17:
 - a. Differential pressure gauges shall be provided to measure pressure drop across the fan, carbon media and grease filter/mist eliminator, respectively. Range to be 0 to 20 in. W.C.
 - b. Pressure gauges (minimum range: -15 to 0 in. W.C.) and (minimum range: 0 to + 20 in. W.C.) shall be provided to measure pressure at the inlet and outlet to each fan.
4. Differential pressure switches shall be provided for each system in accordance with Division 17:
 - a. Differential pressure switch shall be provided to alarm on low pressure drop across the fan. Alarm setpoint shall be 3 in. W.C. when the motor is running.
 - b. Pressure switches shall be provided to alarm on low suction pressure and high discharge pressure for the odor control fan. Initial alarm setpoints shall be set based on Engineer's notes in the shop drawings. Range shall be to -10 in W.C. for suction and to +10.5 in. W.C. in discharge.
5. Pressure transmitters shall be provided for each system in accordance with Division 17:
 - a. Pressure transmitter shall be provided to monitor pressure at the inlet to the carbon system.
6. Process Tubing for Differential Pressure Instruments: Process tubing shall be 1/4 x 0.065-inch seamless, annealed, ASTM A-269 Type 316L stainless steel with Type 316 - 37 degrees stainless steel flared fittings or Swagelock or Parker-CPI flareless fittings. Provide stainless adaptors as necessary to accommodate process connections to gauges and switches.
7. Valves for Pressure Instruments shall be stainless steel ball valves.

2.08 LOCAL CONTROL PANEL

- A. Provide one (1) independent control panel to control the odor control system. Panel shall be designated FCP-500. The control panel shall include a motor circuit protector, NEMA rated contactor, pilot devices, control relays, and other components as specified herein.

B. Control Panel Enclosure:

1. Rating: NEMA 7, 316 stainless steel, metal thickness of 14 gauge
2. Live front with padlock provisions.
3. Rubber-gasketed, hinged outer door with continuous stainless steel hinge and stainless steel butterfly twist type latches.
4. Stainless steel or copper-free aluminum back panel with provisions to mount control devices and terminal strip for field connections.
5. Control Panel Features:
 - a. Main power disconnect switch or circuit breaker device, mechanically interlocked with door so that the main power must be "OFF" before door can be opened.
 - b. Power Requirements: Local Control Panel (LCP) to operate from a single 480-volt, 3-phase power source.
 - c. Control power transformer to be sized for anticipated loads from devices/controls.
 - d. Heater and thermostat for condensation protection.
 - e. NEMA-rated motor starter.
 - f. Panel components are to conform to Division 16 requirements.

C. The control panel enclosure shall be wall or stanchion mount type, located as shown on the Drawings.

- D. All control wiring shall be No. 14 AWG (minimum). Power wiring shall be No. 12 AWG (minimum). Wiring shall be type MTW rated for 105°C. All wiring shall have not less than 600 volts insulation. Control wiring shall be color coded as specified in Division 16. All connections required to field control components shall be made at approved type terminal blocks with marker strips or similarly approved means. All wires shall be marked at both ends using self-adhering plastic wire markers with heat shrink or clear self-laminating strips. Wire numbers shall be in accordance with the accepted Shop Drawings.**
- E. All conduit, couplings, fittings and fasteners furnished by the equipment manufacturer for skid mounted equipment shall be PVC coated rigid galvanized steel and liquid tight, PVC coated flexible metal conduit. Feeders from the control panel to equipment shall be by the Contractor and per the electrical drawings.**
- F. A phenolic-type nameplate shall be securely fastened on the door of each control panel and shall identify the specific floating aerator unit associated with the control panel. Each component located within the panel shall be provided with an identification label.**
- G. The starter shall be NEMA rated, full voltage, combination-type, individual magnetic starter complete with motor circuit protectors (MCPs). Starter shall be rated 480VAC, 3-pole, sized for the mixer motor. The starter shall be furnished with a minimum of two spare auxiliary contacts.**
1. The starter shall be supplied with a three-pole manual reset overload relay. The relay shall be solid state type, with at least one isolated normally open and one isolated normally closed auxiliary contact. Overload relay shall have phase loss protection built in against motor single phasing. The relay shall have adjustable current range dial. Eutectic alloy and bi-metallic type overload relays shall not be used.

2. Starters shall be provided with all coils and controls for 120 VAC operation. A control power transformer shall be furnished and installed for each motor controller. Refer to specification Division 16, for detailed description.
 3. Motor starter coil shall be equipped with a surge-suppression device for protection of the solid state equipment (e.g. programmable logic controller), wired as part of the control circuit.
- H. A molded case motor circuit protector with adjustable instantaneous trip shall be provided for each motor controller. The motor circuit protector shall be externally operable and shall provide clear identification of its position. The motor circuit protector shall have a minimum interrupting capacity as the MCC that feeds it.
- I. A three-phase Surge Protection Device (SPD) shall be supplied and connected to the load side of the main circuit breaker. The SPD shall protect against damage due to transient voltages and lightning strikes. The SPD shall have a surge current rating of 80 kA per mode for each phase, and shall meet UL 1449.
- J. Control Relays (CR) shall be Type D3 as manufactured by Cutler-Hammer, Potter Brumfield equivalent, Allen-Bradley equivalent, Siemens Energy and Automation Inc. equivalent, or equal. Relays shall be general purpose plug-in type with coil voltage as shown on the Drawings and sealed 10 ampere contacts. All relays shall have three SPDT contacts rated 120/240 VAC and 28 VDC minimum. Machine tool relays shall be provided when the contact burden exceeds 10 amperes. Miniature type or "ice cube" relays are not acceptable. Control relay mechanical life expectancy shall be in excess of 10 million operations. Provide time delay relay to allow a staggered start of aerators on restoration of power. The setting of these time delay relays shall be coordinated with the settings of the time clock specified below.
- K. Pilot device ratings shall meet or exceed the NEMA rating of the control panel enclosure. Pilot lights shall be LED type. Pilot devices shall be heavy duty, oil tight, 30mm components as manufactured by Allen Bradley (#800H) or Square D (#9001SKT), or equal. Pilot lights shall be provided with legend plates, shall be LED-type, and shall be push-to-test. Push buttons and pilot devices shall meet all requirements of Division 17. Lens colors shall be as indicated in Division 17.
- L. The panel shall have the following front-mounted control devices:
1. Local-Off-Remote Selector Switch
 2. Start-Stop Selector Switch
 3. Power On Indicating light
 4. Run indicating light
 5. Fan Overload indicating light
 6. Fan Broken Belt indicating light
 7. Carbon Unit Alarm indicating light
 8. Alarm Reset pushbutton
 9. Emergency stop pushbutton
 10. Airflow rate

- M. Provide dry contacts for remote indication of the following conditions for each system. Conditions identified as alarms shall be normally-closed and open when the alarm condition occurs:
1. Common Alarm
 2. Fan e-stop Alarm
 3. H-O-A switch in Auto position
 4. Fan run status
- N. Control panel shall accept the following dry contacts for operation of the system:
1. Fan low differential pressure
- O. The panel shall accept the following analog signals:
1. Airflow transmitter
- P. The panel shall have the following analog outputs for remote indication:
1. Airflow transmitter
- Q. Provide circuit breakers and 120 VAC power for the following devices powered from panel:
1. Airflow transmitter
- R. A control power transformer shall be mounted in the control panel to reduce the line voltage to 120 V for the control circuit. The transformer shall be rated the necessary KVA. The transformer primary and secondary shall be protected from short circuits and overloads by circuit breakers or fuses of the proper rating. Provide a separate transformer for the control circuit and the enclosure heater. Provide a spare set of fuses (two minimum) of each type and rating.
- S. Provide elapsed run time meters (ETM) for each motor. ETM ratings shall meet or exceed the NEMA rating of the control panel enclosure. ETM shall be six digit, non-reset type.
- T. The control panel shall provide the following control function for each fan:
1. When the HOA switch is in the HAND position, the fan shall run as follows:
 - a. When the Start-Stop switch is in the START position, the fan shall run.
 - b. When the Start-Stop switch is in the STOP position, the fan shall not run.
 2. When the HOA switch is in the OFF position, the fan shall not run.
 3. When the HOA switch is in the AUTO position, the fan shall be started by closure of a set of remote dry contacts in the LCP. When the remote dry contacts open, the fan shall stop.
 4. In either AUTO mode or HAND mode, the fan shall be shut down when the broken belt alarm condition occurs.
 5. Broken belt alarm shall be generated by a current trip located in the panel. When a fan is running and the current drawn by the fan motor is below a setpoint determined by the manufacturer as indicating that the fan wheel has been decoupled from its motor, the fan shall be stopped and the broken belt alarm shall be activated.

6. Fan motor space heater shall be energized by the control panel when the motor is off.
 7. Alarms shall be latched such that the alarm indicator light shall remain energized and alarm contacts shall remain in the alarm state until the Alarm Reset pushbutton has been pressed.
- U. A space heater or a trickle-charge heating system with transformers, relays, and switches shall be provided in the control panel.

2.09 TIE DOWN SYSTEMS

- A. Scrubber and duct shall withstand horizontal loadings of 40 pounds per square foot at the location in accordance with the latest edition of the Building Code in the jurisdiction where the system will be installed, for the area under the worst condition, whichever is greater. Type 316L stainless steel clips, anchor bolts, and accessories shall be provided to securely anchor the scrubber and duct to the concrete pad.

2.10 FIBERGLASS REINFORCED PLASTIC FANS

- A. Provide fiberglass reinforced plastic (FRP) fire retardant fans with an epoxy or UV gel coating to protect against ultraviolet degradation. Fans shall be installed complete with motors, drives, guards, and coatings of sufficient capacity for the duty required. Fans shall operate to draw odorous air from the odor sources and shall exhaust air through the odor control system.
1. Provide fans that are factory-fabricated and assembled, factory-tested, and factory-finished, with indicated capacities and characteristics.
 2. Base fan performance at standard conditions (density 0.075 Lb/ft³).
 3. Selected fans selected are to be capable of accommodating static pressure and flow variations of +/-15% of scheduled values.
 4. Fans are to be belt driven, AMCA arrangement 10 (motor sizes less than 25 hp) or AMCA arrangement 9 (motor sizes 25 hp and larger), unless otherwise shown on the Drawings.
 5. Fans are to be equipped with lifting lugs.
 6. Nameplate: Each fan to be furnished with a permanently affixed SS nameplate with manufacturer's name, model number, serial number and electrical data.
 7. Mounting: Where mounted on a roof or elevated platform, the entire fan and motor assembly is to be mounted on vibration isolators to reduce noise transmission.
 8. Rotating Assembly: Statically and dynamically balanced to balance grade G6.3 per ANSI S2.19 and designed for continuous operation at the maximum rated fan speed and motor horsepower.
- B. Fan shall be constructed such that all surfaces in contact with the corrosive gas stream are made of solid, corrosion resistant FRP, model RFE manufactured by The New York Blower Company, or equal as manufactured by Hartzell or Ceilcote/Verantis. All nuts, bolts and fasteners in contact with the gas stream shall be type 316 SST and encapsulated in FRP.
- C. Performance: Fan ratings shall be based on tests made in accordance with AMCA Standard 210. Fans shall be licensed to bear the AMCA Certified Ratings Seal for Air Performance. Fans not licensed to bear the AMCA Seal for performance shall be tested, at supplier's

expense, in an AMCA Registered Laboratory. Fans shall have a sharply rising pressure characteristic extending throughout the operating range to assure quiet and stable operation. Fan speed and motor size shall be selected by the odor control system manufacturer to meet the required conditions of air flow rate and pressure drop across the odor control system and ducting, including the pressure drop in the ducting upstream of the odor control system inlet. Fan speed shall not exceed 85% of the maximum allowable driven speed of the fan.

- D. **Motor:** Motor shall meet the requirements specified in the table below.

Motors	
Item	Value
Rating	230/460V, 3 ph, 60 Hz
Horsepower	10 or 15 as specified
Speed, rpm	1800
Enclosure	TEFC ¹ or TEXP
Insulation	Class F
Inverter Duty	Yes
Service Factor	1.10
Space Heater	Yes
Motor Winding Temperature Switches	No

¹ Suitable for Class I, Division 2 environment.

- E. **Sound:** Fan manufacturers shall provide sound power level ratings for fans tested and rated in accordance with AMCA Standards 300 and 301. Sound power ratings shall be in decibels (reference IOE-12 watts) in eight octave bands.
- F. **Bearings:** Bearings shall be grease lubricated, precision anti-friction ball, self-aligning, pillow block design. Bearings shall be designed for a minimum L-10 life of 30,000 hours (150,000 hours L-50 life) when rated at the fan's maximum cataloged operating speed. Fan bearings shall be visible and accessible for inspection and maintenance. Bearings enclosed within the fan housing where they can be exposed to the corrosive gas stream are not acceptable.
- G. **Construction:** Fan shall be constructed in accordance with the ASTM D-4167 standard specification for fiber-reinforced plastic fans and blowers to ensure structural integrity. All surfaces exposed to the atmosphere shall be resin rich of a paraffinated resin stabilized against ultraviolet degradation and include a reinforcement not to exceed 20% "C" grade fiberglass. All parts exposed to the gas stream shall be constructed of, or encapsulated in, an FRP laminate capable of resisting continuous airstream temperatures of 250 degrees Fahrenheit. All resins shall be clear to allow detection of subsurface imperfections. Use of pigments, gel coats, inhibitors and additives which may disguise flaws in the laminate is prohibited. Other minimum construction requirements shall consist of the following:
1. **Housing** - Fan housing shall be constructed of a fire retardant polyester resin or Type II PVC with an ASTM E84 Class I rating. Housing laminate construction shall conform to ASTM Standard C-582. Airstream surfaces shall be smooth to minimize resistance and prevent build up of airborne contaminants. Shaft hole openings shall be fitted with a Teflon closure having a maximum clearance of 1/32" to minimize leakage. A flanged inlet and flanged outlet shall be furnished on the fan and shall be of FRP construction. Inlet assembly shall be bolted to permit wheel removal. Fan shall be furnished with an access door, positioned to avoid collection of condensation, and a 1-inch minimum flanged type drain connection, positioned at the lowest portion of the fan scroll.
 2. **Wheel** - Wheel shall be of backwardly inclined non-overloading design for increased efficiency. Wheel shall be fabricated of a fire-retardant vinyl ester resin with an ASTM E84 Class II rating no greater than 30. Wheel hub shall be permanently bonded to the shaft and completely encapsulated in FRP to insure corrosion resistant integrity. Steel wheels coated with FRP or wheels with taper-lock hubs are not acceptable.

3. Shaft - Shaft shall be ASTM A- 108 steel, grade 1040/1045 with an FRP sleeve fixed securely and bonded to the wheel backplate. The sleeve shall extend out through the housing shaft hole for corrosion protection. The shaft first critical speed shall be at least 125 percent of the fan's maximum operating speed. Shaft shall be counter-sunk for tachometer readings.
- H. Fan wheel shall have true backwardly curved or radial, single thickness air foil type blades which limit load horsepower characteristics, and shall not exceed the brake horsepower shown on the schedule. Fan wheel shall be made of solid fiberglass reinforced polyester with a stainless steel hub, encapsulated within the impeller, to provide a reliable connection with the drive shaft.
- I. Belt Drives:
 1. Belt drive components to be sized based on a service factor of 1.4.
 2. Pulleys to be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. Motor pulleys to be adjustable for final balancing.
 3. Belts: Oil-resistant, non-sparking, and non-static.
 4. Belt and Bearing Tube: Furnish unit with heavy gauge belt tube to shield the belts and bearings from the air stream.
 5. Belt drives are to be factory-mounted, with final alignment and belt adjustment made after installation.
 6. Belt Guard: Provide FRP, OSHA compliant belt guard, on the outside of the fan cabinet. Belt guard or motor cover is to completely cover the motor pulley and belt(s).
 7. Furnish one additional complete set of belts for each belt-driven fan.
- J. Furnish an aerodynamically designed inlet box for fan. The inlet box shall be designed to attach to the inlet flange of the fan and shall have a support leg with mounting plate. Inlet box shall be constructed of the same resins and construction techniques as the fan specified above. Inlet box shall be designed to support the weight of the vertical ductwork above the inlet box. Coordinate final weight with ductwork manufacturer and Engineer.
- K. Balance and Run Test: The wheel and shaft shall be dynamically balanced on precision balancers. Prior to shipment, completed fans shall receive a final test balance at the specified operating speed.
- L. Final Inspection: All fans shall receive a final inspection by a qualified inspector prior to shipment. Inspection shall include: fan description and accessories, balance, welding, dimension, bearings, duct and base connection points, paint finish and overall workmanship.
- M. The fan and motors shall be factory mounted on a structural channel subbase with integral motor slide base. An OSHA approved FRP motor and drive canopy shall be furnished and installed.
- N. Expansion joints shall be provided on the suction and discharge of each fan. Provide expansion joints in accordance with 15892, FRP Piping Systems.
- O. Sound Enclosure – Provide an acoustical enclosure for each fan motor unit suitable for outdoor installation. The enclosure shall be complete with FRP housing, gaskets, fasteners, flashing or any additional components required for installation. The sound enclosure shall reduce fan noise to a maximum of 60 db at 3 ft.

