Jones & Henry Engineers, Ltd.

Village of Ashville, Ohio

New Water Treatment Plant

ADDENDUM 4

January 12, 2026

Planholders of the Village of Ashville, Water Treatment Plant Improvement, project are hereby notified of the following amendments to the Contract Documents. This Addendum is hereby made a part of the Contract Documents.

GENERAL CLARIFICATIONS

A4-G1:
Question: Please clarify the "Operator" designation of "M" on the Valve Schedule on Drawing PE-0.1.

Response: "M" in the Valve Schedule "Operator" column should be replaced with "MO" to correspond with the Operator Designation Legend.

SPECIFICATIONS

Section 10880, Replace with attached

Section 11030, Replace with attached

Section 13650, Replace with attached

Section 15211, Replace with attached

DRAWINGS

Drawing S-0.1, Replace with attached

Drawing PE-2.0, Replace with attached

Drawing E-0.6, Replace with attached

Attachments: Specification 13650
Specification 10880
Specification 11030
Specification 15211
Drawing S-0.1
Drawing PE-2.0
Drawing E-0.6

RECEIPT OF THIS ADDENDUM MUST BE ACKNOWLEDGED ON PAGE C-410 - 1 OF THE BID.

SECTION 10880
SCALES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes all labor, materials, equipment, and supervision required to furnish and install scales as specified and shown on the Drawings.

B. Scales to be furnished and installed under this Section includes:

1. Two Sodium Hypochlorite scales.
2. One Caustic Soda scale.
3. One dual channel scale indicator.
4. One single channel scale indicator.

C. All scales shall be furnished by the same manufacturer.

D. Additional product requirements are specified in Section 01350.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:
   a. The Contractor shall indicate all variances from the requirements of the Contractor Documents.
   b. Scaled dimensional drawings.
   c. Wiring schematics with termination point identification.
   d. Manufacturer's catalog data.
2. Operation and maintenance manual.

PART 2 PRODUCTS

2.01 PLATFORM SCALE

A. Scale shall be completely self-contained and suitable for floor mounting. Scale shall be constructed of carbon steel and the scale platform shall have a non-skid surface. Scale capacity and size shall be as specified in Part 4.

B. The scale shall have a 150% safe overload and 300% ultimate overload capacity.

C. The scale load cell(s) shall have the following accuracy:

Output:	2 mV/V at maximum rated capacity
Repeatability:	0.01% of full scale
Nonlinearity:	0.02% of full scale
Hysteresis:	0.02% of full scale
Creep (15 min.)	0.02% of full scale
Zero T.C.:	20 ppm/degrees C
Span T.C.:	20 ppm/degrees C
Operation Temp.:	-10 to 40 degrees C

D. Load cell shall have an integral cable to transmit output to the indicator.

2.02 INDICATOR

A. Indicator shall be digital in a NEMA 4X enclosure. The digital display shall use seven segment LEDs providing a 0.5 -inch high 6 digit or 5 digit and (-) sign display.

B. Indicator shall be capable of displaying weight in either pounds or kilograms. The display shall be able to be switched from pounds to kilograms or visa versa from the face of the indicator.

C. The indicator shall be equipped with a motion detector, automatic zero maintenance, and display verification.

D. The indicator shall be capable of exciting up to four 350 ohm or eight 725 ohm load cells. Load cell excitation voltage shall be 12.5 volts.

E. Indicator shall be suitable for operation on a 120 volt, 60 hz power supply.

F. Indicator shall be capable of operation over an ambient temperature range of minus 10 degrees to 40 degrees C at 10% to 95% relative humidity, noncondensing.

G. The indicator shall have an initial range of 0 to 20 millivolts, a span range of 5 to 30 millivolts, both referenced to a 30-millivolt load cell output. The indicator shall have a sensitivity of 0.50 microvolts per increment minimum.

H. Indicator capacity and weight increments shall be as specified in Part 4.

PART 3 EXECUTION

3.01 INSTALLATION

A. The scales shall be installed in the locations shown on the Drawings.

B. Installation shall be complete and in accordance with the manufacturer's recommendations, Engineer's instructions, and Contract Documents.

C. Initial start-up shall be provided by the equipment manufacturer.

PART 4 SPECIAL PROVISIONS

4.01 SODIUM HYPOCHLORITE DAY SCALE

A. Sodium hypochlorite scales shall be of the weigh plate type suitable for weighing the sodium hypochlorite day tank and its contents. The maximum estimated weight of the tank and its contents is 750 pounds. The anticipated outside diameter of the tank is 23 inches.

B. Scale:

Number:	2
Size:	27.5-inch by 31-inch.
Weigh Plate Material:	Epoxy coated steel.
Capacity:	1000 pounds

C. Indicator shall be suitable for wall mounting and be able to display the scales 1000 pound capacity in 0.5 pound increments. A single indicator shall monitor both day tank scales.

D. Scale and indicator shall be Force Flow 27-DR10DS weight plate and Solo G2 dual indicator; Eagle Microsystems LP4310 scale and EI-2000 dual indicator; or equal. **(Addendum 4, Issued 1/12/2026)**

4.02 CAUSTIC SODA DAY SCALE

E. Caustic soda scales shall be of the weigh plate type suitable for weighing the caustic soda day tank and its contents. The maximum estimated weight of the tank and its contents is 750 pounds. The anticipated outside diameter of the tank is 23 inches.

F. Scale:

Number:	1
Size:	27.5-inch by 31-inch.
Weigh Plate Material:	Epoxy coated steel.
Capacity:	1000 pounds

G. Indicator shall be suitable for wall mounting and be able to display the scales 1000 pound capacity in 0.5 pound increments. A single indicator shall monitor each day tank scales.

H. Scale and indicator shall be Force Flow 27-DR10DS weight plate and Solo G2 indicator; Eagle Microsystems LP4310 scale and EI-1000 indicator; or equal. **(Addendum 4, Issued 1/12/2026)**

END OF SECTION

SECTION 11030
SOFTENING EQUIPMENT

PART 1 GENERAL

1.01 SCOPE

A. Under this Section, the Contractor shall furnish and install three cation exchange softening units with accessories as specified herein.

B. The softening system shall be a complete operational system to be furnished by a single responsible equipment manufacturer.

C. Under this Section, the Contractor shall furnish labor, materials, equipment and incidentals as specified to install and test the softening equipment complete with piping, internals, controls and appurtenances.

D. All work performed under this Section shall comply with all approved trade practices and manufacturer's recommendations.

E. Additional product requirements are specified in Section 01350 and 11050.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. For Review:

   a. The Contractor shall indicate all variances from the requirement of the Contract Documents.

   b. Dimensions.

   c. Manufacturer's literature.

   d. Manufacturer's installation instructions.

   e. Manufacturer's certificates.

2. Information for the Record:

   a. Equipment supplier's written report that equipment:

      1) Has been properly installed.

      2) Has been operated and that satisfactory operation has been obtained.

   b. Complete list of all component parts including:

      1) Manufacturer's name and model number.

2) Materials of construction.

3) Accessories.

4) Performance data.

c. Catalog data.

d. Design data.

B. Operation and Maintenance Manuals.

1.03 MANUFACTURER

A. It is the specific intent of this Section to limit the equipment furnished to a product of a major process equipment manufacturer that has substantial experience and expertise in similar size pressure softeners and that will assume responsibility with respect to the overall functional capability of the equipment provided.

B. All major softener components shall be furnished by a single manufacturer who has adequate experience and experimental data, in the judgment of the Engineer, concerning softeners of the type to be furnished for this Section.

C. It is recognized the softener equipment manufacturer may not manufacture all the equipment specified under this Section; however, to ensure a stable and complete operating softener system, it is required that the softener equipment manufacturer furnish and be responsible of all equipment, regardless of manufacturer, furnished under this Section.

D. The manufacturer must have a quality management system that is ISO 9001 certified.

E. Equipment shall be by WesTech Engineering or Tonka Water, a Kurita brand.

F. Other equipment manufacturers wishing to pre-quality as alternative suppliers shall submit the following to the engineer at least 14 days prior to the bid date and time.

1. A list of ten reference systems of similar type and capacity.

2. Detailed equipment drawings, specifications and product literature meeting the requirements of this specification.

3. NSF 61 certification for product materials.

4. Process P&ID Drawings.

5. A detailed list of variations required from the original design drawings and specifications.

PART 2 PRODUCTS

2.01 GENERAL

A. The softening system shall be furnished by a single manufacturer who shall comply with the following:

1. In addition to normal start-up service, the systems detailed above shall be fully operational including the demonstration of a fully automated control sequence for the regeneration of the system.

2. All component parts and equipment utilized in the pre-engineered water treatment system described in this Section shall be furnished as a complete integrated system by one manufacturer.

B. Each softener unit shall be capable of softening the water at the rate of 200 gpm (average), 260 gpm (maximum short period).

C. Three vessels will be installed with provisions for a 4th in the future.

D. The chemical analysis of the water to be softened is as follows:

Hardness (as $CaCO_3$)	328 – 346 mg/L
Calcium (as $CaCO_3$)	210 -215 mg/L
Magnesium (as $CaCO_3$)	118 – 131 mg/L
Total Alkalinity (as $CaCO_3$)	288 – 315 mg/L
Total Dissolved Solids	424- 436 mg/L
Temperature	45 – 55 (F)
pH	7.0 – 7.5

E. The system shall be designed based on the following:

1. Total influent hardness: 346 mg/L (as $CaCO_3$)
2. Total plant flow rate: 900 gpm (1,350 gpm future)
3. Flow through IX System: 780 gpm (1040 gpm future)
4. By-pass flow rate: 120 gpm – 600 gpm
5. Finished water hardness: 150 mg/L (as $CaCO_3$)
6. Number of IX Vessels: 3 (1 future)
7. Diameter of each vessel: 7-feet
8. Straight side height vessel: 9-feet
9. Depth of resin: 5-feet
10. Hydraulic loading rate: <7 gpm/sf

2.02 SOFTENER TANKS

A. Each softener tanks shall be not less than 84-inch diameter by 108-inch high on the straight side of the shell. Design working pressure shall be 100 psig with a test pressure of 130 percent of design pressure. The vessels shall be constructed using A36 Grade 70 shells and A516 Grade 70 heads. Design shall be in accordance with the Pressure Vessel Handbook including a design safety factor of 3.5. An ASME stamp and certification are required. **(Addendum 4, Issued 1/12/2026)**

B. Each tank shall be provided with one 18" diameter manhole in the top head and one 24-inch diameter manhole in the side shell just above the underdrains. The main inlet, brine and outlet connections shall be flanged and properly reinforced and placed in the top, side shell and bottom heads respectively. Each softener tank shall have four adjustable cast iron or structural steel legs.

C. Contractor shall coordinate and furnish anchor bolts with softener tank manufacturer.

2.03 DISTRIBUTION AND WASH WATER COLLECTION SYSTEM

A. The method of introduction of hard water or collection of wash water for each ion exchange unit shall be such that water is distributed to, or collected from, the entire bed in a uniform manner.

B. The distribution and collection system shall be designed for a maximum backwash rate of 8 gallons per minute per square foot of bed area. The backwash rate shall be in accordance with the ion exchange manufacturer's recommendations and varies with temperature.

C. The arrangement of each collection system shall provide for the proper backwashing of the beds without loss of ion exchange resin material. The distance from the surface of the bed to the wash water collector (freeboard) shall be not less than 50% of the depth.

2.04 UNDERDRAIN SYSTEM

A. The underdrain system shall be of the header and lateral or perforated plate style.

1. Header and lateral:

a. It shall be amply designed to ensure uniformity of flow in both the backwash and treatment modes of operation. The underdrain shall be of PVC pipe construction and shall be structurally supported. The underdrain systems shall incorporate a header pipe with laterals. The laterals shall be provided with openings to accept the underdrain diffuser nozzles. The header lateral underdrain shall be constructed of PVC with all joints solvent welded. No threaded joints will be allowed.

b. The header-lateral underdrain piping shall be factory installed by the equipment manufacturer. Installation of header-lateral piping in the field by the installing contractor is unacceptable. Concrete fill shall be installed in the field by the contractor up to the bottom of the underdrain diffuser nozzle connections. Care shall be taken so as not to introduce foreign material into the underdrain piping during the installation process. The laterals will be plugged until the installation process has been complete after which the plugs shall be removed and the underdrain diffuser nozzles shall be installed by the contractor.

2. Perforated plate - Each softener tank shall be equipped with an underdrain system consisting of a rigidly supported plate extending over the entire bottom

of the filter area. It shall be perforated with openings to receive non-clogging General Filter Model 125 MSW ABS plastic distributors. The design of the underdrain nozzle shall consist of a single horizontal slot with a minimum opening of 0.125 inch. Slot area of the nozzle shall be greater than the final orifice area to assure uniform distribution.

B. The quantity of nozzles shall be such that the ratio of final orifices to area is approximately 0.003.

C. The underdrain shall be so designed to reduce the water velocity, discharging the water horizontally without impeding its flow, thereby preventing channeling in the resin bed. Underdrain nozzles shall be NSF Standard 61 approved for use in drinking water. Underdrain components without this approval shall not be allowed.

2.05 BRINE DISTRIBUTOR

A. Each softener tank shall be provided with an internal brine distributor system to distribute the regenerating brine over the entire area of the ion exchange resin. Brine distributors shall be header and lateral type constructed of PVC pipe and fittings properly supported. Wall mounted splash baffles are not acceptable.

2.06 SUPPORTING GRAVEL

A. Each softener shall be provided with a gravel supporting bed consisting of properly graded layers of gravel and sand. The gravel bed shall be as follows:

Layer & Depth	Passing Screen	Retained on Screen
Bottom 3-inch	1-1/2-inch	3/4-inch
Next 3-inch	3/4-inch	1/2-inch
Next 3-inch	1/2-inch	1/4-inch
Next 3-inch	1/4-inch	1/8-inch
Top 3-inch	0.8 to 1.2 mm Filter Sand	#10

B. The filter sand utilized in the top layer of the support gravels shall have a uniformity coefficient not greater than 1.7.

C. The support gravels shall be procured from a manufacturer that complies with AWWA B-100 standards. Installation of the support gravel shall be in accordance with AWWA B-100 procedures. Installation of support gravels and resin shall be under the direct supervision of an employee of the equipment manufacturer experienced in this procedure.

2.07 ION EXCHANGE RESIN

A. Furnish for each unit 192 cu. ft. of high capacity polystyrene-divinylbenzene cation exchange resin. The equipment shall be designed for an operating exchange value of the resin of 20,000 grains as CaCO3 per cubic foot when regenerated with 6 lbs. of salt per

cubic foot of resin. A minimum freeboard space of 50 percent of the depth of the resin shall be provided to prevent loss of the resin during backwashing.

B. The resin shall be placed in the ion exchange vessels above the support gravel beds. Placement of the ion exchange resin shall be under the direct supervision of a qualified employee of the ion exchange equipment manufacturer.

2.08 PIPING AND VALVES

A. The piping as shown on the project plans shall be arranged to carry out the operations of service, backwashing, and regeneration. All piping shall be standard weight flanged steel construction. Flanges are to be standard weld on flanges. No threads are to be cut on pipe 3 inches and larger.

