WATERWHEEL BOOSTER STATION
SAWS Job No. 20-6008
SAWS Solicitation No. CO-00407

ADDENDUM NO. 2
February 26, 2021

To Respondent of Record:

This addendum, applicable to work referenced above, is an amendment to the price proposal, plans, and specifications and as such will be a part of and included in the Contract Documents. Acknowledge receipt of this addendum by entering the addendum number and issue date in the space provided in submitted copies of the price proposal.

RESPONSES TO QUESTIONS

QUESTION 1: Is SAWS replacing the current analyzers on this project?

RESPONSE: No analyzers are being replaced.

QUESTION 2: Gicon has recently been purchased by Headwater and Xylem/Goulds has decided to no longer support Gicon as part of Headwater. How will this affect this bid since that is the called out manufacturer? Will substitutions be allowed?

RESPONSE: The selected contractor may make post award substitution requests which will be evaluated by SAWS and the Design Engineer. The approval of substitution requests shall be at the sole discretion of SAWS and the Design Engineer.

QUESTION 3: J&S Valve C509/C515 gate valve was approved by SAWS. J&S Valve is seeking this approval so we can bid this project. In addition, I rep Val-matic manufacturing that has a wafer style dual disc check valve. Val-Matic wafer style dual disc check valve meets bid item 25.

RESPONSE: SAWS' current specifications were used for this project. If any item that does not appear in the current specs is desired for this project, the selected contractor may submit the item for review by both the design engineer and SAWS.

QUESTION 4: Will there be any SS components, 2" and under, being used on this project? Items such as fittings, valves, tubing, etc.

RESPONSE: The only stainless steel items are those specifically listed or those that are normally provided as part of a product.

QUESTION 5: There is not a specification for the ductile iron pipe and corresponding accessories. Can you provide that specification?

RESPONSE: Refer to SAWS standard Specifications for Ductile Iron Pipe and Fittings, SAWS Material Specification 05-11.

QUESTION 6: Ref plan page C1.1 and C2.0. There are several conflicts in the drawings between fittings that are shown as flange joint on one drawing and mechanical moint on the other drawing. Please verify if we can provide mechanical joint fittings/valves for buried lines and Flange Joints for exposed? If not, please verify which drawings to follow for conflicting lines.

RESPONSE: Mechanical joints shall be used underground and flanged joints shall be used above Grade.

QUESTION 7: Can you provide a flange bolt specification?

RESPONSE: Refer to SAWS Standard Specification for Fittings, SAWS Material Specification 113-02.

QUESTION 8: Ref plan page C2.0. Can you provide a detail for the harness mechanical coupling for use on ductile iron pipe? Or would you allow a restrained coupling? Or a bolted coupling with harness clips. Please provide detail.

RESPONSE: A detail is not available for this coupling at this time. The selected contractor may propose alternate couplings for review by the design engineer and SAWS.

QUESTION 9: Are there any domestic material requirements for this project?

RESPONSE: There are no domestic material requirements.

QUESTION 10: Per section 43 23 00 Vertical Turbine Pumps, section 1.01B & 2.01 A, states that Gicon Brand and list Xylem (goulds) models, and Gicon is listed as a Manufacture which is not the case, Gicon is a distributor of Xylem equipment not the manufacture.

We propose that American Turbine to added to the specifications and both manufactures have the required years of experience as listed on section 2.01B,

ATs foundry is ISO 9001 certified and can provide NSF/ ANSI 61 &372 compliant material.

We respectfully request that American Turbine be added to the approved manufacture list.

RESPONSE: The selected contractor may make post award substitution requests which will be evaluated by SAWS and the Design Engineer. The approval of substitution requests shall be at the sole discretion of SAWS and the Design Engineer. Additions to the

approved manufacturer's list must be done as a revision to the spec and as such is not within the scope of this solicitation.

QUESTION 11: I was wondering if I could get a little more clarification on the Hydropneumatic Tank. On sheet C5 it shows the to slab with 4" of compacted base, but does not give any indication on how thick that pad is to be. Also, the dimensions on the overall plan shoes that pad to be 32' x 12', but on C5 it is indicating there should be an additional 4' or more feet in length. Could we get the thickness as well as the exact dimensions for that top pad?

RESPONSE: The top (housekeeping) pad under the hydropneumatic tank shall be 5" thick. On the control equipment end the pad extends 3 feet past the end of the tank and on the opposite end of the tank it shall extend 1 foot past the end of the tank (including any manway). The total length will depend on the dimension of the end shell provided and is expected to be 42' +/-. The width shall extend one foot outside of the tank shell. The anticipated width would be 14' 2" +/-.

QUESTION 12: Please confirm the above ground piping at the booster pump station is Ductile Iron Pipe.

RESPONSE: Above ground piping shall be steel pipe.

QUESTION 13: Ref Plan Page C2.0. Keynote #4, 14 & 19 (Between meter & Air Valve) are called out as flex couplings. Plan Page C3.0 – Keynote #25 – is called out as a Wafer Check Valve

RESPONSE: On sheet C2.0 Key Notes #4,14, and 19 should be for Wafer Check Valves of the size indicated. Refer to "Changes to the Plans" number 3, this addendum.

QUESTION 14: Ref Plan Page C2.0. 4" Drain Line. Please verify which bid item this material should be included.

RESPONSE: This is called for in the description of Bid Item Number 10.

QUESTION 15: In spec section #40 71 13, Magnetic Flow Meter. The summary of work call out for (1) 24" Mag Meter for HSP. There is no HSP on the project. Please confirm we are not to supply this 24" Mag Meter.

RESPONSE: There is no 24" flow meter in this project. This section of the specs is for flow meters of other sizes.

QUESTION 16: In spec section 40 70 00-5 they call out a Turbidity Sensor. We could not find the Sensor anywhere on the drawing. Please confirm we are not to supply this Turbidity Sensor.

RESPONSE: The reference to the Turbidity Sensor was erroneously included. There is no Turbidity Sensor on this project and this section of Spec 40 70 00 has been removed in the attached, revised version of the spec. Refer to "Changes to the Specifications" number 3.

QUESTION 17: Section 43 23 00 - Vertical Turbine Pumps - Short Set 1.01, B calls for "Goulds - a Xylem Brand" model numbers and 2.01, A calls for Gicon brand, or approved equal. Gicon has been purchased and no longer sells Goulds brand bowls.

Please define the required manufactures allowable for this project.

RESPONSE: The selected contractor may make post award substitution requests which will be evaluated by SAWS and the Design Engineer. The approval of substitution requests shall be at the sole discretion of SAWS and the Design Engineer.

QUESTION 18: In Section 43 23 00 - Vertical Turbine Pumps, there are many items specified that aren't typical of the "SAWS standard" for vertical turbine pumps. Some of those items that are typical of SAWS specs that are not included in these specifications are items like: bowl and impeller wear rings, 316L SST bolt on suction strainers, 316 SST bolting (all hardware), John Crane Single Cartridge Type Mechanical Seals - Silicon Carbide, Adjustable Spacer Headshaft Coupling, flanged column piping, dynamically balanced impellers, 304 SST lineshaft couplings, Marine bearings with 316L SST retainers, for the column piping, Coatings and Fabrication requirements for the suction cans (straitening vanes, sole plate, etc.), 2 year warranty from substantial completion, fully assembled pump w/ job motor hydraulic test, etc.

RESPONSE: Although some items specified may not be typical of the SAWS standard, these specifications have been reviewed and approved by SAWS for use on this project. The selected contractor may propose alternates for the above items to be reviewed and approved by both the design engineer and SAWS.

QUESTION 19: Please consider adding "National Pump Company" to Section 43 23 00 - Vertical Turbine Pumps, 2.01, A. and/or Please consider adding "M8MC-9 Stage" (Pump 5), "E12LC-5 Stage" (Pumps 3-4), and "K10LC-7 Stage" (Pumps 1-2) to Section 43 23 00 - Vertical Turbine Pumps, 1.01, B.

National Pump Company has been specified on previous SAWS projects like Meghan Pump Station.

RESPONSE: The submitted pumps have been reviewed and been determined to not be "equal" due to the characteristics (number of stages, flows and head at shutoff and runout, NPSH values, etc.). The bid shall be based on the specified pumps. The selected contractor may make post award substitution requests which will be evaluated by SAWS and the Design Engineer. The approval of substitution requests shall be at the sole discretion of SAWS and the Design Engineer. In addition, dditions to the approved manufacturer's list must be done as a revision to the spec and as such is not within the scope of this solicitation.

QUESTION 20: Our company is looking at the possibility of bidding as a painting / coating subcontractor to the GCs bidding this project. The new steel hydro-pneumatic tank is specified to be furnished with factory finished interior surfaces and shop primed exterior surfaces followed with field applied System (??) per Section 09900 Painting and Coating (not in bid documents). Valves are specified to be factory finished. The magnetic flow meter specification calls for cleaning and repainting the flow meter. Vertical turbine pumps are specified to have one coat of paint. (I assume this is shop prime coat) There is no painting specification in the bid documents. Please clarify if there is any field painting, and provide a specification for the painting on this project.

RESPONSE: The Hydropneumatic Tank may be furnished with the exterior pre-painted if desired. See Section 09 90 00 Paint and Protective Coatings included with this addendum, see "Changes to the Specifications" number 4.

CHANGES TO THE SPECIFICATIONS

1. The Supplementary Instructions to Respondents is being modified to remove the sentence on page SIR-3, section E.1.vi. requiring respondents to provide a financial statement prepared within the last twelve (12) months by an independent Certified Public Accountant.
2. The Supplementary Instructions to Respondents is being modified to correct the header on page SIR-9, section E.4, Safety Information for Prime Contractor and Key Subcontractor(s). The header has been revised to remove/replace the reference to "pass/fail."
3. Technical Specification 40 70 00, Instrumentation for Process Systems, is being revised to remove section 2.06, UTRATRUB PLUS SC SENSOR.
4. The Technical Specifications are being revised to add section 09 90 00, Painting and Protective Coatings.

CHANGES TO THE PLANS

1. Insert sheet M0.1
2. Replace sheet M2.1, which has been revised to show ductwork and outdoor units.
3. Replace sheet C2.0, which has been revised to correct keynotes 4, 14, and 19 to refer to Wafer Check Valves.
4. Replace sheet C5.0, which has been revised to add the thickness of the concrete pad of the hydropneumatic tank.

END ADDENDUM 2

This Addendum, is forty-four (44) pages in its entirety.

Attachments:

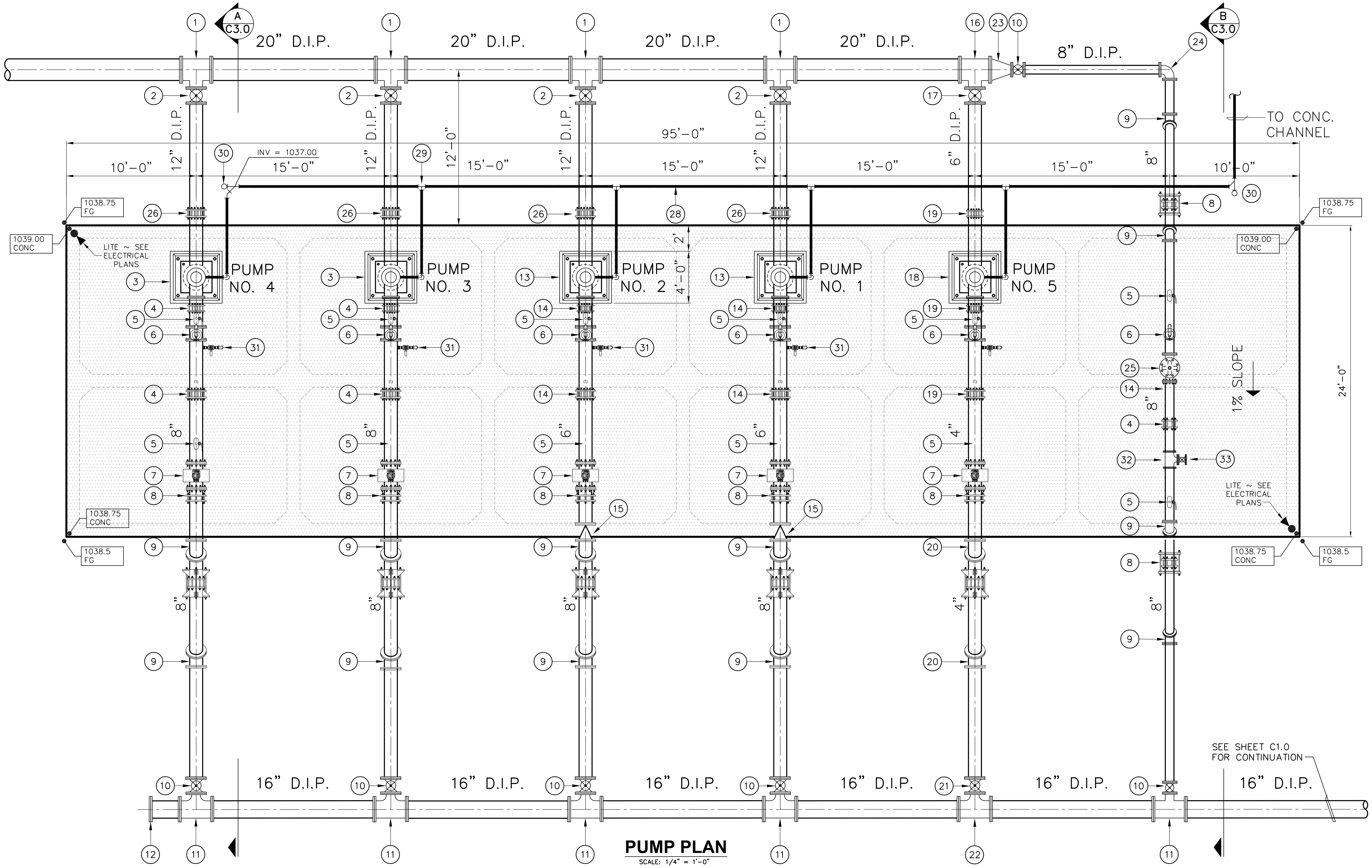
Revised sheets C2.0, C5.0, and M2.1
Added sheet M0.1

STATE OF TEXAS
ALAN D. LINDSKOG
89706
REGISTERED
PROFESSIONAL ENGINEER

12/26/21

Revised/added technical specification sections:

- 09 90 00 – Painting and Protective Coatings
- 40 70 00 – Instrumentation for Process Systems



PUMP PLAN

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

SCALE
1/4 inch = 1 foot

KEY NOTES:

1. 20" X 12" TEE, FL
2. 12" GATE VALVE AND BOX
3. PUMP NO. 3 AND 4
4. 8" WAFER CHECK VALVE — ADDENDUM 2
5. PRESSURE GAUGE – SEE SPEC SECTION 407000
6. COMBINATION AIR VALVE
7. ELECTROMATIC FLOW METER SEE SPEC SECTION 407113
8. COUPLING WITH FOUR HARNESS CLIPS
9. 8" 1/8 BEND, FL
10. 8" GATE VALVE AND BOX, MJ
11. 16" X 8" TEE, MJ
12. 16" BLIND FLANGE
13. ~~PUMP NO. 1 AND 2~~
14. 6" WAFTER CHECK VALVE — ADDENDUM 2
15. 8" X 6" REDUCER, FL.
16. 16" X 6" TEE, FL.
17. 6" GATE VALVE AND BOX
18. PUMP NO. 5
19. 4" WAFER CHECK VALVE — ADDENDUM 2
20. 4" 1/8 BEND, FL.
21. 4" GATE VALVE AND BOX, MJ
22. 16" X 4" TEE, FL
23. 20" X 8" REDUCER, FL.
24. 8" 1/4 BEND, FL.
25. 8" SURGE VALVE
26. 12" FLEX COUPLING
27. 1" PVC DRAIN PIPING
28. 4" SDR 26 PVC DRAIN @ 1.00%
29. 4" TEE WITH VERTICAL RISER WITH 4" X 1" ADAPTOR
30. 4" CLEAN OUT
31. 3/4" TAP WITH BALL VALVE FOR SAMPLE TAP
32. 8" X 6" TEE, FL
33. 6" GATE VALVE WITH HANDWHEEL, FL 6" BLIND FLANGE

GENERAL NOTES:

1. REFER TO ELECTRICAL PLANS FOR CONDUIT AND CONTROL LOCATIONS.
2. ALL VALVE BOXES TO BE SET IN AN 18" X 18" X 6" THICK CONCRETE BLOCK.
3. SEE SHEET C1.0 FOR LOCATION OF SUCTION AND DISCHARGE PRESSURE TRANSDUCER TAPS
4. SEE SHEET C3.0 FOR PUMP AND SURGE VALVE ELEVATIONS.
5. SEE SHEET C9.0 FOR SYSTEM CONNECTION REQUIREMENTS.

UNIT DESIGNATION	P5	P1, P2	P3, P4
NUMBER OF UNITS	1	2	2
DESIGN PUMP			
RATED DESIGN POINT			
A. CAPACITY AT RATED DESIGN PUMP HEAD	250	500	1000
B. DESIGN POINT HEAD (FT) (AT DISCHARGE FLANGE)	261.5	263.4	262.6
C. OVERALL PUMP EFFICIENCY (%)	75.52	80.99	81.30
MINIMUM HEAD CONDITION FOR CONTINUOUS OPERATION WITHOUT CAVITATION FULL SPEED			
NPSH AVAILABLE	30	30	30
MINIMUM SHUT-OFF HEAD (FT)	310.5	309.3	344.2
MAXIMUM PUMP OPERATING SPEED	1770	1770	1770
MAX POWER REQUIRED AT THE MOTOR SHAFT FOR ANY POINT IN THE OPERATING HEAD RANGE (BHP)	23.6	47.1	89.8
RECOMMENDED MOTOR RATING HP	25	50	100
MIN. PUMP NOZZLE SIZE			
"V" SUCTION (IN)	6"	12"	12"
"Y" DISCHARGE (IN)	4"	6"	8"

PRESSURE ZONE 11A

DEVELOPER'S NAME: SAN ANTONIO WATER SYSTEM (SAWS)		
ADDRESS: 2800 U.S. HIGHWAY 281 NORTH		
CITY: SAN ANTONIO	STATE: TEXAS	ZIP: 78212
PHONE: (210) 704-7297	FAX: –	
SAWS BLOCK MAP#: 064614	TOTAL EDU'S: N/A	TOTAL ACREAGE: N/A
TOTAL LINEAR FOOTAGE OF PIPE:		PLAT NUMBER:
NUMBER OF LOTS:		SAWS JOB NO.: 20-6008

DESIGNED BY:	DRAWN BY:	DATE:	JOB NO.:
A.D.L.	E.R.G.	JAN, 2020	E0584608

CEC
CIVIL ENGINEERING CONSULTANTS
dba DON DURDEN, INC.
11550 IH 10 WEST, SUITE 395
SAN ANTONIO, TEXAS 78230-1037
TEL: (210) 641-9999
FAX: (210) 641-6440
REGISTRATION #F-2214 / #10041000

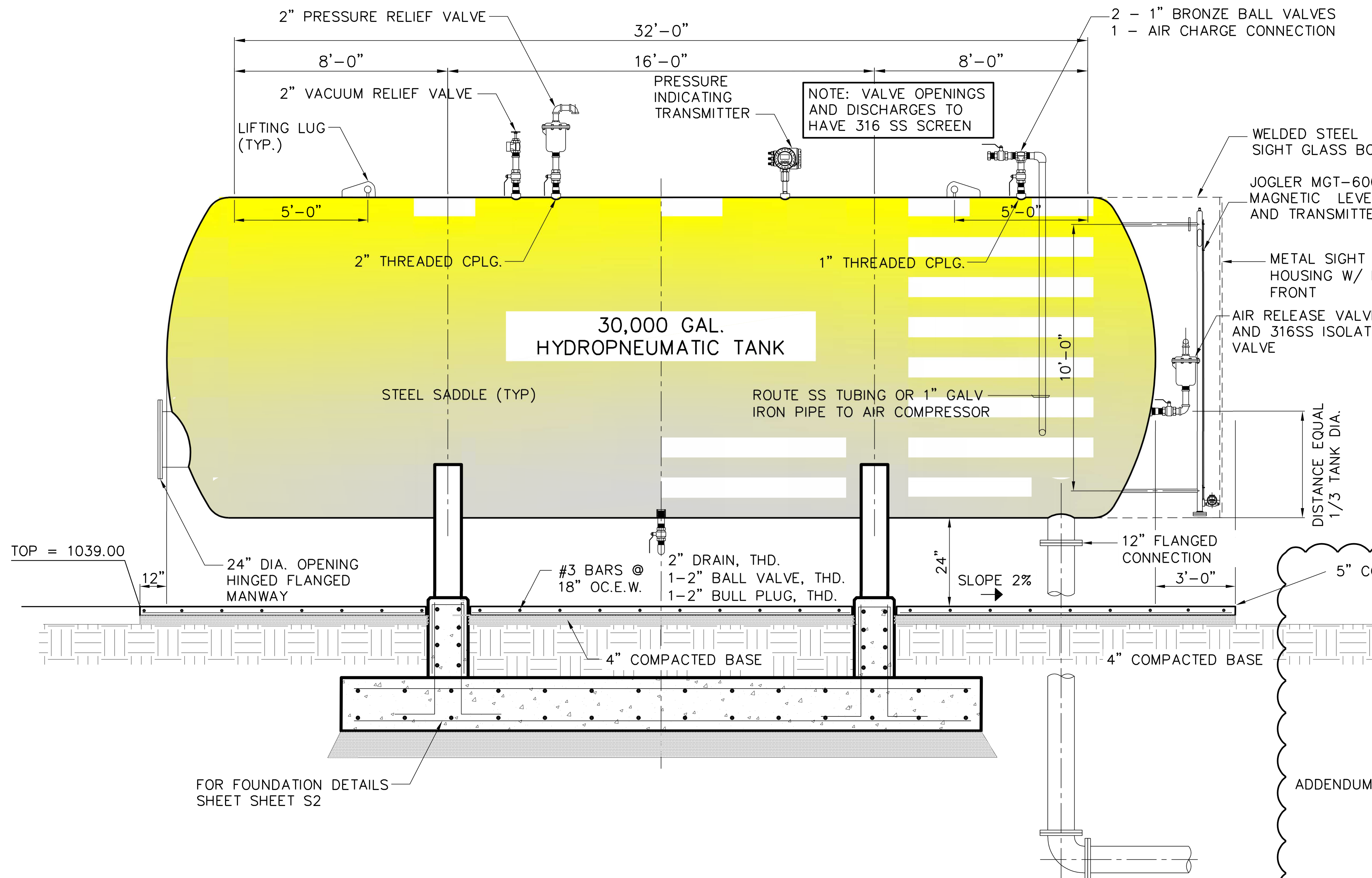
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY ALAN D. LINDSKOG, P.E. #39706
ON: SEPTEMBER 8, 2020
FEBRUARY 26, 2021