1. All panels and components shall be prefabricated and shall not be susceptible to damage from extended exposure to airflow, pressure differentials, vibration, air temperature, or humidity.
2. The entire enclosure shall be designed by the manufacturer to be self-supporting when any or all of the side panels are removed. The enclosure shall be independent of the fan and ductwork.
3. Enclosure size is shown approximately on the drawings. Final size shall be determined by the manufacturer to suit the fan actually furnished. Enclosure shall be large enough to provide a minimum of 24 inches clear on three sides of the fan as shown on the drawings.
4. Construction
 - a. Enclosure shall have one access doors, located as shown on the Drawings, arranged to permit access to all parts of the fan assembly for service and major maintenance. Provide a double door, minimum of 42" high. Each sound enclosure shall be manufactured in two "halves" which can be slid together and joined with a flanged connection. A closed-cell neoprene sponge gasket shall be provided along with stainless fasteners to facilitate installation. "Kit" sound enclosures which rely on the Contractor to cut/fit parts are not acceptable.
 - b. All panels shall be made up of a ¾" thick FRP laminate with acoustical core. Deflection of these FRP panels shall not be more than L/360 under an 80 mph wind load and 6-inch snow load. The top panel of each enclosure shall be suitable for a 250 pound man-load on a 12" x 12" section with a deflection of no more than ½".
 - c. Each panel shall be coated with a vinyl sound barrier to isolate any noise not absorbed by the acoustic sound deadening foam.
 - d. Each panel shall contain a 2 inch thick layer of acoustical foam. This foam shall be an open cell, flexible polyester based acoustical grade, polyurethane foam designed to give maximum sound absorption per given thickness. It must provide excellent resistance to heat, moisture and chemicals as required for this application. Mineral wool, or any material which will degrade under high humid conditions is not acceptable. Foam used must be specifically designed for use in sound deadening applications.
 - e. Acoustical Performance:
 - 1) The manufacturer shall provide certified testing data obtained from an acoustical laboratory, listing sound absorption and transmission loss characteristics of the panel assembly. Testing data must be for the construction utilized for the specific sound enclosures on this project. Testing done on other products, especially dissimilar materials is not acceptable.
 - 2) The Insertion Loss measured at a 1 meter distance from the enclosure and 2 meters above the ground shall be a minimum of 24 dBA. The test shall be performed in accordance with the OSHA measurement standards and the NMTBA (National Machine Tool Builders Association) standards.
 - f. Support Members and Trim: All perimeter and internal channel members and trim items shall be of either corrosion resistant fiberglass reinforced plastic or stainless steel. Any other form of mild steel is not acceptable.
 - g. Furnish all anchor bolts, nuts and washers, which shall be Type 316 stainless steel. The enclosure unit shall be bolted directly to the equipment slab. The enclosure shall

have a flanged base with a minimum width of 3 inches internal and external. A polyethylene or UHMW plastic base shall be bonded to the base flange to prevent damage to the enclosure base flange.

5. Sealant: Where required for acoustical performance, base channel/floor interfaces shall be sealed with a caulking sealant. Sufficient sealant shall be used to extrude surplus sealant and give a visual indication of complete coverage in all joints. The sealant shall have sufficient adhesive strength to prevent air leakage through the assembly when a pressure differential exists, but still allow system disassembly without damage to the panel components.
6. Windows: Provide one 18 inch by 24 inch observation window to visually observe the motor. Window shall be constructed of double pane ¼ inch thick safety glass held in place with neoprene acoustical seals and separated by an air space of the same thickness as the panel.
7. Ventilation System: Provide an acoustical air intake silencer and acoustical air discharge silencer with an integral fan curb in the enclosure walls to admit air for cooling the enclosure while minimizing sound exiting from the enclosure.
 - a. The air intake and discharge silencers shall meet the following service conditions:
 - 1) Number of Units: 1 per enclosure
 - 2) 300 CFM
 - 3) Total Static Pressure at Each Silencer: 0.25 inches w.g.
 - 4) Acoustical Performance: The insertion loss shall at a minimum equal to the performance of the enclosure wall.
 - b. The fan of the fan motor may provide air movement and cooling inside the enclosure. An auxiliary exhaust fan shall be mounted on the acoustical enclosure to provide air circulation during fan operation. The fan shall be located on the roof of the enclosure on the inlet side and shall be quiet running, so as to maintain integrity of the noise limitation specified below. The auxiliary exhaust fan shall provide a minimum of one air change per minute in the acoustical enclosure.
 - c. Auxiliary exhaust fan motors:
 - 1) Service Conditions:
 - a) Number of Units: 1 per enclosure
System 1: 300 CFM, 1/12 HP
 - b) Static Pressure, Each Unit: 0.25 inches w.g.
 - 2) Exhaust fan shall be a dome type roof exhauster suitable for operation on 120 volt, 1-phase, 60 Hz power, solid shaft, ball bearing type.
8. Openings for Pipe Penetrations: Openings for pipe and conduits shall be field cut to ensure proper positioning. Provide framing members, collars, and fittings as required to insure the openings are sealed against acoustical leakage.
9. One (1) fluorescent light shall be provided inside each acoustical enclosure as specified in Division 16. Lighting shall run on 120VAC, 1-phase, 60 Hz power. A switch shall be provided inside each acoustical enclosure for turning the light on and off in accordance with Division 16.

PART 3 - INSTALLATION

3.01 INSTALLATION

- A. All equipment shall be assembled and shipped so that field assembly will be minimized and installation can be completed with little or no field fabrication.
- B. The odor control system will be received, unloaded, stored and installed by the Contractor.

3.02 SHOP TESTING

- A. Carbon Vessel Shop Tests
 - 1. Provide the services of an independent Testing Inspector to be present at the point of manufacture, upon completion of fabrication and prior to shipment, to perform or witness the following:
 - a. Barcol Hardness measurements per ASTM D2583-87 for each unit
 - b. Acetone sensitivity test for all internal secondary bonds
 - c. Glass content by ignition loss on three cutouts per ASTM D2584
 - d. Hydrostatic Leak Test:
 - 1) Perform on each vessel.
 - 2) Fill to 3' above bottom of vessel; allow to stand for 2 hours with no visible leakage.

3.03 FIELD ACCEPTANCE TESTS

- A. Field acceptance tests shall be required for all odor scrubber equipment specified herein within 6 months of installation of the equipment. All equipment shall be field tested in accordance with the applicable requirements of Division 1. Field testing shall include mechanical tests and performance tests as specified below. The manufacturer shall submit information which fully describes the testing procedure. The manufacturer will be provided at least ten days' notice of such tests and the Engineer shall have a representative present when acceptance tests are run. In case of failure of any unit to meet the test requirements, the manufacturer shall make such alterations as are necessary, and the tests shall be repeated without additional cost to the Owner until the equipment is satisfactory. Certified reports shall be submitted to the Engineer for approval.
- B. All ductwork shall be tested and balanced in accordance with Division 15, prior to field testing.
- C. Mechanical Test: The entire odor control system with other associated equipment such as fans, piping and controls shall be mechanically tested for at least 4 hours after initial installation. The test shall be made with airflow being introduced at the design rate. All equipment shall show evidence of mechanical soundness, no evidence of liquid or gas leaks, no undue vibration and generally be structurally rigid when being tested.
- D. Acoustical Test: Record octave band sound power levels (LW) IN/dB RE 10-12 W from 63 to 8000 Hz while carbon adsorber is operating. Convert to sound pressure level, dB on "A" weighted scale at two distances: at the property line and to demonstrate the sound criteria

specified herein is met. Operating sound levels for carbon adsorber system as installed shall be less than the levels stated above.

- E. Performance Test: The manufacturer shall test the system to meet the design conditions of service as specified above. The ability of the equipment to meet the performance requirement shall be determined by the capability of reducing H₂S by 99.5% of the concentration of hydrogen sulfide in the air at maximum inlet H₂S concentration conditions.
1. The manufacturer will be furnished the following items by the odor control vendor for testing:
 - a. Portable manometer: 0 to 10-inches water, for differential pressure loss across reactor vessel.
 - b. Air velocity meter with pitot tube for airflow through reactor.
 - c. H₂S portable analyzer for inlet and outlet gas concentrations – Jerome 631-X, or equal.
 - d. All labor and equipment manufacturer's field engineer for conducting the tests.
 - e. H₂S gas canister with regulator.
 - f. MOSS Odalog system from Detection Instruments.
 2. H₂S Test Procedures: The test shall be conducted for a four (4) hour period at design airflows. Influent and effluent samples shall be taken at 15 minute intervals for a period of not less than four (4) hours using the Jerome meter with continuous inlet/outlet tracks recorded every 1 min using an MOSS odalog system H₂S sampling methods shall conform to the following standards:
 - a. Influent and outlet H₂S concentration shall be demonstrated by mechanical volumetric measurement and high-precision gas sampling system. Differential pressure and airflow rate shall be recorded at each interval.
 - b. H₂S analyzer shall be calibrated prior to shipment to the job site. Provide calibration certificate in testing report.
 - c. Augment air stream with H₂S gas to obtain required concentrations. Airstream shall be spiked to the peak concentration two times during the testing period for a 120-second duration.
- F. The manufacturer's representative witnessing the field tests shall furnish the Owner, through the Engineer, a written report certifying that the scrubber unit:
1. Has been properly installed and accurately aligned.
 2. Is free from any undue stress imposed by connecting piping and/or anchor bolts.
 3. Has been operating at design airflow rates and that the unit operates satisfactorily.
 4. The Contractor has accurately recorded the data obtained during the field test.

3.04 TRAINING

- A. The services of the manufacturer's representative shall be provided for a period of not less than three (3) days as follows:

1. At least two (2) trips of one (1) day(s) to check and supervise the installation of the equipment.
2. See Section 01450 for Startup and Training.

Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor. A written report covering the representative's findings and installation approval shall be submitted to the Engineer covering all inspection and outlining in detail any deficiencies noted.

The times specified are exclusive of travel time to and from the facility and shall not be construed as to relieve the manufacturer of any additional visits to provide sufficient service to place the equipment in satisfactory operation.

3.05 TOOLS, SUPPLIES AND SPARE PARTS

- A. The manufacturer shall furnish all recommended spare parts. At a minimum, the odor control system shall include the following spare parts:
 1. One (1) set of gaskets for all gasketed covers and connections for each system
 2. One (1) set of internal bolts and fasteners for wetted service for each system
 3. Four (4) H2S indicators for each system
 4. One (1) spare set of belts and bearings for each fan.

3.06 EQUIPMENT IDENTIFICATION

- A. Each piece of equipment shall be provided with an equipment nameplate in accordance with the specifications, which will be securely fastened in a conspicuous place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, and principal rating data.

END OF SECTION

KEY NOTES:

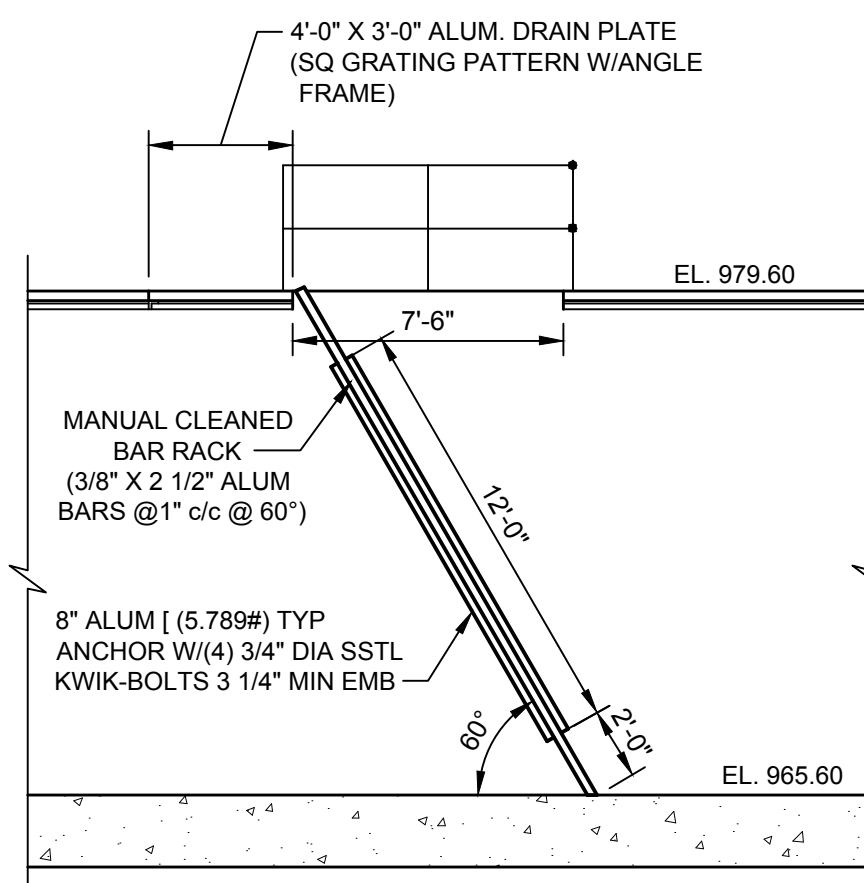
- 1 ALUM PLANK GRATING
- 2 3'-0" WIDE X 5'-6" HIGH SSSL SLIDE GATE (EXPLOSION PROOF, ELECTRIC OPERATED)
- 3 1 1/2" Ø REMOVABLE ALUM HANDRAIL
- 4 NOT USED
- 5 MECHANICAL BAR SCREEN
- 6 SSSL EXHAUST HOOD FOR ODOR CONTROL
- 7 14" PVC ODOR CONTROL PIPING
- 8 SCREEN COMPACTOR/CONVEYOR
- 9 ODOR CONTROL PIPING SUPPORTS (SSSL)
- 10 3'-6" X 4'-6" ALUM ACCESS HATCH (CHANNEL FRAME)
- 11 2'-0" X 4'-6" ALUM ACCESS HATCH (CHANNEL FRAME)
- 12 3" SSSL GUIDE RAILS
- 13 12" DI 90° ELL
- 14 12" DI DISCHARGE PIPE
- 15 12" PUMP INLET PIPE
- 16 2' X 4' X 2' DEEP SUMP W/SUMP PUMPS (2)
- 17 2" SUMP PUMP DISCHARGE LINES W/CHECK VALVES (WALL PENETRATION W/LINK SEAL)
- 18 COMPLETE EXTERIOR RATED 2 TON STAND ALONE INDEPENDENT MONORAIL CRANE SYSTEM, INCLUDING HOIST, MONORAIL BEAM, ALL SUPPORTING FRAMING COLUMNS, CRANE STOPS, ETC.
- 19 SSSL GUIDE RAILS (TYP OF 2)
- 20 (2) 2" TRU-UNION BALL CHECK VALVE

D

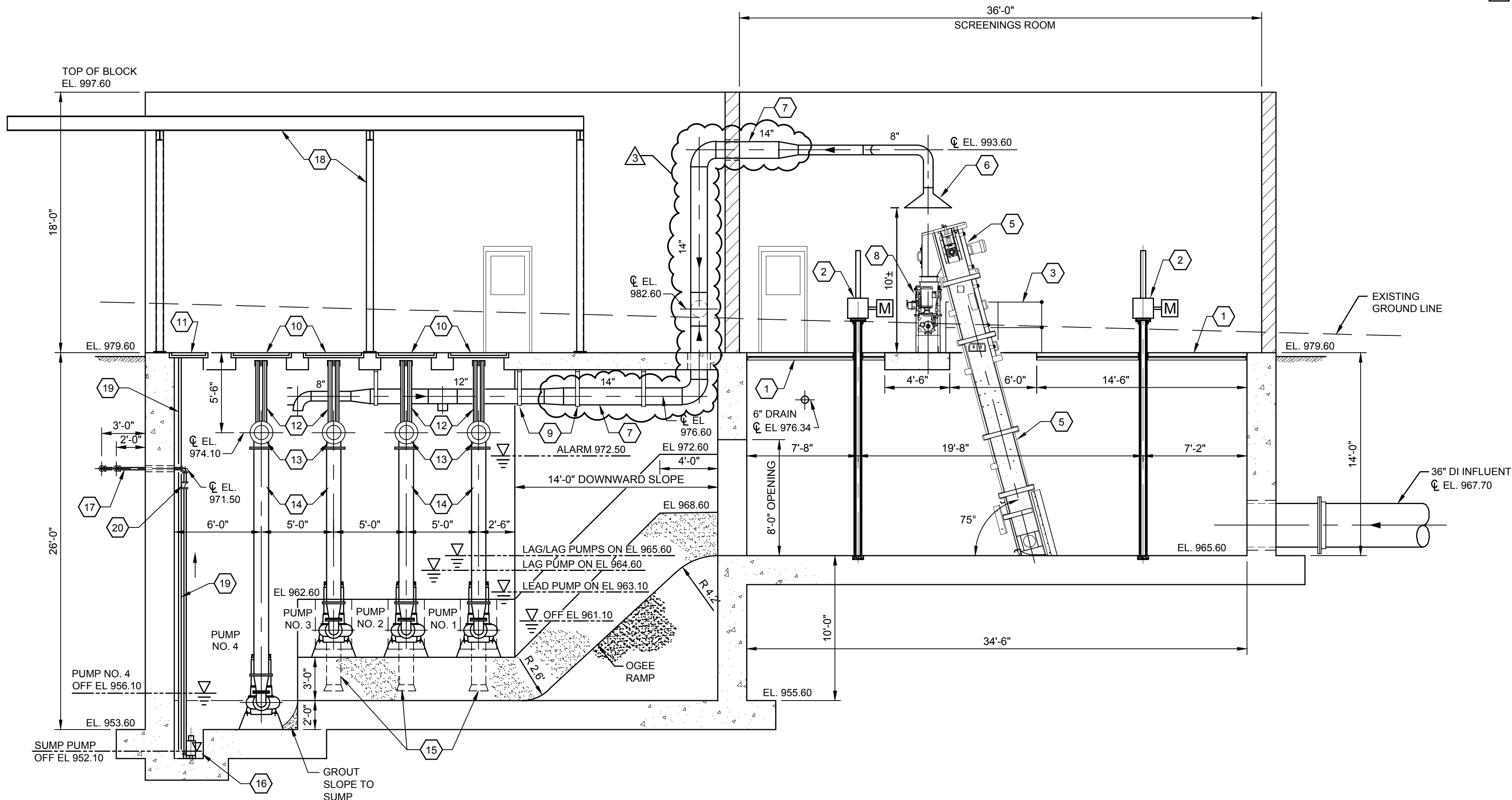
C

B

A



SECTION 2
01D-03 3/16" = 1'-0"