B. The following electrically operated function valves shall be furnished by the equipment manufacturer:

1.	Influent Valves, size:	6”
2.	Backwash Waste Valves, size:	4” (with limit stop)
3.	Effluent Valves, size:	6”
4.	Rinse Valves, size:	4” (with limit stop)
5.	Backwash Supply Valves, size:	4”
6.	Brine Valves, size:	3”

C. Valves shall be Lug style butterfly valves: Bray Series or 3L or engineer approved equal. Bi-directional pressure ratings of 175 psi through 12” and tested to 110% of full rating.

D. Valve Construction:

1. One piece, internal, through-stem drive requiring no disc screws or pins to connect stem to disc.
2. Body: ASTM A126 Class B, polyester coated or ASTM A536 Gr. 65-45-12 polyester coated, for mounting between two bolted flanges without the need for flange gaskets.
3. Resilient seats:
    a. Molded directly to the valve body for optimized torque and sealing performance with primary hub seal and secondary seal.
    b. Wide flange sealing surface suitable for weldneck and slip-on flanges.
4. Disc construction: Ductile iron ASTM A536 Gr. 65-45-12 with Nylon 11 coating or 316 stainless steel ASTM A351 CF8M.
5. Seat material: Peroxide cured EPDM that is NSF-61/372 certified.

E. Valve Control

1. Provide electric motor operators for valves in locations indicated on plans and on the Equipment Schedule.
2. Electric motor operators: Bray Series 70 or engineer pre-approved equal.
3. Motor operator construction:
    a. Quarter turn type with cast aluminum TYPE 4 water tight housing.
    b. Auxiliary open and closed limit switches 24vdc for PLC feedback.
    c. Open and closed torque switches.
    d. End of travel mechanical stops.
    e. Declutching handwheel manual override.
    f. Self-locking worm gears.
    g. Position indicator.
4. Anti-condensation heater.

F. Operator Power and Control:
1. Provided from the Softener Control Panel
2. Voltage: 120VAC, single phase.
3. Modulating service control: 4-20 mA input modulating card.

G. Manual Actuators
1. Handwheel type gear with position indicator.
2. Housing and handwheel material: cast iron
3. Include adjustable open and closed position stops.

H. Necessary automatic air release valves shall be furnished for the treatment system. Air release system shall include a common automatic air release valve, manual isolation and flush valves. Discharge piping to be supplied and installed by the Contractor.

2.09 PRESSURE GAUGES AND SAMPLING COCKS

A. Each softener unit shall be provided with a duplex pressure gauge or two single pressure gauges, connected to hard water inlet and soft water outlet, to indicate pressure loss through the softener when in operation. The pressure loss through softener when delivering 690 gpm shall not exceed 10 psi. Sampling cocks shall be furnished for hard and soft water lines.

B. Sampling cocks shall be provided so that representative water samples may be secured a the following points:
1. Softener Influent
2. Softener Effluent

2.10 AUTOMATIC REGENERATION CONTROLS

A. The manufacturer shall furnish a Softener Control Panel containing all necessary control functions and internal wiring. The controls shall be completely assembled and mounted in a NEMA 4 enclosure. The automatic regenerating cycle shall be initiated by inlet volume set point or by manual initiation by the operator.

B. The Softener Control Panel shall be equipped to provide controls and necessary accessories for three softener vessels and include provisions for a future vessel.

C. The control panel shall be a NEMA 4 floor mounted control cabinet containing a Programmable Logic Controller (PLC), a non-volatile memory module, relays all shop wired to a marked terminal strip and tested before shipment, and an Operator Interface Terminal (OIT) to provide operator interface of the ion exchange vessel functions. All relays shall be of the plug in type for easy servicing. A modem shall be included for remote access capability. The control panel will be designed and fabricated by the same equipment supplier that provides the ion exchange vessels.

D. The single control panel shall include the PLC and OIT. The panel shall also include all necessary hardware, components, timers, relays, switches, fuses, power supply, alarms and other items necessary for a complete operational system. All nameplates shall be black Phenolic with white lettering. All wiring terminal blocks and strips shall be properly labeled and numbered.

E. The PLC, modules, communication hardware, switches, lights, indicators and other accessories shall be Allen-Bradley Series.

F. The automatic regeneration of each unit shall be initiated by the effluent meter. The fully automatic control panel shall contain the necessary cycle (program) timers, brine draw control and interlock devices.

G. The ion exchange system shall be provided with corresponding OIT screens indicating the operating and regeneration positions. Necessary electrical wiring, conduit, and fittings shall be provided by the contractor to connect the control panels to the operation valves. Where required, an additional interlock shall be provided to prevent stopping the well pump during the regeneration of the units. Interlocks shall be provided to allow only one unit to regenerate at a time.

H. The OIT shall provide the following ion exchange information:

1. “Volume Treated - Off” regeneration mode selector
2. “Auto Regeneration - Manual Start” regeneration mode selector for each vessel
3. Green “In Service” light for each vessel in service
4. Red “Regeneration Scheduled” light for each vessel requiring regeneration
5. Yellow “Regeneration in Process” light for each vessel in regeneration
6. Open-Auto-Close selector button for each valve
7. One green service position light for each valve

8. One amber regeneration position light for each valve
9. Adjustable 0–45 minute backwash duration timer
10. Adjustable 0–30 minute brine injection timer
11. Adjustable 0–120 minute slow rinse timer
12. Adjustable 0–45 minute fast rinse duration timer
13. Brine waste tank high level alarm
14. Flow rate for each meter (each vessel, brine meter, bypass meter)
15. Volume of water treated between regeneration for each vessel
16. Indication of each phase of regeneration cycle
17. Volume in gallons since last regeneration for each vessel
18. Low water level for the brine make-up tank
19. Brine make-up tank refill in process
20. Brine pump in service
21. Brine pump failure

I. Effluent Water Meters

1. The ion exchange units shall be equipped with a bi-directional flow meter specified in Section 16902. Power shall be supplied through the Softener Control Panel along with analog communication.

J. Blending Water Control

1. The ion exchange treatment system shall incorporate a raw water blending system. A controlled amount of raw water shall be blended with the treated water effluent, so as to maintain a finished water quality as specified in the Equipment Schedule.
2. Blend Valve. A butterfly valve with modulating actuator shall be used to properly control the amount of water bypassing the ion exchange system. The system PLC shall receive feedback from an in-line nitrate analyzer and send a signal to modulate the blend valve as necessary to maintain the desired concentration in the finished water.
3. Blend Meter. A flanged in-line magnetic flow meter shall be used to measure system bypass flow rate. Meter shall be install as specified in Section 16902. Power shall be supplied through the Softener Control Panel with analog communication.
4. A manual shutoff valve shall be installed on each end of the blend line to permit complete isolation of the blend line components as shown on the plans.

K. Functional Control Description

1. General. During automatic operation the PLC shall control the individual ion exchange functions and shall indicate and communicate individual ion exchange vessel status to the OIT and remote SCADA system as required.

2. Normal operation consists of opening ion exchange vessel influent and effluent valves, which are their normal positions. Each vessel effluent will include a flow meter, which will transmit a signal to the PLC control that will be used for the flow totalization batch control and display of rate of flow. The OIT will include a batch control screen for each vessel, which will allow the operator to set the batch volume in gallons. The meter signal will be used to show a count-up volume in gallons for each vessel. Once the batch counter has reached the batch set point the vessel will be placed into regeneration by the PLC.

3. Once regeneration has been initiated the regeneration will automatically sequence as programmed. Only one ion exchange vessel may be regenerated at a time. If a second ion exchange vessel should require regeneration while another unit is in regeneration, it will remain in service until the first ion exchange vessel regeneration has been completed.

4. The regeneration sequence shall be as follows:

Step	Set-point
1. Backwash	OIT timer screen, adjustable timer
2. Brine	Brine batch meter control with adjustable watch dog timer
3. Slow Rinse	OIT timer screen, adjustable timer
4. Fast Rinse	OIT timer screen, adjustable timer

5. The Backwash, Slow Rinse, and Fast Rinse steps will be based on operator-adjustable set-points on the OIT. The Brine step will be based on a batch set-point. The brine meter will send a signal to the PLC control that will be used for the batch and reset control. The OIT will include a batch control screen for the brine meter. The batch control screen will allow the operator to set the batch volume in gallons. The meter signal shall be used to calculate a count up volume in gallons for the brine feed system. Once the batch counter has reached the batch set point the brine pumps will be shut down and the slow rinse step of the regeneration will be initiated.

6. Upon completion of the ion exchange vessel regeneration, the regenerated vessel will be put back into service and the batch control shall be reset for the next regeneration brine cycle.

7. Power Failure. If power to the PLC is lost, the uninterruptible power supply shall engage and shall continue automatic operation of the control panel (all function

and indication) for a minimum of 15 minutes. If after 15 minutes power has not been restored to the ion exchange control panel, then all valves shall fail to "service" condition, meaning that all ion exchange vessels shall be placed into normal service mode.

L. Remote Access Capability. The system control panel shall contain capability for remote screen mirroring, through Ethernet, of the system control panel PLC and OIT to monitor and operate the system.

M. Shop Testing Prior to Shipment. Prior to shipment, the ion exchange control panel shall be fully tested with all alarms, indication and I/O fully simulated at the factory prior to shipment. All screens shall be tested along with all alarm functions and other control parameters, verified by factory certification as to inspector and date inspected. Testing shall be subject to verified witnessing by the engineer if required.

2.11 BRINING SYSTEM

A. Brine Storage Tanks

1. Two double walled filament wound reinforced thermoset plastic storage brine maker tanks shall be provided that will allow sufficient brine flow for the purposes of regeneration.

2. The tank shall be constructed of FRP. The laminate process of construction shall include an interior surface, an interior layer, a structural layer and an exterior protective surface. The brine vessel shall be certified to NSF 61 and shall be traceable to an NSF authorized production facility.

3. Tanks shall be Bryneer™ 52-ton, 12-15 model or equal.

4. The brine vessel shall have the following accessories:

a. Tie down lugs; 304 stainless steel

b. Lifting channels; 304 stainless steel

c. 1 – 4'' conically gusseted flanged nozzle with 4'' diameter 304 stainless steel schedule 40 salt unloading pipe with ¾'' water injection port, 4'' aluminum Kamlock coupling and cap

d. Fiberglass clips will be furnished to support the pipe off the vessel wall

e. 1 – 2'' conically gusseted flanged nozzle brine outlet with internal brine plenum with slotted PVC filter pipe

f. 1 – 2'' conically gusseted flanged nozzle with PVC water distribution ring

g. 1 – 8'' elbow vent with PVC vent extension, clips to attach to vessel wall, polyester dust bag, rubber connection boot.

h. 1 - 2'' conically gusseted flanged nozzle; PRV (device excluded)

i. 1 – 24'' top flanged manway w/cover, neoprene sponge gasket, spring loaded for emergency pressure relief, pressure on salt delivery will be approximately 15 psi.

j. 1 – 24'' side flanged manway w/cover, neoprene gasket & 304 stainless steel fasteners.

k. 2'' foam insulation with FRP protective covering around bottom 6 feet of its shell & thermal maintenance system to maintain a temperature of 60°F at a minimum ambient temperature of 0°F

l. FRP encapsulated nameplate

m. Connection in exterior wall with electronic leak detection assembly

n. Binmaster SmartBob AO solid level indicator device

o. 1 - PTI Standard Operations & Maintenance Manual-See CLARIFICATION below.

p. Digital brine level controller and pressure transmitter with Asco 1 1/4'' normally closed solenoid valve to be mounted by customer in the water inlet line

q. Vessels are designed for storage of Sodium Chloride, specific gravity 1.2, ambient temperature, design pressure/vacuum ±3''WC, 105 mph winds, seismic conditions in accordance with IBC, outdoor installation.

r. OHSA approved fiberglass ladder with safety cage.

s. Heat Retention System. The tank shall include an automated heat tracing and retention system. Current demands will be determined by a sensing bulb which directly reflects temperature of vessels contents. System shall be able to maintain 60°F at a minimum ambient temperature of 0°F. The first 6 feet of the brine vessel is to be insulated with 2” thick foam with 1/8” thick fiberglass protective covering. The top of the insulation will be capped to seal out any moisture. The insulated portion will be finished with a white exterior gel coat.

B. Brine Pumps

1. Two brine pumps shall be supplied for the application of brine during ion exchange regeneration. The brine pumps shall be configured to operate in an alternating arrangement. The OIT shall also incorporate provisions to permit the selection of a particular pump for regeneration or alternation of the two pumps.

2. The brine pumps shall be of adequate head and capacity to meet the brining requirements of ion exchange regeneration. he brine pump housings shall be constructed of Polypropylene or other non-corrosive materials when used with saturated salt brine. Other internal components exposed to the salt brine solution being pumped shall be constructed of thermoplastic materials. The brine pumps shall incorporate a magnetic drive assembly to prevent seal

leakage and to protect the motor from overloading. The brine pumps shall be designed for flooded suction applications.

3. The brine pump motors shall be multi-voltage, single or three phase, NEMA 56 frame, TEFC designs. Motor horsepower will be as required for the operating conditions.

C. Brine Line Components

1. The brine line shall include components as shown on the plans. These components shall include, but are not limited to, rate control valves, isolation valves, check valves and sample taps. Brine line components shall be constructed of PVC. Interconnecting PVC brine line piping is to be provided by others.

2. A brine dilution line shall be piped into the brine feed line as shown on the plans. The ion exchange system manufacturer shall provide the brine dilution line components. These components include, but are not limited to, flow controllers, automatic valves check valves and isolation valves. All dilution line components shall be constructed of PVC. Interconnecting PVC brine dilution piping is to be provided by others.

D. Brine Meter

1. Each system shall be equipped with an electromagnetic flow meter. The brine meter will send a signal to the control panel and the volume will be compared to the brine volume set point.

E. Brine Valves

1. A manual operated plug valve and check valve shall be supplied for installation in the saturated brine line. The plug valve shall be used in conjunction with the brine meter to set the saturated brine feed rate.

2.12 PAINTING

A. The interior of the vessels above the underdrain shall be sandblasted and protected from corrosion by proper application of approved coatings for potable water. The exterior of the vessels shall be sandblasted and prime painted and finish painted at the factory.

B. Surface preparation:

1. Interior - Sandblast to near white blast cleaning (SSPC-SP10).

2. Exterior - Sandblast to commercial blast cleaning (SSPC-SP6).

C. Coating:

1. The total paint system shall be the product of and be applied in accordance with the recommendations of one manufacturer. Alternate paint systems must be

pre-approved by engineer. Contractor shall purchase an adequate amount of touch-up paint, if required.

2. Interior

a. Stripe coating: Tnemec Series 21-WH16 Off White, or Sherwin-Williams SherPlate 600 Mill White, to a dry film thickness of 3-5 mils on all welds and hard-to-reach areas.

b. Prime coating: Tnemec Series 21-1255 Beige, or Sherwin-Williams SherPlate 600 Buff, to a dry mil thickness of 5-7 mils before any rust can form.

c. Finish coating: Tnemec Series 21-WH16 Off White, or Sherwin-Williams SherPlate 600 Mill White, to a dry mil thickness of 5-7 mils.

d. Total dry film thickness of 8-12 mils.