STATE OF TEXAS
ALAN D. LINDSKOG
39706
LICENSED PROFESSIONAL ENGINEER

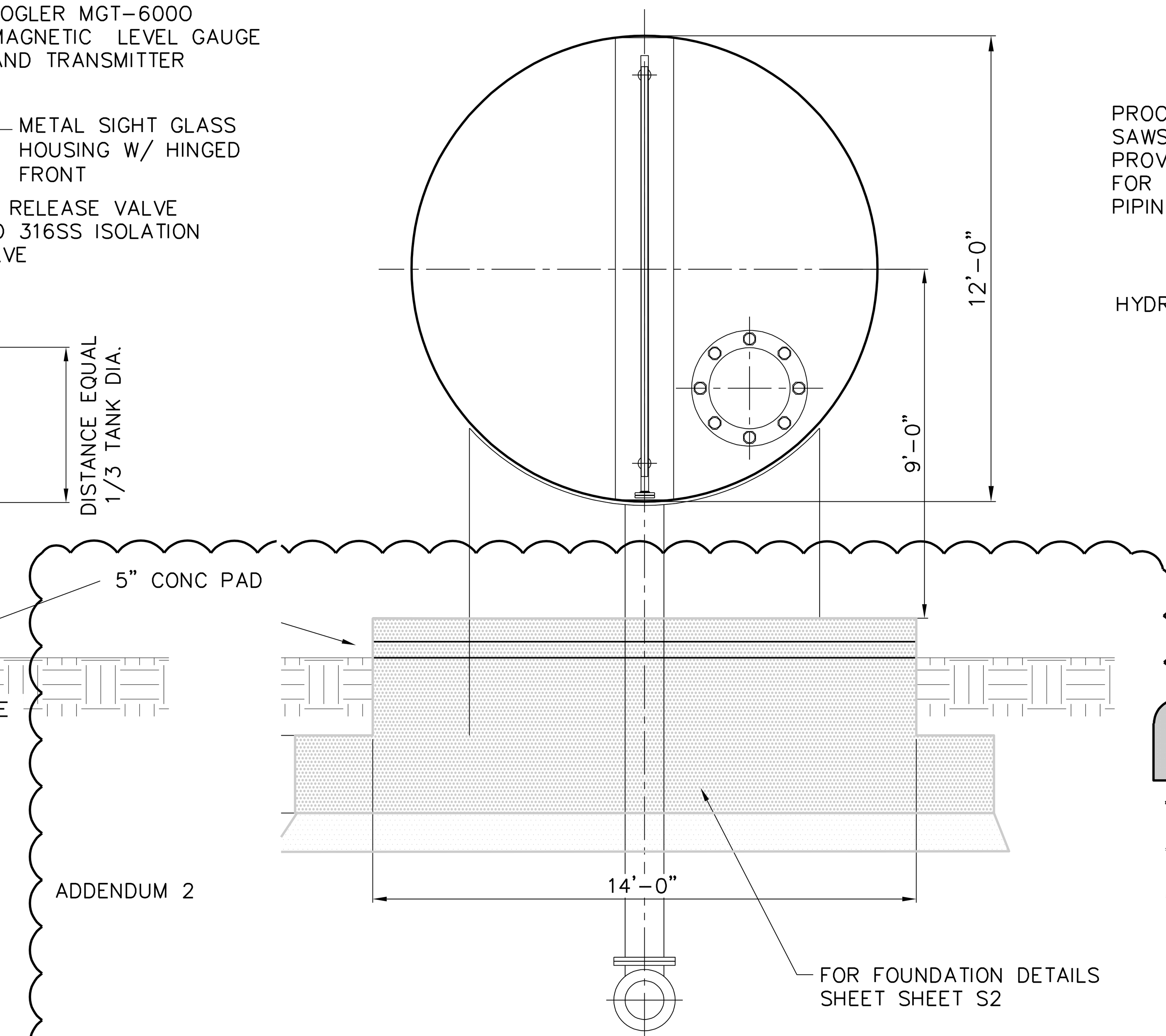
REV	DATE	DESCRIPTION
	02 / 26	ADDENDUM 2

PIPING PLAN
WATERWHEEL SUBD.
WATER BOOSTER SYSTEM

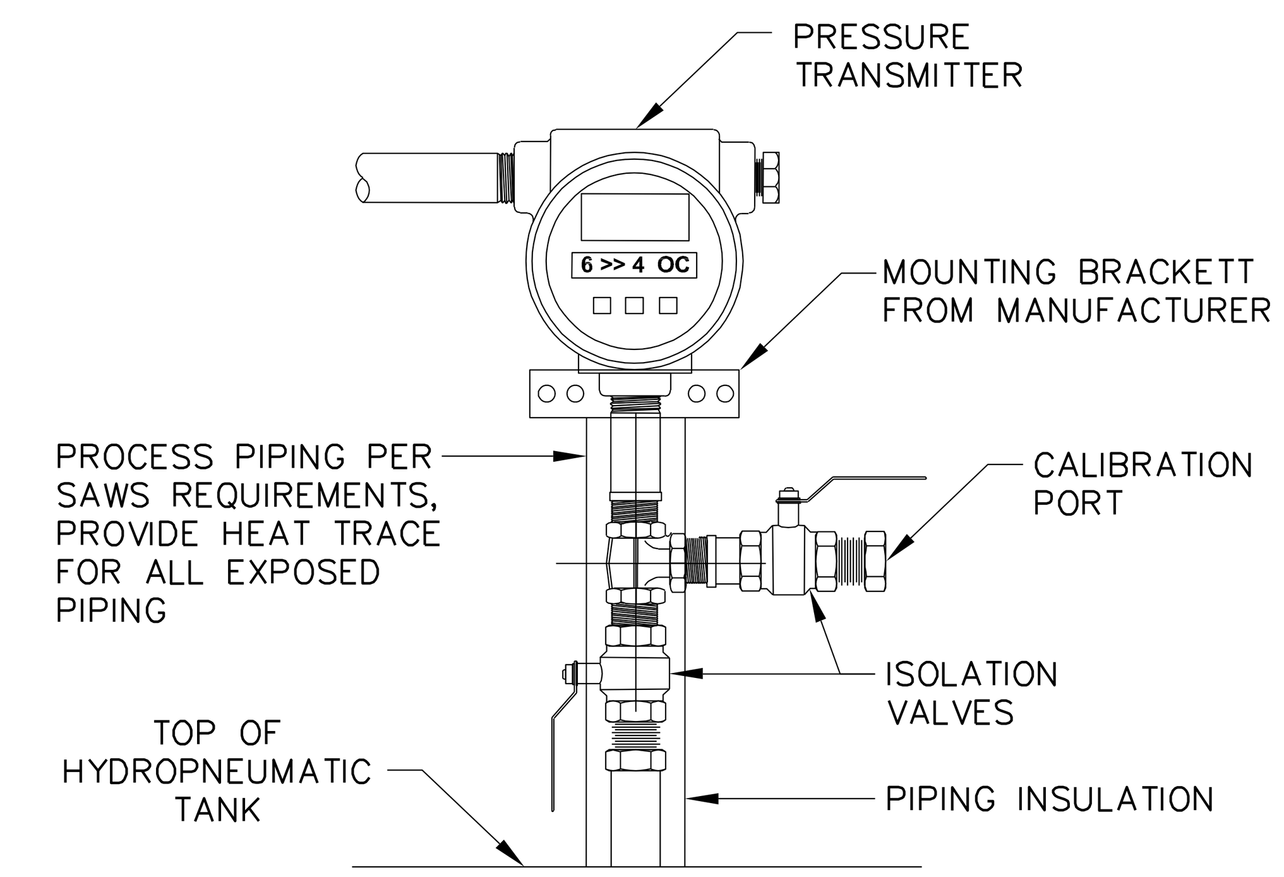
SHEET NO.
C2.0



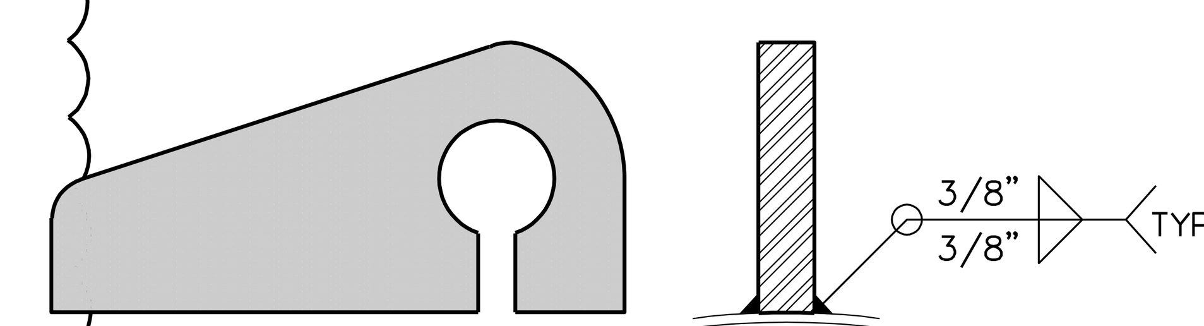
HYDROPNEUMATIC TANK PROFILE



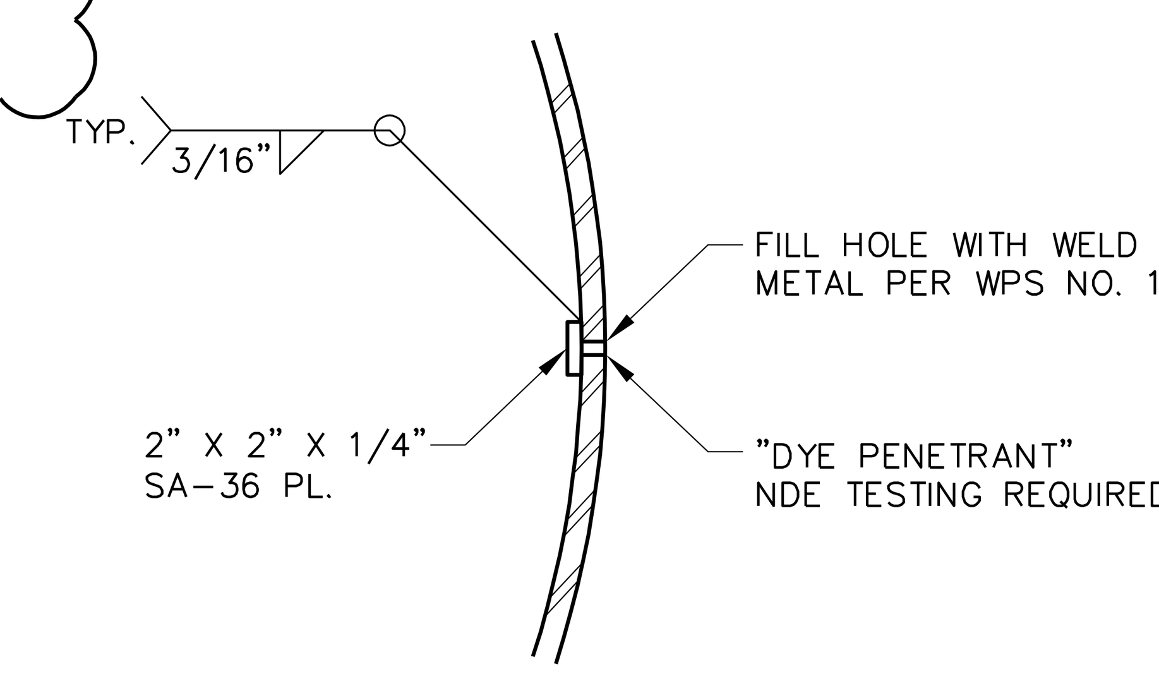
HYDROPNUMATIC END VIEW



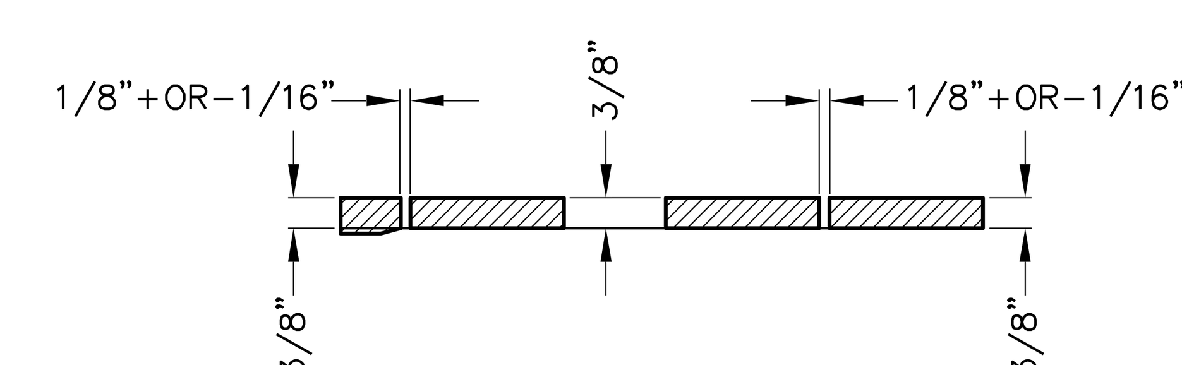
PRESSURE TRANSMITTER MOUNTING DETAIL



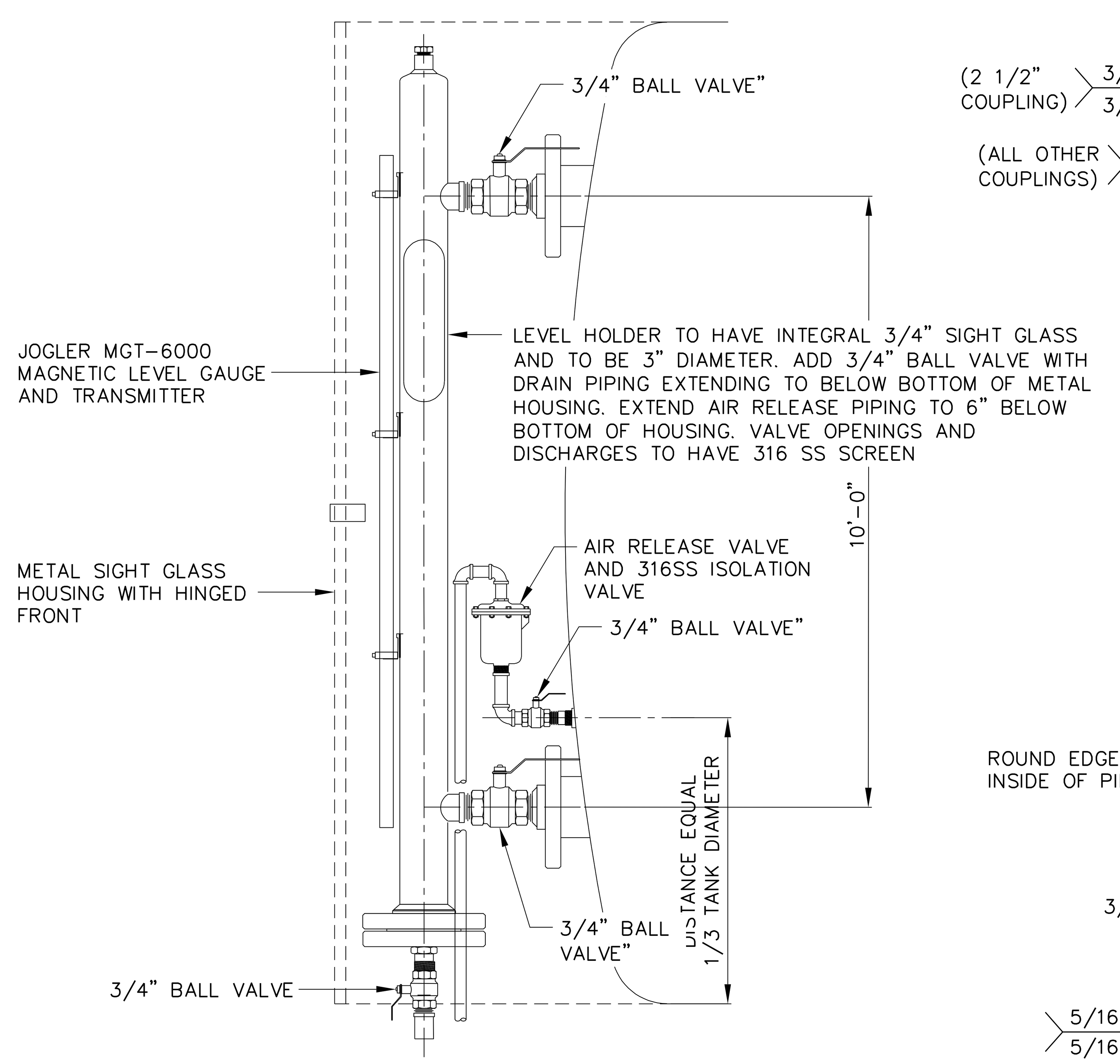
LIFT LUG DETAIL



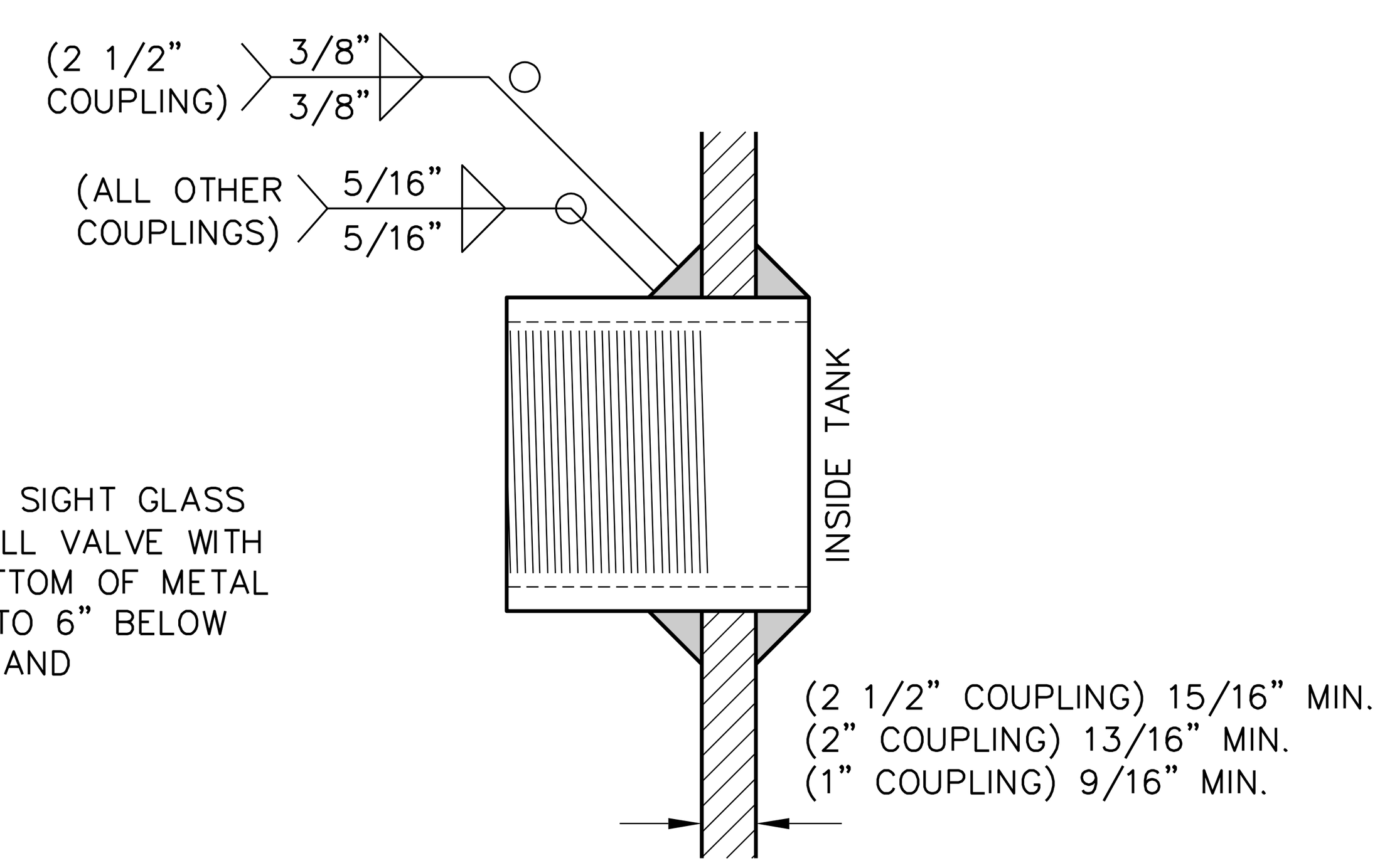
SPINHOLE DETAIL



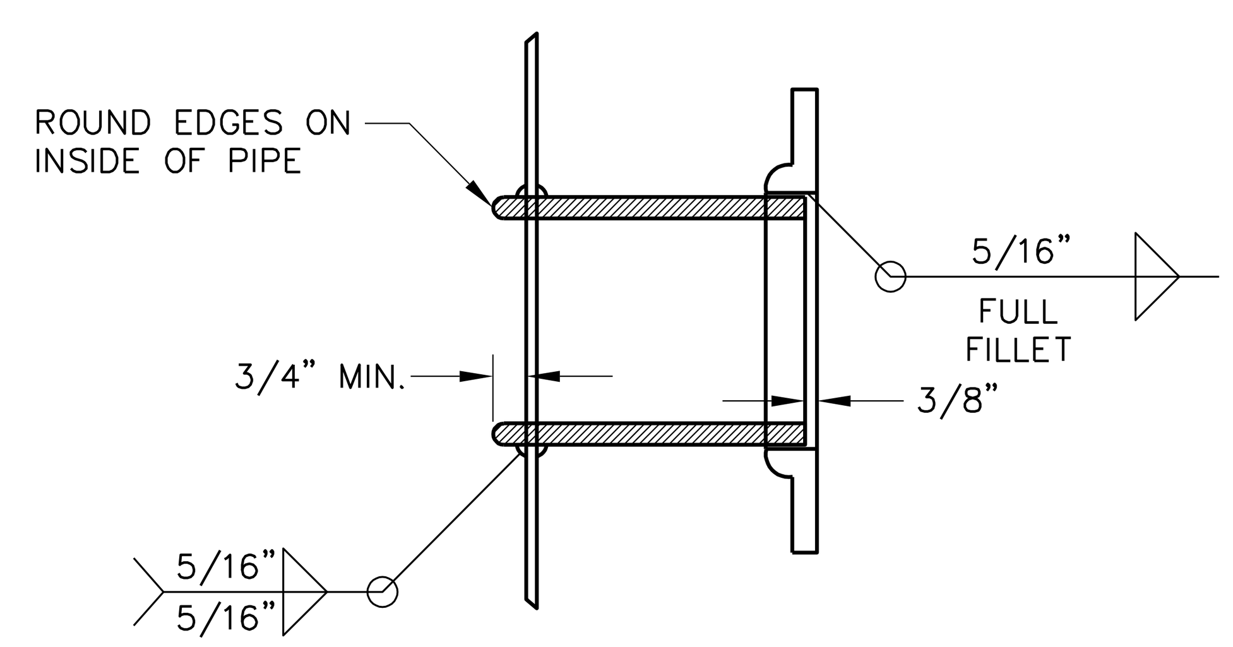
JOINT "1"