SECTION 1
01D-03 3/16" = 1'-0"

GENERAL NOTES:

1. HICKMAN 7 WET WEATHER STORAGE FACILITIES IMPROVEMENTS (HPPC) CONTRACT NO. 09961 OR PROJECT NO. 09961 CONTRACT NO. 09961



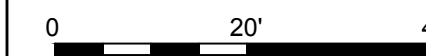
ISSUE	DATE	DESCRIPTION
1	10-18-2017	ADDENDUM NO. 3
A	10-06-2017	BID DOCUMENTS

PROJECT MANAGER	P. BENTON HANSON
DESIGNED	J.T.M.
DRAWN	C.P.L.
CHECKED	P.B.H.
QA/QC	R.K.S.
PROJECT NUMBER	10055008



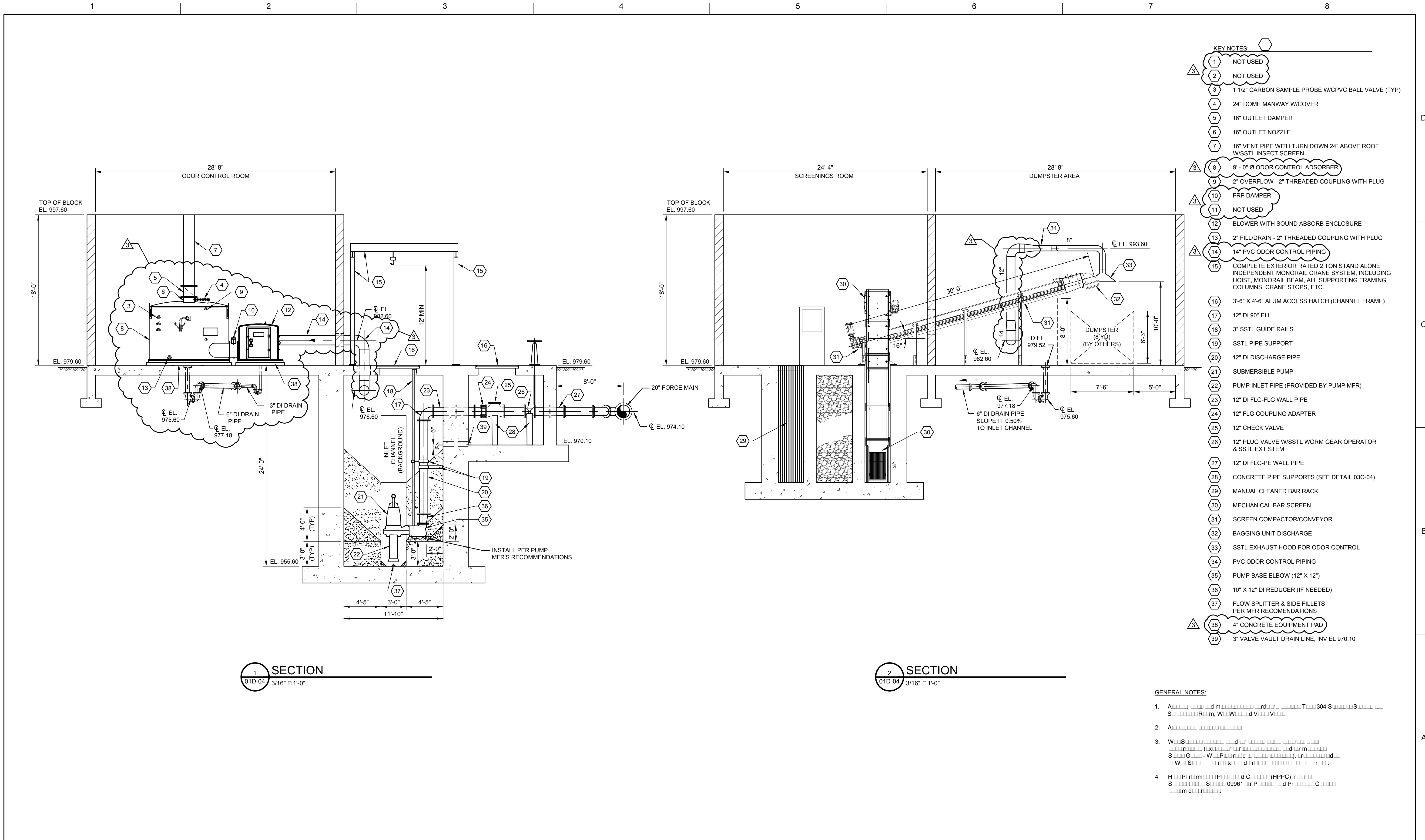
WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK

PUMP STATION
SECTION



FILENAME 01D-03
SCALE 3/16" = 1'-0"

SHEET
01D-03

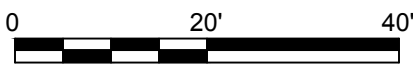


1	10-18-2017	ADDENDUM NO. 3
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PROJECT NUMBER	10055008



WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK



PUMP STATION
SECTIONS

FILENAME 01D-04
SCALE 3/16" = 1'-0"

SHEET
01D-04

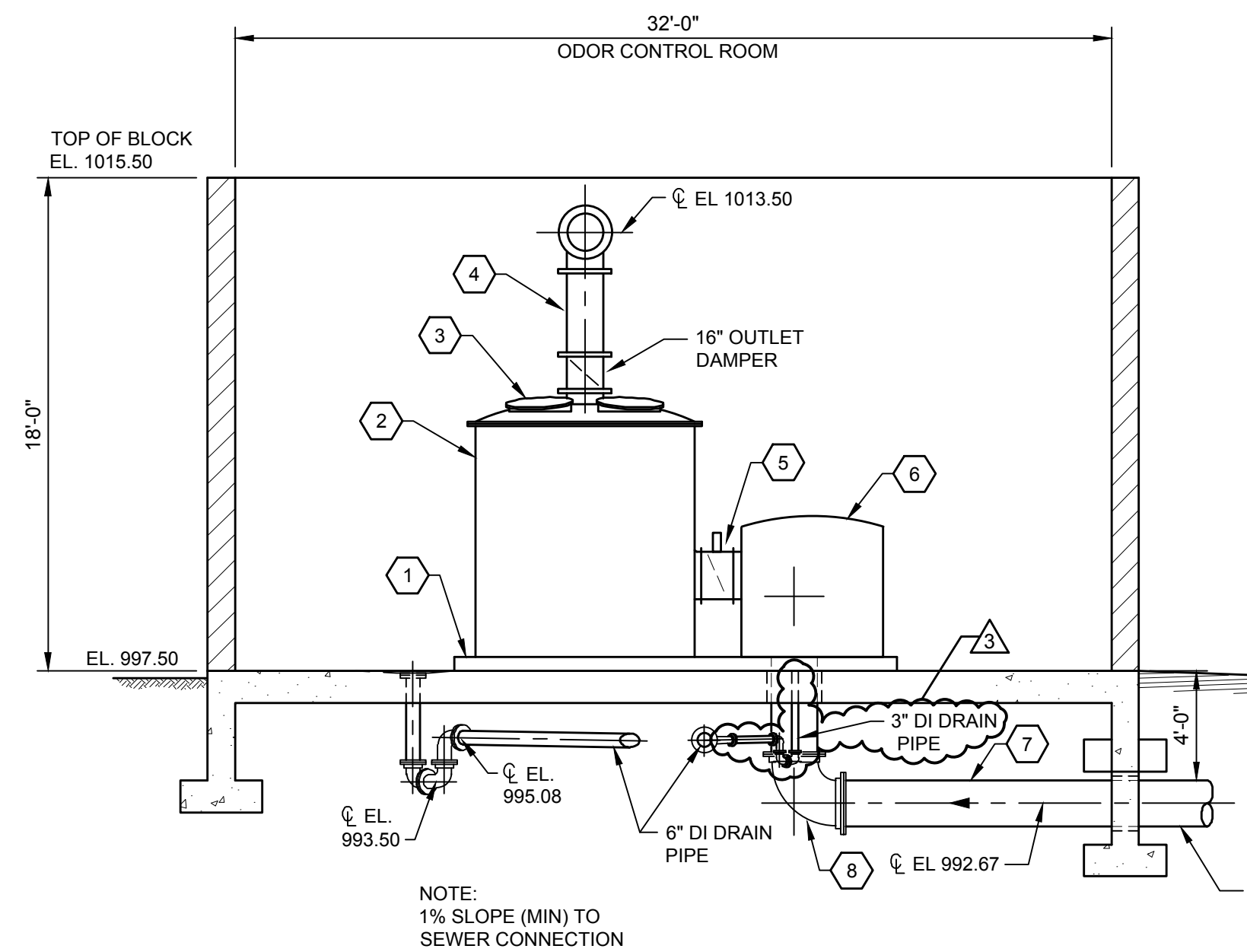


- GENERAL NOTES:
1. All nuts, bolts and miscellaneous hardware shall be Type 304 Stainless Steel in the Screenings Room, Wet Well and Valve Vault.
 2. All hatches shall be lockable.
 3. High Performance Paints and Coatings (HPCC) refer to Specifications Section 09961 for Painting and Protective Coating system descriptions.
 4. Coat inside Containment Wells and Chemical Fill/Spill Containment Area per Section 09961.

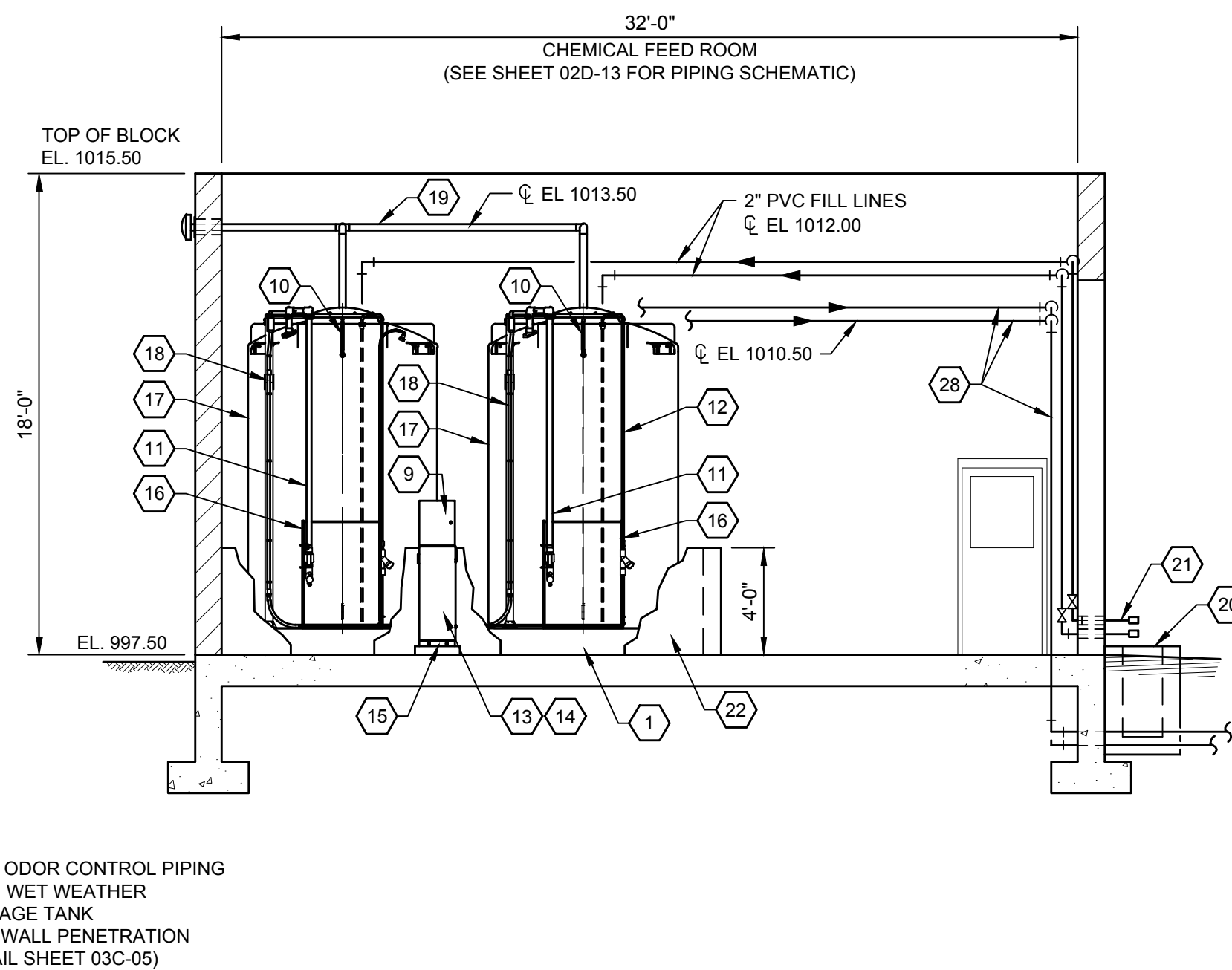


KEY NOTES:

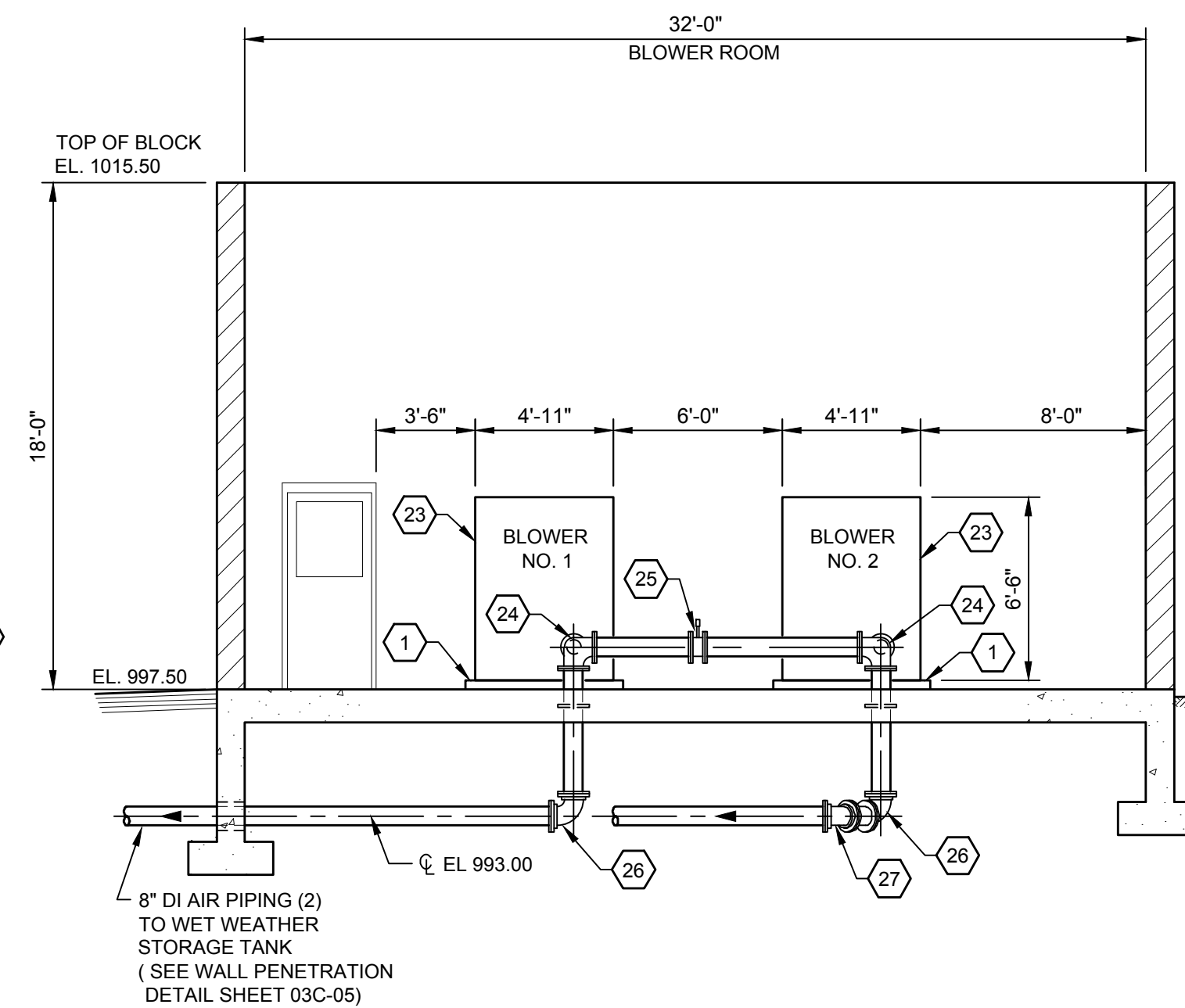
- 1 6" CONCRETE EQUIPMENT PAD
- 2 8" - 0" Ø ODOR CONTROL ADSORBER
- 3 ACCESS COVER
- 4 16" VENT PIPE
- 5 FRP DAMPER
- 6 BLOWER WITH SOUND ABSORB ENCLOSURE
- 7 20" DI ODOR CONTROL PIPING
- 8 20" DI MJ 90° BEND
- 9 ELECTRICAL CONTROL BOX ASSEMBLY
- 10 1/2" Ø OVERFILL SIGHT TUBE ASSEMBLY
- 11 2" Ø FILL PIPING ASSEMBLY
- 12 3/4" Ø SUCTION PIPING ASSEMBLY
- 13 CALIBRATION STAND ASSEMBLY
- 14 CHEMICAL FEED PUMPS
- 15 16" X 12" SSTL PIPE STAND RISER
- 16 SSTL PIPE/UTILITY TANK STAND
- 17 3,000 GALLON TANK: 7' - 1" Ø X 11' - 8" HIGH
- 18 PRESSURE SENSOR LEVEL INDICATOR ASSEMBLY
- 19 3" PVC VENT PIPE
- 20 2' x 4' x 4' DEEP SPILL CONTAINMENT BOX
- 21 2" PVC FILL PIPING WITH 2" MALE/FEMALE QUICK COUPLINGS, 2" PVC BALL VALVE AND 2" MALE/FEMALE QUICK COUPLINGS AT INTERIOR WALL
- 22 4' HIGH CONCRETE CONTAINMENT WALL
- 23 SOUND ENCLOSED BLOWER
- 24 8" X 8" X 6" DI FLG SIDE OUTLET 90° BEND
- 25 8" BUTTERFLY VALVE, LEVER OPERATED
- 26 8" DIMJ 90° BEND
- 27 8" DIMJ 45° BEND
- 28 2" PVC CHEMICAL FEED (SCH 80 PIPE, FITTINGS AND VALVES)