3. Exterior:

a. Stripe coating: one coat Tnemec Series 21-WH16 off white or Sherwin-Williams Sherplate 600 mill white to all welds and hard to reach areas, to a dry film thickness of 3-5 mils.

b. Prime coating: Tnemec Series 21-1255 Beige or Sherwin-Williams Sherplate 600 Buff primer to a dry film thickness of 5-7 mils before any rust can form.

c. Finish coating: The exterior finish coat shall be applied by installing contractor with compatible system. (Factory finish) Tnemec Series 1095-B9333 Endura-Shield Aliphatic Acrylic Polyurethane in Kurita Blue or Sherwin Williams Macropoxy 646 in Tonka Blue applied to a dry film thickness of 3-5 mils.

D. Facepiping:

1. Gaps between flanges and all locations where a gap exists at flange hub/pipe intersection shall be caulked prior to finish painting with Sonneborn NP -1 by Sonneborn-Chem Rex, Inc., Sika FLEX 1-A, or equal.

2. Ductile Iron piping shall be prime painted at factory and finish painted by installing contractor with compatible system.

PART 3 EXECUTION

3.01 INSTALLATION

A. Delivery and Storage

1. Upon delivery of the equipment to the jobsite, the contractor shall take inventory of the shipment and immediately report to the equipment

manufacturer any discrepancies between the equipment manufacturer's packing lists and shipping documents.

2. The contractor shall be responsible for off-loading and protection of all equipment against damage and during on-site storage and installation. All media must be stored on pallets in a manner that protects it from UV, radiation and weather. Damaged equipment and materials will be replaced by the contractor at the contractor's expense.

B. Manufacturer's Instructions. Installation shall be as shown on the plans and in accordance with the manufacturer's recommendations, installation instructions and assembly drawings. Manufacturer's installation instructions and assembly drawings shall be submitted and approved by the engineer prior to shipment of equipment. Installation of the filtration system shall be in strict accordance with the details shown on the drawings and in complete conformance to manufacturer's instructions and procedures.

C. Disinfection by Contractor - After support gravel and resin has been placed, and before the softeners are placed in service, the entire softener shall be cleaned and disinfected by chlorination in accordance with AWWA C653.

3.02 INSPECTION, STARTUP, AND TRAINING

A. The contractor will verify in writing that the project is ready for manufacturers field services. Copies of written verification shall be given to the manufacturer, engineer and owner prior to scheduling field services.

B. The contractor shall provide the services of a factory representative during start-up of the treatment equipment. The contractor shall provide the number of days on site for start-up supervision as outlined in the Equipment Schedule. At a minimum, the equipment manufacturer's technician shall perform the following start-up functions:

C. Inspect the final installation to assure proper installation, connection and wiring of all equipment of the manufacturer's supply.

D. Start-up of the equipment in the presence of the Contractor and Owner's operating personnel.

E. Training of Owner's operating personnel in proper operation and maintenance procedures, start-up/shutdown procedures, response to emergency conditions, and troubleshooting. The responsibility of the Contractor and the factory service representative with regard to start-up shall be fulfilled when the start-up is complete, the equipment is functioning properly, operating personnel have been trained and the equipment has been accepted by the Owner.

F. Inspection, startup, and training services shall consist of an equipment check, startup, and training of operating personnel. The Contractor shall ensure that all equipment is in operating condition and ready for service.

G. Contractor to coordinate Startup plan in accordance with Section 01650.

PART 4 SPECIAL PROVISIONS

4.01 BRINE TANK TIE DOWN LUGS

A. The tie down lugs shall be designed to resist sliding and overturning per the following criteria:

1. Risk Category: IV
2. Minimum Roof Live Load = 15 psf
3. Basic Wind Speed: 119 mph
    a. Wind Exposure: C
4. Ground Snow Load: 20 psf
    a. Snow Importance Factor: 1.2
    b. Snow Exposure Factor: 0.9
    c. Thermal Factor: 1.2
5. Seismic Design Category:
    a. Site Class: D
    b. Seismic Importance Factor: 1.50
    c. Seismic Design Category: C

END OF SECTION

SECTION 13650
PRE-ENGINEERED METAL BUILDING

PART 1 GENERAL

1.01 SCOPE

A. This Section includes the furnishing of all materials, equipment and labor required to install the following:

1. Structural framing.
2. Roof panels.
3. Wall panels and liners.
4. Insulation and vapor retarder.
5. Framed openings for personnel doors, services doors, windows, louvers and vents.

1.02 SUBMITTALS

A. Submittals shall be in accordance with all requirements of Section 01300 and Section 01410 and shall include:

1. Shop Drawings for Review
    a. Submit product data including, but not limited to, construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal building system components:
        1) Structural-framing system.
        2) Roof panels.
        3) Wall panels and liners.
        4) Insulation.
        5) Trim and closures.
        6) Accessories.
        7) Shop and field coatings.
    b. Submit drawings for the following metal building system components. Including, but not limited to, plans, elevations, sections, details, and attachments to other Work.
        1) For installed components indicated to comply with design loads, include structural analysis data signed and sealed by the

professional engineer responsible for their preparation. Seal shall be issued by the state for which the project resides. Provide all single load and combination load reactions for all building columns.

2) Anchor-Bolt Plans shall include location, diameter, and projection of anchor bolts required to attach metal building to foundation.

3) Structural-Framing drawings shall show complete fabrication of primary and secondary framing. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross sections.

4) Roof and wall panel layout drawings shall show layout of panels on support framing, details of edge conditions, joints, panel profiles, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work.

2. Information for the Record:

a. Samples and color charts showing the full range of colors available for each type of the following products with factory-applied color finishes:

1) Roof panels.

2) Wall panels.

3) Trim and closures.

b. Product Certificates, signed by manufacturers of metal building systems certifying that products furnished comply with requirements.

c. Letter of Design Certification, signed and sealed by the professional engineer shall include the following:

1) Name and location of Project.

2) Order number.

3) Name of manufacturer.

4) Name of Contractor.

5) Building dimensions, including width, length, height, and roof slope.

6) Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.

7) Governing building code and year of edition.

8) Design Loads, including but not limited to, gravity loads, wind and seismic design criteria and crane capacities.

d. Erector Certificates, signed by manufacturer, certifying that erectors comply with requirements.

e. Manufacturer Certificates, signed by manufacturers, certifying that they comply with requirements. Include evidence of manufacturing experience.

f. Warranties as specified herein.

1.03 QUALITY ASSURANCE

A. Manufacturer shall be a firm experienced in manufacturing metal building systems similar to those indicated for this Project and with a record of successful in-service performance.

1. The design shall be performed by a Professional Engineer who is legally qualified to practice in jurisdiction where Project is located.

2. The preparation of shop drawings, testing program development, test result interpretation, and comprehensive engineering analysis shall be by a Professional Engineer.

3. Member of Metal Buildings Manufacturers Association (MBMA).

B. The design fabrication and erection shall be in accordance with the following standards:

1. AISC 360 - Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design.

2. AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members.

1.04 PROJECT HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package roof and wall panels for protection during transportation and handling.

B. Handling - Unload, store, and erect roof and wall panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store roof and wall panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.05 GUARANTEE

A. Special warranties specified shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty on Panels shall be executed by manufacturer for repair or replacement of roof and wall panels that fail in materials or workmanship within three years from date of Substantial Completion.

C. Warranty on Panel Finishes shall be executed by the manufacturer for repair of finish or replacement of metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

1. Warranty Period for Wall Panels and Roof Panels shall be 20 years from date of Substantial Completion.

D. Warranty on Standing-Seam Roof Panel shall be executed by manufacturer agreeing to repair or replace standing-seam roof panel assemblies that fail to remain weathertight within 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS OR PRODUTS OR EQUIPMENT

A. Available Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Buildings Company.
2. United Structures of America, Inc. (USA).
3. Butler Manufacturing Company.
4. Ceco Building Systems.
5. Nucur Building Systems.
6. Varco-Pruden Buildings; a United Dominion Company.
7. Or equal.

B. Cornerstone Building Brands has been used as the basis of the foundation and anchor design for the Project.

2.02 PERFORMANCE REQUIREMENTS

A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of

water into building interior. Include primary and secondary framing, roof and wall panels, insulation, and accessories complying with requirements specified and shown on the Drawings.

B. Metal Building System Design - Of size, spacing, slope, and spans indicated, and as follows:

1. Primary Frame Type - Provide the following:

a. Rigid Clear Span - Solid-member structural-framing system without interior columns.

2. End-Wall Framing - Manufacturer's standard as follows:

a. Provide primary frame, capable of supporting one-half of a bay design load, and end-wall columns. (North Endwall)

b. Provide load-bearing end-wall and corner columns, and rafters. (South Endwall)

3. Secondary Frame Type - Manufacturer's standard rafters and the following girts:

a. Exterior-framed (bypass) girts.

4. Eave Height - as indicated on Drawings.

5. Bay Spacing - as indicated on Drawings.

6. Roof Slope - as indicated on Drawings.

7. Roof System - Manufacturer's standard standing-seam metal roof panels.

8. Exterior Wall System - Manufacturer's standard metal wall panels.

C. Fire Resistance - Provide roof and wall panel assemblies with fire-resistance ratings indicated.

D. Structural Performance - Provide metal building systems capable of withstanding the effects of dead loads and the following loads and stresses within limits and under conditions indicated:

1. Design Loads Criteria:

a. 2024 Ohio Building Code and ASCE 7-16.

b. Building Category: IV (per building code).

c. Ground Snow Load: 20 psf.

d. Snow Exposure Factor, Ce: 1.00.

e. Snow Importance Factor: 1.20.

f. Roof Live Load: 20 psf (minimum).

g. Collateral Load: 10 psf.

h. Basic Wind Speed: 120 mph.

i. Wind Exposure Category: C.

j. Seismic Use Group: III (per building code).

k. Seismic Site Class: D.

l. Seismic Importance Factor: 1. 5.

m. 0.2 sec Spectral Response Acceleration: 0.118. **(Addendum 4, Issued 1/12/2026)**

n. 1.0 sec Spectral Response Acceleration: 0.061. **(Addendum 4, Issued 1/12/2026)**

o. Roof supported HVAC equipment and ceiling fans: See drawings.

p. Auxiliary loads: See drawings.

2. Wind Loads - Include horizontal and vertical loads induced by a basic wind speed corresponding to a 50-year mean-recurrence interval at Site to develop both stress and deflection calculations.

3. Seismic Loads - Include horizontal and vertical loads induced by the seismic accelerations at Site to develop both stress and deflection calculations.

4. Load Combinations - Design metal building systems to withstand the most critical effects of load factors and load combinations per MBNA's "Low Rise Building System Manual".

E. Engineer assemblies to withstand design loads with deflections no greater than the following:

1. Purlins and Rafter - Vertical deflection of 1/180 of the span.

2. Girts - Horizontal deflection of 1/360 of the span.

3. Frame Sway - Horizontal deflection of 1/360 of the height.

4. Metal Panels - Vertical deflection of 1/100 of span.

F. Design secondary framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

G. Design and engineer metal building systems capable of withstanding the effects of earthquake motions determined according to the building code in effect for this Project or ASCE 7, "Minimum Design Loads for Buildings and Other Structures" - Section 9, "Earthquake Loads," whichever is more stringent.

H. Provide metal building roof and wall panel systems that allow for thermal movements by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.

I. Provide roof and wall panel assemblies with permanent resistance to air leakage through assembly.

J. Water Penetration for Roof and Wall Panels - Provide roof and wall panel assemblies with no water penetration.

K. Wind-Uplift Resistance - Provide roof panel assemblies that meet requirements of UL 580 for Class 90 wind-uplift resistance.

L. ~~Panel shall be class one as approved by Factory Mutual.~~ **(Addendum 4, Issued 1/12/2026)**

2.03 STRUCTURAL-FRAMING MATERIALS

A. Structural steel, including but not limited to, steel shapes, plates, bars, tubing, and pipe shall comply with the requirements of Section 05500.

B. Fasteners, including but not limited to, non-high and high strength bolts, anchor rods, anchor bolts shall comply with the requirements of Section 05500.

C. Welding shall be in accordance with the requirements of Section 05500.

2.04 STRUCTURAL FRAMING

1. Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
2. Rigid Clear-Span Frames shall be I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
3. Frame Configuration shall be single gable.
4. Exterior Column Type shall be tapered.
5. Rafter Type shall be tapered.

B. Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly shall comply with the following:

1. End-Wall and Corner Columns shall be I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates.
2. End-Wall Rafters shall be I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates.

C. Manufacturer's standard secondary framing members, including, but not limited to, purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members shall be fabricated framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet prepainted with coil coating, unless otherwise indicated, and shall be as follows:

1. Purlins shall be C- or Z-shaped sections; fabricated from minimum 0.0598-inch-(16 gage) thick steel sheet, built-up steel plates, or structural-steel shapes.

a. Depth - 8-1/2 inches.

2. Girts shall be C- or Z-shaped sections; fabricated from minimum 0.0598-inch (16 gage) thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 45 to 50 degrees to flange and with minimum 2-1/2-inch wide flanges.
   a. Depth - 10 inches. **(Addendum 4, Issued 1/12/2026)**
3. Eave Struts shall be unequal-flange, C-shaped sections; fabricated from 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate backup for both roof and wall panels.
4. Base or Sill Angles shall be a minimum 3-by-2-by-0.0747-inch zinc-coated (galvanized) steel sheet.
5. Purlin and Girt Clips shall be a minimum 0.0747-inch thick, zinc-coated (galvanized) steel sheet.
6. Framing for Openings shall be channel shapes; fabricated from minimum 0.0598-inch (16 gage) thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.

D. Canopy Framing shall be manufacturer's standard structural-framing system, designed to withstand required loads, fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.

1. Straight-beam, eave type.
2. Purlin extension type.

E. Bracing shall be adjustable wind bracing as follows:

1. Rods - ASTM A36; ASTM A572, Grade D; or ASTM A529, Grade 50; 1/2-inch minimum diameter steel; threaded at each end.
2. Cable shall not be permitted.
3. Angles shall be fabricated from structural-steel shapes of size required to withstand design loads.
4. Rigid Portal Frames shall be fabricated from shop-welded, built-up steel plates or structural-steel shapes; of size required to withstand design loads.
5. Diaphragm Action of Panels shall not be permitted to resist wind forces through diaphragm action of roof and wall panels.

F. Bolts shall be shop-painted bolts unless structural-framing components are in direct contact with roof and wall panels. Provide zinc-plated bolts when structural-framing components are in direct contact with roof and wall panels.

2.05 ROOF PANELS

A. Standing-seam roof panels shall be manufacturer's standard with vertical-ribs and flat-pan panels fabricate from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 12-inch to 16-inch coverage; with 1 inch to 3-inch high, inverted-L, vertical ribs at panel edges. Design panels for mechanical attachment to roof purlins using concealed clips inside lap splices. Factory apply sealant at each interlocking joint shall be as follows:

1. Material - Zinc-coated (galvanized) steel.
2. Material - Aluminum-zinc alloy-coated steel.
3. Yield Strength - 50 ksi
4. Metal Thickness - 0.0239 inch (24 gage).
5. Joint Type - As standard with manufacturer.
6. Clip System: Fixed, or floating when required to provide for thermal movement.