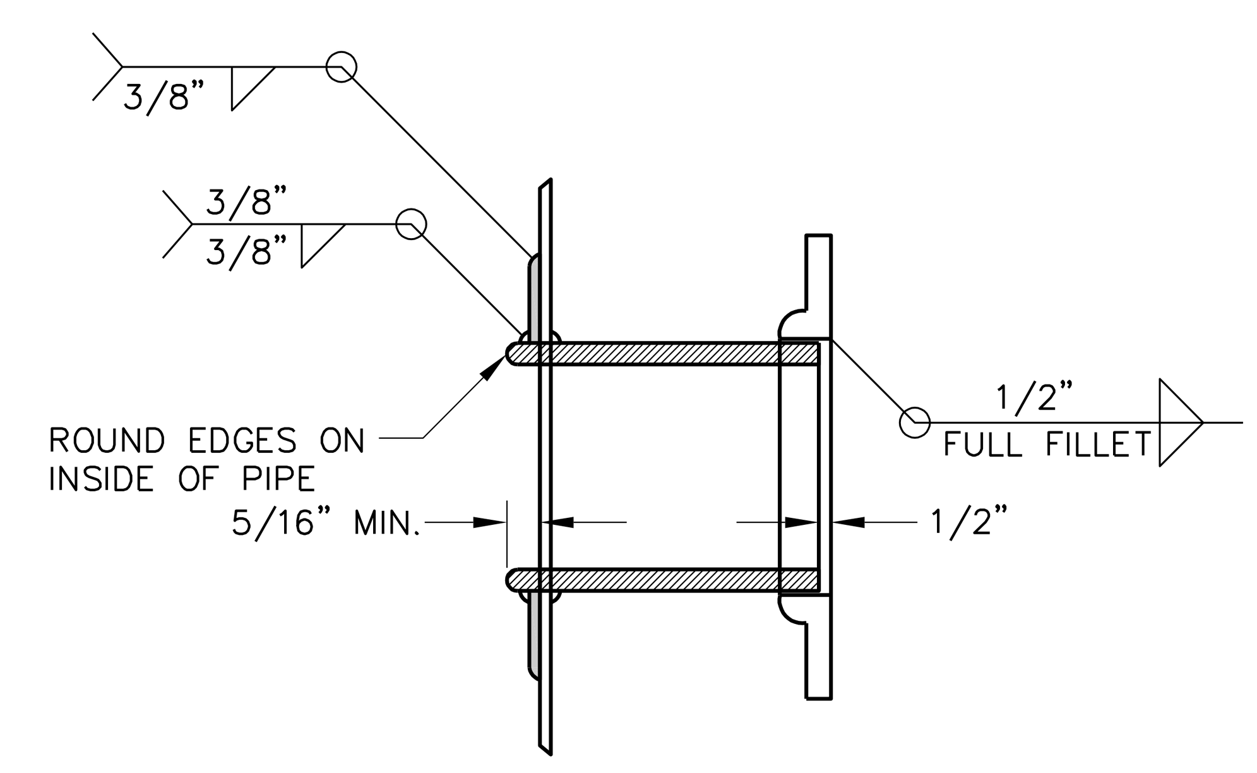
LEVEL CONTROL CHAMBER



COUPLING DETAIL



FLANGE DETAIL



FLANGE MANWAY DETAIL

1. PROVIDE HEAT TRACING ON HYDROPNEUMATIC TANK OUTLETS. TRACING SHALL BE SIZED BASED ON LOW TEMPERATURES OF 10° F. PROVIDE THERMOSTAT AND TUBING INSULATION AS REQUIRED.

PRESSURE ZONE 11A

DEVELOPER'S NAME:	SAN ANTONIO WATER SYSTEM (SAWS)
ADDRESS:	2800 U.S. HIGHWAY 281 NORTH
CITY: SAN ANTONIO	STATE: TEXAS ZIP: 78212
PHONE: (210) 704-7297	FAX: –
SAWS BLOCK MAP#: 064614	TOTAL EDU'S: N/A TOTAL ACREAGE: N/A
TOTAL LINEAR FOOTAGE OF PIPE:	PLAT NUMBER:
NUMBER OF LOTS:	SAWS JOB NO.: 20-6008

DESIGNED BY: A.D.L.
DRAWN BY: E.R.G.
DATE: JAN, 2020
JOB NO.: E0584608

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ON: SEPTEMBER 8, 2020
FEBRUARY 26, 2021

STATE OF TEXAS ALAN D. LINDSKOG 39706 REGISTERED PROFESSIONAL ENGINEER

REV	DATE	DESCRIPTION
	02/26	ADDENDUM 2

HYDROPNUMATIC TANK DETAILS
WATERWHEEL SUBD.
WATER BOOSTER SYSTEM

SHEET NO.
C5.0

SPECIFICATIONS - HVAC

SECTION 230500 COMMON WORK RESULTS FOR HVAC

1. SUMMARY: F&I ALL ITEMS REQUIRED FOR AN INSTALLATION COMPLETE IN EVERY RESPECT. (THE WORK)
2. CODES: LATEST REQUIREMENTS OF IBC, IMC, NFPA, TDH, OSHA, ADA, & ALL APPLICABLE LOCAL, STATE, & FEDERAL CODES, ORDINANCES & REGULATIONS.
3. HVAC DESIGN CONDITIONS: SUMMER -- 97F DB, 77F WB OUTSIDE; 75F DB, 50% RH INSIDE. WINTER -- 25F OUTSIDE; 72F INSIDE.
4. QUALITY STANDARDS: FURNISH NEW, DOMESTIC MATERIALS & EQUIPMENT; STANDARD CATALOGED PRODUCTS OF MANUFACTURERS; CONFORMING TO THE STANDARDS OF ALL APPLICABLE, RECOGNIZED TESTING & APPROVAL AGENCIES; & UL LISTED AS REQUIRED.
5. ACCEPTABLE MANUFACTURERS: MANUFACTURERS' NAMES & CATALOG NUMBERS SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN ESTABLISH STANDARDS OF DESIGN, PERFORMANCE, QUALITY & SERVICEABILITY. EQUIPMENT OF EQUIVALENT DESIGN, W/ LOCAL FACTORY / DEALER REPRESENTATION, WILL BE ACCEPTABLE PENDING ARCHITECT'S / ENGINEER'S REVIEW.
6. SUBMITTALS: SUBMIT SHOP DRAWINGS & PRODUCT DATA TO ARCHITECT / ENGINEER PRIOR TO ORDERING MATERIALS & EQUIPMENT. REFER TO INDIVIDUAL SECTIONS. CLEARLY HIGHLIGHT DATA TO INDICATE EXACT CHARACTERISTICS OF MATERIALS / EQUIPMENT TO BE FURNISHED, & INCLUDE ADEQUATE DATA FOR VERIFICATION OF CAPACITIES & OTHER SCHEDULED CHARACTERISTICS, OPTIONAL ACCESSORIES, ETC.
7. EXISTING CONDITIONS: VERIFY PRIOR TO CONSTRUCTION. PRIOR TO CUTTING/CORING OPERATIONS THROUGH EXISTING CONSTRUCTION, VERIFY W/ BUILDING OWNER / MANAGER LOCATION OF REINFORCING BARS, TENDONS, CONDUITS, OR OTHER ITEMS CONCEALED IN OR BENEATH EXISTING CONSTRUCTION; ALTERNATIVELY, X-RAY EACH CUT/CORE PRIOR TO PERFORMING THE OPERATION. REPAIR ANY DAMAGE AS PART OF THE WORK.
8. COORDINATION: COORDINATE W/ NEW & EXISTING WORK OF ALL TRADES, PARTICULARLY ABOVE CEILING & BELOW FLOOR. COORDINATE ELECTRICAL CHARACTERISTICS OF ALL FURNISHED MECHANICAL EQUIPMENT W/ ELECTRICAL SUBCONTRACTOR PRIOR TO ORDERING EQUIPMENT. RESOLVE ALL CONFLICTS PRIOR TO ORDERING EQUIPMENT & PRIOR TO ROUGH-IN, AS APPLICABLE. REWORK & REPLACE AS NECESSARY ALL WORK NOT PROPERLY COORDINATED.
9. OBSTRUCTIONS: NOT ALL OFFSETS ARE SHOWN. AS PART OF THE WORK, ALTER ROUTING OF WORK SHOWN ON DRAWINGS, F&I OFFSETS, REROUTE EXISTING SERVICES, & OTHERWISE PERFORM WHATEVER WORK IS REQUIRED TO SATISFY THE PURPOSE OF NEW WORK & MAINTAIN EXISTING SYSTEMS.
10. PROTECTION OF WORK: PROTECT EXISTING & NEW MATERIALS, EQUIPMENT & OTHER ITEMS FROM DAMAGE, MOISTURE ABSORPTION & METALLIC CORROSION. FURNISH OUTDOOR APPARATUS OF CORROSION RESISTANT STEEL, ZINC COATED. FURNISH INDOOR EQUIPMENT W/ BAKED ENAMEL FINISH. FURNISH EQUIPMENT & DEVICES EXPOSED IN FINISHED AREAS W/ STANDARD PAINTED FINISH; CONFIRM COLOR W/ ARCHITECT PRIOR TO PLACEMENT OF EQUIPMENT ORDERS.
11. COOPERATION: COOPERATE W/ OTHER TRADES PERFORMING WORK, INCLUDING THOSE OF SEPARATE CONTRACTORS.
12. INSTALLATION STANDARDS: IN ACCORDANCE W/ MANUFACTURER'S RECOMMENDATIONS & APPLICABLE TRADE STANDARDS; ALLOW READY ACCESS FOR SERVICE & REMOVAL OF PERTINENT COMPONENTS. INSTALL ACCESS DOORS IN NEW AND/OR EXISTING CONSTRUCTION AS REQUIRED TO PROVIDE READY ACCESS TO ALL ITEMS REQUIRING ACCESS FOR MAINTENANCE, REPAIRS, AND ADJUSTMENTS.
13. ROUTING: CONCEAL ALL WORK IN WALLS, CHASES, OR ABOVE CEILINGS; ROUTE ALL WORK PARALLEL OR PERPENDICULAR TO BUILDING LINES, UON.
14. START-UP: DO NOT RUN TERMINAL UNITS OR FANS UNTIL ALL INTERIOR CLEANING & PAINTING IS COMPLETE; PROVIDE TEMPORARY FILTERS IF UNITS MUST BE RUN. CLEAN COILS OR FANS FOULED DUE TO CONSTRUCTION PAINT OR DEBRIS.
15. CLOSEOUT: SUBMIT OPERATING & MAINTENANCE MANUALS, PROJECT RECORD DOCUMENTS, & AIR BALANCE REPORTS TO ARCHITECT/ENGINEER; & PROVIDE OPERATING INSTRUCTIONS TO OWNER.
16. WARRANTY: WARRANT DEFECTIVE MATERIALS & WORKMANSHIP FOR ONE YEAR FROM DATE OF BENEFICIAL OCCUPANCY OF PROJECT. CORRECT ANY OBJECTIONABLE NOISE OR VIBRATION.

SECTION 230548 VIBRATION ISOLATION FOR HVAC PIPING & EQUIPMENT

1. SUSPENDED EQUIPMENT: AMBER BOOTH TYPE BSR COMBINATION SPRING & RUBBER HANGERS.
2. PIPING: AT PUMPS & WATER COILS, AMBER BOOTH TYPE SS-FW.
3. SUBMITTALS: PRODUCT DATA.

SECTION 230593 TESTING, ADJUSTING AND BALANCING FOR HVAC

1. COMPLETE AIR BALANCE IN ACCORDANCE W/ NEBB OR AABC STANDARDS OF ALL SUPPLY & EXHAUST SYSTEMS AFFECTED BY THE WORK.
2. COMPLETE BALANCE OF ANY COOLING OR HEATING WATER SYSTEMS AFFECTED BY THE WORK.
3. SUBMIT REPORT ON NEBB OR AABC FORMS.
4. AS FOLLOW-UP TO INITIAL BALANCING, COMFORT BALANCE SYSTEM AFTER USER OCCUPIES THE BUILDING, INCLUDING UP TO TWO ADDITIONAL TRIPS OVER TWO MONTHS.

SECTION 230700 HVAC INSULATION - GENERAL

1. FIRE RATING: SYSTEMS HAVING A FLAME SPREAD RATING NOT EXCEEDING 25, SMOKE DEVELOPED RATING NOT EXCEEDING 50, & FUEL CONTRIBUTED RATING NOT EXCEEDING 50, AS PER APPLICABLE ASTM, NFPA, & UL TESTS.
2. WIRE: GALVANIZED WIRE TO SECURE INSULATION (EXCEPT FIBERGLASS PIPE INSULATION) AROUND PIPES, VALVES, FITTINGS, & OTHER ITEMS. FOR PIPE 4 IN. OR SMALLER, USE 16 GAUGE WIRE ON 9 IN. SPACING.
3. VALVES & OTHER SPECIAL ITEMS: INSULATE TO THICKNESS REQUIRED FOR PIPING.
4. SHIELDS: HIGH-DENSITY INSULATION & GALVANIZED SHIELDS AT ALL HANGERS.
5. HANGERS: CARRY INSULATION CONTINUOUSLY THROUGH HANGERS.
6. WORKMANSHIP: INSULATE CONTINUOUSLY THROUGH WALL & CEILING OPENINGS & SLEEVES, EXCEPT AT FIRE-RATED PENETRATIONS. REPLACE INSULATION DAMAGED BY MOISTURE, ABUSE, OR OTHER MEANS. PERFORM ALL REQUIRED PRESSURE TESTS PRIOR TO INSULATING SYSTEMS.
7. ACCEPTABLE MANUFACTURERS: CERTAINTEED, KNAUF, OWENS-CORNING, SCHULLER.
8. SUBMITTALS: PRODUCT DATA FOR ALL INSULATION MATERIALS, SHIELDS, SEALANTS, & FINISH.

SECTION 230713 EXTERNAL DUCT INSULATION

1. MATERIALS: CONCEALED - 0.75 PCF DENSITY GLASS FIBER INSULATION WRAP; EXPOSED - 3.0 PCF DENSITY GLASS FIBER INSULATION BOARD; BOTH W/ FACTORY-APPLIED, REINFORCED FOIL-KRAFT FACING.
2. THICKNESS: CONCEALED - 1-1/2 IN; EXPOSED - 1 IN.
3. SEALANT & FINISH: CONCEALED OR EXPOSED - BENJAMIN FOSTER 30-35 VAPOR BARRIER COATING & 85-20 VAPOR BARRIER ADHESIVE; EXPOSED TO WEATHER - COAT W/BENJAMIN FOSTER SELFAS GPM, 35-00, COLOR WHITE.

SECTION 230719 HVAC LOW TEMPERATURE PIPING INSULATION

1. MATERIALS: FOR CHILLED WATER PIPING, F&I PREMOLDED 4 PCF DENSITY FIBERGLASS PIPE INSULATION W/ ASJ & SELF-SEALING LAPS. FOR REFRIGERANT SUCTION, F&I ARMAFLEX AP PIPE INSULATION. FOR CONDENSATE DRAIN PIPING, F&I ARMAFLEX AP PIPE INSULATION.
2. THICKNESS:
   a. CHILLED WATER 6 IN. & SMALLER: 1-1/2 IN.
   b. CONDENSATE DRAINS: ½ IN.
3. FOR CHILLED WATER PIPING, USE BENJAMIN FOSTER 85-20 TO SEAL LONGITUDINAL LAPS AND BUTT JOINTS INSTEAD OF SELF-SEALING LAPS.

SECTION 230722 HVAC HIGH TEMPERATURE PIPING INSULATION

1. MATERIALS: FOR DOMESTIC HOT WATER PIPING & HEATING WATER PIPING, F&I PREMOLDED 4 PCF DENSITY FIBERGLASS PIPE INSULATION W/ ASJ & SELF-SEALING LAPS.
2. THICKNESS:
   a. DOMESTIC HOT WATER: 1 IN.
   b. HEATING WATER: 1-1/2 IN.
3. SEALANT & FINISH: F&I JOHNS-MANVILLE 460 & BENJAMIN FOSTER 30-35 W/ GLASS FABRIC REINFORCEMENT ON INSULATED FITTINGS, FLANGES, & VALVES.

SECTION 230922 CONTROL SYSTEMS

1. ALL ITEMS OF CONTROL REQUIRED FOR COMPLETE FUNCTIONING OF THE SYSTEMS, USING EX. CONTROL SYSTEM WHERE APPLICABLE.
2. MOUNT THERMOSTATS 46 IN. AFF, & 8 IN. TO ONE SIDE OF LIGHT SWITCH, WHERE BOTH OCCUR IN SAME LOCATION, UNLESS OTHERWISE NOTED.
3. WHERE REQUIRED BY CODE & NOT SHOWN ON ELEC. DRAWINGS, DUCT-MOUNTED SMOKE DETECTORS; COORDINATE W/ ELEC. TO PROVIDE SHUTDOWN OF AIR UNITS AS APPLICABLE; INCLUDING BUT NOT LIMITED TO SUPPLY & RETURN OF ALL AIR UNITS SCHEDULED AT 2000 CFM OR MORE.
4. CALIBRATE ALL AFFECTED CONTROLS.
5. CONFIRM PROPER FUNCTIONING OF EACH SYSTEM.
6. SUBMITTALS: PRODUCT DATA. CONTROL DIAGRAMS, INDICATING SEQUENCES OF OPERATION.

SECTION 233100 HVAC DUCTS

1. MATERIAL: GALVANIZED SHEET METAL FOR ALL DUCTWORK UNLESS OTHERWISE NOTED.
2. STANDARDS: FABRICATE & INSTALL IN ACCORDANCE W/ LATEST SMACNA STANDARDS FOR 2 IN. PRESSURE CLASS FOR LOW PRESSURE DUCTS, 6 IN. PRESSURE CLASS FOR DUCT MAINS TO TERMINAL UNITS.
3. SEALING: ALL GALVANIZED DUCTWORK W/ HARDCAST DT TAPE & FTA-20 ADHESIVE; TO SMACNA TYPE "A" SEAL CLASS.
4. FLEXIBLE DUCTS: ATCO, FLEXMASTER, THERMOFLEX, PORTER, WIREMOLD. UL CLASS 1 AIR DUCT; AIRTIGHT INNER LINER, INSULATION AND OUTER JACKET. INNER LINER OF COATED HELIX AND FABRIC, SUBSTANTIALLY BONDED TOGETHER. TO PREVENT THE DUCT FROM COLLAPSING OR KINKING IN SHORT RADIUS BENDS. METAL FLEXIBLE DUCTING, GLASS FIBER INSULATION, MIN. 1-1/2 IN. THICK 3/4 LB.PER CU. FT. DENSITY, (R-5 MIN.) & VAPOR BARRIER JACKET. MAX. INSTALLED LENGTH 6 FT. RATED FOR 25/50 FLAME/SMOKE SPREAD.
5. CONSTRUCTION: DUCT DIMENSIONS SHOWN ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS. CONICAL DUCT TAPS W/ BALANCING DAMPER, LOCKING QUADRANT, & AIR SCOOP AT EACH TAKEOFF TO AIR DEVICE; MAINTAIN ACCESS TO DAMPER. SHOE-TAP FITTING AND VOLUME DAMPER AT EACH DUCT BRANCH SERVING MORE THAN ONE OUTLET. FACTORY FABRICATED DOUBLE-WALL TURNING VANES FOR RECTANGULAR ELBOWS. ROUND ELBOWS W/ MIN. CENTERLINE RADIUS OF 1.5 X DUCT DIAMETER.
6. SUPPORTS: IN ACCORDANCE W/ SMACNA STANDARDS. USE GALVANIZED STRAP SADDLES & SUPPORTS, NO WOVEN PLASTIC STRAPS.
7. SUBMITTALS: PRODUCT DATA ON FLEXIBLE DUCTS; FIRE & FIRE/SMOKE DAMPERS. SHOP DRAWINGS OF EQUIPMENT ROOMS & TYP. ROUND TAP TO SUPPLY AIR DEVICE.

SECTION 233713 DIFFUSERS, REGISTERS AND GRILLES

1. STANDARDS: RATED IN ACCORDANCE W/ ADC STANDARDS.
2. TYPE: AS SCHEDULED ON THE DRAWINGS. DEVICES OF ONE MANUFACTURER. FURNISH OPPOSED BLADE DAMPER ON ALL EXHAUST DEVICES.
3. MOUNTING: SUITABLE FOR CEILING IN WHICH MOUNTED. FRAME FOR MOUNTING DEVICE. REFER TO ARCHITECTURAL DRAWINGS.
4. INSTALLATION: COORDINATE EXACT LOCATIONS W/ ARCH. DRAWINGS. SHIFT AIR DEVICES AS REQUIRED TO FIT IN FINAL LOCATIONS, INCLUDING ADDITIONAL FLEXIBLE DUCT & DUCTWORK AS REQUIRED.
5. ACCEPTABLE MANUFACTURERS: CARNES, KRUEGER, METAL-AIRE, PRICE, TITUS.
6. SUBMITTALS: PRODUCT DATA.