1 SECTION
02D-12 3/16" □ 1'-0"



2 SECTION
02D-12 3/16" □ 1'-0"



3 SECTION
02D-12 3/16" □ 1'-0"

GENERAL NOTES:

1. All dimensions are in feet and inches.
2. All dimensions are in feet and inches.
3. See S000-03 for material requirements.
4. No other notes.



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A	10-06-2017	BID DOCUMENTS

PROJECT MANAGER	P. BENTON HANSON
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CHECKED	P.B.H.
QA/QC	R.K.S.
PROJECT NUMBER	10055008



WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK

STORAGE TANK BUILDING
SECTIONS

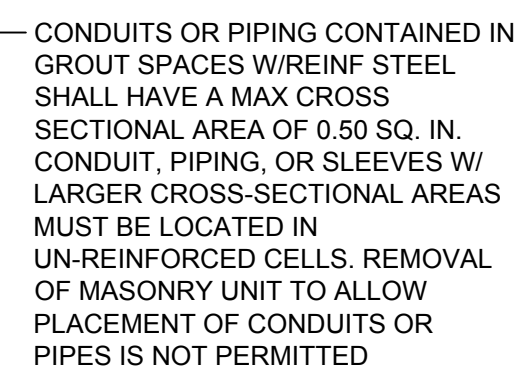


FILENAME 02D-12
SCALE 3/16" □ 1'-0"

SHEET
02D-12



1. THIS STANDARD FOLLOWS REQUIREMENTS OF IBC-2012 FOR SEISMIC DESIGN CATEGORY "C" AND RUNNING BOND CONSTRUCTION.
2. ALL HORIZONTAL BAR REINFORCING SHALL BE SET IN LINTELS OR BOND BEAMS, NOT IN JOINTS.
3. PROVIDE CONTINUOUS GALVANIZED "LADDER" MASONRY JOINT REINFORCING @ 16" @ VERTICALLY (UNO). CONTINUE JOINT REINFORCING INTO INTERSECTING WALL. USE PREFABRICATED CORNER AND TEE SECTIONS



- PIPES SHALL NOT BE EMBEDDED IN MASONRY IF THEY ARE:
- 1) CONTAINING LIQUID, GAS, OR VAPORS HIGHER THEN 150° F (66° C)
 - 2) UNDER PRESSURE IN EXCESS OF 55 PSI (379 lbf/in²)
 - 3) CONTAINING WATER OR OTHER LIQUIDS SUBJECT TO FREEZING

PI
NTS



- NOTES:

1. OPENINGS 8" OR LESS WIDE MAY OCCUR WITHOUT LINTEL REINFORCING AS LONG AS NO REINFORCING IS INTERRUPTED..

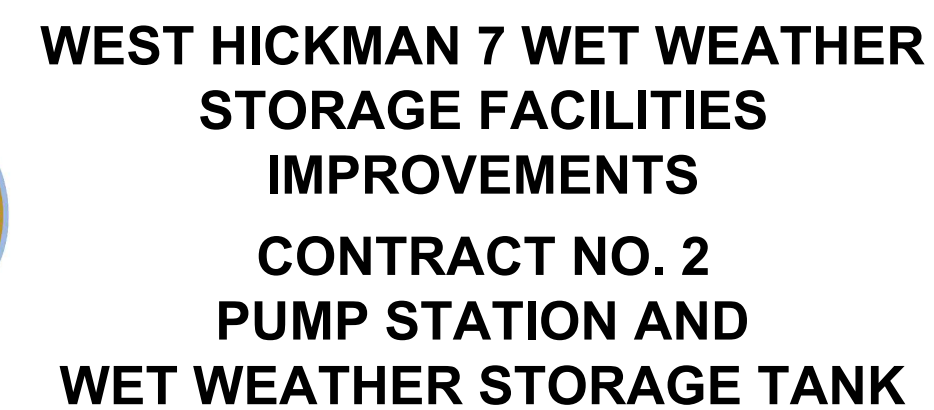
2. SEE DRAWINGS FOR LINTEL TYPES.

4 LIN
- NTS

H2R

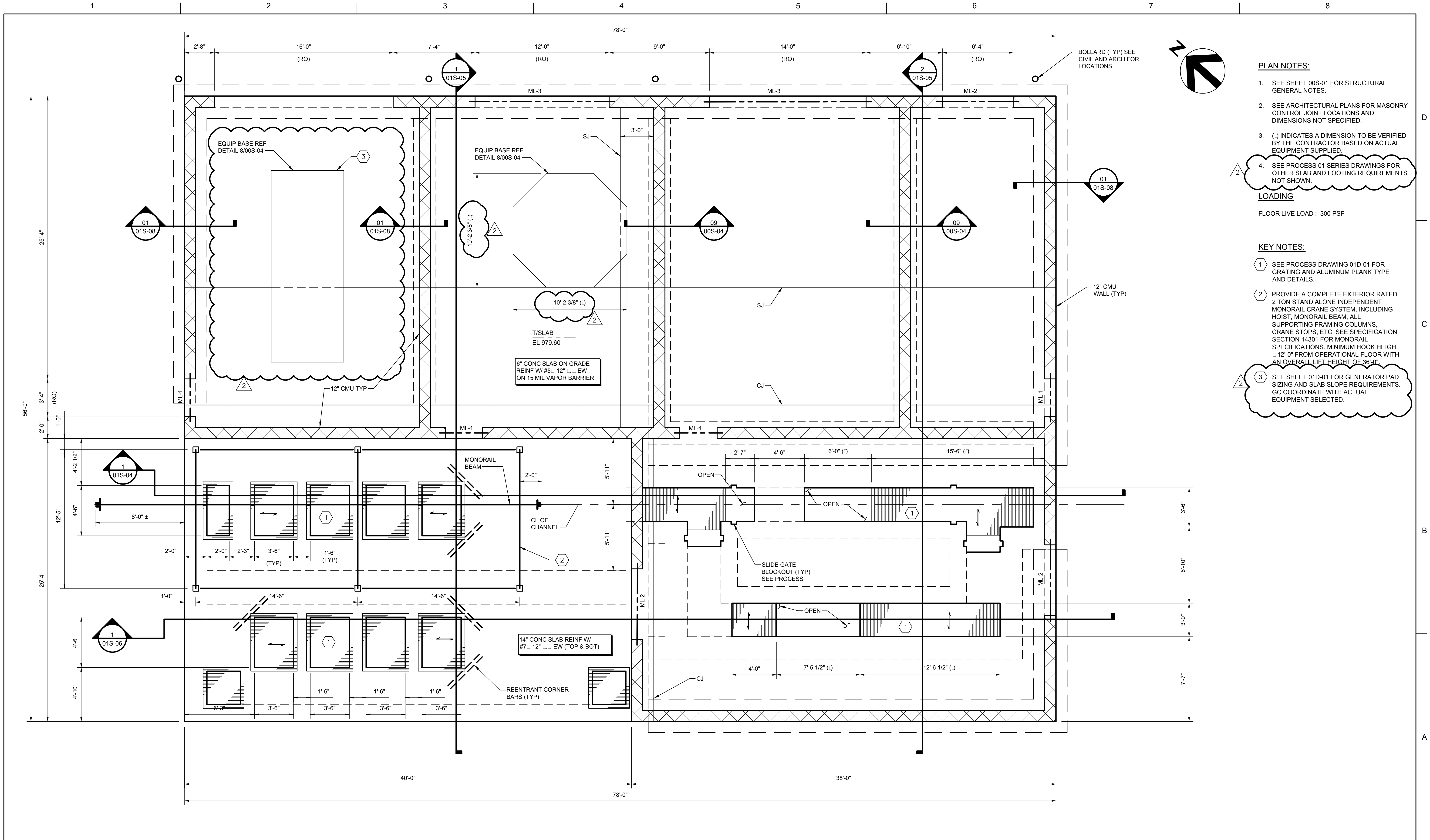
2	10/19/17	ADDENDUM #3
1	10/6/17	ISSUED FOR BID
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	P. BENTON HANSON
DESIGNED	M.T.T.
DRAWN	D.R.G.
CHECKED	M.E.M.
QA/QC	
PROJECT NUMBER	10055008



FILENAME	00S-01-00S-05
SCALE	AS NOTED

HEET
00S-04



PLAN NOTES:

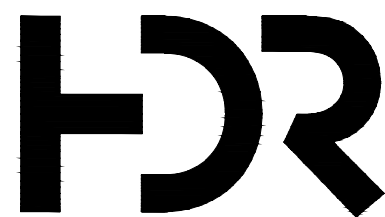
1. SEE SHEET 00S-01 FOR STRUCTURAL GENERAL NOTES.
2. SEE ARCHITECTURAL PLANS FOR MASONRY CONTROL JOINT LOCATIONS AND DIMENSIONS NOT SPECIFIED.
3. () INDICATES A DIMENSION TO BE VERIFIED BY THE CONTRACTOR BASED ON ACTUAL EQUIPMENT SUPPLIED.
4. SEE PROCESS 01 SERIES DRAWINGS FOR OTHER SLAB AND FOOTING REQUIREMENTS NOT SHOWN.

LOADING

FLOOR LIVE LOAD : 300 PSF

KEY NOTES:

1. SEE PROCESS DRAWING 01D-01 FOR GRATING AND ALUMINUM PLANK TYPE AND DETAILS.
2. PROVIDE A COMPLETE EXTERIOR RATED 2 TON STAND ALONE INDEPENDENT MONORAIL CRANE SYSTEM, INCLUDING HOIST, MONORAIL BEAM, ALL SUPPORTING FRAMING COLUMNS, CRANE STOPS, ETC. SEE SPECIFICATION SECTION 14301 FOR MONORAIL SPECIFICATIONS. MINIMUM HOOK HEIGHT 12'-0" FROM OPERATIONAL FLOOR WITH AN OVERALL LIFT HEIGHT OF 36'-0".
3. SEE SHEET 01D-01 FOR GENERATOR PAD SIZING AND SLAB SLOPE REQUIREMENTS. GC COORDINATE WITH ACTUAL EQUIPMENT SELECTED.



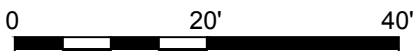
2	10/17/17	ADDENDUM #3
1	10/6/17	ISSUED FOR BID
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER P. BENTON HANSON	
DESIGNED	M.T.T.
DRAWN	D.R.G.
CHECKED	M.E.M.
QA/QC	
PROJECT NUMBER	10055008



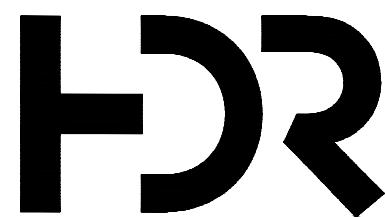
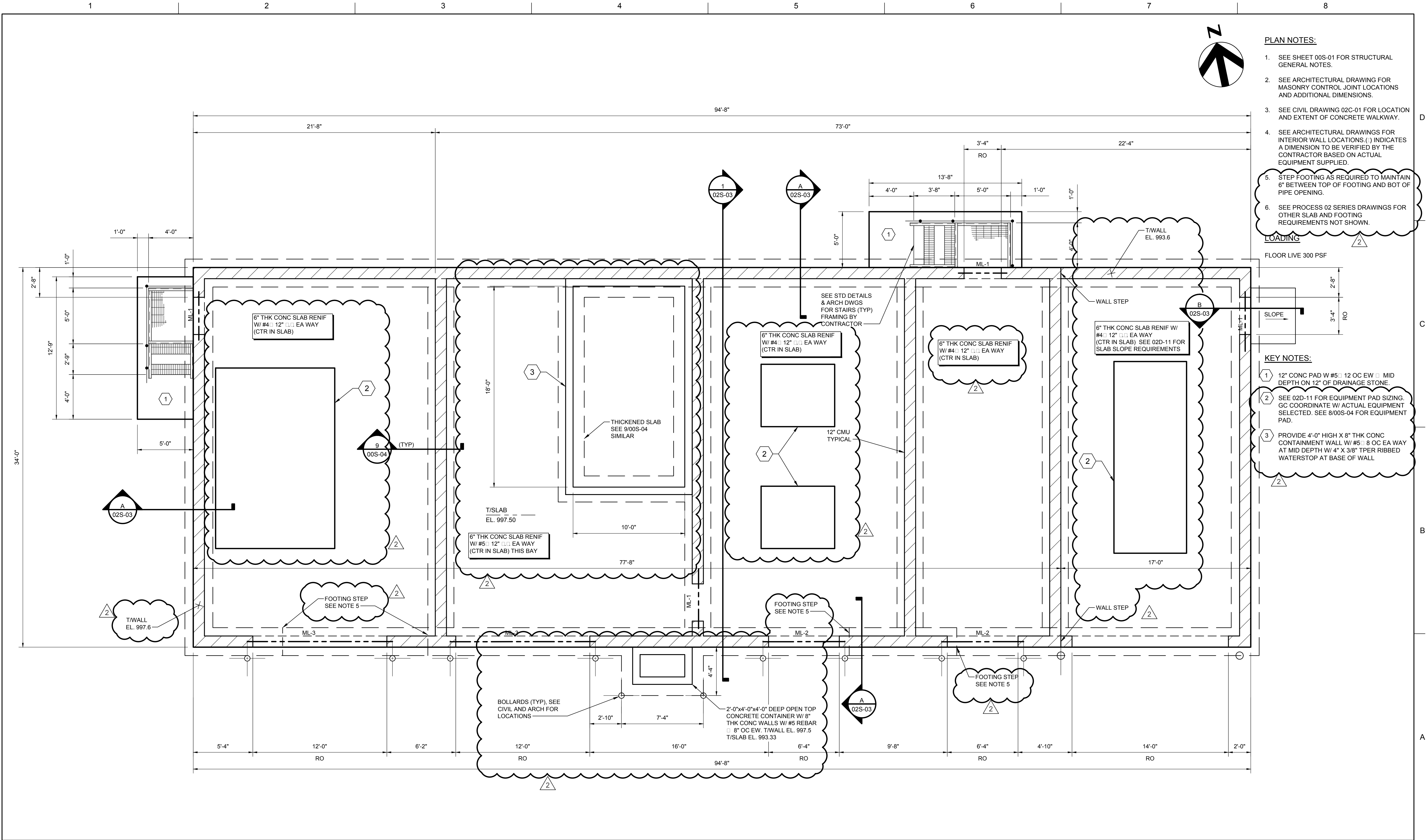
WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK

PUMP STATION
UPPER FOUNDATION PLAN



FILENAME 01S-01
SCALE 1/4"=1'-0"