B. Roof panel accessories shall be components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.

1. Closures at eave and ridge shall be fabricated of same metal as roof panels.
2. Clips shall be a minimum 0.0625-inch thick, stainless-steel panel clips designed to withstand negative-load requirements.
3. Cleats shall be mechanically seamed cleats formed from minimum 0.0250-inch thick, stainless-steel or nylon-coated aluminum sheet.
4. Thermal spacer blocks shall be where panels attach directly to purlins. Furnish 1-inch thick, thermal spacer blocks; fabricated from extruded polystyrene.

C. Backing plates shall be metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

D. Apply the following coil coating to roof panels and accessories:

1. Siliconized-Polyester coating shall be epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
2. Colors, textures, and glosses shall be selected by Owner from manufacturer's full range for these characteristics.

E. Concealed Finish - Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

2.06 WALL PANELS (ADDENDUM 4, ISSUED 1/12/2026)

A. Provide manufacturer's insulated metal panels complying with the following:

1. Panels shall be fabricated from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 36-inch coverage. Design panels for mechanical attachment to structure. Comply with the following:

a. Attach panels with concealed, semi-concealed, or exposed fasteners.

b. Material - Zinc-coated (galvanized) steel.

c. Material - Aluminum-zinc alloy-coated steel.

d. Yield Strength - 50 ksi, minimum.

e. Metal Thickness - 0.0239 inch (24 gage), minimum.

f. Panel Thickness - 4 inches.

g. Profile shall be selected by Owner.

B. Wall panel accessories shall be components required for a complete wall panel assembly, including trim, copings, mullions, sills, corner units, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

1. Metal backing plates shall be provided at panel end splices, fabricated from material recommended by manufacturer.

C. Apply the following coil coating to the wall exterior panels.

1. Siliconized-polyester coating shall be epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat. Coating shall have a 20-year warranty against corrosion and caulking.

2. Colors, textures, and glosses shall be selected by Owner from manufacturer's full range for these characteristics.

D. Wall liner panels shall be fabricated from metallic-coated steel sheets prepainted with coil coating, factory formed to provide 36-inch coverage, with raised major ribs at 12 inches OC, and intermediate stiffening ribs symmetrically spaced between major ribs for full length of panel. Design panels for mechanical attachment to structure using exposed fasteners, lapping major ribs at panel edges. Comply with the following:

1. Material - Zinc-coated (galvanized) steel.

2. Material - Aluminum-zinc alloy-coated steel.

3. Yield Strength - 50 ksi.

4. Metal Thickness - 0.0179 inch (26 gauge).

5. Panel Thickness - 1.125 inches.

E. Apply the following coil coating to the wall liner panels.

1. Siliconized-polyester coating shall be epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

2. Acrylic-enamel coating shall be epoxy primer and acrylic-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

3. Colors, textures, and glosses shall be selected by Owner from manufacturer's full range for these characteristics.

F. Concealed Finish - Apply pretreatment and manufacturer's standard white or light-colored backer finish, consisting of prime coat and wash coat with a total minimum dry film thickness of 0.5 mil.

2.07 TRIM PANELS

A. Fascia panels shall be the manufacturer's standard panels.

B. Soffit panels shall be the manufacturer's standard panels.

C. All other trim and accessory panel shall be the manufacturer's standard panel.

2.08 METAL PANELS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating - Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755 and the following requirements:

1. Zinc-Coated (Galvanized) Steel Sheet - ASTM A653, G90 coating designation; structural quality.

2. Aluminum-Zinc Alloy-Coated (Galvalume) Steel Sheet - ASTM A792, Class AZ50 coating, Grade 40; structural quality.

B. The following Panel Sealants shall be provided:

1. Sealant Tape - Pressure-sensitive, 100% solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, non-staining tape.

2. Joint Sealant - ASTM C920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in panels and remain weathertight; and as recommended by metal building system manufacturer.

C. Mastic for translucent panels shall be non-staining, saturated vinyl polymer as recommended by panel manufacturer for sealing laps.

2.09 ACCESSORIES

A. Fasteners including self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners shall be designed to withstand design loads. Provide fasteners with heads matching color of roof or wall sheets by means of plastic caps or factory-applied coating. Comply with the following:

1. Fasteners for roof and wall panels shall be self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of panels.

B. Closure accessories shall include but not be limited to eaves, rakes, corners, bases, framed openings, ridges, fascia, fillers, soffit, trim, and flashing as may be standard with the manufacturer's metal building system.

1. Provide closure accessories as required to seal against weather and to provide finished appearance.

2. Closure accessories shall be 0.0179-inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating.

3. Finish flashing and trim with same finish system as adjacent roof or wall panels.

C. Roof ventilators shall be gravity type, complete with hardware, flashing, closures, and fittings.

1. Continuous or sectional ridge-type shall be factory-engineered and -fabricated, continuous unit; fabricated from minimum 0.0179-inch thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; in 10-foot long sections. Provide throat size and total length indicated, complete with side baffles, ventilator assembly, end caps, splice plates, and reinforcing diaphragms. Finish ventilators to match roof panels.

a. Bird Screens shall be stainless steel or aluminum mesh.

b. Dampers shall be manually operated, spring-loaded, vertically rising type; with chain and worm gear operator.

c. Throat size shall be 9 or 12 inches, as standard with manufacturer, and as required to comply with ventilation requirements.

2. Louvers - Refer to Division 10 Section "Louvers and Vents".

D. Provide snow guards in accordance with the requirements of Section 077253.

1. Place over all personnel doors and where indicated on Drawings.

2.10 INSULATION MATERIALS (ADDENDUM 4, ISSUED 1/12/2026)

A. Refer to Specification 07210 for insulation.

2.11 FABRICATION

A. Shop Coatings:

1. Aluminum:

a. Where anodizing is specified, provide Architectural Class I anodic coating, applied after fabrication.

b. Surfaces which will be in contact with concrete, masonry, or dissimilar metals shall receive a heavy coat of coal tar paint, Bitumastic Super Service Black, or equal.

2. Carbon Steel:

a. Steel fabrications wholly embedded in concrete or masonry and with a minimum of 2-inch of concrete cover shall be abrasive blasted in accordance with SSPC SP-6, but shall not be coated. Exposed portions of partially embedded steel shall be shop coated to a point 4-inch below the concrete surface.

b. Component shall be hot dip galvanized after fabrication in conformance with ASTM A123. Threaded parts and hardware shall be galvanized in conformance with ASTM A153 or zinc-plated in conformance with ASTM B695.

c. Unless specified otherwise, non-galvanized fabrications shall be shop primed per Section 09900.

3. Surfaces which will be inaccessible for field painting after installation shall receive two coats of primer.

4. Contractor shall ensure primer is compatible with specified field coatings.

5. Comply with NAAMM's "Metal Finishes Manual for Engineerural and Metal Products" for recommendations for applying and designating finishes.

B. General - Design components and field connections required for erection to permit easy assembly and disassembly.

1. Fabricate components in a manner that once assembled in the shop, they may be disassembled, repackaged, and reassembled in the field.

2. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.

3. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.

C. Primary Framing - Shop-fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.

1. Make shop connections by welding or by using high-strength bolts.
2. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
3. Brace compression flange of primary framing by angles connected between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
4. Weld clips to frames for attaching secondary framing members.
5. Shop Priming - Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.

D. Secondary Framing - Shop-fabricate framing components to indicate size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.
2. Shop Priming - Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime secondary structural members with specified primer after fabrication.

E. Factory Priming for Field-Painted Finish - Where field painting after installation is indicated, apply the specified air-dried primer immediately after cleaning and pretreating.

1. Prime primary, secondary, and end-wall steel framing members with specified primer to a minimum dry film thickness of 1 mil.
    a. Prime secondary steel framing formed from metallic-coated steel sheet with red-oxide polyester paint, with a minimum dry film thickness of 0.5 mil on each side.
2. Prime galvanized members, after phosphoric acid pretreatment, with manufacturer's standard zinc dust, zinc-oxide primer.

F. Tolerances - Comply with MBMA's "Low Rise Building Systems Manual" - Chapter IV, Section 9, "Fabrication and Erection Tolerances".

2.12 SOURCE QUALITY CONTROL

A. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable.

B. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

PART 3 EXECUTION

3.01 COORDINATION

A. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Section 03300.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in Section 07800.

C. Coordinate all mechanical wall openings with mechanical construction drawings and mechanical contractor.

D. Foundation loads shall be submitted prior to construction of foundations.

E. Anchor bolts shall be delivered in sufficient time to permit proper placement in concrete foundation.

F. System for resisting lateral foundation loads shall be constructed prior to erection of building unless temporary ties of adequate capacity are installed.

1. Where lateral foundation loads are resisted by ties into floor slab, building erection shall not begin until floor slab has obtained specified strength.

2. Where lateral foundation loads are resisted by earth pressure, building erection shall not begin until footing excavation is backfilled and compacted in accordance with Specifications.

G. Foundation dimensions shown on Drawings are as required by a preliminary building system. Contractor shall coordinate dimensions with approved building.

H. Foundation has been designed for a preliminary building system. Engineer will require modification to foundations when foundation loads of approved building system vary from preliminary values.

I. Foundation modifications shall be made at no additional cost to Owner.

3.02 PREPARATION

A. Clean substrates of substances, including oil, grease, rolling compounds, incompatible primers, and loose mill scale that impair bond of erection materials.

B. Surface Preparation - Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

3.03 ERECTION AND INSTALLATION

A. Erect metal building system according to manufacturer's written instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

E. Primary Framing and End Walls - Erect framing true to line, level, plumb, rigid, and secure. Level baseplates to a true even plane with full bearing to supporting structures.

1. Make field connections using high-strength bolts

F. Secondary Framing - Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts. Hold rigidly to a straight line by sag rods.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.

2. Locate and space wall girts to suit door and window arrangements and heights.

3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

G. Bracing - Install bracing in roof and sidewalls where indicated on erection drawings.

1. Tighten rod and cable bracing to avoid sag.

H. Framing for Openings - Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to building structural frame.

3.04 ROOF PANEL INSTALLATION

A. General - Provide roof panels of full length from eave to ridge when possible. Install panels perpendicular to purlins.

1. Field cutting by torch is not permitted.

2. Rigidly fasten eave end of roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels.

3. Provide weatherseal under ridge cap.

4. Flash and seal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.

5. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
6. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.
7. Locate and space fastenings in true vertical and horizontal alignment.
8. Install ridge caps as roof panel work proceeds.
9. Locate panel splices over, but not attached to, structural supports. Stagger panel splices to avoid a four-panel lap splice condition.

B. Standing-Seam Roof Panels - Fasten roof panels to purlins with concealed clips at each standing-seam joint. Install clips over top of insulation at location and spacing determined by manufacturer.

1. Install clips to supports with self-drilling fasteners.
2. Crimp standing seams with manufacturer-approved motorized seamer tool so clip, panel, and factory-applied side-lap sealant are completely engaged.

C. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl sealant and fastened together by interlocking clamping plates.

3.05 WALL PANEL INSTALLATION

A. General - Provide panels full height of building when possible. Install panels perpendicular to girts.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Apply panels and associated items for neat and weathertight enclosure. Avoid “panel creep” or application not true to line. **(Addendum 4, Issued 1/12/2026)**
2. Unless otherwise indicated, begin panel installation at corners. **(Addendum 4, Issued 1/12/2026)**
3. Field cutting by torch is not permitted.
4. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws.
5. Fasten flashing and trim around openings and similar elements with self-tapping screws.
6. When two rows of panels are required, lap panels 4 inches minimum. Locate panel splices over structural supports.
7. When building height requires two rows of panels at gable ends, align lap of gable panels over wall panels at eave height.

8. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

9. Provide weather-resistant escutcheons for pipe and conduit penetrating exterior walls.

10. Flash and seal wall panels with weather closures under eaves and rakes, along lower panel edges, and at perimeter of all openings.

11. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing. Handle and apply sealant and backup according to sealant manufacturer's written instructions.

12. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.

13. Locate and space fastenings in true vertical and horizontal alignment.

B. Uninsulated Panels - Install wall panels on exterior side of girts. Attach panels to supports with fasteners as recommended by manufacturer.

C. Liner Panels - Install panels on interior side of girts at locations indicated on Drawings. Fasten with exposed fasteners as recommended by manufacturer.

3.06 FASCIA AND SOFFIT PANEL INSTALLATION

A. General - Provide panels full width of fasciae and soffits. Install panels perpendicular to support framing.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Install panels with vertical edges plumb. Lap ribbed or fluted panels one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

2. Field cutting by torch is not permitted.

3. Fasten flashing and trim around openings and similar elements with self-tapping screws.

4. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

5. Use aluminum or stainless-steel fasteners for exterior applications and galvanized fasteners for interior applications.

6. Locate and space fastenings in true vertical and horizontal alignment.

B. Fascia Panels - Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

C. Soffit Panels - Flash and seal panels with weather closures where soffit meets walls and at perimeter of all openings

3.07 ACCESSORY INSTALLATION

A. General - Install gutters, downspouts, ventilators, louvers, and other accessories according to manufacturer's written instructions, with positive anchorage to building and weathertight mounting. Coordinate installation with flashings and other components.

B. Flashing and Trim - Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Engineerural Sheet Metal Manual." Provide for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

2. Expansion Provisions - Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

C. Gutters - Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet OC using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts - Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches OC in between.

1. Provide elbow at base of downspout to direct water away from building unless noted to be tie to underground drainage system.

2. Tie downspouts to underground drainage system indicated.

E. Continuous Roof Ventilators - Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports according to manufacturer's written instructions. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to roof panels.

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

G. Insulation - Install insulation concurrently with panel installation, according to manufacturer's written instructions and as follows:

1. Set vapor-retarder-faced units with vapor retarder on the interior side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

H. Blanket Insulation - Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths with both sets of facing tabs sealed to provide a complete vapor retarder. Comply with the following installation method:

1. Over-Framing Installation - Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by panels fastened to secondary framing.

2. Over-Purlin-with-Spacer-Block Installation - Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Install layer of filler insulation over first layer to fill space formed by roof panel standoffs. Hold in place by panels fastened to standoffs.

I. Retainer Strips - Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

3.08 ERECTION TOLERANCES

A. Structural-Steel Erection Tolerances - Comply with erection tolerance limits of AISC S303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Roof Panel Installation Tolerances - Shim and align units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Wall Panel Installation Tolerances - Shim and align units within installed tolerance of 1/4 inch in 20 feet on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles

3.09 PROTECTION

A. Touchup Painting - Immediately after erection, clean, prepare, and prime or reprime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.

2. Apply compatible primer of same type as shop primer used on adjacent surfaces.

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

C. Roof and Wall Panels - Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

D. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

PART 4 SPECIAL PROVISIONS

4.01 FABRICATOR APPROVAL

A. The fabricator of structural load bearing members and assemblies furnished under this Section, shall be registered and approved to fabricate these products without special inspections per the requirements of the current Building Code Section 1704. The approved fabricator shall submit evidence of such registration at the time that shop drawings are submitted. At the completion of production, the approved fabricator shall submit a certificate of compliance to the local building code official stating that the fabrication was performed in accordance with the Contract Documents and the approved shop drawings.