SECTION 238126 AIR-COOLED CONDENSING UNITS

1. PERFORMANCE: AS SCHEDULED ON DRAWINGS, W/ HEAD PRESSURE CONTROL TO ENABLE UNIT TO OPERATE IN TEMPERATURES AS LOW AS 20F.
2. PRODUCTS: HERMETIC OR SEMI-HERMETIC COMPRESSOR W/ CRANKCASE HEATERS, INHERENTLY PROTECTED MOTORS, SPRING MOUNTS & CAPACITY MODULATION.
3. WARRANTY: 5-YEAR WARRANTY ON COMPRESSORS.
4. CONDENSER COILS: COPPER TUBES W/ MECHANICALLY BONDED ALUMINUM FINS.
5. FANS AND MOTORS: PROPELLER-TYPE FANS W/ DIRECT DRIVE OR BELT DRIVE & VERTICAL DISCHARGE. PROTECT FAN W/ HEAVY-GAGE WIRE GUARD. INHERENTLY PROTECTED, PERMANENTLY LUBRICATED, & WEATHERPROOF MOTORS.
6. CASING: DESIGNED FOR OUTDOOR MOUNTING. HEAVY GAGE STEEL, ZINC COATED & FINISHED W/ ENAMEL. REMOVABLE ACCESS PANELS.
7. CONTROLS: SAFETY & OPERATING CONTROLS FACTORY WIRED, MOUNTED IN SEPARATE ENCLOSURE. HIGH & LOW PRESSURE SWITCHES & COMPRESSOR MOTOR OVERLOAD DEVICES. TIME DELAY DEVICE TO PREVENT SHORT CYCLING. CONTROL TRANSFORMER, PRESSURE RELIEF DEVICE, & SUCTION & DISCHARGE VALVES W/ SERVICE CONNECTIONS.
8. INSTALLATION: IN ACCORDANCE W/ MANUFACTURER'S RECOMMENDATIONS; ON 5-1/2 IN. HOUSEKEEPING PAD; SIZE REFRIGERANT PIPING IN ACCORDANCE W/ MANUFACTURER'S RECOMMENDATIONS.
9. SUBMITTALS: PRODUCT DATA, PERFORMANCE DATA.

SECTION 238219 FAN COIL UNITS

1. REFERENCE STANDARDS:
   a. ARI STANDARD 210 OR 360 (PERFORMANCE RATING).
   b. ARI STANDARD 240.
   c. UL LISTED, LABELED IN ACCORDANCE W/ UL 465/1995 FOR INDOOR BLOWER COIL UNITS.
   d. UL & CSA CERTIFIED FOR ELECTRIC RESISTANCE HEATERS.
2. PRODUCTS: YORK NAD & KEU, OR EQUIVALENT. FACTORY ASSEMBLED INCLUDING COIL, CONDENSATE DRAIN PAN, FAN MOTOR(S), FILTERS, & CONTROLS IN INSULATED CASING FOR VERTICAL OR HORIZONTAL CONFIGURATION.
3. CASING: ZINC COATED, HEAVY GAGE, GALVANIZED STEEL. EXTERIOR SURFACES CLEANED, PHOSPHATIZED & FINISHED W/ WEATHER-RESISTANT BAKED ENAMEL FINISH. COMPLETELY INSULATED W/ FIRE-RETARDANT, PERMANENT, ODORLESS GLASS FIBER MATERIAL. KNOCKOUTS FOR UNIT ELECTRICAL POWER & REFRIGERANT PIPING CONNECTIONS. CAPTIVE SCREWS ON ALL ACCESS PANELS.
4. REFRIGERATION SYSTEM: SINGLE REFRIGERATION CIRCUIT UP TO 7-1/2 TONS NOMINAL CAPACITY; DUAL REFRIGERATION CIRCUITS FOR 10 TON OR GREATER NOMINAL CAPACITY. FACTORY-INSTALLED THERMAL EXPANSION VALVE.
5. EVAPORATOR COIL: CONFIGURED ALUMINUM FIN SURFACE MECHANICALLY BONDED TO 3/8 IN. INTERNALLY ENHANCED COPPER TUBING; FACTORY PRESSURE & LEAK TESTED @ 375 PSIG. COIL ARRANGED FOR DRAW-THROUGH AIRFLOW. CONDENSATE DRAIN PAN CONSTRUCTED OF GALVANIZED STEEL W/ EXTERNAL CONNECTIONS ON EITHER SIDE OF UNIT. COMPLETELY FACTORY ASSEMBLED INCLUDING EXPANSION VALVES & DRAIN PANS. CONVERTIBLE TO VERTICAL / HORIZONTAL CONFIGURATION.
6. EVAPORATOR FAN: DOUBLE INLET, DOUBLE WIDTH, FORWARD CURVED, CENTRIFUGAL-TYPE FAN(S) W/ ADJUSTABLE BELT DRIVE. THERMAL OVERLOAD PROTECTION ON MOTOR. FAN & MOTOR BEARINGS PERMANENTLY LUBRICATED. OVERSIZED MOTORS FOR HIGH STATIC APPLICATION.
7. CONTROLS: MAGNETIC EVAPORATOR FAN CONTACTOR, LOW VOLTAGE TERMINAL STRIP, CHECK VALVE(S), & SINGLE POINT POWER ENTRY. ALL NECESSARY CONTROLS FACTORY-INSTALLED & WIRED. EVAPORATOR DEFROST CONTROL.
8. FILTERS: FILTER RACKS SUITABLE FOR USE W/ EITHER 1 IN. OR 2 IN. FILTERS, W/OUT MODIFICATION TO UNIT. SIZE FILTER RACK TO PROVIDE AIR VELOCITY AT MAX. RATED SUPPLY AIR QUANTITY NOT EXCEEDING 500 FPM. 2 IN. THICK REPLACEABLE FILTERS, FARR 30/30 OR EQUIVALENT.
9. ELECTRIC HEATERS: UL & CSA APPROVED ELECTRIC HEAT MODULES FOR INSTALLATION DIRECTLY ON FAN DISCHARGE. FURNISH SCHEDULED CAPACITIES W/ ONE OR TWO STAGE CONTROL, SINGLE-POINT ELECTRIC POWER CONNECTION & TERMINAL STRIP CONNECTIONS. ELECTRIC HEATER ELEMENTS CONSTRUCTED OF HEAVY-DUTY NICKEL CHROMIUM ELEMENTS INTERNALLY WYE CONNECTED ON 480/660 VOLT, THREE PHASE & DELTA CONNECTED ON 208/240, THREE PHASE. EACH 208/240 VOLT HEATER W/ PILOT DUTY SECONDARY BACKUP FUSE LINKS FOR AUTOMATIC RESET OF HIGH LIMIT CONTROLS. EACH 480/600 VOLT HEATER W/ AUTOMATIC LINE BREAK HIGH LIMIT CONTROLS.
10. ACCEPTABLE MANUFACTURERS: CARRIER, LENNOX, TRANE, YORK.
11. INSTALLATION: IN ACCORDANCE W/ MANUFACTURER'S RECOMMENDATIONS. INSTALL W/ APPROPRIATE STRUCTURAL SUPPORTS & VIBRATION ISOLATION FOR HORIZONTAL SUSPENDED APPLICATION. IF LOCATED ABOVE CEILING, INSTALL SECONDARY DRAIN PAN & TRAPPED CONDENSATE DRAIN AS REQUIRED BY CODE. INSTALL ON HOUSEKEEPING PAD W/ SUB-BASE & SPRING ISOLATORS FOR VERTICAL FLOOR-MOUNTED APPLICATION. ROUTE TRAPPED CONDENSATE DRAIN FROM UNIT TO NEAREST FLOOR DRAIN, HUB DRAIN, OR OTHER APPROVED POINT OF DISCHARGE.
12. SUBMITTALS: PRODUCT DATA, PERFORMANCE DATA.

SPECIFICATIONS - PLUMBING

SECTION 220500 COMMON WORK RESULTS FOR PLUMBING

1. SUMMARY: F&I ALL ITEMS REQUIRED FOR AN INSTALLATION COMPLETE IN EVERY RESPECT. (THE WORK)
2. CODES: LATEST REQUIREMENTS OF IBC, IMC, IPC, NFPA, TDH, OSHA, ADA, & ALL APPLICABLE LOCAL, STATE, & FEDERAL CODES, ORDINANCES & REGULATIONS.
3. QUALITY STANDARDS: FURNISH NEW, DOMESTIC MATERIALS & EQUIPMENT; STANDARD CATALOGED PRODUCTS OF MANUFACTURERS; CONFORMING TO THE STANDARDS OF ALL APPLICABLE, RECOGNIZED TESTING & APPROVAL AGENCIES; & UL LISTED AS REQUIRED.
4. ACCEPTABLE MANUFACTURERS: MANUFACTURERS' NAMES & CATALOG NUMBERS SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN ESTABLISH STANDARDS OF DESIGN, PERFORMANCE, QUALITY & SERVICEABILITY. EQUIPMENT OF EQUIVALENT DESIGN, W/ LOCAL FACTORY / DEALER REPRESENTATION, WILL BE ACCEPTABLE PENDING ARCHITECT'S / ENGINEER'S REVIEW.
5. SUBMITTALS: SUBMIT SHOP DRAWINGS & PRODUCT DATA TO ARCHITECT / ENGINEER PRIOR TO ORDERING MATERIALS & EQUIPMENT. REFER TO INDIVIDUAL SECTIONS. CLEARLY HIGHLIGHT DATA TO INDICATE EXACT CHARACTERISTICS OF MATERIALS / EQUIPMENT TO BE FURNISHED, & INCLUDE ADEQUATE DATA FOR VERIFICATION OF CAPACITIES & OTHER SCHEDULED CHARACTERISTICS, OPTIONAL ACCESSORIES, ETC.
6. EXISTING CONDITIONS: VERIFY PRIOR TO CONSTRUCTION. PRIOR TO CUTTING/CORING OPERATIONS THROUGH EXISTING CONSTRUCTION, VERIFY W/ BUILDING OWNER / MANAGER LOCATION OF REINFORCING BARS, TENDONS, CONDUITS, OR OTHER ITEMS CONCEALED IN OR BENEATH EXISTING CONSTRUCTION; ALTERNATIVELY, X-RAY EACH CUT/CORE PRIOR TO PERFORMING THE OPERATION. REPAIR ANY DAMAGE AS PART OF THE WORK.
7. COORDINATION: COORDINATE W/ NEW & EXISTING WORK OF ALL TRADES, PARTICULARLY ABOVE CEILING & BELOW FLOOR. COORDINATE ELECTRICAL CHARACTERISTICS OF ALL FURNISHED MECHANICAL EQUIPMENT W/ ELECTRICAL SUBCONTRACTOR PRIOR TO ORDERING EQUIPMENT. RESOLVE ALL CONFLICTS PRIOR TO ORDERING EQUIPMENT & PRIOR TO ROUGH-IN, AS APPLICABLE. REWORK & REPLACE AS NECESSARY ALL WORK NOT PROPERLY COORDINATED.
8. OBSTRUCTIONS: NOT ALL OFFSETS ARE SHOWN. AS PART OF THE WORK, ALTER ROUTING OF WORK SHOWN ON DRAWINGS, F&I OFFSETS, REROUTE EXISTING SERVICES, & OTHERWISE PERFORM WHATEVER WORK IS REQUIRED TO SATISFY THE PURPOSE OF NEW WORK & MAINTAIN EXISTING SYSTEMS.
9. PROTECTION OF WORK: PROTECT EXISTING & NEW MATERIALS, EQUIPMENT & OTHER ITEMS FROM DAMAGE, MOISTURE ABSORPTION & METALLIC CORROSION. FURNISH OUTDOOR APPARATUS OF CORROSION RESISTANT STEEL, ZINC COATED. FURNISH INDOOR EQUIPMENT W/ BAKED ENAMEL FINISH. FURNISH EQUIPMENT & DEVICES EXPOSED IN FINISHED AREAS W/ STANDARD PAINTED FINISH; CONFIRM COLOR W/ ARCHITECT PRIOR TO PLACEMENT OF EQUIPMENT ORDERS.
10. COOPERATION: COOPERATE W/ OTHER TRADES PERFORMING WORK, INCLUDING THOSE OF SEPARATE CONTRACTORS.
11. INSTALLATION STANDARDS: IN ACCORDANCE W/ MANUFACTURER'S RECOMMENDATIONS & APPLICABLE TRADE STANDARDS; ALLOW READY ACCESS FOR SERVICE & REMOVAL OF PERTINENT COMPONENTS. INSTALL ACCESS DOORS IN NEW AND/OR EXISTING CONSTRUCTION AS REQUIRED TO PROVIDE READY ACCESS TO ALL ITEMS REQUIRING ACCESS FOR MAINTENANCE, REPAIRS, AND ADJUSTMENTS.
12. ROUTING: CONCEAL ALL WORK IN WALLS, CHASES, OR ABOVE CEILINGS; ROUTE ALL WORK PARALLEL OR PERPENDICULAR TO BUILDING LINES, UON.
13. START-UP: DO NOT RUN TERMINAL UNITS OR FANS UNTIL ALL INTERIOR CLEANING & PAINTING IS COMPLETE; PROVIDE TEMPORARY FILTERS IF UNITS MUST BE RUN. CLEAN COILS OR FANS FOULED DUE TO CONSTRUCTION PAINT OR DEBRIS.
14. CLOSEOUT: SUBMIT OPERATING & MAINTENANCE MANUALS & PROJECT RECORD DOCUMENTS TO ARCHITECT/ENGINEER; & PROVIDE OPERATING INSTRUCTIONS TO OWNER.
15. WARRANTY: WARRANT DEFECTIVE MATERIALS & WORKMANSHIP FOR ONE YEAR FROM DATE OF BENEFICIAL OCCUPANCY OF PROJECT. CORRECT ANY OBJECTIONABLE NOISE OR VIBRATION.

SECTION 220523 GENERAL DUTY VALVES FOR PLUMBING PIPING

1. UNIFORMITY OF MANUFACTURE: USE VALVES OF SAME MANUFACTURER THROUGHOUT PROJECT WHERE POSSIBLE.
2. TYPE: THREADED VALVES FOR PIPE SIZES 2-1/2 IN. & SMALLER. FLANGED OR GROOVED END VALVES FOR PIPE SIZES 3 IN. & LARGER. CLASS 150 BRONZE BODY; ASTM B-62. NIBCO T-134 MODIFIED FOR MALLEABLE IRON HANDWHEEL (GATE), T-235-Y (GLOBE), T-585-BR (BALL), & T-473-B (CHECK), OR EQUIVALENT.
3. ACCESS: WHERE VALVES ARE CONCEALED IN PIPE CHASES OR ABOVE INACCESSIBLE CEILINGS, F&I ACCESS DOORS W/ CONCEALED HINGE & KEY-OPERATED LOCKS. FIRE-RATED ACCESS DOORS IN FIRE-RATED CONSTRUCTION.
4. ACCEPTABLE MANUFACTURERS: APOLLO, HAMMOND, MILWAUKEE, NIBCO, RED WHITE.
5. SUBMITTALS: PRODUCT DATA.

SECTION 220700 PLUMBING INSULATION - GENERAL

1. FIRE RATING: SYSTEMS HAVING A FLAME SPREAD RATING NOT EXCEEDING 25, SMOKE DEVELOPED RATING NOT EXCEEDING 50, & FUEL CONTRIBUTED RATING NOT EXCEEDING 50, AS PER APPLICABLE ASTM, NFPA, & UL TESTS.
2. WIRE: GALVANIZED WIRE TO SECURE INSULATION (EXCEPT FIBERGLASS PIPE INSULATION) AROUND PIPES, VALVES, FITTINGS, & OTHER ITEMS. FOR PIPE 4 IN. OR SMALLER, USE 16 GAUGE WIRE ON 9 IN. SPACING.
3. VALVES & OTHER SPECIAL ITEMS: INSULATE TO THICKNESS REQUIRED FOR PIPING.
4. SHIELDS: HIGH-DENSITY INSULATION & GALVANIZED SHIELDS AT ALL HANGERS.
5. HANGERS: CARRY INSULATION CONTINUOUSLY THROUGH HANGERS.
6. WORKMANSHIP: INSULATE CONTINUOUSLY THROUGH WALL & CEILING OPENINGS & SLEEVES, EXCEPT AT FIRE-RATED PENETRATIONS. REPLACE INSULATION DAMAGED BY MOISTURE, ABUSE, OR OTHER MEANS. PERFORM ALL REQUIRED PRESSURE TESTS PRIOR TO INSULATING SYSTEMS.
7. ACCEPTABLE MANUFACTURERS: CERTAINTEED, KNAUF, OWENS-CORNING, SCHULLER.
8. SUBMITTALS: PRODUCT DATA FOR ALL INSULATION MATERIALS, SHIELDS, SEALANTS, & FINISH.

SECTION 220716 PLUMBING LOW TEMPERATURE PIPING INSULATION

1. MATERIALS: FOR DOMESTIC COLD WATER PIPING IN EXTERIOR WALLS OR BELOW A ROOF, F&I PREMOLDED 4 PCF DENSITY FIBERGLASS PIPE INSULATION W/ ASJ & SELF-SEALING LAPS. FOR HORIZONTAL ROOF DRAIN PIPING, F&I 0.75 PCF DENSITY FOIL-SCRIM-KRAFT FACED WRAP.
2. THICKNESS:
   a. DOMESTIC COLD WATER: 1 IN.
   b. ROOF DRAINS: ½ IN.
3. SEALANT & FINISH: F&I BENJAMIN FOSTER 95-44 AT VALVE COVERS; 30-35 W/ GLASS FABRIC REINFORCEMENT FOR VALVES & FITTINGS OR USE PVC FITTING COVERS. F&I TWO COATS OF ARMASTRONG FINISH ON ARMAFLEX INSULATION.

SECTION 220722 PLUMBING HIGH TEMPERATURE PIPING INSULATION

1. MATERIALS: FOR DOMESTIC HOT WATER PIPING, F&I PREMOLDED 4 PCF DENSITY FIBERGLASS PIPE INSULATION W/ ASJ & SELF-SEALING LAPS.
2. THICKNESS:
   a. DOMESTIC HOT WATER: 1 IN.
3. SEALANT & FINISH: F&I JOHNS-MANVILLE 460 & BENJAMIN FOSTER 30-35 W/ GLASS FABRIC REINFORCEMENT ON INSULATED FITTINGS, FLANGES, & VALVES.

SECTION 221116 DOMESTIC WATER PIPING

1. COPPER PIPE: SEAMLESS TYPE L, ASTM B-88 OR CDA ALLOY 194; WROUGHT COPPER FITTINGS, ANSI B-16.22; AND SILVER SOLDERED CONNECTIONS.
2. ESCUTCHEONS: CUT OPENINGS MIN. REQUIRED TO PASS THE PIPE. POLISHED CHROME-PLATED CAST BRASS FLOOR, WALL, & CEILING PLATES, LARGE ENOUGH TO FULLY COVER THE OPENING, AROUND PIPES AT ALL PENETRATIONS EXCEPT THOSE IN CHASES OR ABOVE FINISHED CEILINGS. PLATES MUST COVER OPENING IN MILLWORK.
3. WORKMANSHIP: ROUTE ALL PIPING IN A WORKMANLIKE MANNER, ALLOWING MAXIMUM HEADROOM, PROPER ACCESS, & CLEARANCES AT EQUIPMENT; INSTALL PARALLEL TO BUILDING WALLS, AS CLOSE TO CEILINGS, WALLS, & COLUMNS AS IS REASONABLE. USE LONGEST AVAILABLE COMMERCIAL STANDARD LENGTHS OF PIPING TO MINIMIZE JOINTS. GRADE PIPING FOR PROPER DRAINAGE.
4. DISSIMILAR METALS: DIELECTRIC UNIONS OR FLANGES AT JOINTS BETWEEN COPPER & STEEL PIPES.
5. ALLOWANCE FOR EXPANSION: EXPANSION LOOPS & ANCHORS AS REQUIRED TO ACCOMMODATE EXPANSION & CONTRACTION.
6. SUPPORTS: GALVANIZED ALL-THREAD ROD & APPROVED, CLEVIS-TYPE, SPLIT-RING OR TRAPEZE-TYPE HANGERS SUPPORTED FROM THE STRUCTURE. GROUP PIPE WHERE POSSIBLE ON TRAPEZE HANGERS. USE COPPER HANGERS W/ COPPER PIPE. SUPPORT VERTICAL RISERS W/ STEEL STRAP PIPE CLAMPS. DESIGN HANGERS TO FIT OUTSIDE OF PIPE INSULATION; F&I GALVANIZED SHEET METAL SHIELDS. DO NOT USE PERFORATED PIPE HANGERS, STRAPS, WIRES, OR CHAINS. DO NOT SUPPORT PIPE FROM OTHER PIPE, EQUIPMENT, OR CONDUITS.
7. SLEEVES: SCHEDULE 40 GALVANIZED PIPE SLEEVES FOR ALL WALL & FLOOR PENETRATIONS, SIZED FOR MINIMUM CLEARANCE, CUT FLUSH W/ SURFACES, & CAULKED WATER & AIR TIGHT. CUT FLOOR SLEEVES TWO INCHES ABOVE FINISHED FLOOR LEVEL. USE 3M FIRE BARRIER 2000 SERIES TO SEAL ALL PENETRATIONS OF FLOORS & FIRE-RATED WALLS.
8. CLEANING: CLEAN ALL PIPING SYSTEMS DURING & AT COMPLETION OF WORK.
9. MARKING: BRADY PIPE MARKERS, SYSTEM 2, FOR INDOOR SYSTEMS. CONFORM TO ANSI STANDARDS.
10. SUBMITTALS: PRODUCT DATA FOR ALL PIPING MATERIALS & MARKERS..
11. TESTING: HYDROSTATICALLY AT 1.5 TIMES OPERATING PRESSURE, MINIMUM. 150 PSIG. REPAIR ALL LEAKS & RETEST UNTIL SYSTEM HOLDS FOR AT LEAST 24 HOURS.
12. STERILIZATION: W/ CHLORINATING SOLUTION FOR AT LEAST 8 HOURS. FLUSH W/ CLEAN WATER UNTIL RESIDUAL CHLORINE CONCENTRATION IS LESS THAN 0.2 PPM.