SHEET
01S-02



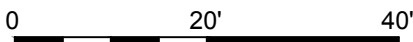
2	10/19/17	ADDENDUM #3
1	10/6/17	ISSUED FOR BID
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER P. BENTON HANSON	
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CHECKED	M.E.M.
QA/QC	
PROJECT NUMBER	10055008



WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK

STORAGE TANK BUILDING
FOUNDATION PLAN



FILENAME 01S-01
SCALE 1/4"=1'-0"

SHEET
02S-01

NTS

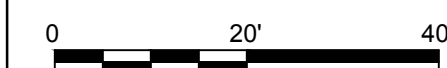
2	10/19/17	ADDENDUM #3
1	10/6/17	ISSUED FOR BID
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DESIGNED	M.T.T.
DRAWN	D.R.G.
CHECKED	M.E.M.
QA/QC	
PROJECT NUMBER	10055008



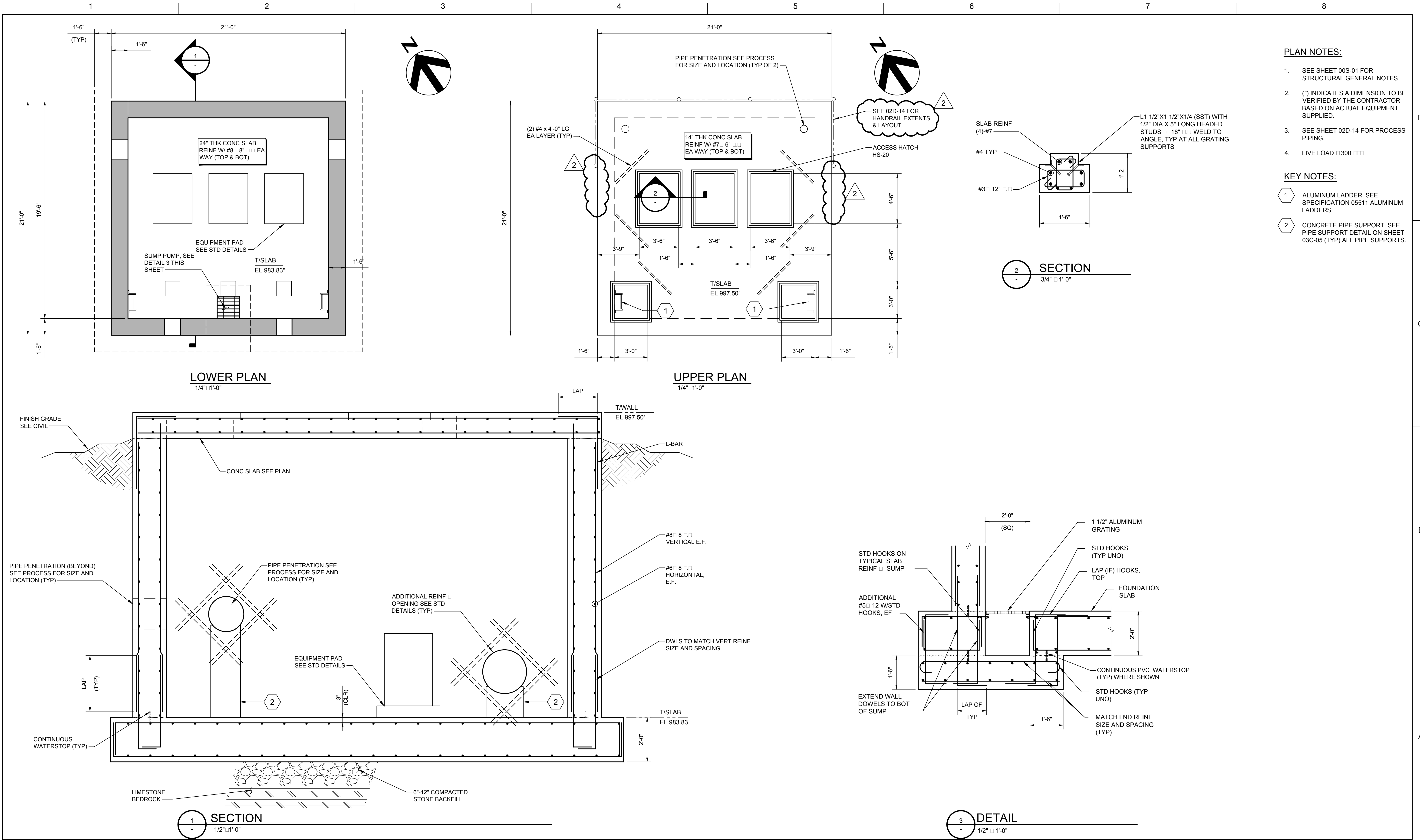
**WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK**

STORAGE TANK BUILDING SECTIONS



FILENAME	02S-03
SCALE	AS NOTED

02S-03

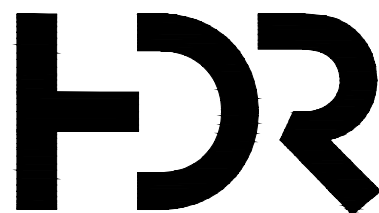


PLAN NOTES:

- SEE SHEET 00S-01 FOR STRUCTURAL GENERAL NOTES.
- () INDICATES A DIMENSION TO BE VERIFIED BY THE CONTRACTOR BASED ON ACTUAL EQUIPMENT SUPPLIED.
- SEE SHEET 02D-14 FOR PROCESS PIPING.
- LIVE LOAD 300

KEY NOTES:

- ALUMINUM LADDER. SEE SPECIFICATION 05511 ALUMINUM LADDERS.
- CONCRETE PIPE SUPPORT. SEE PIPE SUPPORT DETAIL ON SHEET 03C-05 (TYP) ALL PIPE SUPPORTS.



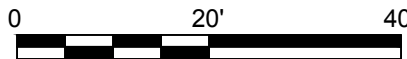
2	10/19/17	ADDENDUM NO. 3
1	10/6/17	ISSUED FOR BID
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	P. BENTON HANSON
DESIGNED	M.T.T.
DRAWN	D.R.G.
CHECKED	M.E.M.
QA/QC	
PROJECT NUMBER	10055008



WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK

MIXING PUMP STATION
PLANS AND SECTIONS



FILENAME 03S-01.DWG
SCALE 1/4" = 1'-0"

SHEET
02S-04

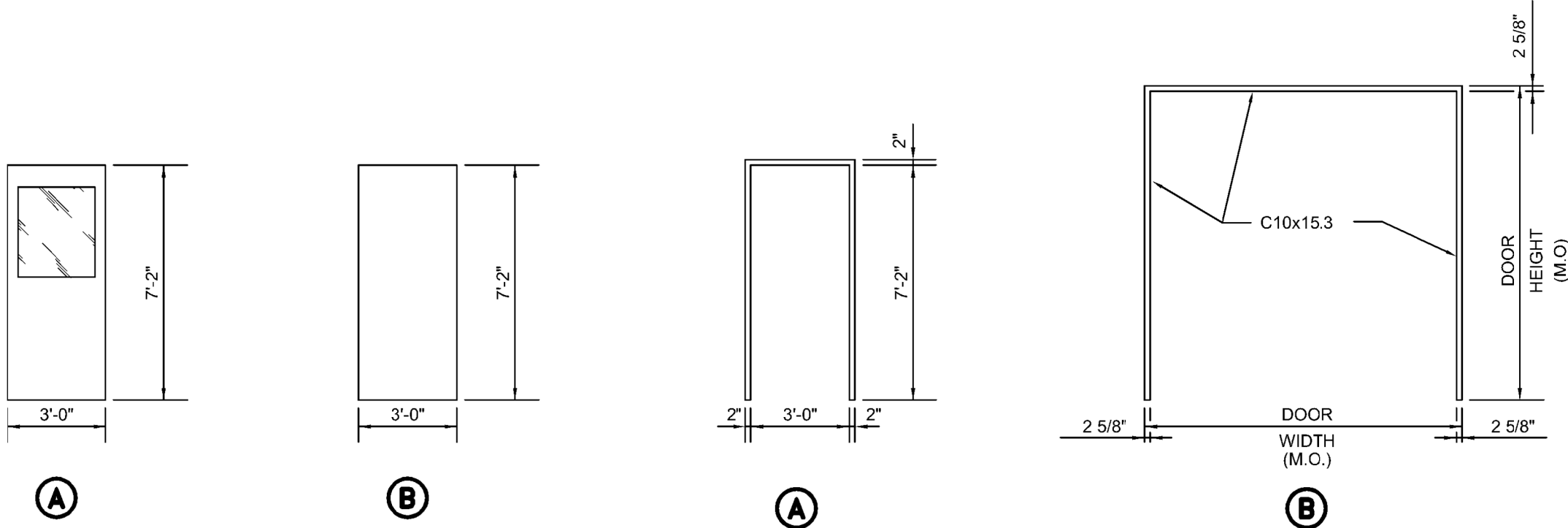
DOOR AND FRAME SCHEDULE													
DOOR NO.	DOOR						FRAME						
	SIZE			MATERIAL	TYPE	GLASS	MATERIAL	TYPE	DEPTH	FRAME			REMARKS
	WIDTH	HEIGHT	THICK							HEAD	JAMB	SILL	
	PUMP STATION BUILDING												
PS-1	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	
PS-2	18'-0"	10'-0"	-	GS	-	-	GS	-	-	-	-	-	GENERATOR AREA, CHAIN LINK GATES
PS-3	12'-0"	14'-0"	-	ALUM	OCD	-	STL	B	10"	A	(6)	-	ODOR CONTROL ROOM, MOTOR OPER
PS-4	14'-0"	15'-0"	-	ALUM	OCD	-	STL	B	10"	A	(6)	-	DUMPSTER AREA, MOTOR OPER
PS-5	6'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	ELECTRICAL ROOM
PS-6	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	ELECTRICAL ROOM
PS-7	6'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	SCREENINGS ROOM
PS-8	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	SCREENINGS ROOM
PS-9	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	SCREENINGS ROOM/DUMPSTER AREA
PS-10	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	ODOR CONTROL ROOM
	STORAGE TANK BUILDING												
ST-1	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	GENERATOR AREA
ST-2	18'-0"	10'-0"	-	GS	-	-	GS	-	-	-	-	-	GENERATOR AREA, CHAIN LINK GATES
ST-3	6'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	ELECTRICAL ROOM
ST-4	6'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	BLOWER ROOM
ST-5	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	BLOWER ROOM/CHEMICAL FEED ROOM
ST-6	12'-0"	14'-0"	-	ALUM	OCD	-	STL	B	10"	A	(6)	-	CHEMICAL FEED ROOM, MOTOR OPER
ST-7	12'-0"	14'-0"	-	ALUM	OCD	-	STL	B	10"	A	(6)	-	ODOR CONTROL ROOM, MOTOR OPER
ST-8	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	ODOR CONTROL ROOM
ST-9	-	-	-	-	-	-	-	-	-	-	-	-	NOT USED
ST-10	3'-0"	7'-2"	1 ¾"	FG	A	1" I	FG	A	10"	B	B	B	ELECTRICAL ROOM

(1) OCD = OVERHEAD COILING DOOR
(2) ALUM = ALUMINUM
(3) FG = FIBERGLASS
(4) I = INSULATED GLASS
(5) STL = STEEL
(6) FRAMED WITH C10x15.3 ON JAMBS AND HEAD
(7) GS = GALVANIZED STEEL

NOTE: FINISH ON ALL HARDWARE SHALL BE AS INDICATED IN HARDWARE SETS.

ROOM FINISH SCHEDULE													
ROOM NO.	ROOM NAME	FLOOR			BASE		WALL		CEILING			HEIGHT	REMARKS
		CONC. WITH SEALER	CERAMIC TILE	RESILIENT FLOORING	NONE	CERAMIC	VINYL	NONE	PAINT ON CMU	GYPSUM BD. W/ PAINT	PRECAST ROOF PANELS W/PAINT		
	PUMP STATION BUILDING												WATER PROOF OUTSIDE BLOCK
PSB-1	GENERATOR AREA	X			X				X		---	---	
PSB-2	ODOR CONTROL ROOM	X			X				X	X		18' - 2 3/8"	
PSB-3	DUMPSTER AREA	X			X				X	X		18' - 2 3/8"	
PSB-4	ELECTRICAL ROOM	X			X				X	X		18' - 2 3/8"	
PSB-5	SCREENINGS ROOM	X			X				X	X		18' - 2 3/8"	
	STORAGE TANK BUILDING												WATER PROOF OUTSIDE BLOCK
STB-1	ODOR CONTROL ROOM	X			X				X	X		18' - 2 3/8"	
STB-2	CHEMICAL FEED ROOM	X			X				X	X		18' - 2 3/8"	
STB-3	BLOWER ROOM	X			X				X	X		18' - 2 3/8"	
STB-4	ELECTRICAL ROOM	X			X				X	X		18' - 2 3/8"	
STB-5	GENERATOR AREA	X			X				X		---	---	

NOTE: FINISH ON ALL HARDWARE SHALL BE AS INDICATED IN HARDWARE SETS.