END OF SECTION

SECTION 15211
SMALL PIPING AND VALVES

PART 1 GENERAL

1.01 SCOPE

A. This Section includes furnishing and installing all pipelines and valves less than 4-inch in diameter as shown on the Drawings or as required for a complete piping system for each service or combination of services except the piping and valves included in Section 15400 and Section 15500.

B. Each piping system shall be adequate to conduct and control the flow of process water, plant water, non-potable water, instrument air, compressed air, vacuum, natural gas, sewage gas, propane, fuel oil, chemicals, sewage, sludge, sampling or other uses as specified or shown on the Drawings.

C. This Section includes, but is not limited to:

1. Securing and bearing the cost of all permits, certificates, and inspection as required by local regulations and state codes.
2. All pipe, fittings, and connections for water supply to equipment and waste to drains.
3. Valves less than 4-inch in diameter, control devices, pipe hangers, anchors, supports, and sleeves for the piping systems covered under this Section.
4. Hose bibbs, sill cocks, and hydrants.
5. Non-potable water supply, drain lines, or other equipment requiring these services.
6. Compressed air piping, valves, connections to valve operators, and other equipment requiring compressed air.
7.

D. The Contractor shall remove all existing pipelines and valves less than 4-inch in diameter that are indicated on the Drawings to be removed except piping and valves included in Section 15400 and Section 15500. Removals shall be done in accordance with the requirements of Section 02110.

E. The Contractor shall furnish, install, and remove all temporary piping and valves that are required to maintain processes in operation during construction.

F. All wall, floor, and roof penetration and any building modifications which are required for the installation of the Work under this Section shall be included in this Section.

G. Instruments which are to be located in pipelines to be furnished under Division 16 shall be installed under this Section.

1.02 SUBMITTALS

A. Submittals shall be in accordance with the requirements of Section 01300 and shall include:

1. Shop Drawings for Review:

a. Drawings shall include plan dimensions to and elevations of sleeves, inserts, and anchors, the size and location of each run of pipe, and the location of valves and unions.

b. Manufacturer's literature, catalog data, specifications, and illustrations shall be bound in a brochure which includes a complete bill of materials.

2. Information for the Record:

a. Operation and maintenance manual.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

A. Copper Pipe and Tubing shall be manufactured in accordance with ASTM B88. Type L hard temper shall be used above ground and inside of structures for compressed air, hot and cold potable water, plant water, vacuum, and other services unless another type of pipe is specifically called for. Type K soft temper shall be used where underground piping is installed. Fittings and unions shall be solder joint fittings of cast bronze manufactured in accordance with ASTM B62 and with ends complying to ANSI B16.18 or wrought copper manufactured in accordance with ASTM B75 and with ends complying to ANSI B16.22. Unions shall be cast bronze and shall be installed adjacent to valves and equipment and as required to assemble the piping but not less than one union shall be included in each run. Threaded adapters shall be installed on each side of valves in copper lines. Where joints are made between pipes of different materials, dielectric couplings shall be installed. Pipe nipples shall be standard weight seamless red brass pipe ASTM B43. Solder joints shall be made in conformance with ASTM B828 Flux conforming to ASTM B813 shall be applied. Materials used for solder joints in all potable water services shall contain less than 0.2% lead and comply with ASTM B32.

B. Steel Pipe, unless otherwise noted, shall be used for all aboveground natural gas, digester gas aboveground only, aboveground fuel oil, and scum. Pipe shall be ASTM A53 Schedule 40, unless otherwise noted or where code requirements differ, with standard weld or malleable iron fittings. Unions shall comply with ANSI B16.3.

1. Steel piping installed above ground, unless otherwise noted, shall be Schedule 40 pipe with standard malleable iron screwed fittings. Unions shall be 250 pound screwed malleable iron with iron to iron seats. On pipes 2-inch and larger, ASTM A105 companion flanges shall be used in lieu of unions. For natural gas through 2-inch, fittings shall be 3,000-pound forged steel socket weld. For natural gas, digester gas, and fuel oil, pipe 2-1/2-inch and larger, ASTM A234 weld fittings and ASTM A105 flanges shall be used.

2. Steel piping installed underground, unless otherwise noted, shall be Schedule 40 plastic coated at the factory with Scotchkote 212 by 3M or equal. Pipe fittings through 1-1/2-inch shall be 3000-pound forged steel socket weld, and 2-inch and larger shall be ASTM A234 weld fittings. Joints shall be welded, primed, and wrapped double the manufacturer's recommended thickness with Tapecoat TC Primer and Tapecoat CT, or equal.

3. Where couplings are called for on gas piping, they shall be Dresser Style 38, or equal. The couplings shall be specifically designed for digester or natural gas, middle ring width shall be 5-inch long.

C. PVC Pipe and fittings shall be composed of Class 12454-B rigid PVC compound in conformance with ASTM D1784 (formerly classified Type I, Grade 1). Pipe shall be Schedule 80 with a design stress of 2000 psi in conformance with ASTM D1785. All joints, unless otherwise shown on the Drawings, shall be solvent welded in conformance with ASTM D2855. Joint solvent shall be as recommended by the pipe manufacturer and shall comply with ASTM D2564. In pressure or vacuum lines and in gravity drains 1-inch diameter and less, the fittings shall be Schedule 80 and shall conform to ASTM D2467. For gravity drains greater than 1-inch diameter, the fittings shall conform to the requirements of ASTM D2665. PVC pipe shall be used for acid-resistant services and all lines carrying chlorine solution, sodium hypochlorite, De-ionized (DI) water and other chemicals unless otherwise shown on the Drawings or specified.

D. CPVC Pipe shall be composed of Class CPVC 23447-B plastic as defined in ASTM D1784 (formerly classified Type IV, Grade 1). Pipe shall be Schedule 80 chlorinated polyvinyl chloride pipe in accordance with ASTM F441. Fittings shall be schedule 80 and shall conform to ASTM F439. All joints, unless otherwise shown on the Drawings, shall be solvent welded in conformance with ASTM D2896. Joint solvent shall be as recommended by pipe manufacturer and shall comply with ASTM F493. CPVC pipe shall be used where designated in Part 4 or on the Drawings.

E. Polyethylene Pipe with heat fusion joints and compression type metal fittings shall be used for underground natural gas service lines and underground digester gas service lines.

1. Piping shall be installed underground only and comply with ASTM D2513, ANSI B31.8, and AGA standards.

2. Fittings shall be approved plastic for making heat fusion joints complying with ASTM D2513, D2683, D3197, D3261, D3350. When applicable, compression fittings shall be Dresser 401 plastic.

3. Outside risers shall be flexible steel casing or rigid noncorrosive steel encased plastic and shall be coated and cathodically protected.

4. All underground pipe shall be traced with No. 12 insulated wire taped and installed as required by the governing authority.

5. Polyethylene Pipe shall be SDR 11 with a working pressure of 100 psi and shall be Phillips Driscopipe 8000 or equal.

2.02 VALVES

A. Unless otherwise specified or shown on drawings, valves installed in pipelines 3-1/2-inch diameter and smaller for process water lines shall be gate valves; for compressed air and vacuum, globe valves; for natural and sewage gas lines, lubricated plug or eccentric nonlubricated plug valves; and for gas lines less than 2-inch diameter tapered nonlubricated plug cocks; for fuel oil, ball valves; for sludge, eccentric nonlubricated plug valves. Valves for other types of services when required will be specified under that Section.

B. Gate Valves shall be 150-pound, all bronze, rising stem, solid wedge disc furnished with screwed or flanged ends as required. Gate valves shall be Crane No. 431, Jenkins No. 47-U, Powell No. 514/515, or equal.

C. Quick Opening Gate Valves shall be used at locations as shown on the Drawings. Quick opening gate valve shall be Crane 432 or equal.

D. Globe Valves shall be 150-pound, all bronze body with renewable plug-type disc of 500 Brinell Hardness Stainless Steel. The seat ring shall be screwed-in and of the same material as the disc. Globe valves shall be Powell No. 2600, Crane No. 14-1/2P, Jenkins No. 2032, or equal.

E. Ball Valves through 2-inch shall be screwed end bronze, two-piece, 125 psi, Teflon seats, bronze trim, and blowout-proof stem, Nibco No. T-580-BR-Y-20, or equal.

F. Butterfly Valves shall be AWWA, Class 150 B, wafer body equipped for ANSI 125-pound flanges. Butterfly valves shall provide bubble-tight shutoff to 150 psig cold water pressure. The valve body shall be made from ASTM A126, Grade B cast iron or equal. The valve disc shall be made with nickel-coated cast iron, bronze, or equal. Valve shall have bronze shaft bearings, O-ring shaft seals, and EPDM valve body seat Keystone Figure 239, or equal. Valves shall be hand lever actuated.

G. Check Valves shall be 200-pound, all bronze body with bronze disc, Y-pattern, with flanged or screwed ends as required. The check valves shall be Crane No. 36, Powell 560-Y/561-Y, Jenkins 762-A, or equal. Non-slam check valves shall be used on all pipelines operating at 25 psig or higher pressure and shall be Valve and Primer Corporation, Series 300 or equal.

H. Nonlubricated Plug Valves shall be 150-pound, all bronze body and plug, with synthetic rubber faced plugs and have screwed or flanged ends as required. They shall be DeZurik Figure 120, or equal. Valves shall operate with nonremovable lever type handles.

I. Lubricated Plug valves 3-1/2-inch and smaller shall be 150-pound solid bronze body and plug, lever operated, furnished with screwed or flanged ends as required, and with nonremovable lever operating handles. Lubricated plug valves shall be Rockwell

Permaturn Figure 114, or equal. Each valve shall be equipped with a giant button head coupler for use with a hydraulic hand lubrication gun. One gun shall be furnished.

J. Plug Cocks shall be nonlubricated tapered plug type cocks, furnished with a square operating nut and wrench. Plug cocks 1-inch diameter and smaller shall be all bronze; larger sizes shall be furnished with bronze plug and washer and iron body. Plug cocks shall be designed for 125 pound working pressure, Walworth 554, Hays 1275, or equal.

K. Sampling Cocks shall be Ernest Gage Co. Fig. 29, Conbeaco, or equal.

L. Pressure Regulator shall be Watts U5HP, or equal.

M. Corporation Stops shall be brass and comply with AWWA C800 as manufactured by Ford Meter Box Co., Inc. or equal. Corporation stops shall be provided with inserts, saddles, and curb boxes as required. Saddles shall be brass with double straps and be placed over a molded rubber gasket.

2.03 PVC VALVES

A. PVC Ball Valves shall be used in all PVC lines under this Section. Ball valves shall be PVC body, Hayward TBH Series True Union; or equal.

1. PVC ball valves used for sodium hypochlorite applications shall be of the vented ball design suitable for sodium hypochlorite. Ball valves shall be Hayward TBH Series “Z-Ball”, or equal.

B. PVC Butterfly Valves:

1. Butterfly Valves shall be made of Class 23447-B rigid PVC compound in conformance with ASTM D1/84 (formerly classified Type IV, Grade 1).
2. Shaft shall be 316 stainless steel. Seats and secondary seals shall be Viton.
3. Bearings shall be glass filled Teflon. Butterfly valves shall have a pressure rating of 150 psi at 70 degrees F.
4. Valve bodies shall be the wafer type compatible with 150-pound ANSI flanges.
5. Valves which are scheduled to be motor operated shall be furnished with mounting saddle. Manually operated valves shall be furnished with lever operators.

C. Check Valves:

1. Check Valves shall be made of Class 12454-B rigid PVC compound in conformance with ASTM D1784 (formerly classified Type I, Grade 1).
2. All check valves shall have Viton seals.
3. Check valves 4-inch size and smaller shall be true union ball checks.

D. PVC Pressure Relief Valves shall be Wallace & Tiernan No. U-23655, Fischer & Porter, or equal, with 1-inch female NPT BPV connections. These shall not be used on chlorination systems.

2.04 AIR RELEASE VALVES

A. Air release valves shall be used at various high points in the piping systems under constant pressure to exhaust entrapped air while the pipe is under pressure. Valves shall be designed for a working pressure of 150 psi.

B. Each air release valve shall be of the compound lever type and have a body and cover made of cast iron and a float of stainless steel. The float seat shall be made of Buna-N material while all other internal parts such as lever pins, cotter pins, screws, and linkage shall be made of highest quality stainless steel or bronze.

C. Each unit shall have female NPT connections in the sizes indicated on the Drawings. A valve shall be furnished and installed to isolate the process from the air release valve.

D. Discharge shall be piped to 6-inch above nearest drain out of traffic pattern.

E. Type “A” air release valves shall be Valve and Primer Corp. 200A; Golden Anderson AR Series, or equal.

2.05 AIR AND VACUUM VALVES

A. Air and vacuum valves shall be used at high points in pressurized piping systems subject to cycling to exhaust entrapped air whenever placed under pressure and to allow air to re-enter the line to prevent a vacuum from developing. Normal service pressures will be less than 150 psi.

B. Each air and vacuum valve shall have a body, cover, and baffle constructed of cast iron and a float made of stainless steel. The float seat shall be made of Buna-N material while all other internal parts such as float guides, bushings, and baffle retaining screws shall be made of high quality stainless steel or bronze.

C. Each unit shall have female NPT connections in the sizes indicated on the Drawings. A nonlubricated plug valve of same size as the air and vacuum valve shall be furnished and installed to isolate the process from the air and vacuum valve.

D. Discharge shall be piped to 6-inch above nearest drain out of traffic pattern.

E. Equipment shall be Type “AV” or Type “CAV” as manufactured by Valve and Primer Corp., GA Industries, or equal.

2.06 HOSE BIBBS

A. Hose bibbs inside buildings shall be all bronze angle hose valves with 3/4 by 11-1/2 threads per inch American (National) or Chicago Standard Hose Threads, Mueller Brass

Co. No. V-1016, or equal. Hose bibbs shall have nonremovable type vacuum breaker, Watts No. 8A, or equal. Hose bibbs shall be located 3-feet above the floor.

2.07 SILL COCKS

A. Sill cocks shall be cast bronze non-freeze wall hydrants, Wade W-8620, Zurn Z-1310, or equal, with 3/4 by 11-1/2 threads per inch hose connection, polished face, galvanized wall sleeve, renewable seat, brass or bronze operating parts, ground joint union elbow adapter with 3/4-inch IPS (or 3/4-inch solder) and removable T-handle.

2.08 ELECTRIC VALVE OPERATORS (OPEN-CLOSE)

A. Electric operators shall be sized and geared to meet the torques required at a valve opening and closing speed of 2 to 8 seconds per 90-degree rotation. The operator shall be rated for 25% duty cycle at maximum rate output.

B. Operators shall be powered by 115 v, single phase, 60 Hz current and shall operate in any mounting attitude.

C. Operators shall have thermal overload protection, reversing magnetic starter, and a NEMA 4 enclosure for all electrical components. The starter shall be capable of receiving contact closures from remote sources to actuate the operator in either direction. The operating motor shall be provided with surge suppression to limit voltage transients. The surge suppression device shall be equal to Electrocube Part No. RC1782, sized as required to suit the motor characteristics.

D. Adjustable limit switches shall be provided. Two limit switches shall be used for de-energizing operator once the fully open position or fully closed position of the valve is reached. Two limit switches shall be used for remote indication of end positions. Limit switches shall be single pole double throw snap acting totally enclosed and rated at 250 VAC.