SECTION 221119 DOMESTIC WATER PIPING SPECIALTIES

1. WATER HAMMER ARRESTORS: J.R. SMITH HYDROTROL 5000 SERIES, PRECISION PLUMBING PRODUCTS PISTON TYPE WATER HAMMER ARRESTORS, OR EQUIVALENT.
2. WATER HAMMER ARRESTOR LOCATIONS: SIZE & QUANTITY AS REQUIRED & RECOMMENDED BY BOTH PLUMBING & DRAINAGE INSTITUTE STANDARD PDI-WH-201 & MANUFACTURER'S SIZING & PLACEMENT RECOMMENDATION DATA SHEETS.
3. ACCESS DOORS: WHEREVER REQUIRED FOR ACCESS TO ARRESTORS.
4. SUBMITTALS: PRODUCT DATA.

SECTION 221120 PIPING AND PIPING APPURTENANCES FOR COLD WATER MAKE-UP AND EQUIPMENT DRAINS

1. PIPE: SCHEDULE 40 GALVANIZED STEEL PIPE & FITTINGS, OR SEAMLESS TYPE L COPPER.
2. TRAPS: FOR AIR HANDLING UNIT CONDENSATE DRAINS, F&I A TRAP DEEP ENOUGH TO OVERCOME STATIC PRESSURE OF THE UNIT.
3. AIR GAP FITTINGS: F&I FOR ALL OPEN-SITE DRAINS AT FLOOR OR HUB DRAIN.
4. BACKFLOW PREVENTERS: WATTS 008-QT FOR BACK-SIPHONAGE PROTECTION; WATTS 009-QT FOR BACKPRESSURE AND BACK-SIPHONAGE PROTECTION.

SECTION 221316 SANITARY WASTE AND VENT PIPING - CAST IRON

1. WASTE: ASTM A-74 & CISPI HS 74 78. COATED, STANDARD WEIGHT, CAST IRON, DWV, BELL & SPIGOT SOIL PIPE. NO-HUB TYPE ACCEPTABLE, MEETING CISPI 301 & 310. W/ SIZE, WEIGHT PER FOOT, & MAKER'S NAME CLEARLY CAST OR STAMPED ON EACH LENGTH. MANUFACTURED BY MEMBER OF CAST IRON SOIL PIPE INSTITUTE.
2. VENT: ASTM B-306, ANSI H 23.6, COPPER DRAINAGE TUBE & FITTINGS FOR PIPING SMALLER THAN 2 IN. SAME AS SOIL & WASTE FOR 2 IN. & LARGER.
3. SLOPE: 1/4 IN. PER FOOT.
4. TESTING: HYDROSTATIC TEST BY MAINTAINING NOT LESS THAN 5 FEET OF HEAD TO ANY PORTION OF SYSTEM. REPAIR ALL LEAKS & RETEST UNTIL SYSTEM HOLDS FOR 6 HOURS W/OUT DROP IN WATER LEVEL.
5. EXISTING: WRAP ANY EXISTING PVC PIPING ABOVE CEILING W/ DUCT INSULATION & SEAL TO PROVIDE REQUIRED FLAME/SMOKE SPREAD RATING, IF CEILING PLENUM IS USED FOR RETURN AIR.

SECTION 221319 DOMESTIC WASTE PIPING SPECIALTIES

1. CLEANOUTS: FOR FINISHED FLOORS, J.R. SMITH 4053-F-C-U-NB; SQUARE TOP, HEAVY DUTY, SATIN FINISHED NICKEL BRONZE, ADJUSTABLE. FOR FINISHED WALLS, J.R. SMITH 4532-U-Y; CAST IRON CLEANOUT TEE, COUNTERSUNK TAPER THREAD BRONZE PLUG, ROUND SS ACCESS COVER, VANDAL RESISTANT SCREW.
2. CLEANOUT LOCATIONS:
   a. ON EACH HORIZONTAL DRAIN LINE 5 FEET OR GREATER IN LENGTH.
   b. NO MORE THAN 50 FEET APART.
   c. AT CHANGES IN DIRECTION OF 90 DEGREES OR MORE (LINE SIZE).
   d. AT END OF EACH CONTINUOUS WASTE LINE.
   e. AT END OF EACH BATTERY OF FIXTURES.
   f. AT EACH SINK & URINAL.
   g. AT BASE OF EACH SOIL/WASTE STACK.
   h. WHEREVER ELSE REQUIRED FOR SERVICEABILITY OR BY CODE.
3. ACCESS DOORS: WHEREVER REQUIRED FOR ACCESS TO CLEANOUTS & ARRESTORS.
4. SUBMITTALS: PRODUCT DATA.

SECTION 221500 GENERAL SERVICE COMPRESSED AIR SYSTEMS

1. PIPE: SCHEDULE 40 BLACK STEEL; GALVANIZED FROM COMPRESSOR DISCHARGE TO 2 FT. DOWNSTREAM OF REFRIGERATED DRYER, AND FOR EXTERIOR PIPING.
2. TESTING: APPLY AIR PRESSURE AT 1.5 TIMES OPERATING PRESSURE, 150 PSIG MINIMUM, TEST ALL JOINTS W/ SOAP SOLUTION; RETEST UNTIL ALL LEAKS ARE REPAIRED.

SECTION 224200 COMMERCIAL PLUMBING FIXTURES

1. QUALITY STANDARDS:
   a. FREE FROM IMPERFECTIONS, TRUE AS TO LINE, ANGLES, CURVES & COLOR, SMOOTH, WATERTIGHT, COMPLETE IN EVERY RESPECT.
   b. FITTINGS, ESCUTCHEONS, FAUCETS, TRAPS, EXPOSED PIPING, ETC., THAT ARE BRASS, CHROME PLATED OVER NICKEL PLATE W/ POLISHED FINISH.
   c. ALL HANGERS, SUPPORTS, BRACKETS, ETC., FOR PROPER INSTALLATION OF FIXTURES.
   d. FIXTURES & TRIM COMPLYING W/ FEDERAL, STATE & LOCAL HANDICAP REQUIREMENTS.
   e. FIXTURES & TRIM THAT MEET ALL APPLICABLE WATER CONSUMPTION STANDARDS & APPROVED BY THE STATE.
2. PLUMBING FIXTURES: SEE FIXTURE SCHEDULE ON DRAWINGS.
3. MOUNTING HEIGHTS: REFER TO ARCHITECTURAL DRAWINGS.
4. INSULATION: INSULATE ALL HOT WATER SUPPLIES, STOPS, & P-TRAPS UNDER LAVATORIES UON.
5. CARRIERS: FOR ALL WALL-MOUNTED FIXTURES.
6. ACCEPTABLE MANUFACTURERS:
   a. FIXTURES: AMERICAN-STANDARD, ELJER, KOHLER.
   b. TRIM: AMERICAN-STANDARD, CHICAGO FAUCET, ELJER, ELKAY, KOHLER, MCGUIRE, SPEAKMAN, SYMMONS, T&S BRASS, WATERSAVER.
   c. SEATS: BEMIS, BENEKE, CHURCH, SPERZEL.
   d. MOP SINKS: AMERICAN-STANDARD, STERN-WILLIAMS, ZURN.
   e. ELECTRIC DRINKING FOUNTAINS: ELKAY, HALSEY TAYLOR, HAWS.
   f. STAINLESS STEEL SINKS: ELKAY, JUST.
   g. FLUSH VALVES: SLOAN, ZURN.
   h. CARRIERS: JAY R. SMITH, WADE, ZURN.
7. SUBMITTALS: PRODUCT DATA.

MEP ENGINEERING, INC.
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(210) 349-1400
1120 Capital of Texas Hwy, South
Building 1, Suite 150
Austin, TX 78746
(512) 306-9650

PRESSURE ZONE XXX

DEVELOPER'S NAME: SAN ANTONIO WATER SYSTEM (SAWS)	
ADDRESS: 2800 U.S. HIGHWAY 281 NORTH	
CITY: SAN ANTONIO	STATE: TEXAS ZIP: 78212
PHONE: (210) 704–7297	FAX: (210) XXX–XXXX
SAWS BLOCK MAP#: 064614 TOTAL EDU'S: XXX	TOTAL ACREAGE: XXX.XX AC
TOTAL LINEAR FOOTAGE OF PIPE:	PLAT NUMBER:
NUMBER OF LOTS:	SAWS JOB NO.: XX–XXXX

DESIGNED BY:	JTP
DRAWN BY:	LET
DATE:	07/06/2020
JOB NO.:	E0584608

CEC
CIVIL ENGINEERING CONSULTANTS
d b a. D O N D U R D E N, I N C.
1 1 5 5 0 I H 1 0 W E S T, S U I T E 3 9 5
SAN ANTONIO, TEXAS 78230-1037
TEL: (210) 641-9999
FAX: (210) 641-6440
REGISTRATION #F-2214 / #10041000

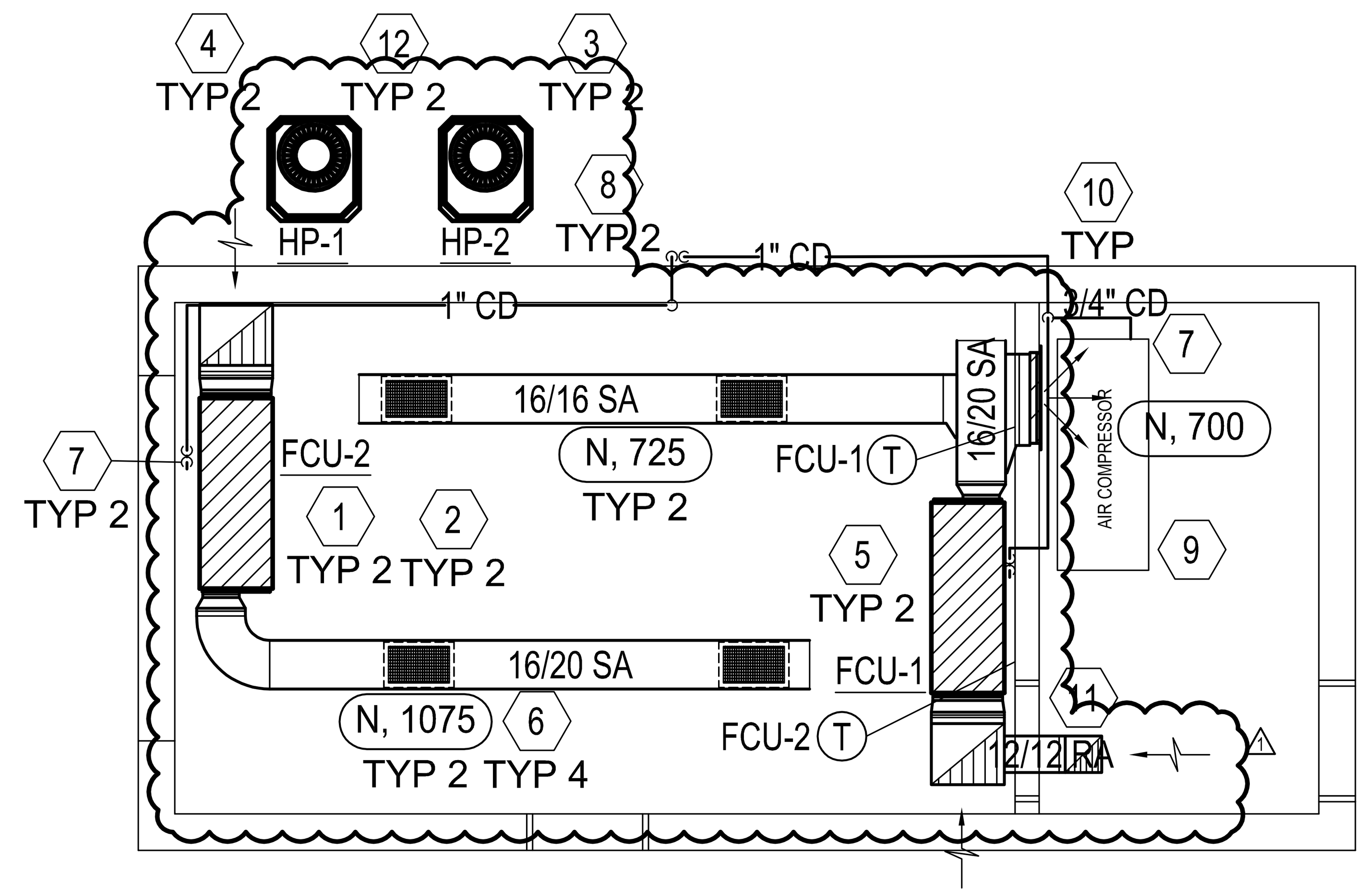
STATE OF TEXAS
JOSHUA T. PETERSON
110191
LICENSED PROFESSIONAL ENGINEER
02-24-21

REV	DATE	DESCRIPTION
1	02/24/2021	ADDENDUM #2

SPECIFICATIONS - MECHANICAL
WATERWHEEL SUBD.
WATER BOOSTER SYSTEM

SHEET NO.
M0.1

Date: Feb 23, 2021, 1:14pm User ID: jcartwright File: P:\37005 SAWS Waterwheel Pump Station\1 Dwgs\M0 SPEC – MECH.dwg



1 FLOOR PLAN - HVAC
SCALE: NONE

KEYED NOTES - HVAC

1. RE: 3/M6.1 FOR FAN COIL UNIT DETAIL.
2. RE: 1-2/M6.1 FOR CONDENSATE DRAIN DETAIL.
3. RE: 4/M6.1 FOR REFRIGERANT PIPING DETAIL.
4. RE: 5/M6.1 FOR REFRIGERANT PIPING AND CONDUIT SUPPORT DETAIL.
5. RE: 6/M6.1 FOR SENSOR LOCATION DETAIL. PROVIDE CLEAR LOCKING COVER FOR THERMOSTAT.
6. RE: 7/M6.1 FOR SIDEWALL REGISTER FOR EXPOSED DUCT.
7. ROUTE FULL SIZE CONDENSATE DRAIN AND MAKE FINAL CONNECTION TO EQUIPMENT.
8. MAINTAIN REQUIRED AIR GAP TO HUB DRAIN; REFER TO CIVIL DRAWINGS FOR EXACT LOCATION AND CONTINUATION.
9. AIR COMPRESSOR PROVIDE BY OTHERS.
10. RE: 8/M6.1 FOR PIPE THRU WALL PENETRATION DETAIL.
11. RE: 8/M6.1 FOR DUCT THRU WALL PENETRATION DETAIL.
12. PROVIDE 3-1/2" CONCRETE HOUSEKEEPING PAD.

GENERAL NOTES - HVAC

1. REFER TO THE LEGEND SHEET FOR LEGEND, ABBREVIATIONS, & GENERAL MECHANICAL NOTES. REFER TO SPECIFICATIONS.
2. HEAVY LINES INDICATE NEW WORK; LIGHT LINES INDICATE APPROXIMATE EXISTING CONDITIONS. FIELD VERIFY PRIOR TO BIDDING.
3. MAKE DUCT TAPS, RUNOUTS, & FLEX DUCT CONNECTIONS TO AIR DEVICES SAME SIZE AS DUCT CONNECTION SIZE INDICATED ON DIFFUSER & GRILLE SCHEDULE UNLESS OTHERWISE INDICATED.
4. ALL DUCT DIMENSIONS INDICATED ARE CLEAR INSIDE DIMENSIONS. CONSTRUCT ALL DUCTWORK DOWNSTREAM OF TERMINAL UNITS TO SMACNA 2" PRESSURE CLASSIFICATION, AND ALL UPSTREAM OF TERMINAL UNITS TO SMACNA 6" PRESSURE CLASSIFICATION UNLESS OTHERWISE INDICATED. SEAL ALL DUCTWORK TO SMACNA TYPE A SEAL CLASS UNLESS OTHERWISE INDICATED.
5. USE GALVANIZED STEEL FOR ALL DUCTWORK, WITH FIBERGLASS BLANKET WRAP INSULATION UNLESS OTHERWISE INDICATED. RE: SPECIFICATIONS FOR THICKNESS AND DENSITY REQUIREMENTS. DO NOT INSULATE EXHAUST OR OUTSIDE AIR DUCTWORK UNLESS OTHERWISE INDICATED.
6. USE FLEX DUCT INSULATED TO A MINIMUM OF R-6; CODY 184, ATCO UPC #036 OR EQUIVALENT. INSTALL IN LENGTHS NOT EXCEEDING 6 FT.
7. COORDINATE EXACT LOCATION OF AIR DEVICES WITH ARCHITECT PRIOR TO INSTALLATION. SHIFT AIR DEVICES AS REQUIRED TO FIT WITHIN ROOMS. MODIFY DUCTWORK ARRANGEMENT AS REQUIRED TO LOCATE DIFFUSERS.
8. COORDINATE LOCATION OF WALL-MOUNTED CONTROLS WITH ARCHITECT PRIOR TO ROUGH-IN.
9. MOUNT WALL SENSORS 46" AFF, 8" TO ONE SIDE OF LIGHT SWITCHES WHERE BOTH OCCUR IN THE SAME LOCATION, UNLESS OTHERWISE INDICATED.
10. DO NOT RUN AIR HANDLERS OR FANS UNTIL ALL INTERIOR CLEANING & PAINTING IS COMPLETE. CLEAN OR REPLACE ANY EQUIPMENT, DUCTWORK, ETC., WHICH IS FOULED DUE TO PAINT OR CONSTRUCTION DEBRIS.
11. WHERE WORK IS ADJACENT TO OCCUPIED SPACE, KEEP CONSTRUCTION AREA AT A NEGATIVE PRESSURE RELATIVE TO SUCH SPACES, & FILTER DISCHARGE AIR AS REQUIRED TO CONTAIN DUST.
12. COORDINATE ALL WORK SCHEDULING WITH ARCHITECT PRIOR TO BIDDING TO DETERMINE THE EXTENT OF AFTER-HOURS WORK REQUIRED, & INCLUDE SUCH AFTER-HOURS WORK.

DIFFUSER & GRILLE SCHEDULE

MARK	CFM RANGE	SUPPLY	RETURN	EXHAUST	TYPE	DUCT CONN. SIZE	PATTERN	REMARKS
M	151 - 450	●			SIDEWALL	12 X 6	2-WAY	TITUS 300FS W/ OBD
N	300 - 1800	●			SIDEWALL	30 X 12	2-WAY	TITUS 300FS W/ OBD

NOTES:
1. ALL AIR FLOWS ARE LISTED IN CFM; ALL SIZES IN INCHES.
2. PATTERN IS TWO-WAY UNLESS OTHERWISE INDICATED ON DRAWINGS.
3. FURNISH DEVICES WITH A FRAME COMPATIBLE WITH THE CEILING OR WALL IN WHICH THE DEVICE IS MOUNTED. (APPLIES TO ALL AIR DEVICES)
4. EQUIVALENT MODELS BY PRICE, KRUEGER OR METALAIRE MAY BE ACCEPTABLE PENDING SUBMITTAL

PLAN DESIGNATION:
(A,100) LETTER INDICATES AIR DEVICE MARK, NUMBER INDICATES DESIGN AIR FLOW.

AIR-COOLED HEAT PUMP UNIT SCHEDULE

MARK	MIN. CAP BTUH	MIN. EER@ARI	MIN. SEER @ ARI	HSPF	REFR.	ELECTRICAL VOLTS/PH	ELECTRICAL MCA	ELECTRICAL MOCP	COMPRESSOR QTY.	COMPRESSOR MAX. SUCT. TEMP. F	CONDENSER MAX. COND. TEMP. F	CONDENSER AMBIENT TEMP. F	REMARKS
HP-1	55,500	12.5	15.0	8.5	R410A	460/3	11.0	15	1	50	125	105	TPA060HE-460, NOTE 1-9
HP-2	55,500	12.5	15.0	8.5	R410A	460/3	11.0	15	1	50	125	105	TPA060HE-460, NOTE 1-9

NOTES:
1. LENNOX IS BASIS OF DESIGN. RE: SPECIFICATIONS FOR OTHER ACCEPTABLE MANUFACTURERS.
2. RATE UNIT W/ MATCHING INDOOR UNIT.
3. FURNISH 5-YEAR COMPRESSOR WARRANTY.
4. FURNISH W/ VIBRATION ISOLATION AS SPECIFIED.
5. FURNISH W/ CRANKCASE HEATER, FILTER-DRIER, & SUCTION LINE ACCUMULATOR.
6. FURNISH W/ SERVICE VALVES.
7. FURNISH W/ HAIL GUARD.
8. FURNISH W/ LOW AMBIENT KIT.

FAN COIL UNIT SCHEDULE

MARK	SERVING	CONFIGURATION	TOTAL AIR CFM	OA CFM	EXT. SP. IN. H_2O	DRIVE TYPE	MOTOR HP	VOLTS/PH	COOLING COIL (DX) EDB °F	EWB °F	LDB °F	LWB °F	MIN. GSH BTUH	MIN. GLH BTUH	MIN. GTH BTUH	MIN. # ROWS	MIN. FACE AREA SF	REMARKS
FCU-1	MCC ROOM	HORIZ. DRAW-THRU	2,150	0	0.5	DIRECT	1	208/1	75.00	62.45	53.40	52.90	49,443	9,505	58,948	3	8.3	CBA27UHE-060, NOTE 1-4
FCU-2	MCC ROOM	HORIZ. DRAW-THRU	2,150	0	0.5	DIRECT	1	208/1	75.00	62.45	53.40	52.90	49,443	9,505	58,948	3	8.3	CBA27UHE-060, NOTE 1-4

NOTES:
1. LENNOX IS BASIS OF DESIGN. RE: SPECIFICATIONS FOR OTHER ACCEPTABLE MANUFACTURERS. RATE UNIT W/ CORRESPONDING OUTDOOR UNIT.
2. FURNISH WITH SINGLE POINT POWER.
3. FURNISH WITH CEILING MOUNT ISOLATORS & SECONDARY DRAIN PAN W/ FLOAT SWITCH TO SHUTOFF UNIT UPON ACTIVATION.
4. FURNISH WITH 2 IN. PLEATED FILTERS, 30% EFFICIENCY, FARR 30/30 OR EQUIVALENT.