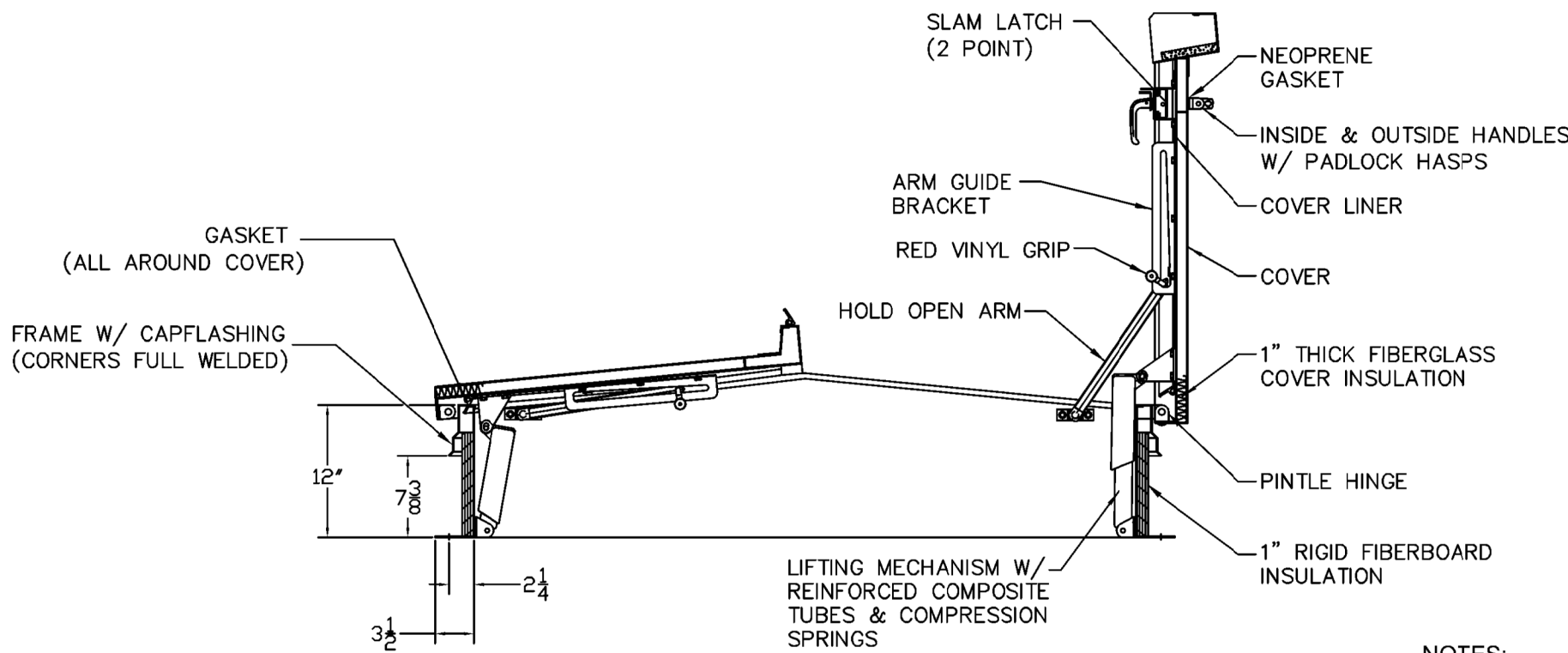


DOOR TYPES

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

DOOR FRAME TYPES

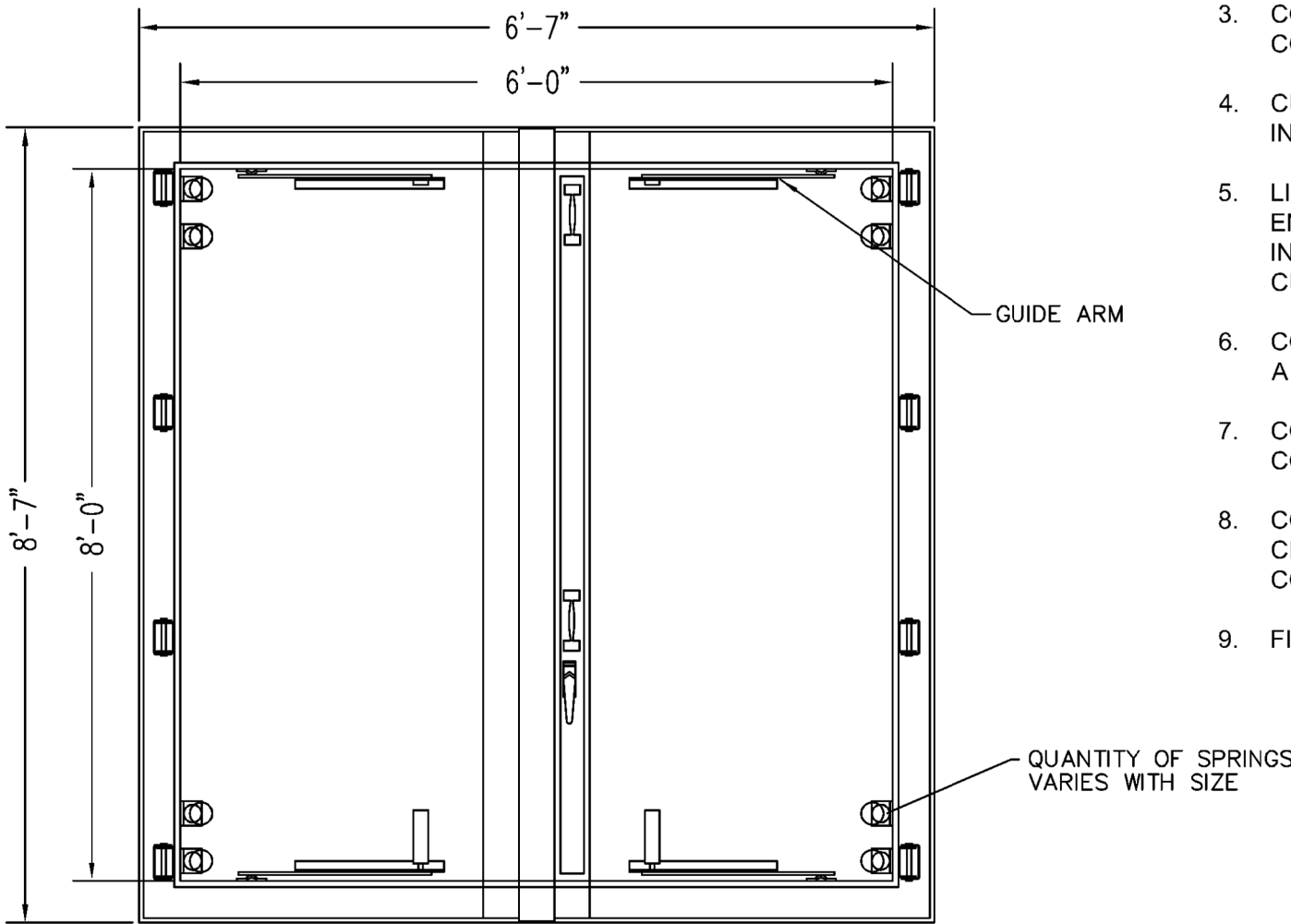
SCALE: 1/4"=1'-0"



SECTION

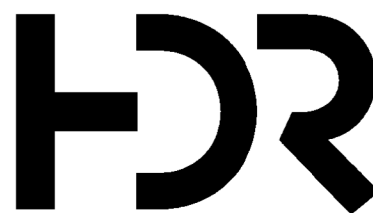
NOTES:

- HATCH SHALL BE 8' X 6' DOUBLE LEAF ROOF HATCH, BILCO TYPE D OR APPROVED EQUAL.
- COVERS SHALL BE 11 GAUGE ALUM WITH HEAVY EXTRUDED EPDM RUBBER GASKET.
- COVER INSULATION SHALL BE FIBERGLASS OF 1" THICKNESS, FULLY COVERED AND PROTECTED BY A 18 GAUGE ALUM LINER.
- CURB SHALL BE 12" IN HEIGHT AND OF 11 GAUGE ALUM WITH CURB INSULATION OF RIGID HIGH-DENSITY FIBERBOARD OF 1" THICKNESS.
- LIFTING MECHANISM SHALL BE COMPRESSION SPRING OPERATORS ENCLOSED IN TELESOPING TUBES. THE LOWER TUBE SHALL INTERLOCK WITH A FLANGED SUPPORT SHOE WELDED TO THE CURB ASSEMBLY.
- COVERS SHALL AUTOMATICALLY LOCK IN THE OPEN POSITION WITH A RIGID HOLD OPEN ARM.
- COMPRESSION SPRING TUBES SHALL BE AN ANTI-CORROSIVE COMPOSITE MATERIAL.
- COVER HARDWARE SHALL BE BOLTED INTO HEAVY GAUGE CHANNEL REINFORCING WELDED TO THE UNDERSIDE OF THE COVER AND CONCEALED WITHIN THE INSULATION SPACE.
- FINISHES SHALL BE MILL FINISH ALUMINUM.



DOUBLE LEAF ROOF HATCH DETAIL

NTS



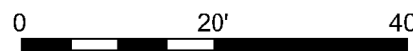
1	10-18-2017	ADDENDUM NO. 3
A	10-06-2017	BID DOCUMENTS
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	P. BENTON HANSON
DESIGNED	J.T.M.
DRAWN	C.P.L.
CHECKED	P.B.H.
QA/QC	R.K.S.
PROJECT NUMBER	10055008



WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK

BUILDING DETAILS AND SCHEDULES

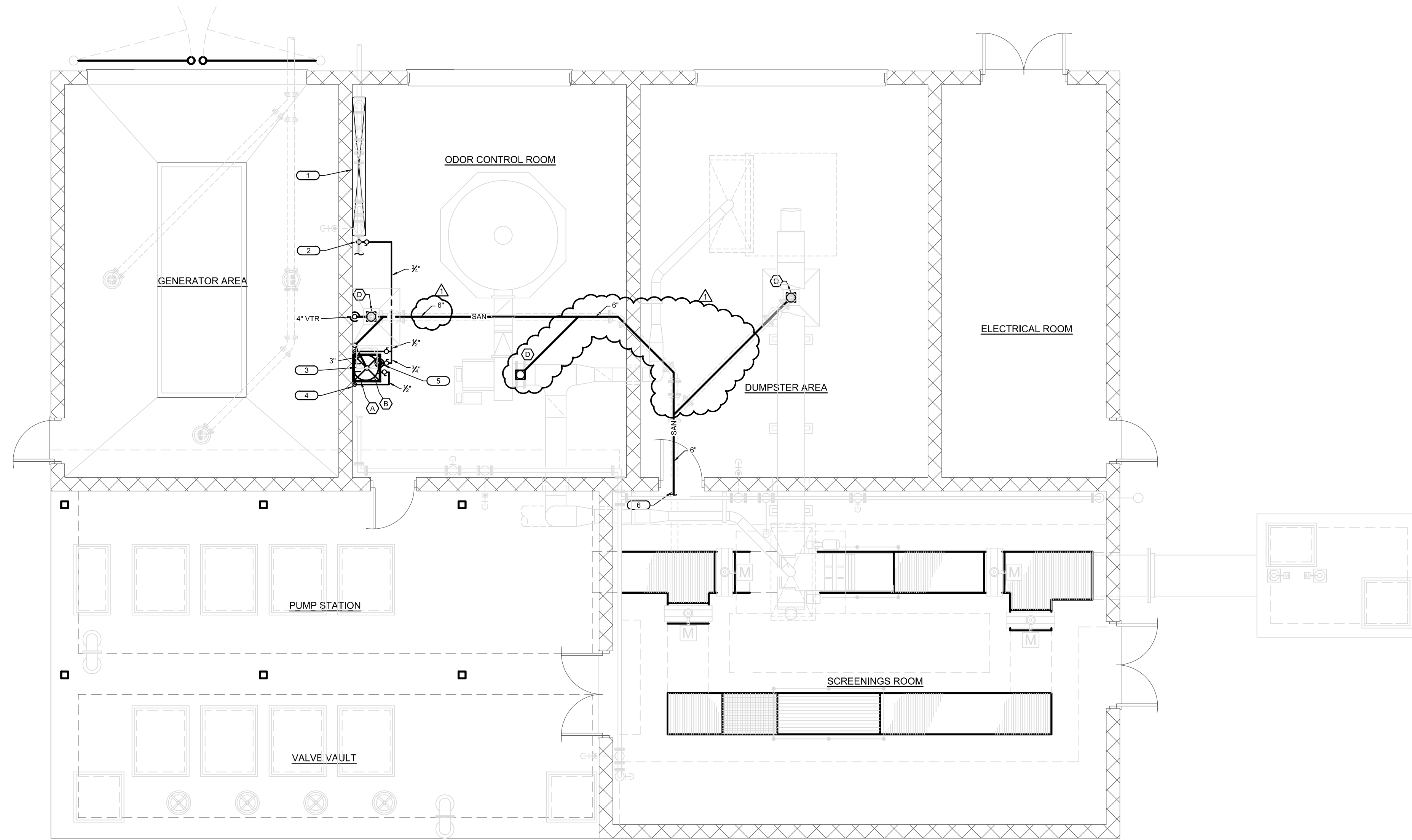


FILENAME | 03A-02
SCALE | AS SHOWN

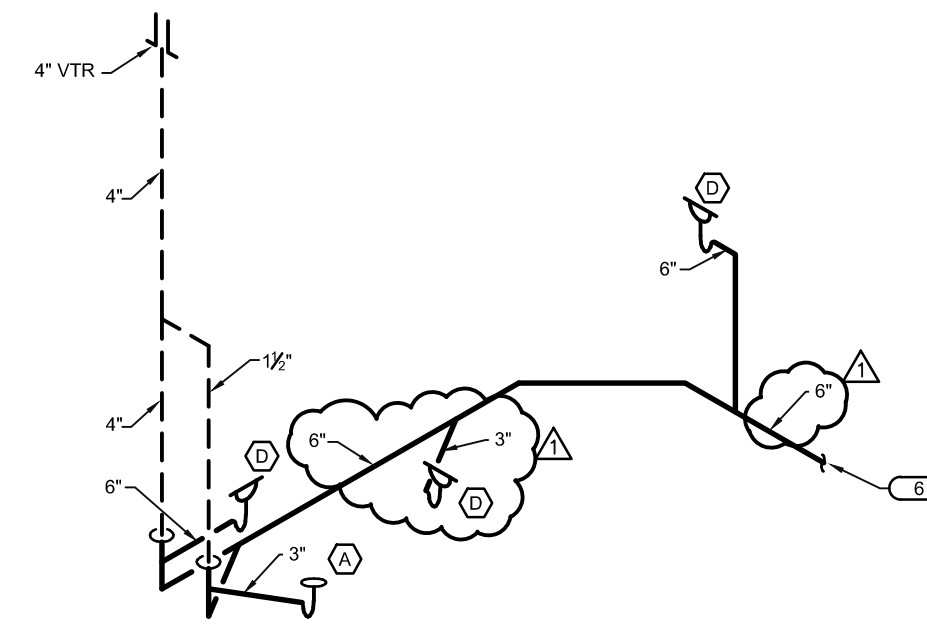
SHEET
03A-02

KEYED NOTES:

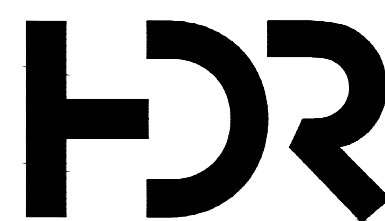
1. BACKFLOW PREVENTER BY OTHERS.
2. 3/4" DOMESTIC WATER CONNECTION, PIPING AND SHUTOFF VALVE BY PLUMBING CONTRACTOR.
3. WATER HEATER MOUNTED ON SHELF ABOVE MOP SINK. PROVIDE DRAIN PAN BENEATH WATER HEATER. SEE SCHEMATIC, SHEET 03P-01 FOR INFORMATION.
4. 1/2" HOT AND COLD WATER PIPING EXPOSED DOWN WALL TO WALL-MOUNTED MOP SINK FAUCET.
5. AMTROL ST-5, EXPANSION TANK OR EQUIVALENT. SUPPORT INDEPENDENTLY FROM PIPING.
6. SANITARY SEWER TO SCREENINGS ROOM PIT. SEE PROCESS DRAWINGS FOR CONTINUATION.

**PLUMBING UPPER PLAN**

SCALE: 3/16"=1'-0"

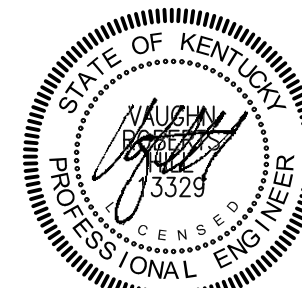
**WASTE AND VENT PIPING DIAGRAM**

SCALE: NONE



ISSUE	DATE	DESCRIPTION
1	10-19-2017	ADDENDUM NO. 3

PROJECT MANAGER	P. BENTON HANSON
DESIGNED	PO'D
DRAWN	PO'D
CHECKED	VRH
QA/QC	
DATE	OCTOBER, 2017
PROJECT NUMBER	55008



SIGNED 10-6-17



**WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK**

**PUMP STATION BUILDING
PLUMBING PLAN**

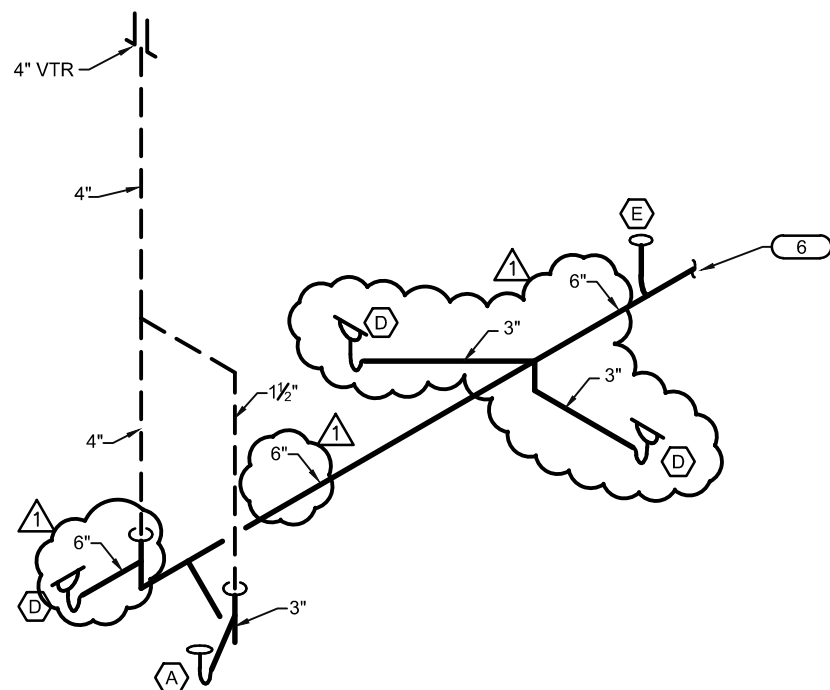


FILENAME | 17089
SCALE | AS NOTED

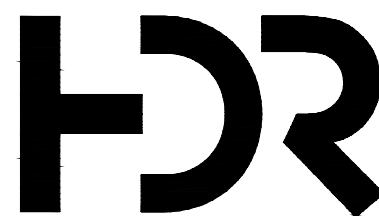
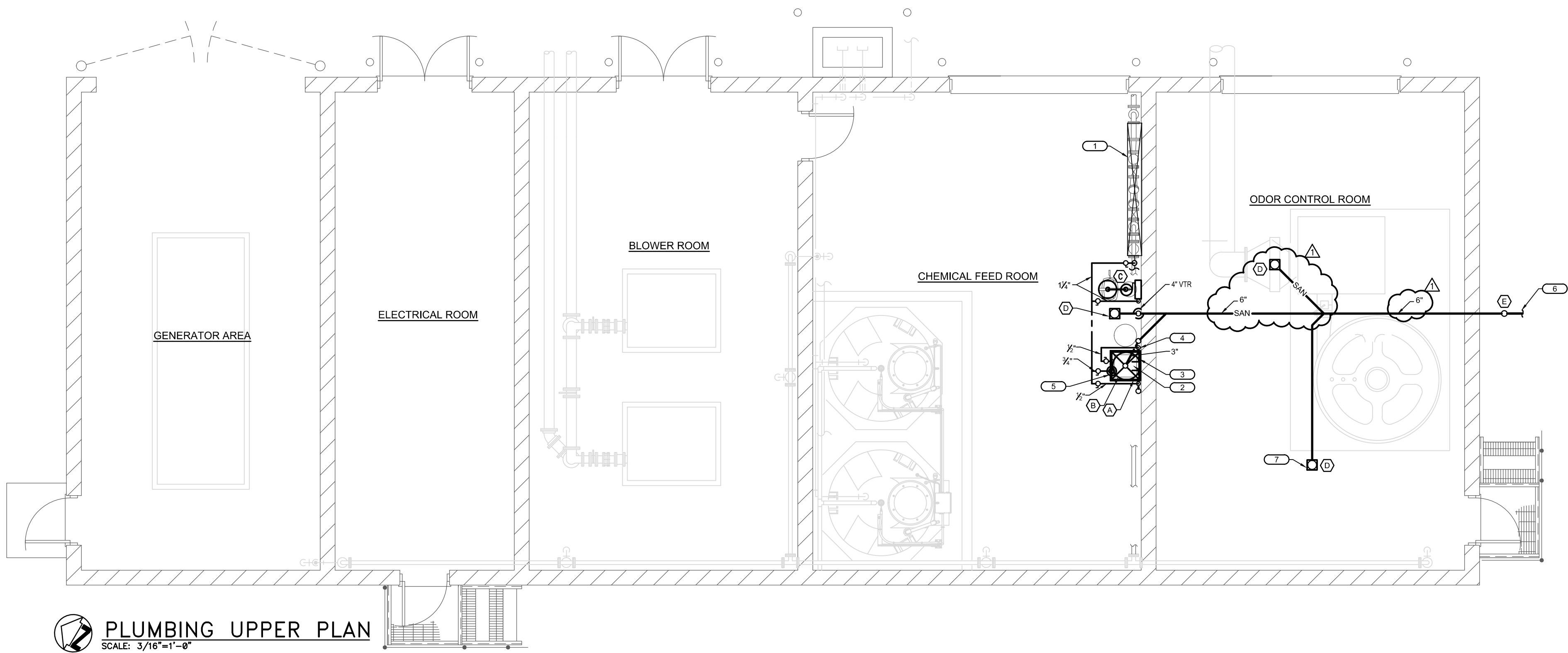
SHEET

01P-01

- KEYED NOTES:**
- BACKFLOW PREVENTER BY OTHERS.
 - 1½" DOMESTIC WATER CONNECTION, PIPING AND SHUTOFF VALVE BY PLUMBING CONTRACTOR.
 - WATER HEATER MOUNTED ON SHELF ABOVE MOP SINK. PROVIDE DRAIN PAN BENEATH WATER HEATER. SEE SCHEMATIC, SHEET 03P-01 FOR INFORMATION.
 - ½" HOT AND COLD WATER PIPING EXPOSED DOWN WALL TO WALL-MOUNTED MOP SINK FAUCET.
 - AMTROL ST-5, EXPANSION TANK OR EQUIVALENT. SUPPORT INDEPENDENTLY FROM PIPING.
 - SANITARY SEWER. SEE CIVIL SITE PLAN FOR CONTINUATION.
 - VERIFY EXACT LOCATION WITH ARCHITECTURAL FLOOR PLAN.