E. Each operator shall be equipped with a manual override feature with manual lockout switch to prevent electrical operation when in the manual mode. Upon completion of manual operation, the operator will automatically return to the electrical mode.

F. Each operator shall be supplied with local indicator for visual valve position and an electro-mechanical brake to minimize overrun.

G. Electric motor valve operators that are to be supplied with butterfly valves shall be sized for 1-1/2 times the valves rated torque or a minimum of 400-inch-pound, whichever is greater.

H. The operators shall be a product of Raymond Control Systems, Worcester Control, or equal. Operators shall have easily identifiable terminal blocks for all external power and control connections.

2.09 STRAINERS

A. Strainers shall be provided where shown on the Drawings and as required to meet local and State codes. Strainers shall also be provided in all water lines ahead of all solenoid valves, pressure regulators, and pilot valves.

B. Unless otherwise specified or required by code, strainers shall be Leslie Model 7000, Mueller Muessco Model 11, or equal. Strainer shall have a Y-pattern cast iron body and a 40-mesh stainless steel screen.

C. The Contractor shall provide a plug cock for blow-off purposes.

2.10 BACKFLOW PREVENTERS

A. Reduced pressure type backflow preventers shall conform to ASSE Standard 1013, AWWA C511, and be approved by the State Department of Public Health, the State Plumbing Board, and the State Department of Labor-Construction Code. Preventers shall be Watts No. 909 with strainer, or equal. Relief valve shall be provided with an air gap, Watts Series AG or equal, piped to drain.

B. All backflow preventers are to include an in-line strainer between the stop valves.

2.11 SLEEVES

A. Type B Sleeve:

1. Type B sleeves are for use in exterior walls.

2. Type B sleeves consist of casting in place a black wrought iron sleeve two sizes larger than the service pipe with couplings on both ends of the sleeve.

3. Service pipe shall be caulked in place with oakum. The oakum shall be covered with a minimum of 1-inch of lead wool on both ends.

B. Type C Sleeve:

1. Type C sleeves are used in exterior walls and other walls as designated on the Drawings.

2. Type C shall be a modular mechanical type seal of interlocking synthetic rubber links by Link-Seal, or equal.

3. Unless otherwise indicated, the seal shall be suitable for corrosive service in a temperature range of minus 40 degrees F to 250 degrees F. The pressure plates shall be of Delrin plastic for good resistance to organic compounds. The bolts and nuts shall be of 18-8 stainless steel. The sealing elements shall be of EPDM rubber which has high resistance to most organic and inorganic materials.

C. Type D Floor Sleeve - Type D sleeves consist of casting in place a steel sleeve with four anchors in the floor slab. The sleeve shall be one size larger than the service pipe or

1-inch larger than the flange on the service pipe. The sleeve shall extend 1-inch above the finish floor surface.

D. Type E Sleeve:

1. Type E wall sleeves shall be used where noted on the Drawings.

2. Type E sleeves consist of casting in place mechanical joint, cast iron wall sleeves meeting the requirements of AWWA C110 and C111.

3. Each Type E sleeve shall be sealed using plain rubber gaskets, follower glands, and mechanical joint studs meeting all requirements of AWWA C111 on both ends.

E. Type F Sleeve:

1. Type F sleeves shall be used for passing through masonry walls, except as otherwise noted on the Drawings.

2. Type F sleeves shall be constructed as detailed on the Drawings using 15-pound. felt paper and sealant.

F. Type G Sleeve - Type G sleeves used for passing through gastight floors shall be similar to Type C sleeves with the addition of non-shrinking grout as shown on the Drawings.

G. Type H Sleeve:

1. Type H sleeves shall be similar to Type G sleeves and used for passing through gastight walls.

2. Type H sleeves shall be as detailed on the Drawings.

2.12 PIPE ESCUTCHEONS

A. Split-type escutcheons shall be used for piping through finished walls, floors, or ceilings. Escutcheons shall be of brass or chromium plated Model 3A by Ritter or equal.

2.13 AUTOMATIC TRAP PRIMER

A. Automatic trap primers shall be furnished and installed as shown on the Drawings.

B. Automatic trap primers shall prevent the traps from drying out by adding water to the traps to keep the water at a constant level.

C. Automatic trap primers shall have bronze bodies with integral vacuum breaker, non-liming internal operating assemblies with strainers and gasketed bronze covers.

D. Automatic trap primers shall be Zurn Z-1022, Sani-Gard, automatic trap primers or equal.

2.14 TAPPED SADDLES

A. Where specifically called for on the Drawings, service saddles shall be installed to provide a simple, positive, bubble tight tapping connection.

B. Saddles shall be rated for 150 psi working pressure and be constructed of corrosion resistant materials for long life, and of heavy proportions to withstand the strains of the tapping operations, and to support the service pipe after tapping.

C. Saddle gasket shall be made of neoprene rubber and assure a positive leak proof service connection.

D. Tapped saddles shall be Clow Corporation, Style 3408; Dresser Style 91 (double strap); or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Cutting of all pipe shall be done with sharp tools. The ends of each pipe shall be reamed until all burrs or fins are removed. Full tapered threads shall be used throughout and threaded joints shall turn up perfectly tight without the use of filling substances. A standard pipe joint paste or tape suitable to use of pipe shall be used on the male threads only, and none shall be allowed to accumulate on the inside of the pipes. All connections between pipe, pipe hangers, and equipment shall be made with an approved dielectric insulating material. Dielectric unions or insulated couplings shall be installed between any dissimilar metallic piping materials or at connections between dissimilar metallic pipes and equipment, tanks, etc.

B. Pipe joints shall conform to respective industry standards.

C. Expansion and contraction of the piping system shall be provided for by the use of swing joints, right angle loops, or approved expansion joints. Branch connections shall have three elbow spring pieces to allow for movement. Unless specified in Part 4, the piping system shall provide for the expansion as required in Section 15010. An expansion joint is also required at all building isolation or expansion joints.

D. Interior and exterior pipelines shall be installed and graded in accordance with State and/or Local Codes. Interior pipes shall run at right angles or parallel to building walls, placed as close as practicable to the ceiling and/or walls, and supported according to Section 15010. Drain valves shall be installed at all low points.

E. Pipe groups shall be run parallel with pipes of other trades, and wherever practicable, all piping shall be supported on common group hangers unless pitch of pipe as hereinbefore mentioned is required.

F. The piping shall be installed in a workmanlike manner and shall avoid interference with columns, beams, equipment, and other piping or fixed construction. A minimum of 7-feet of headroom shall be maintained at any point including stairs.

G. Type C wall sleeves shall be provided for all pipes passing through exterior walls unless other sleeve types are noted on the Drawings. Type C sleeves shall also be provided in interior walls where indicated on the Drawings, Type D floor sleeves shall be used where piping passes through floor. Other sleeve types shall be used where shown on the Drawings.

H. Buried pipe shall be firmly bedded the full length with the exception where bell holes are required. Buried piping located less than 3-feet below a building slab or footing shall be encased in concrete. Where unstable soil conditions occur under buildings, support shall be made from the underside of the structural slab by an approved type hanging device embedded in the concrete.

I. Unless shown otherwise on the Drawings, all buried pipe carrying liquids shall be installed with a minimum cover of 42-inch. Pressure piping which carries gases shall be installed with a minimum cover of 3-feet. When new piping crosses existing utilities and other obstructions which force a change in elevation or horizontal alignment, the Contractor shall install the new piping at a deeper elevation or new alignment to avoid the obstructions unless otherwise instructed by the Engineer. Such changes in elevation or alignment shall be made either by installing fittings or by deflecting joints in accordance with the pipe manufacturer's recommendations. Such Work shall be performed at no additional cost to the Owner. To the extent possible, pressure and process piping shall be installed at a constant grade. All changes in grade shall be approved by the Engineer.

J. Where PVC piping is laid in a trench, the bottom of the trench shall be well graded and compacted to insure even bearing for the full length of the pipe and the pipe shall be snaked at approximate 50-foot intervals to provide for expansion or contraction. Prior to testing the pipe, the pipe shall be center loaded with backfill between joints before testing to prevent the pipe from arching or whipping under pressure. During backfill the line shall be pressurized to 25 psi to minimize impact damage.

K. All valves shall be installed with their stems horizontal or above. As far as possible, all valves of the same type shall be of the same manufacturer.

L. Solenoid operated valves shall be installed in horizontal lines with the solenoid mounted vertically and upright.

M. The T-drill method manufacturing tees in continuous copper tubing is not acceptable.

3.02 EQUIPMENT CONNECTIONS

A. The Contractor shall make all connections where required between the various piping systems and all pieces of equipment. This shall include adapters, traps, backwater valves, or other fittings required when not furnished with the equipment.

B. Unions - Provide a union or flange in piping connections to each valve, device, or item of equipment, and elsewhere as required to makeup or disconnect piping. Each union shall be so installed as to permit the removal of parts and equipment for inspection and

cleaning, and shall be installed in a position which will permit the valve device or part to be removed without disconnection of any piping except unions. Union and flange shall be installed in such a position as will be accessible for disconnection items which are to be screwed. All ground joint unions on copper lines shall be cast brass or bronze. Wrought copper unions are not to be used. All unions, where possible, shall be brass to MPT type.

3.03 INSTRUMENTATION CONNECTIONS

A. The Contractor shall make all necessary allowances for and install all controls and instrumentation furnished under any Contract Division and which require in-line connection to process and pressure piping.

B. The Contractor shall provide all necessary mounting bosses, pipe and boss taps, plugs, tees, and any miscellaneous appurtenances to allow connection of Instrumentation and Controls and their associated piping to process and pressure piping.

C. Thermowells complete with all appurtenances listed in Division 16 shall be furnished and installed under that Division. Thermowells complete with all appurtenances which are not included in the list in Division 16 and are to be installed in piping under this Section, shall be furnished and installed under this Section.

D. Instrumentation and Controls are furnished and specified under various Sections including Section 16902. Any schedules shown in Section 16902 are not guaranteed to be complete.

3.04 PRESSURE AND LEAKAGE TESTS FOR (LIQUID) PROCESS AND PRESSURE PIPE

A. The Contractor shall furnish the pump, pipe connections, taps, gauges, auxiliary water container, bulkheads, plugs, and other necessary equipment and make pressure and leakage tests of all liquid conducting lines unless otherwise directed by the Engineer.

B. Tests shall be conducted on all liquid conducting pipelines or valved sections thereof as directed by the Resident Engineer. Testing of pipelines laid in excavation or bedded in concrete shall be done prior to backfilling or placing concrete cover, except restrained sections of pipe which shall be backfilled prior to testing, unless otherwise permitted by the Engineer. Tests on lines anchored or blocked by concrete shall not be conducted until the concrete has taken permanent set.

C. The line or section thereof to be tested shall be filled slowly with water to expel all air. Hydrostatic pressure shall be applied by pumping water from an auxiliary supply. The test pressure shall be maintained two hours minimum and additional time as required for thorough inspection to find any leaks or defects in the force main and appurtenances. Unless indicated otherwise in Part 4, the test pressure shall be 100 pounds per square inch or 50% above the normal operating pressure, whichever is greater. Should the pipe section fail to pass the tests, the Contractor shall find and correct failures and repeat the tests until satisfactory results are obtained.

D. Leakage tests shall be made simultaneously with or following completion of pressure tests of all lines or valved sections thereof. Leakage is defined as the quantity of water added to the pipe under test to maintain the required test pressure for a specified time. The leakage test pressure shall be not less than the maximum operating pressure of the section under test. The duration of the leakage test shall be not less than two hours. Allowable leakage for buried piping shall not exceed 50 gallons per inch of pipe diameter per mile of pipe in 24 hours. For piping not buried, any leakage during the test is unacceptable.

E. Lines that conduct fuel oil, gasoline, or chemicals that would have a deleterious effect upon the pipeline or process when mixed with water shall be purged after the pressure and leakage tests. Purging shall be performed with air or an inert gas such as nitrogen or carbon dioxide. Purging shall be continued for a minimum of two hours after all visible water has disappeared.

F. Testing of chlorination system piping shall also comply with the provisions of Section 11235.

3.05 PRESSURE TESTING FOR (GAS) PROCESS AND PRESSURE PIPE

A. All new and reused pipelines conducting gases shall be tested for tightness by the Contractor before final approval. All testing shall be witnessed by the Resident Engineer. Testing of natural gas lines shall meet the requirements of this Section or the governing authority.

B. All gas conducting pipelines shall be tested at 100 psig or 150% of the normal operating pressure, whichever is greater.

C. The test medium shall be air or an inert gas such as nitrogen or carbon dioxide. Oxygen, water, and/or natural gas are not to be used. Testing for leaks shall be done with an approved leak detector, or by brushing a soap solution or equivalent on each joint while the system is under pressure.

D. The Contractor shall provide for proper purging of all natural gas piping. All such purging shall be scheduled to minimize interruptions to the continued use of existing natural gas pipelines. After the piping has been pressure tested, leak tested, and approved, it shall be fully purged or cleared of air at the most distant point from the point of entry of the gas. This involves replacement of the atmosphere within the natural gas conduit by an inert substance in such a manner as to prevent the formation of explosive mixtures. Each major branch line shall be similarly purged at its far end. Purging shall be done only by personnel experienced in this particular operation.

E. Testing of chlorination system piping shall also comply with the provisions of Section 11235.

3.06 DISINFECTION OF WATER MAINS

A. After the pressure test and prior to disinfecting, the lines shall be thoroughly flushed through hydrant fixtures or by other means as approved by the Engineer.

B. The Contractor shall furnish required materials and apparatus and perform the Work of disinfection. Temporary and permanent materials, apparatus and appurtenances shall have the same NSF 61 approval and the installed work.

C. All water lines shall be cleaned and disinfected in accordance with federal, state and local codes; and AWWA C651, generally outline as follows.

1. Liquid sodium hypochlorite applied means of a suitable solution feed machine or pump. Sodium hypochlorite storage conditions and durations shall be controlled to minimize deterioration.

2. Calcium hypochlorite applied tablets, powder. Tablets or powder shall be placed in the water line during construction. The water line shall be filled, carefully, with potable water to produce a uniform solution.

3. Calcium hypochlorite applied as a water mixture. The calcium hypochlorite powder shall be mixed with water to form a paste and then thinned to a slurry, to be introduced into the pipe by pumping.

D. The dosage of chlorinating agent shall be of the amount to produce a minimum chlorine residual of 50 parts of chlorine per million. Tests with the DPD drop dilution method shall be made at selected points to determine the residual.

E. Treated water shall be retained in the lines for sufficient time to accomplish the desired disinfection but not less than 24 hours. Valves in the line shall be operated during the retention period.

F. Following disinfection, all treated water shall be flushed from the lines at their extremities until the replacement water throughout the lines shall, upon testing, be chemically and bacteriologically acceptable.

1. Two or more successive sets of samples taken at 24-hour intervals shall indicate microbiologically satisfactory water before the lines are placed into service.

2. Should the initial treatment prove ineffective, the disinfection shall be repeated until the test shows acceptable results.

G. All testing shall be done by a laboratory acceptable to the public authority having jurisdiction, and all costs shall be paid for by the Contractor.