PRESSURE ZONE XXX

DEVELOPER'S NAME: SAN ANTONIO WATER SYSTEM (SAWS)	
ADDRESS: 2800 U.S. HIGHWAY 281 NORTH	
CITY: SAN ANTONIO	STATE: TEXAS ZIP: 78212
PHONE: (210) 704-7297	FAX: (210) XXX-XXXX
SAWS BLOCK MAP#: 064614 TOTAL EDU'S: XXX	TOTAL ACREAGE: XXX.XX AC
TOTAL LINEAR FOOTAGE OF PIPE:	PLAT NUMBER:
NUMBER OF LOTS:	SAWS JOB NO.: XX-XXXX

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REGISTRATION #F-2214 / #10041000

STATE OF TEXAS
JOSHUA T. PETERSON
110191
LICENSED PROFESSIONAL ENGINEER
02-24-21

DESIGNED BY:	JTP
DRAWN BY:	LET
DATE:	07/06/2020
JOB NO.:	E0584608

REV	DATE	DESCRIPTION
1	02/24/2021	ADDENDUM #2

FLOOR PLAN - HVAC
WATERWHEEL SUBD.
WATER BOOSTER SYSTEM

SHEET NO.
M2.1

SUPPLEMENTARY INSTRUCTIONS TO RESPONDENTS

The San Antonio Water System (SAWS) Board of Trustees and/or its designated representative have determined that the Competitive Sealed Proposals method of procurement will provide the best value for SAWS for this project. This procurement shall conform to Section 2269 of the Texas Government Code.

This document provides general information about the requirements and evaluation for this Request for Competitive Sealed Proposals (RFCSP).

A. EVALUATION OF PROPOSALS

1. SAWS will conduct a comprehensive, fair and impartial evaluation of all Competitive Sealed Proposals received in response to this request within 45 days of receipt of the proposals. SAWS will appoint a selection committee to perform the evaluation. SAWS will evaluate and rank each proposal in relation to the following selection criteria:

Team Qualifications and Experience	**20%**
Quality, Reputation, and Ability to Deliver Projects on Schedule and within Budget	**20%**
Project Approach	**15%**
Price	**35%**
Small, Minority, and Women-owned Business Participation	**10%**
Total:	**100%**

2. During the evaluation and ranking of Respondents' proposals, SAWS reserves the right to consider the following:
   a. Whether the Respondent can perform the contract within the specified time. In making this determination SAWS may take into account Respondent's existing commitments and whether in SAWS' sole discretion those commitments will adversely impact Respondent's ability to complete the work in the scheduled time.
   b. The quality and punctuality of performance on any current or previous contacts.
   c. SAWS may contact references provided by the Respondent, as well as any other references to verify qualifications, experience and performance. In making this determination, SAWS may take into account work performed by the Respondent on any project, including but not limited to SAWS' projects, projects that the Respondent provides as references and any other projects that SAWS has knowledge of.
   d. Respondent's previous and existing compliance with the applicable laws, ordinances, permits, and regulations.
   e. Respondent's financial resources and ability to perform the contract.

3. If Respondent fails to provide a response to any of the Evaluation Criteria identified

within this RFCSP, points may be deducted or the proposal may be considered non-responsive and ineligible for consideration.

B. SUMMARY OF WORK

This Summary of Work is being provided to Respondents to better assist them in determining which projects are reasonably comparable to include as part of their proposal to this RFCSP. The work consists of the following:

a. Upgrade of infrastructure, including pumps, for an existing SAWS facility.
b. Careful planning and sequencing of construction activities to tie into existing facility infrastructure.

Respondents should reference the Contract Documents prior to submitting a proposal for this RFCSP to fully understand the entire scope of work for this Project.

The decision of "comparability" when evaluating the Respondent's proposal is at the complete discretion of SAWS.

C. REQUIRED EXPERIENCE

Respondents submitting a proposal for this RFCSP should demonstrate, completely and sufficiently, that wet utility installation, including pump sites are a primary business focus and service, and such services have been successfully provided for at least five (5) continuous years.

D. DEFINITIONS

1. Personnel for the purpose of this RFCSP is defined as employees of the Prime Contractor, or any subcontractor(s), affiliates, joint venture partners, or team members, and consultants engaged by any of those entities.

2. The personnel specified below are considered by SAWS to be essential to the work being performed under this Contract, and as such are defined as Key Personnel. Key Personnel include the Project Manager, Construction Manager, Quality Assurance and Quality Control Lead, Project Scheduler, and Project Superintendent. Key Personnel shall be dedicated exclusively to this Project and shall be assigned as full-time employees for the duration of the Project. Prior to diverting any of the specified individuals to other projects, the contractor shall notify the Owner reasonably in advance and shall submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on the project. No diversion shall be made by the contractor without the written consent of the Owner.

3. Subcontractor is defined in Article I, Contract Definitions of the General Conditions of the Contract Documents. Respondents should reference this definition prior to submitting a proposal in response to this Request for Competitive Sealed Proposals ("RFCSP").

4. Key Subcontractors are defined as subcontractors that are responsible for executing a significant portion of the work, and as such are deemed to be essential to the work being performed under this Contract. The Key Subcontractor roles could include installation of mechanical, electrical, and plumbing infrastructure.

E. RESPONSE FORMAT

1. Team Qualifications and Experience (20 Points)

a. Organizational Structure and Key Information of the Prime Contractor

i. Provide current business organizational structure, type of business structure, and stability of organization.
ii. Provide total number of employees and annual company revenues as of December 31, 2020.
iii. Provide Debarment history for the company for the last ten (10) years.
iv. Provide any litigation, arbitration, and claims history for the last three (3) years and any litigation, arbitration, and claims history with SAWS regardless of the year they occurred.
v. Indicate the number of years performing contracting/construction work under current legal business name and/or previous legal business name(s).
vi. Provide a clear description of the proposed team identifying Key Subcontractor(s), their role on the project, and teaming history. If the Prime Contractor has not worked previously with proposed Key Subcontractor(s), describe the proposed approach for ensuring successful completion of the project in accordance with Contract Documents.
vii. Provide a 1-page organizational chart that describes the composition of the team for this project. The chart shall include proposed Key Personnel for the Prime Contractor and Key Subcontractor(s). The chart shall also include percent availability (as percentage of total individual's workload) for Key Personnel (Prime and Key Subcontractor(s)) and their proposed role for the duration of the Project.
viii. Provide a clear description of the proposed team's Key Personnel roles and responsibilities, including Key Personnel from Key Subcontractor(s).

b. Qualifications and Experience of Key Personnel Proposed for this Project

i. On separate 8 ½" x 11" sheets, provide resumes, one per person and not to exceed one (1) page, for Key Personnel for the Prime Contractor and Key Subcontractor(s) identified on the organizational chart with the Project Manager's resume being first. Key Personnel resumes should include the following information:
   - Name, title, education
   - Number of years of total professional experience
   - Number of years/months with current firm
   - Number of years/months of experience in proposed role for this project

- Description of professional qualifications (to include degrees, licenses, certifications, and associations)
- Brief overview of professional experience
- Detailed description of capabilities and experience relevant to this Project
- List of all other active projects the team member is assigned to for the duration of the Project, to include the phase and percentage of time allocated to each of the other projects. For each project included in each resume, please clearly identify whether the project is with current firm or part of the person's past professional experience.

2. Quality, Reputation, and Ability to Deliver Projects on Schedule and within Budget (20 Points)

a. Prime Contractor On-time Completion on Similar Projects in the Past Ten (10) Years

i. List and describe five (5) completed projects within the last ten (10) years of similar size, scope, and complexity to the work described in the Contract Documents for this Project. Respondents should provide references with contact information to include a valid, recently verified email and telephone number for each project listed.

Each project should include the following information (using the evaluation forms provided):

- Project name.
- Utility/Owner name and contact information to include a valid, recently verified email and telephone number for Project Manager.
- List any Key Personnel also proposed on the Waterwheel Booster Station project and the roles served by the proposed Key Personnel on the past project.
- Project is within the last ten (10) years.
- Project has similar size, scope, and complexity to the work described in the Contract Documents.
- Project description and why it is comparable to the size, scope, and complexity for this item.
- Original (bid/price) and final construction in place costs.
- Total costs for all change orders, as well as explanation regarding the reason for specific change orders.
- Construction Contract Notice to Proceed (NTP) Date.
- Original Contract Duration (Specify Calendar Days or Working Days).
- Original Contract Completion Date and Actual Completion Date.
- Actual number of days beyond the original contract. If Contract time extensions were added, provide a short explanation of each.
- The recovery schedule/plan and implementation of such, if it was required. If a recovery schedule/plan was implemented, describe

whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.
- Describe any project specific challenges and how they were overcome.

ii. A minimum of two (2) of the five (5) projects listed must have been performed by the proposed Key Personnel (Project Manager, Construction Manager, Quality Assurance and Quality Control Lead, Project Scheduler, Project Superintendent, and Open Cut Superintendent for this Project.
- If Respondent has SAWS experience, at a minimum, one (1) SAWS project of similar size, scope, and complexity must be included in the list of five (5) projects provided, and

iii. The Respondent shall also list all current and recently completed pump site projects performed in the last five (5) years for all Utility Owners in the State of Texas. Respondent shall provide the following information for each project:
- Project name.
- Utility/Owner name.
- Date of Notice to Proceed.
- Project description and how it satisfies the pump site requirement for this section.
- Original Contract Time (Specify Calendar Days or Working Days).
- Original Contract Completion Date and Actual Completion Date. If project is not complete at the time of submission, Respondent shall provide the current % Complete based on contract time.
- Original (bid/price) and final construction in place costs. If project is not complete at the time of submission, Respondent shall provide the current % Complete based on contract value as of the most recent application for payment.
- Identify whether the project was completed on-time and within budget, as applicable.

b. Key Subcontractor(s) Performance on Similar Projects in the Past Ten (10) Years

The scope of this Project includes the construction of upgrades to an existing pump station, including mechanical, electrical, and plumbing infrastructure.

i. Provide a list of two (2) projects that the identified Key Subcontractors' Project Manager and/or Project Superintendent(s) participated in that were of similar size, scope, and complexity to the work described in the Contract Documents that have been completed within the last ten (10) years. Describe the role served by the proposed staff on those projects.

ii. If Prime Contractor is planning to self-perform the Work in accordance with the Contract Documents and no Key Subcontractor(s) have been identified in the Response, Respondent shall provide a list of two (2) additional projects that were of similar scope to the Work that would have been performed by a Key Subcontractor and that have been completed within the last ten (10) years. Prime Contractor's Key Personnel shall have participated in at least one (1) of

the two (2) projects listed. Describe the role served by the proposed staff on those projects.

Each project should include the following information:

- Project name.
- Identify if the Project was performed by **Sub-Contractor** or if Prime Contractor **Self-Performed**
- Utility/Owner name and contact information to include a valid, recently verified email and telephone number for Utility/Owner Project Manager.
- List any Key Personnel also proposed on the Waterwheel Booster Station project and the roles served by the proposed Key Personnel on the past project.
- Key Sub-Contractor's Project team(s) involved in this Project were identified on the organizational chart.
- Project is within the last ten (10) years.
- Project has similar size, scope, and complexity to the work described in the Contract Documents.
- Project description and why it is comparable to the size, scope, and complexity for this item.
- Original (bid/price) and final construction in place costs.
- Total costs for all change orders, as well as explanation regarding the reason for specific change orders.
- Construction Contract Notice to Proceed (NTP) Date.
- Original Contract Duration (Specify Calendar Days or Working Days).
- Original Contract Completion Date and Actual Completion Date.
- Actual number of days beyond the original contract. If Contract time extensions were added, provide a short explanation of each.
- The recovery schedule/plan and implementation of such, if it was required. If a recovery schedule/plan was implemented, describe whether the project was successfully brought back on schedule. Please discuss, as necessary and deemed appropriate.
- Describe any project specific challenges and how they were overcome.

If valid contact information is not provided, the project may not be considered and the Respondent's score for this criteria may be reduced and/or Respondent's proposal may be deemed non-responsive.

3. Project Approach including Delivery Schedule (15 Points)

a. Project Approach

i. Provide a narrative of the project approach describing how the Respondent will complete this project. Include key milestones, specific critical processes and critical path items, phases and/or sequencing, permits, approvals, coordination with stakeholders, and procurements anticipated to complete the

project work. Identify potential risks and describe proposed mitigation measures to ensure on-time completion of the Project.

ii. Describe availability of equipment and facilities that will be specifically utilized for this Project.

iii. Explain how Respondent will contact and coordinate with key stakeholders throughout the Project. Describe how the Respondent will coordinate with property owners and business owners being impacted by the Project. Describe the Respondent's approach for securing permits (e.g., ROW, SWPPP, etc.) and/or complying with permit requirements for which SAWS is the permit holder (TXDOT including traffic control, COSA Tree Permit, COSA Floodplain, USACE, etc.).

iv. Provide any innovative ideas for cost savings (due to method or duration) for this project.

v. Provide a quality management plan describing how the Prime Contractor will ensure that the necessary steps, safeguards, subcontractor oversight, Quality Assurance/Quality Control processes, and document controls will be implemented in a rigorous manner as to ensure the completeness, workmanship, accuracy, and successful completion of the Project.

b. Project Schedule, Procurement of Long-Lead Items, and Unforeseen Conditions

i. Provide a detailed, precedence style critical path method (CPM) baseline schedule in Primavera or Microsoft Project. The baseline scheduled must encompass the entire contract duration from Notice to Proceed to the Contract End Date. The baseline schedule must show a completion date (or early completion date) that corresponds to the Contract End Date. The baseline schedule must be inclusive of all work necessary to complete the project including sufficient time necessary for submission and review of submittals, permits, etc. The schedule shall take into consideration sequencing and contractual limitations as described within the Contract Documents. The anticipated notice to proceed (NTP) for this Project is February 8, 2021. Respondent shall use this date for developing the proposed project schedule.

ii. Provide a description of the project approach for procuring long-lead items, as well as for ensuring critical path items will be addressed adequately.

iii. List and describe any instances in which the Contractor has encountered unforeseen conditions.

- Identify whether a recovery plan was required.
- Describe the nature of the issue and whether it was promptly resolved or resulted in the Respondent being asked to demobilize.

iv. Describe the Respondent's approach towards mitigating and managing unforeseen conditions should they be encountered during the construction of this Project.

4. Safety Information for Prime Contractor and Key Subcontractor(s)

i. Provide records showing Total Recordable Incident Rate (TRIR) for each year for the past five (5) years for the Prime Contractor and Key Subcontractor(s).

ii. Provide records showing the company's Experience Modification Rate (EMR) for the past three years for the Prime Contractor and Key Subcontractor(s).
iii. List any fatalities in the company's safety history for the Prime Contractor and Key Subcontractor(s).

5. Price Proposal (35 Points)

The Proposal with the lowest total price will receive thirty-five (35) points. Proposals will receive a percentage of the thirty-five (35) points based on a comparison with the lowest total price proposal as described below.

Computation Steps:

i. Step 1. Determine lowest total price and award 35 points for price.
ii. Step 2. Calculate the ratio between the lowest total price and each proposal. Multiply the ratio by 35 to obtain the points earned.

Proposal	Price	Calculation	Points Earned
A	$22,995,000	(12,875,000/22,995,000) x 35	19.60
B	$19,875,000	(12,875,000/19,875,000) x 35	22.67
C	$16,625,000	(12,875,000/16,625,000) x 35	27.11
D	$12,875,000	(12,875,000/12,875,000) x 35	35.00
E	$15,250,000	(12,875,000/15,250,000) x 35	29.55

6. Small, Minority, Woman, and Veteran-Owned Business Participation

a. Equal Employment Opportunity Requirements - SAWS highly encourages Respondents to implement Affirmative Action practices in their employment programs. This means Respondents should not discriminate against any employee or applicant for employment because of race, color, religion, sex, pregnancy, sexual orientation, national origin, political belief or affiliation, age, disability or genetic information.

The SAWS Board of Trustees has adopted a Small, Minority, Woman, and Veteran-owned Business (SMWVB) Policy to establish and oversee a program that will support the inclusion of local small, minority, woman, and veteran-owned businesses (SMWVB). It is the policy of SAWS that it will ensure that local small, minority, woman, and veteran-owned businesses have an equal opportunity to compete for, receive and participate in SAWS contracts. It is our policy to:

- Ensure nondiscrimination in the award and administration of SAWS contracts;

- Create a level playing field on which SMWBs can compete fairly for SAWS contracts;

• Ensure that only firms that attempt to meet small, minority, and woman-owned business good faith efforts are considered for contract awards.

Respondent's commitment to SAWS SMWB policy will be based on meeting or exceeding the minimum aspirational SMWB goal of 20%. The minimum goal is based on the total contract value. Points will be awarded based on the following tiered scales.

Please note that as of 1/1/2017, an updated SMWVB Policy and scoring methodology are being implemented by San Antonio Water System. Veteran-owned Business Enterprises (VBEs), are tracked for statistical purposes, but are not eligible for points. **The maximum number of Small, Minority, and Woman-owned Business (SMWB) points to be earned is 10 points.** Self-performance and subconsulting may be used to achieve the aspirational goals and earn points. **SMWB Respondents and/or subconsultants must be certified by the South Central Texas Regional Certification Agency**. **Eligible firms (including MBEs and WBEs) must also be certified as a Small Business Enterprise (SBE), must perform a commercially-useful function on the project, and must have a local presence in the San Antonio Metropolitan Statistical Area in order to be counted for SMWB points**. Please see the Good Faith Effort Plan for definitions of terms. All Respondents, whether SMWB or not, may earn the **maximum number of SMWB points (10)** by adhering to any combination of the following point structures when attempting to meet the aspirational goals:

A. M/WBE Scoring Method: Up to 10 Points (By percentage). **20.00% M/WBE Goal:**
• MBE Participation Percentage between 1% and 4.99%: 1 Point
• MBE Participation Percentage between 5% and 9.99%: 2 Points
• MBE Participation Percentage between 10% and 14.99%: 4 Points
• MBE Participation Percentage between 15% and 16.99%: 5 Points
• MBE Participation Percentage between 17% and 19.99%: 8 Points
• MBE Participation Percentage meeting or exceeding 20.00%: 10 Points
B. SBE (Non-M/WBE) Scoring Method (for participation of firms whose sole certification is "SBE"): Up to 5 Points (By percentage). **5% SBE Participation:**
• SBE Participation Percentage between 1% and 1.99%: 1 Point
• SBE Participation Percentage between 2% and 2.99%: 2 Points
• SBE Participation Percentage between 3% and 3.99%: 3 Points
• SBE Participation Percentage between 4% and 4.99%: 4 Points
• SBE Participation Percentage meeting or exceeding 5.00%: 5 Points

C. **Optional:** Prior subcontractors/supplier utilization compliance averages for the past 2 years may be considered when totaling the SMWB score, based upon data from the Subcontractor Payment & Utilization Reporting (SPUR) System. This applies to SMWB and Non-SMWB Prime Contractors' utilization of their SMWB subcontractors/suppliers. Up to 3 points may be deducted from the SMWB score for discrepancies between the pledged SMWB goal, and the current/ongoing actual utilization of SMWB subcontractors/suppliers on recent SAWS projects. This option does not apply to work order/unspecified contracts.
• Total SMWB Subconsultant compliance discrepancy between 3% - 4%: Deduct 1 Point
• Total SMWB Subconsultant compliance discrepancy between 4% - 5%: Deduct 2 Points
• Total SMWB Subconsultant compliance discrepancy greater than 5%: Deduct 3 Points

b. All firms submitted as SMWVB must provide a copy of their certification certificate.

c. The SMWB goal is expressed as a percentage of the total dollar amount of the contract going to SMWBs for those areas which the Respondent has subcontracted or anticipates to subcontract, including any future change orders. The goal shall also apply to change orders that require work beyond the scope of services originally required to accomplish the project.

d. The Respondent agrees to employ good faith efforts to carry out this policy through award of subcontracts to SMWVBs to the fullest extent possible.

e. The SAWS Good Faith Effort Plan (GFEP) will be used for scoring purposes based upon SMWB participation. However, **all subcontractors and/or suppliers, whether SMWVB-certified or not, must be listed in the GFEP**, because the information provided in the GFEP will be utilized in the development of the final contract/agreement. The GFEP format is attached as Exhibit "B." This form is required and considered part of the response to the RFCSP. Should the Good Faith Effort Plan not be submitted, the proposal may be considered non-responsive.

f. The S.P.U.R. System is accessed through a link on SAWS' "Business Center" web page. The Respondent and all subcontractors will be provided a unique login credential and password to access the SAWS subcontractor payment reporting system. The link may be accessed through the following internet address: https://saws.smwbe.com/.

   Training on the use of the system will be provided by SAWS. After the Respondent receives payment from SAWS, electronic submittals will require data entry of the amount paid to each subcontractor listed on the Contractor's Good Faith Effort Plan.

g. Please contact the SMWVB program manager, Marisol V. Robles, at 210-233-3420

or marisol.robles@saws.org for any questions pertaining to the Good Faith Effort Plan or the SMWVB Program.

F. FORMAT OF PROPOSALS

1. Proposals shall be prepared simply and economically, providing a straightforward, concise description of the Respondent's ability to meet the requirements of this RFCSP. Emphasis shall be on the quality, completeness, clarity of content, responsiveness to the requirements, responsiveness to the evaluation criteria, and an understanding of SAWS needs.

2. Respondents shall utilize the fillable evaluation criteria forms provided by SAWS to prepare their response to the RFCSP and should reference the Required Documents Matrix, which identifies which documents are required and won't count toward the page limit. Proposals shall be a MAXIMUM OF TWENTY-FIVE (25) PRINTED PAGES, for those pages that do count towards the page limit. Respondents shall respond to each section fully, but are not obligated to use every page set by the limit and are allowed the flexibility to use this page limit as they see fit.

3. Proposals shall be submitted in three (3) pdf files electronically. Respondents should reference the revised Respondent's Proposal Checklist to ensure all required items are included.

4. Respondents shall carefully read the information contained in this RFCSP and submit a complete response to all requirements and questions as directed. Incomplete Proposals will be considered non-responsive and subject to rejection.

5. Proposals and any other information submitted by Respondents in response to this RFCSP shall become the property of SAWS.

6. Proposals shall be prepared using letter-size 8-1/2" x 11" pages. The project schedule and Team Organizational Chart can be prepared using tabloid-size 11" x 17" pages.