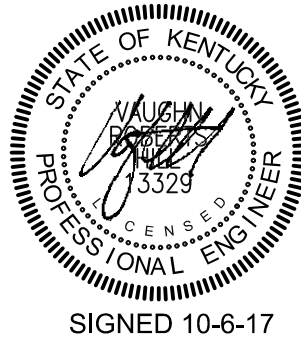


WASTE AND VENT PIPING DIAGRAM
SCALE: NONE

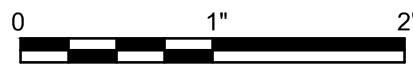


1	10-19-2017	ADDENDUM NO. 3
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	P. BENTON HANSON
DESIGNED	PO'D
DRAWN	PO'D
CHECKED	VRH
QA/QC	
DATE	OCTOBER, 2017
PROJECT NUMBER	55008



**WEST HICKMAN 7 WET WEATHER
STORAGE FACILITIES
IMPROVEMENTS
CONTRACT NO. 2
PUMP STATION AND
WET WEATHER STORAGE TANK**



**STORAGE TANK BUILDING
PLUMBING PLAN**

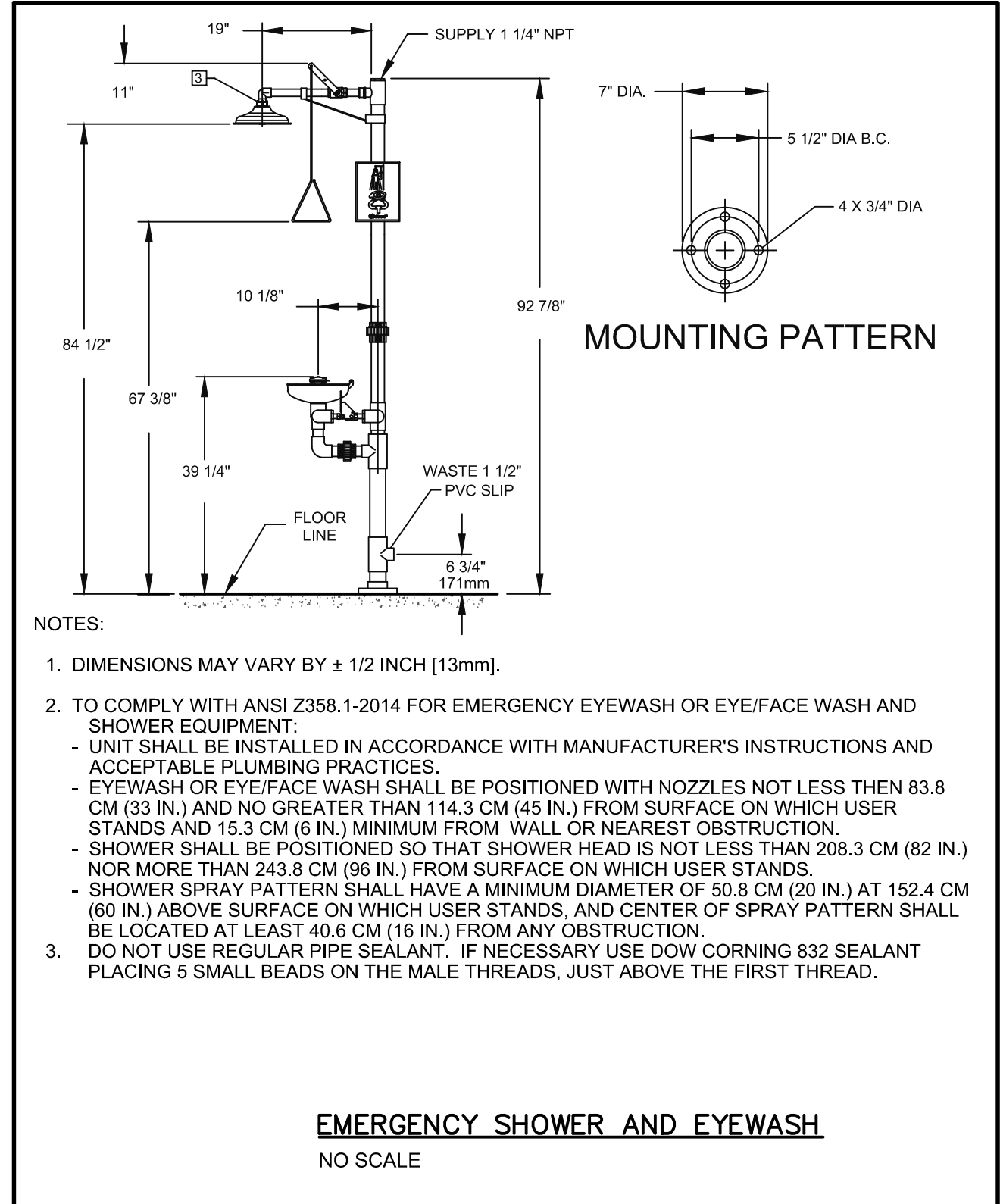
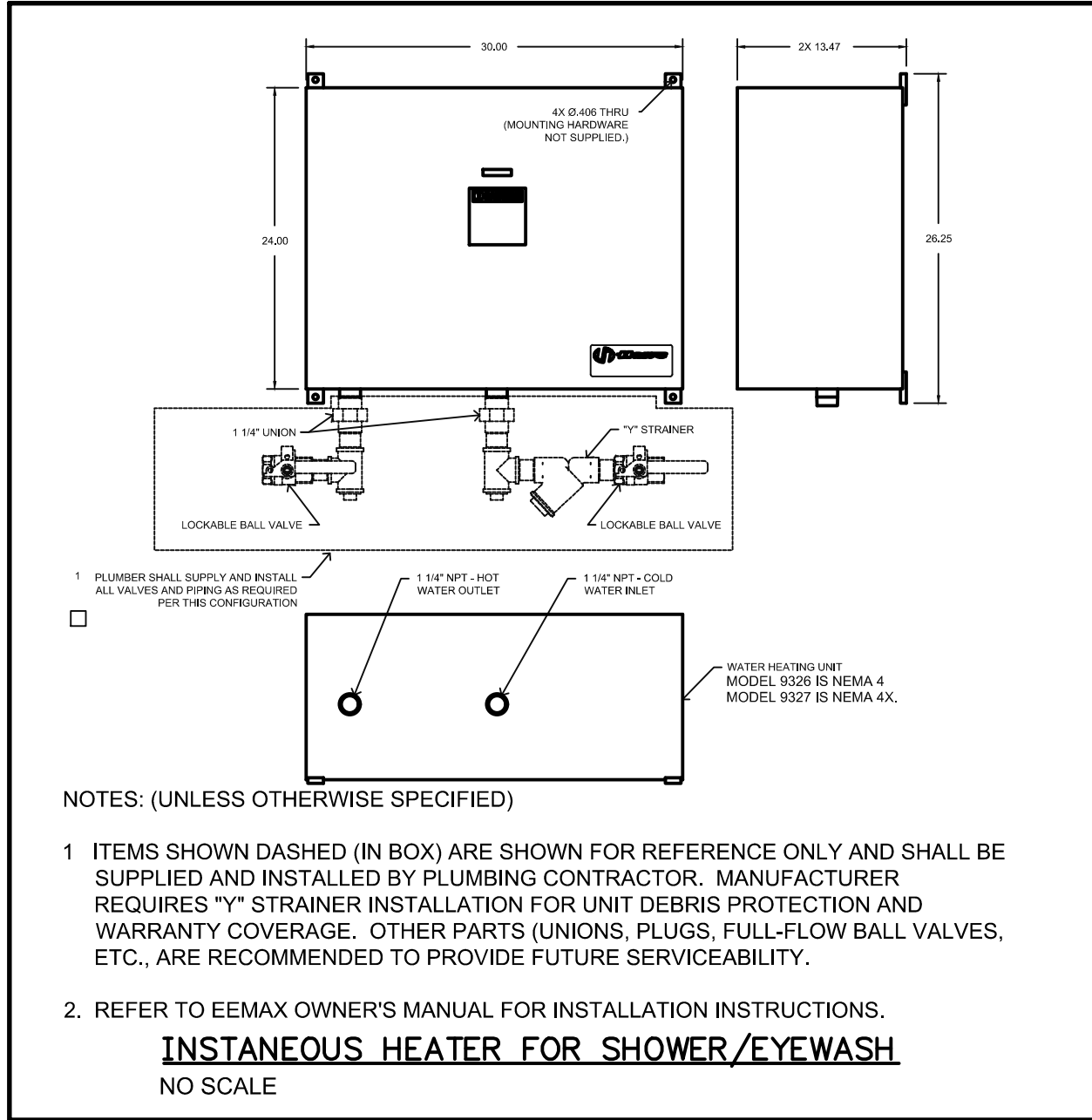
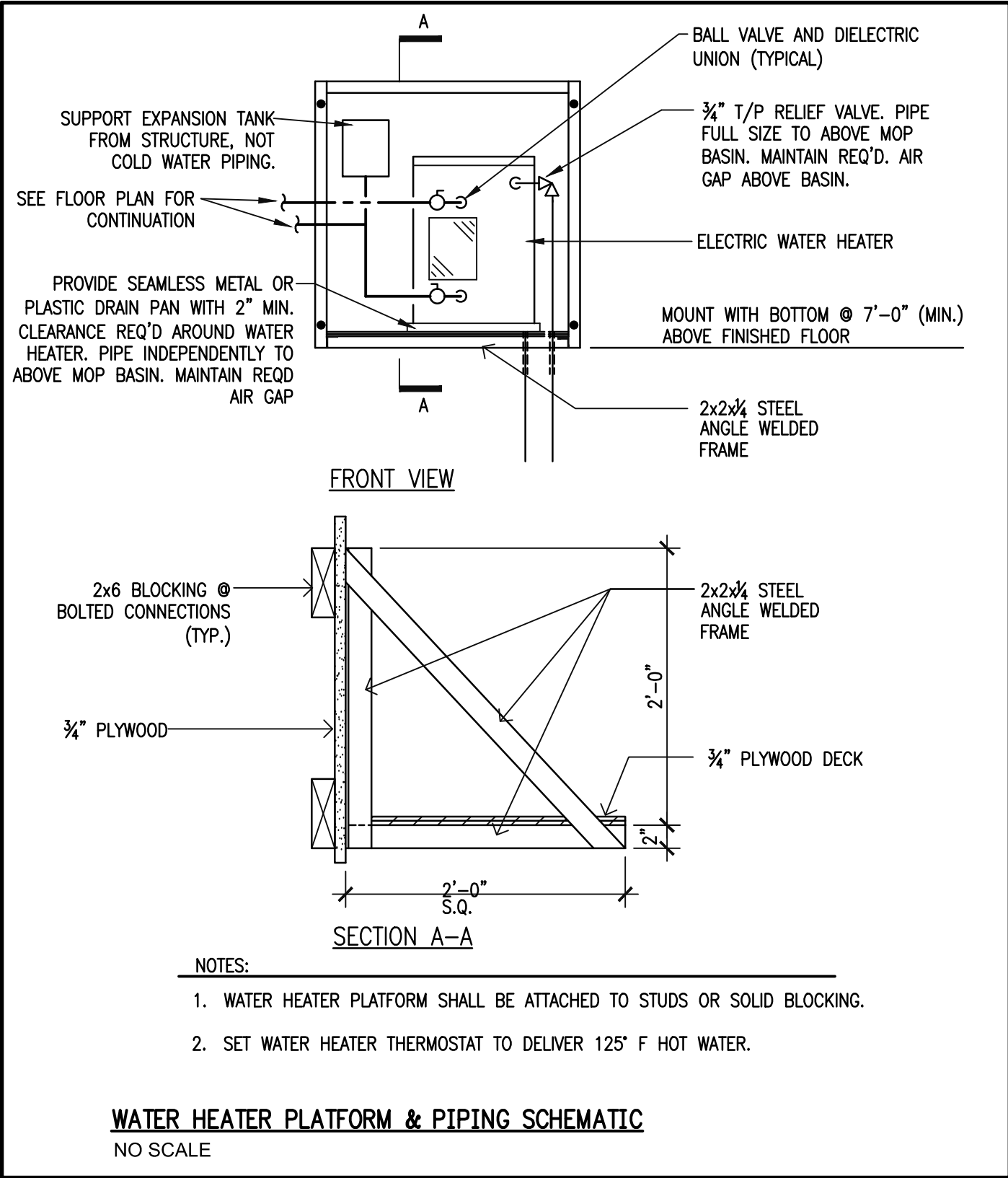
FILENAME | 17089
SCALE | AS NOTED

SHEET
02P-01

PLUMBING FIXTURE SCHEDULE					
MARK	ITEM	HW	CW	WASTE	DESCRIPTION
A	MOP BASIN	½"	½"	3"	MUSTEE TSB-100, 24"x24"x12". PRECAST TERRAZZO WITH STAINLESS STEEL EDGE CAPS, OR EQUAL. CHICAGO FAUCET 835-XKCP, SURFACE MOUNT FAUCET FOR EXPOSED PIPING WITH VACUUM BREAKER SPOUT, PAIL HOOK, WALL BRACE. PROVIDE WALL MOUNTED MOP HANGER BRACKET.
B	WATER HEATER	¾"	¾"	-	A.O.SMITH MODEL DEL-20S. 20 GALLON CAPACITY, 1.5 KW.
C	EMERGENCY SHOWER EYE WASH WITH INSTANTANEOUS WATER HEATER	-	1½"	-	HAWS UNIT COMPLETE WITH INSTANTANEOUS ELECTRIC WATER HEATER. SHOWER-EYEWASH UNIT MODEL 8336. WITH GREEN ABS PLASTIC 10-5/8" SHOWERHEAD, SELF- REGULATING 20 GPM FLOW, GREEN ABS PLASTIC EYE-FACE WASH WITH FLOW CONTROLS, DUST COVERS. CHROME PLATED BRASS SHOWER AND EYEWASH VALVES. 9" DIA C.I. FLOOR FLANGE.
		1½"	1½"	-	HAWS INSTANTANEOUS WATER HEATER MODEL 9327-1-6-7-0-0-1 NEMA 4X, 480 VAC/3-PHASE/126 KW, 160 F.L.A. PROVIDES 25 GPM OF 80 DEG. WATER. MOUNT SECURELY ON WALL.
D	FLOOR DRAIN	-	-	4"	JAY R. SMITH MODEL 2340 OR EQUAL, WITH DUCO C.I. BODY, FLASHING CLAMP, ADJUSTABLE 12 " DIA. DUCTILE IRON TRACTOR GRATE, SEDIMENT BUCKET, ARI COATING, PROVIDE DEEP SEAL TRAP.
E	EXTERIOR CLEANOUT	-	-	4"	ZURN ZB-1400-HD EXTERIOR, ADJUSTABLE CLEANOUT, DUCO COATED, C1 BODY, ABS TAPERED PLUG W/ GASKET, HEAVY DUTY TOP.