3.07 EQUIPMENT DRAINS

A. Seal chamber, base plate drains, and equipment drains shall be piped to the nearest floor or equipment drain with copper lines as directed by the Engineer. All discharges shall provide a 2-inch minimum air gap above the drain.

PART 4 SPECIAL PROVISIONS

4.01 TRUCK UNLOADING STATION FOR CHEMICALS

A. The chemical feed quick coupling components formed of polypropylene material. They shall be heavy-duty Plastic Piping Systems Couplings, Dixon cam and groove fittings, or equal.

B. A 2-inch diameter male quick coupling, PPS Figure 1503006 or equal, with female NPT threaded adaptor end shall be assembled with a 2-inch diameter PVC NPT threaded pipe and secured in a concrete wall with a Type C wall sleeve as shown on the Drawings.

C. The adapters shall be protected when not in use by a cap, PPD Figure 1573006 or equal.

D. A 2-inch diameter ball check shall be supplied and installed as shown on the Drawings. The valve shall be a 2-inch ball check Chemtrol BC Series or equal.

4.02 POLYETHYLENE PRESSURE TUBING

A. Polyethylene pressure tubing shall be furnished and installed in the Plant Effluent Sampling Station as shown on the Drawings.

B. Tubing shall meet the requirements of ASTM D2737 and AWWA C901, latest revisions.

C. Specifications of and marking on the tubing shall be the following with markings spaced at intervals of not more than 5-feet:

1. Nominal tubing size = 2-inch.
2. Plastic tubing type = PE2305.
3. Pressure rating for water at 73-degree F = 160 psig.
4. Designation ASTM D2737 or AWWA C901, with which the tubing complies.
5. The Manufacturer's name (or trademark).
6. Testing agency seal.

4.03 PIPING SERVICE MATERIAL REQUIREMENTS

A. The following are the material classifications to be used for the piping service identified.

Service	Piping	Gaskets
Plant Water/NPW in Buildings **(Addendum 4, Issued 1/12/2026)**	Type L Copper	N/A
Plant Water/NPW Buried **(Addendum 4, Issued 1/12/2026)**	Type K Copper	N/A
Compressed Air	Type L Copper	N/A
Sodium Hydroxide	Stainless Steel	
	Schedule 80 PVC	
Sodium Hypochlorite	Schedule 80 PVC	

Service	Piping	Gaskets
Brine Solution	Schedule 80 PVC	
Brine Solution (Heat Traced)	Schedule 80 CPVC	

4.04 MISCELLANEOUS PRODUCTS

A. Solenoid Operated Valves - Packless type, 150 pound, screwed brass body, with soft discs, encapsulated Class B insulation, continuous duty, NEMA 4 or 7 enclosure as indicated on the Drawings, 115-volt coil, ASCO, JD Gould, or equal. Solenoid operated valves shall operate properly in both vertical and horizontal installations.

B. Shock Absorbers - Zurn “Shoktrol” Josam, or equal. Unit shall conform with ASSE 1010.

C. Relief Valves - All brass, Crane No. 2606, Kennedy, or equal, unless noted; pipe to floor.

4.05 PRESSURE GAUGES

A. Pressure gauges and thermometers shall be 4-1/2-inch in size with fiberglass reinforced polypropylene case, phosphor bronze bourdon tube, 6-inch or 4-1/2-inch dial faces with black lettering, micrometer type pointers and an accuracy of 1% of scale range. Pressure gauge shall be H.O. Trerice No. 450 series, Ashcroft 2462 series, or equal.

B. Pressure gauges shall read in pressure or compound as required by use.

C. All pressure gauges unless otherwise directed shall include a brass pressure snubber and a needle type shut-off valve.

D. Where directed, pressure gauges shall have diaphragm seals. The gauges, seals, and snubber shall be factory assembled and filled with a stainless-steel housing. Diaphragm seal shall be an Ashcroft 101 series, H.O. Trerice 877-2 series, or equal.

4.06 EXPANSION JOINTS

A. For pipe sizes 1/2-inch to 3/4-inch use an Arch Type, Holz Rubber Co., Model 300 or equal.

B. Joints shall be single arch type with control rods and plates. Joints shall have a one-piece elastomer leak free tube compatible with the process fluid. The manufacturer shall select the tube material.

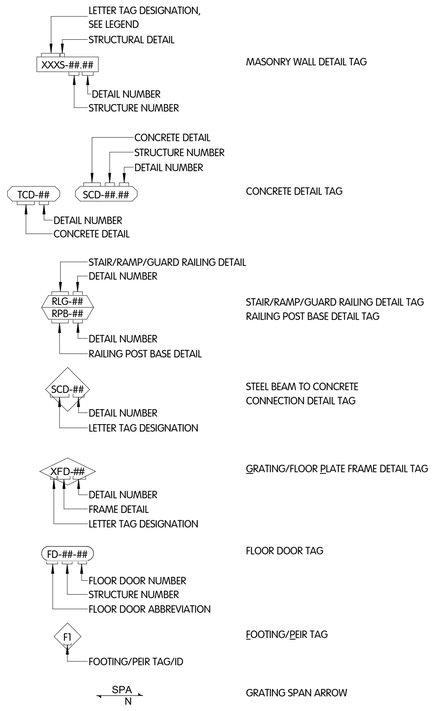
C. For pipe sizes 2-inch up to 4-inch use a Mercer style 500 or equal. Joints shall be a single arch type with control rods and plates. Joints shall have a one-piece elastomer leak free tube compatible with the process fluid. The manufacturer shall select the tube material.

4.07 INSULATION FOR PIPES

A. Pipe insulation shall be as specified in Section 15504.

END OF SECTION

STRUCTURAL SHEET SYMBOLS



STRUCTURAL TAG LEGEND

TCD	-TYPICAL CONCRETE DETAILS
SCD	-STANDARD CONCRETE DETAILS
GFD	-GRATING FRAME DETAILS
PFD	-FLOOR PLATE FRAMES DETAILS
GSD	-GRATING SUPPORT DETAILS
STR	-STAIR RAILING DETAILS
RLG	-GUARD RAILING DETAILS
RPB	-RAILING POSE BASE DETAILS
PWTS	-PARAPET WALL TOP DETAILS, STRUCTURAL
WBS	-WALL BASE DETAILS, STRUCTURAL
WPCS	-WALL/PLANK CONNECTION DETAILS, STRUCTURAL
WTCS	-WALL/TRUSS CONNECTION DETAILS, STRUCTURAL

STRUCTURAL ABBREVIATIONS

ALUM	ALUMINUM
B	BOTTOM
BLDG	BUILDING
C/C	CENTER TO CENTER
CJ	CONTROL JOINT
CSJ	CONSTRUCTION JOINT
DBR	DOWEL BAR REPLACMENT
DIA	DIAMTER
DEG	DEGREES
DIAG	DIAGONAL
DL	DEAD LOAD
EL	ELEVATION
EMB	EMBEDMENT
EXP.JT	EXPANSION JOINT
EXT	EXTERIOR
EXIST	EXISTING
FRB	FIBERGLASS
FTG	FOOTING
GALV	GALVANIZED
HORIZ	HORIZONTAL
INT	INTERIOR
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
NTS	NOT TO SCALE
O/O	OUT TO OUT
REINF	REINFORCING
SL	SNOW LOAD
SS	STAINLESS STEEL
STD	STANDARD
T	TOP
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VERT	VERTICAL
WL	WIND LOAD

TYPICAL STRUCTURAL NOTES

1. THE CONSTRUCTION SHALL CONFORM TO THE TYPICAL STRUCTURAL NOTES, DETAILS AND SCHEDULES, UNLESS NOTED OTHERWISE. TYPICAL NOTES, DETAILS AND SCHEDULES ARE PREFIXED WITH THE WORD "TYPICAL".
2. THE CONTRACTOR SHALL MAINTAIN ADEQUATE SUPERVISION AND CONTROL OF DEWATERING OPERATIONS TO ENSURE THAT STABILITY OF EXCAVATED AND CONSTRUCTED SLOPES ARE NOT ADVERSELY AFFECTED BY INFLOW OF GROUNDWATER AND TO PERMIT PLACEMENT AND CURING OF CONCRETE UNDER CONTROLLED ENVIRONMENTS.
3. BACKFILL UNDERNEATH BASE SLABS AND FOOTINGS SHALL BE SPECIAL BACKFILL, UNLESS OTHERWISE APPROVED. BACKFILL SHALL BE PLACED IN ACCORDANCE WITH THE SPECIFICATION 02200 AND SHALL BE WELL COMPACTED TO NOT LESS THAN 100% MAXIMUM DRY DENSITY IN ACCORDANCE WITH THE STANDARD PROCTOR TEST ASTM D-698.
4. VERIFY ALL EXISTING DIMENSIONS, ELEVATIONS AND CONDITIONS AT THE INTERFACE BETWEEN EXISTING & NEW CONSTRUCTION PRIOR TO DETAILING STRUCTURAL STEEL OR REINFORCEMENT. NOTIFY THE ENGINEER OF ANY DISCREPANCIES FOR RESOLUTION.
5. THE CONTRACTOR SHALL ENSURE THAT FOUNDATIONS REST ON FIRM SOIL MATERIAL. THE TESTING LAB SHALL VERIFY THAT THE SOIL BEARING CAPACITY LISTED BY THE "STRUCTURAL DESIGN DATA" TABLE IS OBTAINED PRIOR TO FOUNDATION PLACEMENT. THE BEARING CAPACITY VERIFICATION IS REQUIRED AT REGULAR INTERVALS IN EACH DIRECTION. NOTIFY THE ENGINEER OF ANY UNSUITABLE SOIL ENCOUNTERED. SUCH SOIL SHALL BE REMOVED AND REPLACED PER SPECIFICATION 02200.
6. DURING EXCAVATION OPERATIONS THE CONTRACTOR SHALL PREVENT THE UNDERMINING OF, AND DAMAGE TO, NEARBY NEW AND EXISTING STRUCTURES, AND UTILITIES, WITH SOIL SUPPORT METHOD SUCH AS SHEET PILING, SHAFT CONSTRUCTION, SOIL NAILING, UNDERPINNING, SOLIDER PILE & LAGGING, OR OTHER SOIL SUPPORT METHODS. THE NEARBY STRUCTURES SHALL BE MONITORED FOR SETTLEMENT WHILE THE EXCAVATION REMAINS OPEN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF SOIL SUPPORT AND UNDERPINNING METHODS. WHEN SHEET PILING OR OTHER SOIL SUPPORT STRUCTURES RETAIN MORE THAN 20 FEET OF SOIL, THE CONTRACTOR SHALL EMPLOY A PROFESSIONAL ENGINEER TO DESIGN THE SUPPORT. THE CONTRACTOR'S EMPLOYED ENGINEER SHALL SUBMIT SEALED CALCULATIONS AND DRAWINGS TO THE ENGINEER OF RECORD.

STRUCTURAL DESIGN DATA

BUILDING CODE	2024 OHIO BUILDING CODE	
RISK CATEGORY		= IV
FLOOR	LIVE LOAD, UNLESS OTHERWISE NOTED	= 250 PSF
FLAT ROOF	LIVE LOAD MECHANICAL & ELECTRICAL	= 20 PSF (MIN.) = 10 PSF
SNOW	GROUND SNOW LOAD FLAT ROOF SNOW EXPOSURE FACTOR SNOW LOAD IMPORTANCE FACTOR THERMAL FACTOR	= P_G = 20 PSF = P_F = 24 PSF = C_E = 1.0 = I_S = 1.2 = C_T = 1.0
WIND	BASIC WIND SPEED WIND EXPOSURE	= 120 MPH = C
SEISMIC	SEISMIC IMPORTANCE FACTOR SITE CLASS SEISMIC DESIGN CATEGORY DESIGN SPECTRAL RESPONSE ACCELERATIONS ANALYSIS PROCEDURE	= IE = 1.5 = D = C = S_{DS} = 0.126 = S_{D1} = 0.098 = EQUIVALENT LATERAL FORCE
STAIRS	LIVE LOAD, UNLESS OTHERWISE NOTED	= 100 PSF
GRATING	LIVE LOAD, UNLESS OTHERWISE NOTED	= 100 PSF
PLATFORM	LIVE LOAD, UNLESS OTHERWISE NOTED	= 100 PSF
SOILS	NET DESIGN BEARING CAPACITY	= 3000 PSF
CONCRETE	DESIGN STRENGTH AT 28 DAY	= 4500 PSI
FLOOD	100 YEAR ELEVATION	= 693.00
DATUM		NAVD 1988

PIPE PENETRATION SCHEDULE

TAG/ID	SIZE	TYPE	CL PIPE EL (UNO)	CONNECTION	USE
	4"	TYPE H		N/A	
	4"	TYPE H		N/A	
	12"	TYPE D	---	N/A	RW
	12"	TYPE D	---	N/A	RW
1-WATER TREATMENT BUILDING					
PP-1-1	8"	TYPE C		N/A	RW
PP-1-2	8"	TYPE C		N/A	RW
PP-1-3	6"	TYPE C		N/A	RW
PP-1-4	6"	TYPE C		N/A	RW
PP-1-5	6"	TYPE C		N/A	RW
PP-1-6	6"	TYPE C		N/A	RW
PP-1-7	6"	TYPE C		N/A	RW
PP-1-8	6"	TYPE C		N/A	RW
PP-1-9	6"	TYPE C		N/A	RW
PP-1-10	6"	TYPE C		N/A	RW
PP-1-11	6"	TYPE C		N/A	RW
PP-1-12	6"	TYPE C		N/A	RW
PP-1-13	8"	TYPE C		N/A	RW
PP-1-14	8"	TYPE C		N/A	RW
2-WATER TREATMENT BUILDING					
	8"	TYPE D	---	N/A	BS
	8"	TYPE D	---	N/A	BS
	8"	TYPE D	---	N/A	BS
PP-2-7	12"	TYPE D	---	N/A	RW
PP-2-8	12"	TYPE D	---	N/A	RW

NOTES: PENETRATION SCHEDULE
1. 4" AND LARGER PENETRATIONS SCHEDULED ONLY. PENETRATIONS SMALLER THAN 4" NOT SCHEDULED.