7. Respondents shall utilize the Respondent's Proposal Checklist provided in this RFCSP and must provide page numbers for all pages of the proposal.

8. Separate and identify each evaluation criteria response of this RFCSP by use of a divider sheet for ready reference in the order indicated within the Respondent's Proposal Checklist.

9. The pdf of the Respondent's Original proposal shall contain the entire proposal package as submitted, excluding the financial statement, Good Faith Effort Plan, and Price Proposal.

SECTION 09 90 00 - PAINTING AND PROTECTIVE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Exposed metal surfaces to be protective painted, whether specifically mentioned or not, except as shown or specified otherwise. Buried piping shall be coated or wrapped as required by the SAWS standard Specifications for the type of pipe. Refer to architectural plans for paint requirements for control building.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
   a. D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
   b. D 4541 - Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.
2. National Association of Pipe Fabricators (NAPF):
   a. 500-03 - Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings.
3. NSF International (NSF):
   a. 61 - Drinking Water System Components - Health Effects.
4. Society for Protective Coatings (SSPC):
   a. QP1, Standard Procedure for Evaluating Qualifications of Painting Contractors.
   b. QP2, Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint.
   c. SP COM - Surface Preparation Commentary for Steel and Concrete Substrates.
   d. SP-1 - Solvent Cleaning.
   e. SP-2 - Hand Tool Cleaning.
   f. SP-3 - Power Tool Cleaning.
   g. SP-5 - White Metal Blast Cleaning.
   h. SP-6 - Commercial Blast Cleaning.
   i. SP-7 – Brush-Off Blast Cleaning.
   j. SP 8, Pickling.
   k. SP-10 – Near-White Blast Cleaning.
   l. SP 11-T, Power Tool Cleaning to Bare Metal.
   m. SP 13, Surface Preparation of Concrete.
   n. Guide No. 3, PA, Guide to Safety in Painting Applications.
5. U.S. Environment Protection Agency (EPA):
   a. Method 24 - Surface Coatings.
6. NACE International (NACE):
   a. SP0178 - Design, Fabrication, and Surface Finish Practices for Tanks and Vessels to Be Lined for Immersion Service.
   b. SP0188-06 - Discontinuity (Holiday) Testing of Protective Coatings.
7. National Association of Pipe Fabricators (NAPF):
   a. 500-03 - Surface Preparation Standard for Ductile Iron Pipe and Fittings Receiving Special External Coatings and/or Special Internal Linings.
8. NSF International (NSF):
   a. 61 - Drinking Water System Components - Health Effects.

9. Society for Protective Coatings (SSPC):
    a. QP1, Standard Procedure for Evaluating Qualifications of Painting Contractors.
    b. QP2, Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint.
    c. SP COM - Surface Preparation Commentary for Steel and Concrete Substrates.
    d. SP-1 – Solvent Cleaning.
    e. SP-2 – Hand Tool Cleaning.
    f. SP-3 – Power Tool Cleaning.
    g. SP-5 – White Metal Blast Cleaning.
    h. SP-6 – Commercial Blast Cleaning.
    i. SP-7 – Brush-Off Blast Cleaning.
    j. SP 8 – Pickling.
    k. SP-10 – Near-White Blast Cleaning.
    l. SP 11-T – Power Tool Cleaning to Bare Metal.
    m. SP 13 – Surface Preparation of Concrete.
    n. Guide No. 3, PA, Guide to Safety in Painting Applications.
10. U.S. Environment Protection Agency (EPA):
    a. Method 24 – Surface Coatings.

1.3 DEFINITIONS

A. Terms used in this section:
1. Exposed surface: Any metal or concrete surface, indoors or outdoors that is exposed to view.
2. Dry film thickness (DFT): Thickness of fully cured coating, measured in mils.
3. Volatile organic compound (VOC): Content of air polluting hydrocarbons in uncured coating product measured in units of grams per liter or pounds per gallon, as determined by EPA Method 24.
4. Ferrous: Cast iron, ductile iron, wrought iron, and all steel alloys except stainless steel.
5. Where SSPC surface preparation standards are specified or implied for ductile iron pipe or fittings, the equivalent NAPF surface preparation standard shall be substituted for the SSPC standard.
6. Coverage: Total minimum dry film thickness in mils, or square feet per gallon.
7. MDFT: Minimum Dry Film Thickness.
8. MDFTPC: Minimum Dry Film Thickness per Coat.
9. Mil: Thousandth of an inch.
10. Military Specification-Paint.
11. PSDS: Paint System Data Sheet.
12. SFPG: Square Feet per Gallon.
13. SFPGPC: Square Feet per Gallon per Coat.
14. SP: Surface Preparation.

1.4 PERFORMANCE REQUIREMENTS

A. Coating materials used in contact with potable water supply systems shall be certified to NSF 61.

1.5 SUBMITTALS

A. General: Submit in the following:

B. Shop Drawings:
1. Schedule of proposed coating materials.
2. Schedule of surfaces to be coated with each coating material.

C. Product Data: Include description of physical properties of coatings including solids content and ingredient analysis, VOC content, temperature resistance, typical exposures and limitations, and manufacturer's standard color chips:
   1. Data Sheets:
      a. For each paint system, furnish a Paint System Data Sheet (PSDS), the Manufacturer's Technical Data Sheets, and paint colors available (where applicable) for each product used in the paint system. The PSDS form is appended to the end of this section.
      b. Submit required information on a system-by-system basis.
      c. Furnish copies of paint system submittals to the coating applicator.
      d. Indiscriminate submittal of Manufacturer's literature only is not acceptable.
      e. Regulatory requirements: Submit data concerning the following:
         1) Volatile organic compound limitations.
         2) Coatings containing lead compounds and PCBs.
         3) Abrasives and abrasive blast cleaning techniques, and disposal.
         4) NSF certification of coatings for use in potable water supply systems.

D. Samples: Include 8-inch square drawdowns or brush-outs of topcoat finish when requested. Identify each sample as to finish, formula, color name and number and sheen name and gloss units.

E. Certificates: Submit in accordance with requirements for Product Data.

F. Manufacturer's Instructions: Include the following:
   1. Special requirements for transportation and storage.
   2. Mixing instructions.
   3. Shelf life.
   4. Pot life of material.
   5. Precautions for applications free of defects.
   6. Surface preparation.
   7. Method of application.
   8. Recommended number of coats.
   9. Recommended dry film thickness (DFT) of each coat.
   10. Recommended total dry film thickness (DFT).
   11. Drying time of each coat, including prime coat.
   12. Required prime coat.
   13. Compatible and non-compatible prime coats.
   14. Recommended thinners, when recommended.
   15. Limits of ambient conditions during and after application.
   16. Time allowed between coats (minimum and maximum).
   17. Required protection from sun, wind, and other conditions.
   18. Touch-up requirements and limitations.
   19. Minimum adhesion of each system submitted in accordance with ASTM D 4541.

G. Manufacturer's Representative's Field Reports.

H. Operations and Maintenance Data: Submit:
   1. Reports on visits to project site to view and approve surface preparation of structures to be coated.
   2. Reports on visits to project site to observe and approve coating application procedures.
   3. Reports on visits to coating plants to observe and approve surface preparation and coating application on items that are "shop coated."

1.6 QUALITY ASSURANCE

A. Quality Assurance Submittals:
   1. Quality Assurance plan.
   2. Qualifications of coating applicator including List of Similar Projects and List of References

substantiating experience.
3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
4. If the Manufacturer of finish coating differs from that of shop primer, provide both Manufacturers' written confirmation that materials are compatible.
5. Manufacturer's written instructions and special details for applying each type of paint.
6. Manufacturers' Certification of Proper Installation.

B. Certifications: All paints and coatings to be used on this project comply with current federal, state, and local VOC regulations

C. Applicator qualifications:
1. Minimum of 5 years' experience applying specified type or types of coatings under conditions similar to those of the Work:
2. Provide qualifications of applicator and references listing 5 similar projects completed in the past 2 years.
3. Manufacturer approved applicator when manufacturer has approved applicator program.
4. Approved and licensed by polymorphic polyester resin manufacturer to apply polymorphic polyester resin coating system.
5. Approved and licensed by elastomeric polyurethane (100 percent solids) manufacturer to apply 100 percent solids elastomeric polyurethane system.
6. Applicator of off-site application of coal tar epoxy shall have successfully applied coal tar epoxy on similar surfaces in material, size, and complexity as on the Project.

D. Regulatory requirements: Comply with governing agencies regulations by using coatings that do not exceed permissible volatile organic compound limits and do not contain lead:
1. Do not use coal tar epoxy in contact with drinking water or exposed to ultraviolet radiation.
2. Perform surface preparation and painting in accordance with recommendations of the following:
3. Paint Manufacturer's instructions.
4. SSPC-PA Guide No. 3, Guide to Safety in Paint Applications.
5. Federal, state, and local agencies having jurisdiction.

E. Samples:
1. Reference Panel:
   a. Prior to start of surface preparation, furnish a 4" by 4" steel panel for each grade of sandblast specified herein, prepared to specified requirements.
   b. Provide panel representative of the steel used; prevent deterioration of surface quality.
   c. Upon approval of Engineer, panel to be reference source for inspection.
   d. Unless otherwise specified, before painting work is started, prepare minimum 8" by 10" samples with type of paint and application specified on similar substrate to which paint is to be applied.
   e. Furnish additional samples as required until colors, finishes, and textures are approved.
   f. Approved samples to be the quality standard for final finishes.
   g. Field samples:
   h. Prepare and coat a minimum 100 square foot area between corners or limits such as control or construction joints of each system.
   i. Approved field sample may be part of Work.
   j. Obtain approval before painting other surfaces.

F. Pre-installation conference: to be conducted prior to painting

G. Compatibility of coatings: Use products by same manufacturer for prime coats, intermediate coats, and finish coats on same surface, unless specified otherwise.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle products as specified by maunbfacturer.

B. Remove unspecified and unapproved paints from Project site immediately.

C. Deliver new unopened containers with labels identifying the manufacturer's name, brand name, product type, batch number, date of manufacturer, expiration date or shelf life, color, and mixing and reducing instructions.
   1. Do not deliver materials aged more than 12 months from manufacturing date.

D. Store coatings in well-ventilated facility that provides protection from the sun, weather, and fire hazards. Maintain ambient storage temperature between 45 and 90 degrees Fahrenheit, unless otherwise recommended by the manufacturer.

E. Take precautions to prevent fire and spontaneous combustion.

F. Shipping:
   1. Where pre-coated items are to be shipped to the site, protect coating from damage. Batten coated items to prevent abrasion.
   2. Use nonmetallic or padded slings and straps in handling.

1.8 PROJECT CONDITIONS

A. Surface moisture contents: Do not coat surfaces that exceed manufacturer specified moisture contents, or when not specified by the manufacturer, the following moisture contents:
   1. Plaster and gypsum wallboard: 12 percent.
   2. Masonry, concrete, and concrete block: 12 percent.
   3. Interior located wood: 15 percent.
   4. Concrete floors: 7 percent.

B. Do not apply coatings:
   1. Under dusty conditions or adverse environmental conditions, unless tenting, covers, or other such protection is provided for structures to be coated.
   2. When light on surfaces measures less than 15 foot-candles.
   3. When ambient or surface temperature is less than 55 degrees Fahrenheit unless manufacturer allows a lower temperature.
   4. When relative humidity is higher than 85 percent.
   5. When surface temperature is less than 5 degrees Fahrenheit above dew point.
   6. When surface temperature exceeds the manufacturer's recommendation.
   7. When ambient temperature exceeds 90 degrees Fahrenheit, unless manufacturer allows a higher temperature.
   8. Apply clear finishes at minimum 65 degrees Fahrenheit.

C. Provide fans, heating devices, dehumidifiers, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.

D. Provide adequate continuous ventilation and sufficient heating facilities to maintain minimum 55 degrees Fahrenheit for 24 hours before, during and 48 hours after application of finishes.

1.9 SEQUENCING AND SCHEDULING

A. Sequence and Schedule: Contractor to provide painting schedule to SAWS and Design Engineer.

1.10 GUARANTEE

A. Guarantee shall provide for correction, or at the option of the Owner, removal and replacement of work specified in this Specification section found *defective* during a period of 2 years after the date of acceptance in accordance with the General Conditions.

B. Contractor and paint Manufacturer shall jointly and severally furnish guarantee.

1.11 MAINTENANCE

A. Extra materials: Deliver the following at completion of project:
   1. When manufacturer packages material in gallon cans, deliver unopened labeled cans as comes from factory.
   2. When manufacturer does not package material in gallon cans, deliver material in new gallon containers, properly sealed and identified with typed labels indicating brand, type, and color.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Special coatings: One of the following or equal:
   1. Carboline: Carboline, St. Louis, MO.
   2. Ceilcote: International Protective Coatings, Berea, OH.
   3. Dampney: The Dampney Company, Everett, MA.
   4. Devoe: International Protective Coatings, Louisville, KY.
   5. Dudick: Dudick, Inc., Streetsboro, OH.
   6. GET: Global Eco Technologies, Pittsburg, CA.
   7. Henkel: Henkel North America, Madison Heights MI.
   8. IET: Integrated Environmental Technologies, Santa Barbara, CA.
   9. Induron Protective Coatings, Birmingham, AL.
   10. NSP: NSP Specialty Products, Pinehurst, NC.
   11. PPG Amercoat: PPG Protective & Marine Coatings, Brea, CA.
   12. Raven Lining Systems, Broken Arrow, OK.
   13. Rustoluem: Rustoleum Corp., Sommerset, NJ.
   14. Sanchem: Sanchem, Chicago, IL.
   15. Sauereisen: Sauereisen, Pittsburg, PA.
   16. Superior: Superior Environmental Products, Inc., Addison, TX.
   17. S-W: Sherwin-Williams Co., Cleveland, OH.
   18. Tnemec: Tnemec Co., Kansas City, MO.
   19. Wasser: Wasser High Tech Coatings, Kent, WA.
   20. ZRC: ZRC Worldwide Innovative Zinc Technologies, Marshfield, MA.

2.2 PREPARATION AND PRETREATMENT MATERIALS

A. Metal pretreatment: As manufactured by one of the following or equal:
   1. Henkel: Galvaprep 5.
   2. International: AWLGrip Alumiprep 33.

B. Surface cleaner and degreaser: As manufactured by one of the following or equal:
   1. Carboline Surface Cleaner No.3.
   2. Devoe: Devprep 88.
   3. S-W: Clean and Etch.

2.3 COATING MATERIALS

A. Alkali resistant bitumastic: As manufactured by one of the following or equal:
1. Carboline: Bitumastic No. 50.
2. S-W: Targuard.
3. Wasser: MC-Tar.
4. As specified for Coal Tar Epoxy Substitute.

B. High solids epoxy (self-priming) not less than 72 percent solids by volume: As manufactured by one of the following or equal:
1. Carboline: Carboguard 891.
2. Devoe: Bar Rust 233H.
3. Induron: PE-70
4. NSP Specialty Products 120.
5. PPG Amercoat: Amerlock 2.
6. S-W: Macropoxy 646.
7. Tnemec: HS Epoxy Series 104**.**

C. Aliphatic or aliphatic-acrylic polyurethane: As manufactured by one of the following or equal:
1. Carboline: Carbothane 134 VOC.
2. Devoe: Devthane 379.
3. PPG Amercoat: Amershield VOC.
4. S-W: High Solids Polyurethane [CA].
5. Tnemec: Endura-Shield II Series 1075 (U).

D. Elastomeric polyurethane, 100 percent solids, ASTM D 16, Type V, (Urethane P): As manufactured by the following or equal:
1. GET: Endura-Flex EF-1988.
2. Sauereisen 381.
3.

E. Galvanizing Zinc Compound: As manufactured by one of the following or equal:
1. ZRC: Cold Galvanizing Compound.

2.4 MIXES

A. Mix in accordance with manufacturer’s instructions.

PART 3 - EXECUTION

3.1 GENERAL PROTECTION

A. Protect adjacent surfaces from coatings and damage. Repair damage resulting from inadequate or unsuitable protection:

B. Protect adjacent surfaces not to be coated from spatter and droppings with drop cloths and other coverings:
1. Mask off surfaces of items not to be coated or remove items from area.

C. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being coated and in particular, surfaces within storage and preparation area.

D. Place cotton waste, cloths, and material which may constitute fire hazard in closed metal containers and remove daily from site.

E. Remove electrical plates, surface hardware, fittings, and fastenings, prior to application of coating operations. Carefully store, clean, and replace on completion of coating in each area. Do not use

solvent or degreasers to clean hardware that may remove permanent lacquer finish.

3.2 GENERAL PREPARATION

A. Prepare surfaces in accordance with coating manufacturer's instructions, unless more stringent requirements are specified in this section.

B. Protect following surfaces from abrasive blasting by masking, or other means:
1. Threaded portions of valve and gate stems, grease fittings, and identification plates.
2. Machined surfaces for sliding contact.
3. Surfaces to be assembled against gaskets.
4. Surfaces of shafting on which sprockets are to fit.
5. Surfaces of shafting on which bearings are to fit.
6. Machined surfaces of bronze trim, including those slide gates.
7. Cadmium-plated items, except cadmium-plated, zinc-plated, or sherardized fasteners used in assembly of equipment requiring abrasive blasting.
8. Galvanized items, unless scheduled to be coated.

C. Protect installed equipment, mechanical drives, and adjacent coated equipment from abrasive blasting to prevent damage caused by entering sand or dust.

D. Ferrous metal surfaces:
1. Remove grease and oil in accordance with SSPC SP-1.
2. Remove rust, scale, and welding slag and spatter, and prepare surfaces in accordance with appropriate SSPC standard as specified.
3. Abrasive blast surfaces prior to coating.
   a. When abrasive blasted surfaces rust or discolor before coating, abrasive blast surfaces again to remove rust and discoloration.
   b. When metal surfaces are exposed because of coating damage, abrasive blast surfaces and feather into a smooth transition before touching-up.
   c. Ferrous metal surfaces not to be submerged: Abrasive blast in accordance with SSPC SP-10, unless blasting may damage adjacent surfaces, prohibited or specified otherwise. Where not possible to abrasive blast, power tool clean surfaces in accordance with SSPC SP-3.
   d. Ferrous metal surfaces to be submerged: Unless specified otherwise, abrasive blast in accordance with SSPC SP-5 to clean and provide roughened surface profile of not less than 2 mils and not more than 4 mils in depth when measured with Elcometer 123, or as recommended by the coating manufacturer.
4. All abrasive blast cleaned surfaces shall be blown down with clean dry air and or vacuumed.

E. Ductile iron pipe and fittings to be lined or coated: Abrasive blast clean in accordance with NAPF 500-03.

F. Sherardized, aluminum, copper, and bronze surfaces: Prepare in accordance with coating manufacturer's instructions.

G. Galvanized surface:
1. Degrease or solvent clean (SSPC SP-1) to remove oily residue.
2. Power tool or hand tool clean or whip abrasive blast.
3. Test surface for contaminants using copper sulfate solution.
4. Apply metal pretreatment within 24 hours before coating galvanized surfaces that cannot be thoroughly abraded physically, such as bolts, nuts, or preformed channels.

H. Shop primed metal:
1. Certify that primers applied to metal surfaces in the shop are compatible with coatings to be applied over such primers in the field.

2. Remove shop primer from metal to be submerged by abrasive blasting in accordance with SSPC SP-10, unless greater degree of surface preparation is required by coating manufacturer's representative.
3. Correct abraded, scratched, or otherwise damaged areas of prime coat by sanding or abrasive blasting to bare metal in accordance with SSPC SP-2, SP 3, or SP-6, as directed by the Engineer.
4. When entire shop priming fails or has weathered excessively (more than 25 percent of the item), or when recommended by coating manufacturer's representative, abrasive blast shop prime coat to remove entire coat and prepare surface in accordance with SSPC SP-10.
5. When incorrect prime coat is applied, remove incorrect prime coat by abrasive blasting in accordance with SSPC SP-10.
6. When prime coat not authorized by Engineer is applied, remove unauthorized prime coat by abrasive blasting in accordance with SSPC SP-10.
7. Shop applied bituminous paint or asphalt varnish: Abrasive blast clean shop applied bituminous paint or asphalt varnish from surfaces scheduled to receive non-bituminous coatings.

I. Cadmium-plated, zinc-plated, or sherardized fasteners:
   1. Abrasive blast in same manner as unprotected metal when used in assembly of equipment designated for abrasive blasting.

J. Abrasive blast components to be attached to surfaces which cannot be abrasive blasted before components are attached.

K. Grind sharp edges to approximately 1/16-inch radius before abrasive blast cleaning.

L. Remove and grind smooth all excessive weld material and weld spatter before blast cleaning in accordance with NACE SP0178.

M. Cleaning of previously coated surfaces:
   1. Utilize cleaning agent to remove soluble salts such as chlorides and sulfates from concrete and metal surfaces:
      a. Cleaning agent: Biodegradable non-flammable and containing no volatile organic compounds.
      b. Manufacturer: The following or equal:
         1) Chlor-Rid International, Inc.
   2. Steam clean and degrease surfaces to be coated to remove oils and grease.
   3. Cleaning of surfaces utilizing the decontamination cleaning agent may be accomplished in conjunction with abrasive blast cleaning, steam cleaning, high-pressure washing, or hand washing as approved by the coating manufacturer's representative and the Engineer.
   4. Test cleaned surfaces in accordance with the cleaning agent manufacturer's instructions to ensure all soluble salts have been removed. Additional cleaning shall be carried out as necessary.
   5. Final surface preparation prior to application of new coating system shall be made in strict accordance with coating manufacturer's printed instructions.

3.3 GENERAL APPLICATION REQUIREMENTS

A. Apply coatings in accordance with manufacturer's instructions.

B. Coat metal unless specified otherwise:
   1. Aboveground piping to be coated shall be empty of contents during application of coatings.

C. Verify metal surface preparation immediately before applying coating in accordance with SSPC SP COM.

D. Allow surfaces to dry, except where coating manufacturer requires surface wetting before coating.

E. Wash coat and prime sherardized, aluminum, copper, and bronze surfaces, or prime with manufacturer's recommended special primer.

F. Prime shop primed metal surfaces. Spot prime exposed metal of shop primed surfaces before applying primer over entire surface.