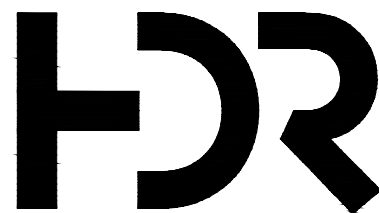
PLUMBING FIXTURE SCHEDULE NOTES:

- CONTRACTOR SHALL FURNISH AND INSTALL CARRIER FOR EACH FIXTURE WHICH IS WALL HUNG, UNLESS OTHERWISE NOTED. PROVIDE APPROPRIATE CARRIER PER FIXTURE TYPE AND REQUIREMENTS.
- CONTRACTOR SHALL FURNISH AND INSTALL P.P.P. INC. TRAP PRIMERS, MODEL OREGON #1 TO SERVE ALL APPROPRIATE FLOOR DRAINS AND/OR OPEN RECEPTACLES AS REQUIRED.
- ACCEPTABLE ALTERNATE MANUFACTURERS FOR ITEMS INCLUDING BUT NOT LIMITED TO: FLOOR DRAINS AND CLEANOUTS: WADE, J.R. SMITH, ZURN, PLASTIC ODDITIES. WATER HEATERS: STATE, LOCKINVAR, RHEEM.
- HOSE BIBBS/WALL HYDRANTS: WOODFORD, ZURN, CHICAGO FAUCET, T&S BRASS.



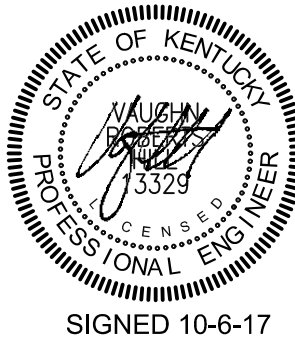
PLUMBING GENERAL NOTES:

- THE EQUIPMENT ROUGH-INS AND THEIR DIMENSIONED LOCATIONS FOR ALL CONNECTIONS ARE ACCURATE TO THE BEST OF OUR KNOWLEDGE. IN SOME INSTANCES, THE OWNER OR EQUIPMENT SUPPLIER MAY MAKE SUBSTITUTIONS. OR THE EQUIPMENT ITEMS MAY VARY FROM WHAT IS SHOWN. THEREFORE, THESE ITEMS AND DIMENSIONS SHALL BE VERIFIED WITH THE EQUIPMENT SUPPLIER, OWNER AND/OR ROUGH-IN DRAWINGS PRIOR TO CONSTRUCTION. OF ANY DEVIATIONS FROM WHAT IS SHOWN OR IMPLIED ON THESE DRAWINGS, FAILURE OF THE APPROPRIATE CONTRACTOR TO VERIFY ROUGH-INS OR THEIR LOCATIONS SHALL PLACE THE RESPONSIBILITY FOR ANY SUBSEQUENT RELOCATION AND/OR ADDITIONAL ROUGH-INS DIRECTLY UPON THE CONTRACTOR.
- CONTRACTOR SHALL SUPPLY TO THE ARCHITECT SIX (6) COPIES OF SHOP DRAWINGS FOR APPROVAL SO THE QUALITY OF THE INTENDED EQUIPMENT, FIXTURES OR MATERIALS CAN BE REVIEWED BEFORE INSTALLATION. THERE WILL BE NO DRAW UNTIL SHOP DRAWINGS HAVE BEEN SUBMITTED AND REVIEWED BY THE ARCHITECT/ENGINEER.
- DO NOT SCALE THIS DRAWING. SEE ARCHITECTURAL FLOOR PLANS FOR BUILDING DIMENSIONS.
- THE SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT THE CONTRACTOR HAS FAMILIARIZED HIMSELF WITH THE PLANS AND BUILDING SITE. CLAIMS MADE SUBSEQUENT TO THE PROPOSAL FOR MATERIALS AND LABOR BECAUSE OF DIFFICULTIES ENCOUNTERED WILL NOT BE RECOGNIZED IF THEY COULD HAVE BEEN FORESEEN HAD PRIOR EXAMINATION BEEN MADE.
- VERIFY SERVICE POINTS FOR PROJECT WITH SITE UTILITY PLAN.
- THE CONTRACTOR SHALL COOPERATE FULLY AMONG THE TRADES.
- ALL ROOF PENETRATIONS FOR PLUMBING SHALL BE MADE IN ACCORDANCE WITH ROOF SYSTEM MANUFACTURER'S GUIDELINES. COORDINATE WITH ARCHITECTURAL DETAILS FOR ROOF SYSTEM USED.
- ALL WATER PIPING SYSTEMS SHALL BE FLUSHED AND STERILIZED IN ACCORDANCE WITH LOCAL REGULATIONS AND/OR PER CODE..
- THE POTABLE WATER SUPPLY SHALL BE PROTECTED AGAINST BACKFLOW AND SIPHONAGE, BOTH NATURAL AND INDUCED. ALL EQUIPMENT CONNECTED TO THE POTABLE WATER SYSTEM BEING CAPABLE OF POLLUTING OR CONTAMINATING THE POTABLE WATER DISTRIBUTION SYSTEM OR ANY PART THEREOF BY MEANS OF A REVERSAL OF FLOW, PRESSURE DROP, PRESSURE LOSS, INDUCED VACUUM OR BY INJECTION BECAUSE OF ANY PRIMARY OR SECONDARY PUMPING SYSTEM CONNECTED THERETO. MUST BE ISOLATED AND CONTAINED BY MEANS OF APPROVED BACKFLOW DEVICES, CHECK VALVES, AIR GAPS OR VACUUM BREAKERS. PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL THESE DEVICES PER LOCAL UTILITY AND/OR CODE REQUIREMENTS.
- THE HOT, TEMPERED AND COLD WATER SUPPLY BRANCHES FOR ALL EQUIPMENT HAVING QUICK CLOSING VALVES OF ANY TYPE SHALL HAVE WATER HAMMER ARRESTORS INSTALLED AT THE HIGH POINT OF EACH BRANCH. AIR CHAMBERS ARE NOT ACCEPTABLE.
- FURNISH AND INSTALL SHUTOFF OR BALL VALVE AND DIELECTRIC UNION ON ALL EQUIPMENT HOT, COLD OR TEMPERED WATER PIPING. PLUMBING CONTRACTOR SHALL MAKE ALL FINAL CONNECTIONS TO EQUIPMENT. COORDINATE WITH EQUIPMENT SUPPLIER FOR EXACT REQUIREMENTS. PROVIDE UNIONS OF SAME PRESSURE RATING AS SYSTEM TO ALLOW REMOVAL OF PIPE, EQUIPMENT, ETC. WITHOUT DAMAGE TO OTHER PARTS OR SYSTEMS.
- FURNISH AND INSTALL ½" MINIMUM FIBERGLASS INSULATION WITH ALL-SERVICE JACKET ON ALL HOT, COLD AND TEMPERED WATER PIPING ABOVE SLAB, AND ALL CONDENSATE PIPING FROM MECHANICAL UNITS.
- WATER PIPING AND FITTINGS SHALL BE COPPER OR BRASS PER CODE. ABOVE GROUND PIPING SHALL BE TYPE "L" RIGID COPPER. ALL JOINTS SHALL BE MADE WITH 95-5 SOLDER OR EQUAL.
- VERIFY MOUNTING HEIGHTS OF ALL BARRIER FREE FIXTURES WITH ARCHITECTURAL DRAWINGS.
- PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL 1" COPPER INDIRECT WASTE PIPING REQUIRED FROM EQUIPMENT TO ABOVE FLOOR DRAINS, OPEN RECEPTACLES OR FLOOR SINKS UNLESS A DIFFERENT SIZE IS INDICATED BY EQUIPMENT DISCHARGE OPENING OR EQUIPMENT SUPPLIER. PIPING SHALL COMPLY WITH STATE AND LOCAL CODES. COORDINATE WITH ALL EQUIPMENT SUPPLIERS AND SIZE AS REQUIRED BY PIECE OF EQUIPMENT SERVED. HOLD PIPING TIGHT TO WALL OR UNDER CASEWORK WHERE APPLICABLE. PROPERLY SECURE AS REQUIRED.
- ALL SANITARY, VENT AND WATER PIPING SHALL BE COMPATIBLE WITH STRUCTURE, MECHANICAL EQUIPMENT AND DUCTWORK, ELECTRICAL EQUIPMENT AND LIGHTING.
- PROVIDE CHROME PLATED ESCUTCHEONS AT ALL WALL PENETRATIONS UNLESS OTHERWISE DIRECTED ON ARCHITECTURAL PLANS.
- SANITARY WASTE AND VENT PIPING SHALL BE DUCTILE IRON. CONTRACTOR MAY USE SCHEDULE 40 OR 80, TYPE 1, GRADE 1, PVC COMPOUNDS AS DEFINED AND DESCRIBED IN TENTATIVE SPECIFICATIONS FOR RIGID PVC (ASTM DESIGNATION D2665, D2949, F891) OR SCHEDULE 40 OR 30 ABS COMPOUND AS DEFINED AND DESCRIBED IN STANDARD SPECIFICATIONS FOR ABS (ASTM DESIGNATION: D2661 OR F628) IN LIEU OF DUCTILE IRON WASTE AND VENT PIPING ONLY IF PERMITTED BY CODE. CONTRACTOR SHALL INSTALL ALL 4" SOIL, WASTE AND GREASE WASTE PIPING WITH A MINIMUM SLOPE OF ¼" PER FOOT OR AS REQUIRED BY CODE.
- HOLD TOPS OF FLOOR DRAINS, FLOOR SINKS OR TRENCH DRAINS FLUSH WITH FINISHED FLOOR. SEE ARCHITECTURAL DRAWINGS FOR FLOOR SLOPES AROUND DRAINS (IF REQUIRED).
- ALL SANITARY VENTS THRU ROOF SHALL BE EXTENDED TO A MINIMUM OF 12" ABOVE PARAPET HEIGHT AND INSTALLED A MINIMUM OF 10'-0" FROM ALL OUTSIDE AIR INTAKES OF ANY KIND.
- CONTRACTOR SHALL PROVIDE PIPE SLEEVES FOR ALL PIPING PASSING THROUGH THE FOUNDATION WALLS. USE SLEEVES ONE SIZE LARGER THAN PIPE SIZE AND THOROUGHLY SEAL AROUND SLEEVE AND PIPE.
- ALL HORIZONTAL SANITARY AND GREASE WASTE PIPING SHALL BE RUN AT A MINIMUM SLOPE OF ¼" PER FOOT (2%) UNLESS OTHERWISE REQUIRED.
- SUPPORT PIPING ABOVE CEILING FROM STRUCTURE, GENERALLY AS HIGH AS POSSIBLE, WITH ¾" DIA. (MIN.) STEEL HANGER RODS WITH PLASTIC COATED HANGERS, EQUAL TO FEE & MASON FIG. 38 OR GRINNELL FOR COPPER PIPE, AND STEEL HANGERS, EQUAL TO FEE & MASON FIG. 199 OR GRINNELL FIG. 104. ALSO SEE MEP GENERAL NOTES FOR COMPLIANCE STANDARDS.
- GAS PIPING INSIDE BUILDING AND ABOVE GRADE SHALL BE AMERICAN MANUFACTURED, NEW SCHEDULE 40 STANDARD WEIGHT BLACK STEEL. PIPING 2½" AND LARGER SHALL BE WELDED. PIPING 2" AND SMALLER SHALL BE THREADED AND HAVE 150 LB., BLACK MALLEABLE IRON SCREW FITTINGS CONFORMING TO ASTM A53. GAS PIPING SHALL BE INSTALLED, INSPECTED AND TESTED IN ACCORDANCE WITH NFPA 58, NFPA 54 (LPG) OR NFPA 96 (COMMERCIAL COOKING EQUIPMENT), 2010 FFGC SECTION 406 AND LOCAL REQUIREMENTS.
- PROVIDE U.L. LISTED CORRUGATED, FLEXIBLE GAS CONNECTIONS TO WATER HEATERS AND COOKING EQUIPMENT (U.O.N.) CONFORMING TO ANSI Z21.24. PROVIDE RIGID CONNECTIONS TO ALL OTHER EQUIPMENT AND APPLIANCES AND WHERE LOCAL CODE PROHIBITS THE USE OF FLEXIBLE CONNECTIONS. OUTDOOR CONNECTORS SHALL BE LISTED FOR OUTDOOR USE.
- MATERIALS, EQUIPMENT, ASSEMBLIES AND SYSTEMS SHALL MEET ALL PERTINENT REQUIREMENTS OF NATIONALLY RECOGNIZED TESTING ORGANIZATIONS SUCH AS THE UL, ASTM, ASSE, AWWA, AGA AND NFPA AS WELL AS THE MOST CURRENT EDITION OF THE STATE CODES AND LOCAL AMENDMENTS.
- ALL INSTALLED SYSTEMS, DEVICES AND RELATED ITEMS SHALL BE TESTED IN PLACE ON-SITE PER STATE AND LOCAL CODE REQUIREMENTS. REPLACE ANY AND ALL CONTRACTOR SUPPLIED DEFECTIVE SYSTEMS, DEVICES AND RELATED ITEMS AT CONTRACTOR'S OWN EXPENSE BEFORE COMPLETION OF PROJECT.
- WHERE JOB CONDITIONS REQUIRE CHANGES FROM THE CONTRACT DOCUMENTS THAT DO NOT CHANGE THE SCOPE OR NATURE OF THE WORK REQUIRED. THE CONTRACTOR SHALL MAKE SUCH CHANGES WITHOUT ADDITIONAL COST TO THE OWNER. NO OTHER CHANGES MAY BE MADE WITHOUT WRITTEN CONSENT OF THE OWNER.
- ALL EQUIPMENT, FIXTURES AND MATERIALS SHALL BE NEW AND UNUSED AND INSTALLED IN STRICT CONFORMANCE TO MANUFACTURER'S RECOMMENDATIONS (U.O.N.). PROVIDE COMPLETE WITH ALL TRIM, STOPS, HANGERS, CARRIERS, SUPPORTS, ETC. INCLUDING PROVISIONS FOR BARRIER FREE USE, IF REQUIRED. WHERE FIXTURES ARE ACCESSIBLE, THEY MUST COMPLY WITH ALL FEDERAL ADA REQUIREMENTS.
- CONTRACTOR SHALL COORDINATE, INSTALL AND TEST ITEMS SPECIFICALLY NOTED AS FURNISHED BY OTHERS. WORK INCLUDES, BUT IS NOT LIMITED TO:
 - CONCRETE CUTTING, REMOVAL, TRENCHING, PIPE BEDDING, BACKFILL AND PATCHING.
 - PIPING FITTINGS AND ESCUTCHEONS AT WALL PENETRATIONS.
 - COPPER CONDENSATE DRAINS FROM MECHANICAL EQUIPMENT.
 - PLUMBING FIXTURES COMPLETE WITH FAUCETS, DRAINS, TRIM AND SUPPORTS.
 - WATER HEATERS WITH CONTROLS AND PRESSURE SAFETY RELEASE.
 - BACKFLOW PREVENTERS AS SPECIFIED AND REQUIRED BY LOCAL CODE.
 - SHUTOFF VALVES ON WATER AND GAS PIPING FOR EACH BRANCH AND PIECE OF EQUIPMENT.
 - CUTTING, PATCHING AND WEATHER-PROOFING ROOF AND WALL PENETRATIONS PER ARCHITECTURAL REQUIREMENTS.
- CONTRACTOR SHALL GUARANTEE ALL WORK FOR WHICH MATERIALS ARE FURNISHED, FABRICATED OR FIELD ERRECTED, ALL FACTORY ASSEMBLED EQUIPMENT FOR WHICH NO SPECIFIC MANUFACTURER'S GUARANTEE IS FURNISHED AND ALL WORK IN CONNECTION WITH THE INSTALLATION OF MANUFACTURER'S GUARANTEED EQUIPMENT. THIS CONTRACTOR'S GUARANTEE SHALL EXIST FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL OWNER ACCEPTANCE OF THE WORK AND SHALL APPLY TO ALL DEFECTS IN MATERIALS AND/OR WORKMANSHIP OF ANY KIND.
- BIDDERS SHALL BE LICENSED CONTRACTORS IN ACCORDANCE WITH STATE AND LOCAL LAWS AND REQUIREMENTS.
- ALL PERMITS AND FEES REQUIRED FOR THE WORK SHALL BE SECURED AND PAID FOR BY THE CONTRACTOR AND INCLUDED IN THE BID PRICE.
- ALL PLUMBING FIXTURES AND PIPING SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF STATE AND LOCAL CODES. COOPERATE AS REQUIRED WITH ALL AUTHORITIES HAVING JURISDICTION (A.J.) TO INSURE THAT PROPER MATERIALS AND WORKMANSHIP ARE USED. REQUIREMENTS OF THE STATE AND LOCAL CODES AND A.H.J. TAKE PRECEDENCE OVER ANY INFORMATION WHICH IS INDICATED OR IMPLIED ON THESE DRAWINGS.



1	10-19-2017	ADDENDUM NO. 3
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER P. BENTON HANSON	
DESIGNED	PO'D
DRAWN	PO'D
CHECKED	VRH
QA/QC	
DATE	OCTOBER, 2017
PROJECT NUMBER	55008



SIGNED 10-6-17



WEST HICKMAN 7 WET WEATHER STORAGE FACILITIES IMPROVEMENTS CONTRACT NO. 2 PUMP STATION AND WET WEATHER STORAGE TANK

PLUMBING DETAILS, LEGEND AND SCHEDULES



FILENAME 17089
SCALE AS NOTED

SHEET
03P-01