FOOTING SCHEDULE

TAG/ID	SIZE (DxWxL)	REINFORCING	T/FOOTING	NOTES
F1	1'-0"x 6'-6"x 8'-0"	#5 @ 12 EWTB	EL 712.50	
F2	1'-0"x 6'-6"x 6'-6"	#5 @ 12 EWTB	EL 712.50	
F3	1'-0"x 7'-0"x 8'-0"	#5 @ 12 EWTB	EL 712.50	
F4	1'-0"x 6'-6"x 8'-0"	#5 @ 12 EWTB	EL. 712.50	
F5	1'-0"x 8'-0"x 5'-0"	#5 @ 12 EWTB	EL. 712.50	
F6	1'-0"x 4'-2"x 4'-2"	#5 @ 12 EWTB	EL. 712.50	
F7	1'-0"x 4'-6"x 7'-0"	#5 @ 12 EWTB	EL. 712.50	
F8	1'-0"x 7'-6"x 10'-0"	#5 @ 12 EWTB	EL. 712.50	
F9	1'-0"x 14'-0"x 8'-2"	#5 @ 12 EWTB	EL. 712.50	
F10	1'-0"x 8'-6"x 10'-0"	#5 @ 12 EWTB	EL. 712.50	
F11	1'-0"x 4'-6"x 6'-7"	#5 @ 12 EWTB	EL. 712.50	
F12	1'-0"x 8'-10"x 8'-0"	#5 @ 12 EWTB	EL 712.50	
F13	1'-0"x 9'-6"x 8'-0"	#5 @ 12 EWTB	EL 712.50	
F14	1'-0"x 6'-6"x 10'-4"	#5 @ 12 EWTB	EL. 712.50	

PIER SCHEDULE

TAG/ID	SIZE (AxB)	REINFORCING	TIES	T/PIER	NOTES
F1	2'-1"x 1'-4"	(12) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F2	2'-11"x 1'-10"	(18) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F3	2'-1"x 1'-4"	(12) #5	#3 @10, (3) #3 @ 3 AT TOP	EL 716.00	
F4	2'-11"x 1'-10"	(18) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F5	1'-10"x 2'-1"	(14) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F6	1'-10"x 2'-1"	(14) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F7	1'-10"x 1'-4"	(12) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F8	4'-0"x 1'-4"	(20) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F9	1'-10"x 2'-1"	SEE DETAIL	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F10	4'-0"x 1'-4"	SEE DETAIL	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F11	2'-0"x 2'-0"	(16) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 715.42	
F12	2'-1"x 1'-4"	(12) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F13	2'-1"x 1'-4"	(12) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	
F14	2'-11"x 1'-10"	(18) #5	#3 @10, (3) #3 @ 3 AT TOP	EL. 716.00	

NOTE:
SCHEDULES ARE NOT GUARANTEED TO BE COMPLETE. ALL ITEMS SHOWN ON THE DRAWINGS OR SPECIFIED SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR WHETHER OR NOT LISTED IN THE FOLLOWING SCHEDULE.

STRUCTURAL LEGENDS, ABBREVIATIONS, SCHEDULES, AND NOTES

VILLAGE OF ASHVILLE, OHIO
NEW WATER TREATMENT PLANT

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
1	1/6/25	ADDENDUM 4	JDM

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JOB NO.: 1000-8177.002
SCALE: AS INDICATED
THIS LINE SCALES 1" WHEN PLOTTED TO NOTED SCALE

DESIGNED	DRAWN	CHECKED
DRC	RLR	JDN

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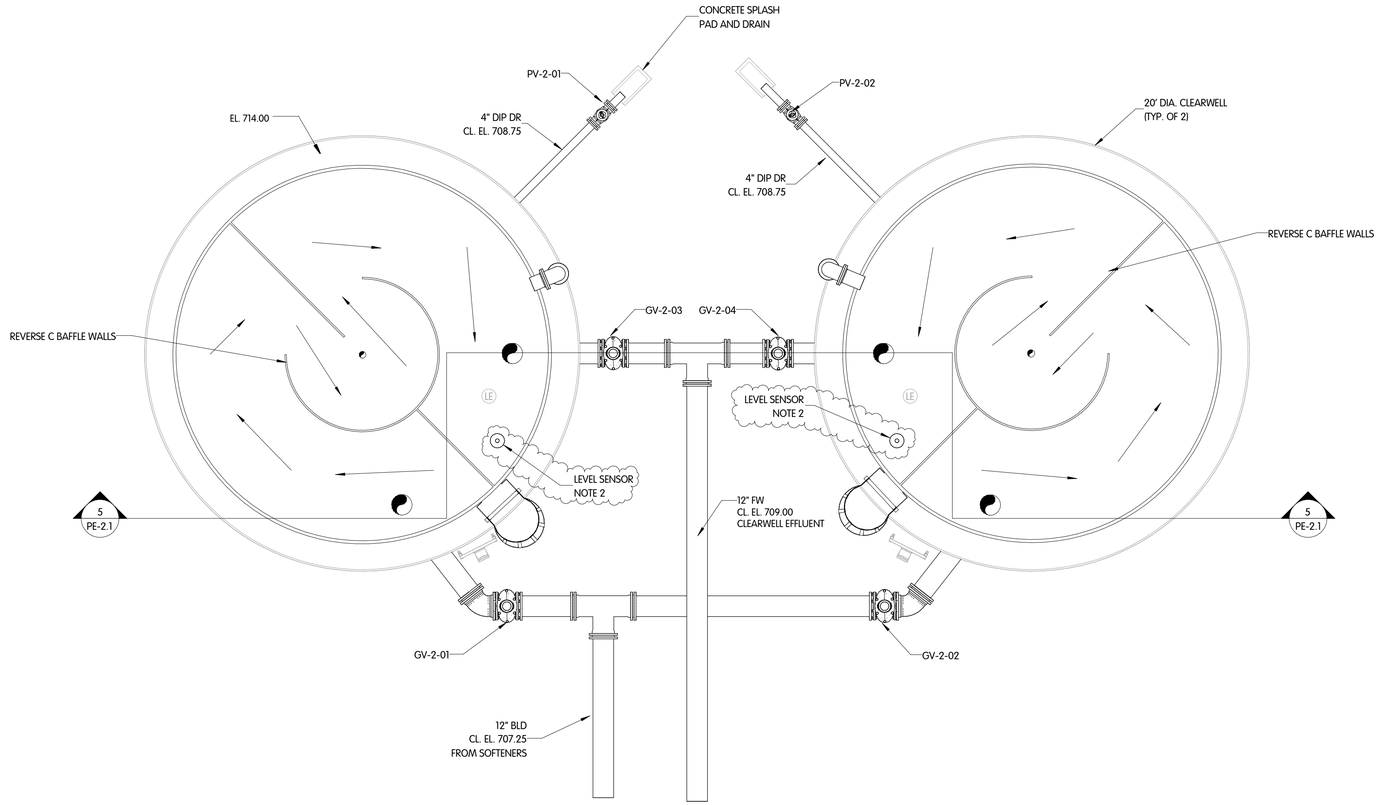
DATE: 11/18/25
SHEET NO.
S-0.1
36 OF 129



FLOOR PLAN AT EL. 714.00
1/4" = 1'-0"

NOTE:
1. MANUFACTURER TO PROVIDE A CATHODIC PROTECTION SYSTEM CONSISTING OF SACRIFICIAL MAGNESIUM ANODES TO PROVIDE CORROSION PROTECTION FOR THE PORTIONS OF THE STRUCTURE IMMERSED IN LIQUID.
2. PRESSURE TRANSDUCER TO BE INSTALLED PER SECTION 16902. TANK MANUFACTURER TO PROVIDE 4" FLANGE, BLIND FLANGE WITH 1" NPT TAP FOR KELLEM GRIP, AND 4" SCH. 80 PVC STILLING WELL. STILL WELL TO BE SUPPORTED BY TANK WALLS WITH 1" HOLES DRILL EVERY 24".

CLEARWELL
PIPING & EQUIPMENT
CLEARWELLS PLAN

VILLAGE OF ASHVILLE, OHIO
NEW WATER TREATMENT PLANT

NO.	DATE	REVISIONS AFTER ISSUED FOR BID	BY
1	1/6/25	ADDENDUM 4	JRM

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

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DESIGNED	DRAWN	CHECKED
XXX	XXX	XXX

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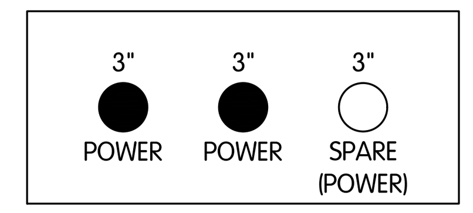
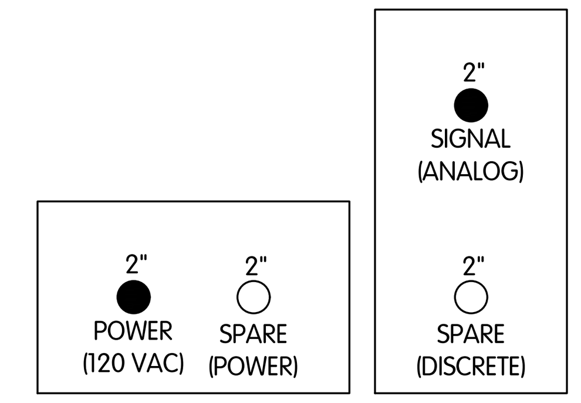


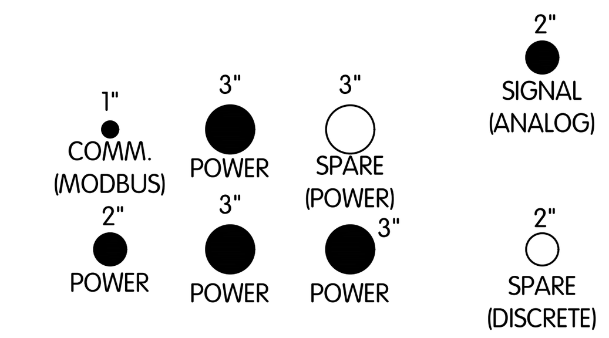
BETWEEN UTILITY TRANSFORMER AND S.E. EQUIPMENT

B — DIRECT BURIED CONDUIT EXCEPT UNDER ROADWAY
1" = 1'-0"



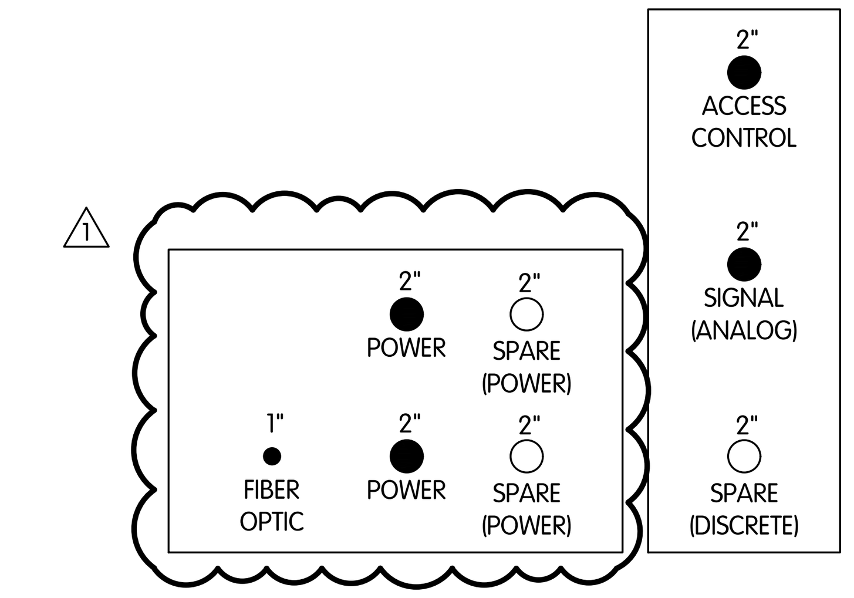
BETWEEN WTP AND CLEARWELLS

C — DIRECT BURIED CONDUIT EXCEPT UNDER ROADWAY
1" = 1'-0"



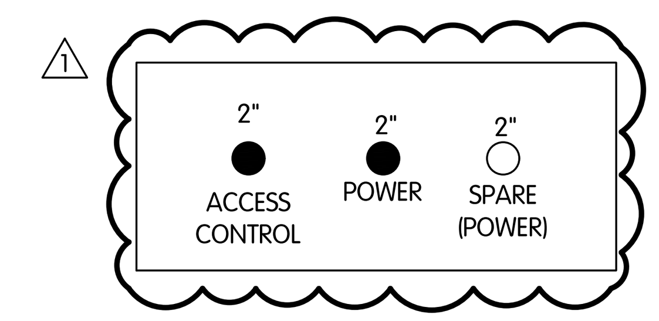
BETWEEN WTP AND GENERATOR

D — DIRECT BURIED CONDUIT
1" = 1'-0"



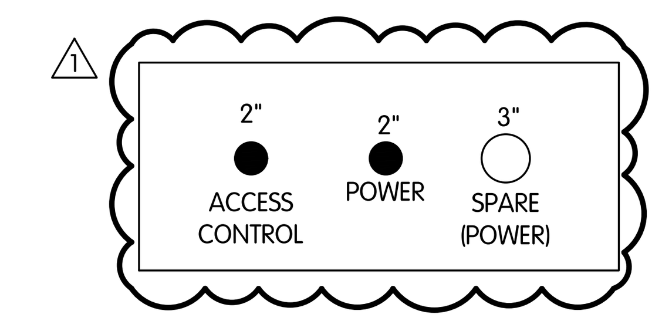
BETWEEN WTP AND WATER TOWER

E — DIRECT BURIED CONDUIT EXCEPT UNDER ROADWAY
1" = 1'-0"



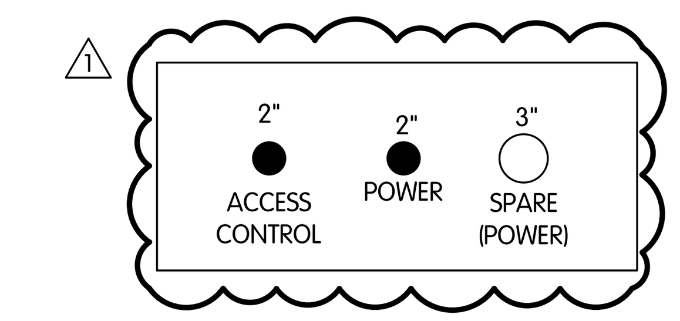
BETWEEN WTP AND WEST SLIDE GATE

F — DIRECT BURIED CONDUIT EXCEPT UNDER ROADWAY
1" = 1'-0"



BETWEEN WATER TOWER AND NORTH SLIDE GATE

G — DIRECT BURIED CONDUIT EXCEPT UNDER ROADWAY
1" = 1'-0"



BETWEEN WTP AND SOUTH SLIDE GATE

H — DIRECT BURIED CONDUIT EXCEPT UNDER ROADWAY
1" = 1'-0"

NOTES:

1. THE MINIMUM AND MAXIMUM BURIAL DEPTHS TO TOP OF ELECTRICAL DUCTS OR CABLES; AND THE SPACING BETWEEN DIFFERENT TYPE OF CABLES/CONDUITS SHALL BE IN ACCORDANCE WITH NFPA 70 ARTICLE 300.50 AND AS PER SPECIFICATION SECTION 16130- CONDUIT SURFACE METAL RACEWAYS AND ACCESSORIES. SEE TYPICAL CONCRETE ENCASED CONDUIT DETAIL ON ELECTRICAL DETAILS SHEET.
2. SEE ELECTRICAL SITE PLAN SHEET.
3. CONDUITS INSTALLED DIRECTLY UNDER ROADWAY AND 5 FEET FROM ROADWAY ON EITHER SIDES SHALL BE CONCRETE ENCASED.
4. ALL SPARE CONDUITS SHALL HAVE PULL STRINGS INCLUDED IN THEIR INSTALLATION FOR FUTURE USE.

ELECTRICAL DUCT BANK SECTIONS AND UTILITY TRANSFORMER PAD DETAIL

VILLAGE OF ASHVILLE, OHIO
NEW WATER TREATMENT PLANT

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E-0.6
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