G. Multiple coats:
1. Apply minimum number of specified coats.
2. Apply additional coats when necessary to achieve specified thicknesses.
3. Apply coats to thicknesses specified, especially at edges and corners.
4. When multiple coats of same material are specified, tint prime coat and intermediate coats with suitable pigment to distinguish each coat.
5. Lightly sand and dust surfaces to receive high gloss finishes, unless instructed otherwise by coating manufacturer.
6. Dust coatings between coats.

H. Coat surfaces without drops, overspray, dry spray, runs, ridges, waves, holidays, laps, or brush marks.

I. Remove spatter and droppings after completion of coating.

J. Apply coating by brush, roller, trowel, or spray, unless particular method of application is required by coating manufacturer's instructions or these Specifications.

K. Plural component application: Drums shall be premixed each day. All gauges shall be working order prior to the start of application. Ratio checks shall be completed prior to each application. A spray sample shall be sprayed on plastic sheeting to ensure set time is complete prior to each application. Hardness testing shall be performed after each application.

L. Spray application:
1. Stripe coat edges, welds, nuts, bolts, difficult to reach areas by brush before beginning spray application, as necessary, to ensure specified coating thickness along edges.
2. When using spray application, apply coating to thickness not greater than that recommended in coating manufacturer's instructions for spray application.
3. Use airless spray method, unless air spray method is required by coating manufacturer's instruction or these Specifications.
4. Conduct spray coating under controlled conditions. Protect adjacent construction and property from coating mist, fumes, or overspray.

M. Drying and recoating:
1. Provide fans, heating devices, or other means recommended by coating manufacturer to prevent formation of condensate or dew on surface of substrate, coating between coats and within curing time following application of last coat.
2. For submerged service, the Contractor shall provide a letter to the Engineer that the lining system is fully cured and ready to be placed into service.
3. Limit drying time to that required by these Specifications or coating manufacturer's instructions.
4. Do not allow excessive drying time or exposure which may impair bond between coats.
5. Recoat epoxies within time limits recommended by coating manufacturer.
6. When time limits are exceeded, abrasive blast clean and de-gloss clean prior to applying another coat.
7. When limitation on time between abrasive blasting and coating cannot be met before attachment of components to surfaces which cannot be abrasive blasted, coat components before attachment.
8. Ensure primer and intermediate coats of coating are unscarred and completely integral at

time of application of each succeeding coat.
9. Touch up suction spots between coats and apply additional coats where required to produce finished surface of solid, even color, free of defects.
10. Leave no holidays.
11. Sand and feather into a smooth transition and recoat and recoat scratched, contaminated, or otherwise damaged coating surfaces so damages are invisible to naked eye.

N. Concrete:
1. Apply first coat (primer) only when surface temperature of concrete is decreasing in order to eliminate effects of off-gassing on coating.

3.4 ALKALI RESISTANT BITUMASTIC

A. Preparation:
1. Prepare surfaces in accordance with general preparation requirements.

B. Application:
1. Apply in accordance with general application requirements and as follows:
a. Apply at least 2 coats, 8 to 14 mils dry film thickness each.

3.5 HIGH SOLIDS EPOXY SYSTEM

A. Preparation:
1. Prepare surfaces in accordance with general preparation requirements and as follows:
a. Abrasive blast ferrous metal surfaces to be submerged at jobsite in accordance with SSPC SP-5 prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP-10.
b. Abrasive blast non-submerged ferrous metal surfaces at jobsite in accordance with SSPC SP-10, prior to coating. When cleaned surfaces rust or discolor, abrasive blast surfaces in accordance with SSPC SP 6.
c. Abrasive blast clean ductile iron surfaces at jobsite in accordance with SSPC SP-7.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:
a. Apply minimum 2-coat system with minimum total dry film thickness (DFT) of 12 mils.
b. Recoat or apply succeeding epoxy coats within time limits recommended by manufacturer. Prepare surfaces for recoating in accordance with manufacturer's instructions.
c. Coat metal to be submerged before installation when necessary, to obtain acceptable finish, and to prevent damage to other surfaces.
d. Coat entire surface of support brackets, stem guides, pipe clips, fasteners, and other metal devices bolted to concrete.
e. Coat surface of items to be exposed and adjacent 1 inch to be concealed when embedded in concrete or masonry.

3.6 HIGH SOLIDS EPOXY AND POLYURETHANE COATING SYSTEM

A. Preparation:
1. Prepare surfaces in accordance with general preparation requirements and as follows:
a. Prepare concrete surfaces in accordance with general preparation requirements.
b. Touch up shop primed steel and miscellaneous iron.
c. Abrasive blast ferrous metal surfaces at jobsite prior to coating. Abrasive blast clean rust and discoloration from surfaces.
d. Degrease or solvent clean, whip abrasive blast, power tool, or hand tool clean galvanized metal surfaces.

e. Lightly sand (de-gloss) fiberglass and polyvinyl chloride (PVC) pipe to be coated and wipe clean with dry cloths, or solvent clean in accordance with coating manufacturer's instructions.
f. Abrasive blast clean ductile iron surfaces.

B. Application:
1. Apply coatings in accordance with general application requirements and as follows:
a. Apply 3 coat system consisting of:
1) Primer: 4 to 5 mils dry film thickness high solids epoxy.
2) Intermediate coat: 4 to 5 mils dry film thickness high solids epoxy.
3) Topcoat: 2.5 to 3.5 mils dry film thickness aliphatic or aliphatic-acrylic polyurethane topcoat.
2. Recoat or apply succeeding epoxy coats within 30 days or within time limits recommended by manufacturer, whichever is shorter. Prepare surfaces for recoating in accordance with manufacturer's instructions.

3.7 ELASTOMERIC POLYURETHANE (100 PERCENT SOLIDS)

A. Preparation:
1. Prepare surfaces in strict accordance with coating manufacturer's instructions and as directed and approved by coating manufacturer's representative.

B. Application:
1. Apply epoxy primer at DFT of 1 to 2 mils, in strict accordance with manufacturer's instructions.
2. Apply polyurethane coating at minimum total DFT as follows:
a. Steel: 60 mils DFT.
b. Ductile iron and ductile iron pipe coating and lining: 30 mils DFT.
c. Concrete: 120 mils DFT.
d. Or as recommended by the coating manufacturer and accepted by the Engineer.

C. For concrete application, provide saw cutting for coating terminations in strict accordance with manufacturer's instructions:

D. For application to damaged concrete, refer to Section 03 01 00.

E. Perform high voltage holiday detection test in accordance with SP0188-06, over 100 percent of coated surface areas to ensure pinhole free finished coating system.

3.8 FIELD QUALITY CONTROL

A. Each coat will be inspected. Strip and remove defective coats, prepare surfaces and recoat. When approved, apply next coat.

B. Control and check dry film thicknesses and integrity of coatings.

C. Measure dry film thickness with calibrated thickness gauge.

D. Dry film thicknesses on ferrous-based substrates may be checked with Elcometer Type 1 Magnetic Pull-Off Gage or Positector 6000.

E. Verify coat integrity with low-voltage sponge or high-voltage spark holiday detector, in accordance with SP0188 06. Allow Engineer to use detector for additional checking.

F. Check wet film thickness before coal tar epoxy coating cures on concrete or non-ferrous metal substrates.

G. Arrange for services of coating manufacturer's field representative to provide periodic field consultation and inspection services to ensure proper surface preparation of facilities and items to be coated, and to ensure proper application and curing:
   1. Notify Engineer 24 hours in advance of each visit by coating manufacturer's representative.
   2. Provide Engineer with a written report by coating manufacturer's representative within 48 hours following each visit.

3.9 PROTECTIVE COATINGS SYSTEMS

A. Hydropneumatic Tank: The hydropneumatic tank exterior and associated piping shall be painted in accordance with the requirements of OCS 5 as described in AWWA D102-17.

B. The intent of the project is to have the pumps and exposed pump piping painted in a uniform color in accordance with System No. 4 as described below. Where equipment comes primed or pre-painted only a top coat will be required. Any damage to the prime or pre-painted surface shall be repaired prior to application of the top coat.

C. System No. 4: Exposed Metal – Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
Abrasive Blast (SP 10)	Primer – Per Manufac-turer's Recommendations	1 coat, 2.5 MDFT
	Top Coat – Aliphatic Polyu-rethane	1 coat, 3 MDFT

D. System No. 5: Buried Metal - General:

Surface Prep.	Paint Material	Min. Coats, Cover
Abrasive Blast or Centrifugal Wheel Blast (SP 10)	Standard Hot Coal-Tar Enamel -OR- Coal-Tar Epoxy -OR- Tape Coat System	AWWA C203 AWWA C210 AWWA C214
	For Acidic Soil, Brackish Water High Bacteria - Hot Coal-Tar, Double Felt	AWWA C203, App. A, Sec. Al.5
	Tape Coat System	AWWA C214 with Double Outer Wrap

3.10 SCHEDULE OF ITEMS NOT REQUIRING COATING

A. General: Unless specified otherwise, the following items do not require coating:
   1. Items that have received final coat at factory and not listed to receive coating in field.
   2. Aluminum, brass, bronze, copper, plastic (except PVC pipe), rubber, stainless steel, chrome, Everdur, or lead.
   3. Buried or encased piping or conduit.
   4. Exterior concrete.
   5. Galvanized steel wall framing, galvanized roof decking, galvanized electrical conduits, galvanized pipe trays, galvanized cable trays, and other galvanized items:
      a. Areas on galvanized items or parts where galvanizing has been damaged during handling or construction shall be repaired as follows:
         1) Clean damaged areas by SSPC SP-1, SP-2, SP-3, or SP-7 as required.
         2) Apply 2 coats of a Galvanizing Zinc Compound in strict accordance with manufacturer's instructions.
   6. Grease fittings.
   7. Fiberglass ducting or tanks in concealed locations.
   8. Steel to be encased in concrete or masonry.

3.11 SCHEDULE OF SURFACES TO BE COATED IN THE FIELD

A. In general, apply coatings to steel, iron, galvanized surfaces, and wood surfaces unless specified or otherwise indicated on the Drawings. Coat concrete surfaces and anodized aluminum only when specified or indicated on the Drawings. Color coat all piping in accordance with SAWS Standards. Color of Hydropneumatic tank to be selected by owner. Color of exposed piping (other than at hydropneumatic tank) to match existing pump station.

END OF SECTION

PAINT SYSTEM DATA SHEET

Complete and attach Manufacturer's Technical Data Sheet to this PSDS for each coating system.

Paint System Number (from Spec):		
Paint System Title (from Spec):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	**Product Name/Number (Proprietary)**	**Min. Coats, Coverage**

- GENERAL

1.01 SCOPE:

A. The CONTRACTOR shall furnish, install and test all field instruments, process control devices and appurtenances, as shown on the project plans, specified in the Related Sections and Divisions as specified herein.

B. Field instruments specified in other Divisions shall be manufactured in accordance with this Section and submitted as part of the equipment specified in the other Divisions.

C. The CONTRACTOR shall furnish to the ENGINEER certified calibration/recalibration (for existing Instruments) reports for field instruments and devices specified herein immediately upon completion of calibration:

1. Receipt of any calibration/recalibration certificate shall in no way imply acceptance of any work or instrument.

2. Each calibration/recalibration certificate shall be signed and dated by an authorized representative of the CONTRACTOR. Three copies of each completed certificate shall be submitted to the ENGINEER.

3. Required calibration data are listed in Part 3 Testing.

1.02 RELATED SECTIONS:

A. Division 26

B. Process Equipment Divisions

C. Mechanical Equipment Divisions

D. Section 406113 Process Control System General Provisions

E. Section 406195 Application Services

F. Section 406700 Control System Equipment Panels

G. Section 407800 Panel Mounted Equipment

H. Section 406196 Process Control Descriptions

I. Section 406193 Input/Output List

J. Section 407010 Field Instrument List

K. Section 406343 Programmable Logic Controller (PLC)

L. Section 406600 Communications Interface Equipment

M. Section 406121 Process Control System Testing

1.03 SUBMITTALS:

A. Submit catalog data for all items supplied from this specification Section as applicable. Submittal shall include catalog data, functions, ratings, inputs, outputs, displays, etc. sufficient to confirm that the equipment provides every specified requirement. Any options or exceptions shall be clearly indicated.

B. Submittals for equipment specified herein, for other Sections or Divisions, shall be made as a part of equipment submittals furnished under other Sections or Divisions.

C. Installation experience documentation shall be submitted for approval with the Section Equipment Submittal.

D. Operations and Maintenance Manuals:

1. Operations and Maintenance manuals shall be constructed in accordance with Division 1 and shall include the following information:

a. Manufacturer's contact address and telephone number for parts and service.
b. Instruction books and/or leaflets
c. Recommended renewal parts list
d. Record documents for the information required by the Submittals section above.

1.04 REFERENCE CODES AND STANDARDS:

A. The equipment in this specification shall be designed and manufactured according to latest revision of the following standards (unless otherwise noted):

1. All meters, relays and associated equipment shall comply with the requirements of the National Electric Code and Underwriters Laboratories (UL) where applicable.

2. Each specified device shall also conform to the standards and codes listed in the individual device paragraphs.

1.05 QUALITY ASSURANCE:

A. The manufacturer of this equipment shall have produced similar instrumentation equipment for a minimum period of five (5) years. When requested by the OWNER/ENGINEER, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

B. The equipment as submitted shall be located as shown on the project plans and shall fit within this location. Equipment with does not fit in the space as shown on the project plans is not acceptable.

C. For the equipment specified herein, the manufacturer shall be ISO 9001 2000 certified.

1.06 WARRANTY:

A. The Manufacturer shall warrant the equipment to be free from defects in material and workmanship for two (2) years from the date of acceptance of the equipment containing the items specified in this Section. Within such period of warranty the Manufacturer shall promptly furnish all material and labor necessary to return the equipment to new operating condition. Any warranty work requiring shipping or transporting of the equipment shall be performed by the CONTRACTOR at no expense to the OWNER.

PART 2 - PRODUCTS

2.01 GENERAL:

A. All devices shall be Factory Mutual (FM) approved:

1. Explosion Proof for Class I division 1 group B, C, and D.

2. Dust-Ignition Proof for Class II and Class III, division 1, group E, F and G.

3. Factory Sealed.

B. Hardware:

1. All hardware used for outdoor instrument mounting shall be 316 Stainless Steel.

C. Instrument Stand:

1. 2”Schedule 80 Double Dipped Galvanized steel pipe.

D. Process Pipe:

1. All tubing and fitting shall be made of 316 Stainless Steel.

2.02 PRESSURE SWITCHES:

A. Bourdon tube pressure switch:

1. Adjustable deadband. Separately externally adjustable high and low pressure operating points.

2. Fully automatic, no manual reset required.

3. Visible calibrated dial.

4. Visible On-Off operation.

5. SPST mercury switch, opens on increase in pressure.

6. To be provided with DELRIN Bushed Movement.

7. Outdoor application:

a. NEMA 4X enclosure.

B. Ratings:

1. 1/8 to 20 psig.

2. 10 amperes at 120 Vac.

C. Manufacturer: Mercoid: Series D-30, Type DAW33-153-3A.

2.03 TEMPERATURE SWITCHES (ELECTRICAL BUILDING HIGH TEMP):

A. Temperature switch:

1. Adjustable from 50-90°F.

2. SPDT bimetal operated snap switch.

3. Indoor application.

4. UL Listed

5. Provide nameplate indicating “Electrical Room High Temperature Switch – Not for HVAC Control” and “SCADA Room High Temperature Switch - Not for HVAC Control”

B. Manufacturer: Columbus Electric: Model ETD-5S-6S or equal

2.04 PRESSURE TRANSMITTER:(TANK LEVEL)

A. Electronic Gage Pressure Transmitter:

1. Local and remote indication.

2. Provide with Ray self-cleaning pressure snubbers.

3. Input isolated with silicone filled stainless steel diaphragms.

4. Local indication LCD meter scaled in FEET and mounted integral to the transmitter. Transmitter operation ranges should operate at bottom 25% of full-scale range of transmitter.

5. Outdoor application:

a. NEMA 4 housing
b. View port for local indication
c. Stainless steel flanges
d. 2” pipe mount

6. Stainless Steel certification tag for Factory Mutual (FM) Explosion Proof rating.

B. Ratings:

1. Overpressure Limit without damage: 1500 psi

2. Input Range: 150 psi

3. Accuracy: +/- 0.075% of span

4. Analog Output: 4 – 20 mA

5. Power Supply: 24 Vdc

6. Operating Temperature Limits: -4° to 175°F

C. Manufacturer: Rosemount, Model: 2088, Model Number 2088 G 2 S 22 A 1 M4 B4 DW.

2.05 PRESSURE TRANSMITTER:(DISCHARGE PRESSURE)

A. Electronic Gage Pressure Transmitter:

1. Local and remote indication.

2. Provide with Ray self-cleaning pressure snubbers.

3. Input isolated with silicone filled stainless steel diaphragms.

4. Local indication LCD meter scaled in PSI and mounted integral to the transmitter. Transmitter operation ranges should operate at bottom 25% of full-scale range of transmitter.

5. Outdoor application:

   a. NEMA 4 housing
   b. View port for local indication
   c. Stainless steel flanges
   d. 2” pipe mount

6. Stainless Steel certification tag for Factory Mutual (FM) Explosion Proof rating.

B. Ratings:

1. Overpressure Limit without damage: 1500 psi

2. Input Range: 150 psi

3. Accuracy: +/- 0.075% of span

4. Analog Output: 4 – 20 mA

5. Power Supply: 24 Vdc

6. Operating Temperature Limits: -4° to 175°F

C. Manufacturer: Rosemount, Model: 2088, Model Number 2088 G 2 S 22 A 1 M4 B4 DW.

2.06 UTRATRUB PLUS SC SENSOR

NOT REQUIRED - ADDENDUM NO. 2

PART 3 - EXECUTION

3.01 INSTALLER’S QUALIFICATIONS:

A. Installer shall be specialized in installing this type of equipment with minimum 5 years documented experience.

3.02 EXAMINATION:

A. Examine installation area to assure there is sufficient clearance to install the equipment.

B. Verify that the equipment is ready to install.

C. Verify field measurements are as instructed by the manufacturer.

3.03 INSTALLATION:

A. PRESSURE TRANSMITTERS AND PRESSURE SWITCHES:

1. Shall be installed with heat trace freeze protection around the fluid housing of the instrument and all piping, valves, and fittings.

2. Installation of the process line:

a. A ½" bore through the process line shall be done along the upper half of the radius of that line.
b. A ½" NPT weld a-let shall be installed over the bore
c. A ½" NPT block (root) valve shall be installed after the weld a-let for the isolation of the process from the pressure device.
d. A ½" NPT to ¼" NPT bushing will be installed on the isolation valve to bush down to allow for the installation of ¼" static or process lines from the process to the pressure measuring device.
e. A 4" expansion loop shall be made after a 1' straight run off the root valve.
f. A ¼" tubing isolation valve shall be installed and a calibration port shall be installed at the device for bleeding off pressure and calibrations can be performed.

3.04 HEAT TRACE SYSTEM:

A. Reference Section, 16940, INSTRUMENTATION HEAT TRACE SYSTEM.

3.05 CONDUIT AND IDENTIFICATION:

A. When the use of flexible conduit is required a minimum of 18" shall be provided but the flexible conduit shall not exceed 36".

B. All Instrumentation runs shall be the full length of the conduit no splices will be allowed.

C. The following nomenclature shall be used for identification:

1. tag # (0-10) for instrumentation info: tags, devices type and termination point
2. jb# (0-10) for junction box, power panel lighting panel and termination point
3. r# (0-10) for rack location and termination point
4. s# (0-10) for slot location and termination point
5. p# (0-10) for point location and termination point

D. Install stainless steel instrument labels with instrument ID, secured with safety wire.

3.06 RACEWAY SEALING:

A. Where raceways enter terminal boxes, junction boxes, or instrumentation equipment, all entrances shall be sealed with 3M 1000NS Watertight Sealant.

3.07 FIELD QUALITY CONTROL:

A. Inspect installed equipment for anchoring, alignment, grounding and physical damage.

B. Check tightness of all accessible electrical connections. Minimum acceptable values shall be specified in the manufacturer's instructions.

3.08 FIELD ADJUSTING:

A. Adjust all equipment for proper range and field conditions, as described in the manufacturer's instructions.

B. Any field adjustments, required for proper system operation, shall be included in the Final O&M Manuals.

3.09 TESTING:

A. Perform all electrical field tests recommended by the manufacturer.

B. Full testing (loop check) shall be done on all instrumentation and all SCADA I/O points and will be witnessed by the OWNER.

C. A calibration sheet shall be supplied for all the instruments and at the time of any instrument test.

1. Analog device calibration sheet shall include the following:

a. Time of calibration
b. Date of calibration
c. Name of the person performing the calibration
d. Name of the witness, OWNER
e. Test equipment used and their calibration dates
f. Device identification S/N, device name and tag number
g. As found voltage reading
h. As left voltage reading
i. As found milliamp reading @ 0%, 25%, 50%, 75% and 100%
j. As left milliamp reading @ 0%, 25%, 50%, 75% and 100%
k. Calibration ranges
l. I/O points

2. I/O point data sheet for each I/O analog and discrete through SCADA:

a. Field point location
b. Analog or Discrete
c. Software point location
d. Point function
e. Time of verification
f. Date of verification
g. Name of the person verifying the point
h. Name of the witness, OWNER

3.10 CLEANING:

A. Remove all rubbish and debris from inside and around the equipment. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint free rags. Do not use compressed air.

3.11 EQUIPMENT PROTECTION AND RESTORATION:

A. Touch up and restore damaged surfaces to factory finish, as approved by the manufacturer. If the damaged surface cannot be returned to factory specification, the surface shall be replaced.

3.12 MANUFACTURER'S CERTIFICATION:

A. A qualified factory-trained and certified representative shall certify in writing that the equipment has been installed, adjusted, including all settings as defined in the Contract Documents.

3.13 TRAINING:

A. Provide the representatives, services for training of OWNER's personnel in operation and maintenance of the equipment furnished under this Section and Section 01650.

B. The training for each type of equipment shall be for a period of not less than one (1) eight hour day.

C. The cost of training program to be conducted with OWNER's personnel shall be included in the Contract Price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.

D. Provide detailed O&M Manuals to supplement the training course. The manuals shall include specific details of equipment supplied and operations specific to the project.

E. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the assembly, motor starters, protective devices, metering, and other major components.

F. The OWNER reserves the right to videotape the training sessions for the OWNER's use.

END OF SECTION