



Bloomington and Normal Water Reclamation District

P.O. Box 3307, Bloomington, IL 61702-3307 (309) 827-4396

August 27, 2024

VIA EMAIL

United States Environmental Protection Agency
1200 Pennsylvania Avenue NW
WJC-E 7334A
Washington, DC 20460

Attention: Dan-Tam Nguyen, Project Engineer
Email: Nguyen.Dan-Tam@epa.gov

NOTE:

This waiver submission may include references to proprietary items and brand name products. These references have been retained to provide context for the waiver submission. EPA does not evaluate a waiver based on a proprietary item but reviews the performance-based specifications for the project/products. As such, any references to brand or proprietary items are reviewed on an "or equal" basis by EPA.

Items and pages may have been intentionally redacted or excluded by the EPA. Contact WFIAWaiver@epa.gov for more information if necessary.

Dear Ms. Nguyen:

On behalf of the Bloomington Normal Water Reclamation District, please find enclosed our AIS/BABA Waiver Request Form and associated documentation for your consideration. As outlined in the waiver request, we seek a waiver from the American Iron and Steel requirements for a select number of valves due to scheduling delays associated with our SEWWTP Biological Phosphorus Removal Improvements Project.

If any additional information is needed, please reach out to our project manager Zach Knight with Farnsworth Group, Inc. (zknight@f-w.com).

Thank you for your assistance.

Sincerely,

Timothy L. Ervin
Executive Director
Bloomington & Normal Water Reclamation District

CC: Zach Knight, PE Farnsworth Group, Inc.
Shawn Maurer, PE District Engineer



We treat water seriously.



AIS/BABA Waiver Request Form

Provide the following information in this form or as an attachment.

Borrower and Project Information

1. Legal name of borrower or prospective borrower and WIFIA Loan ID (if available):
Bloomington-Normal Water Reclamation District (BNWRD) ID#N22106IL
2. WIFIA Project name:
Bloomington-Normal Wastewater System Modernization and Rehabilitation Program – Project 1
3. Waiver Request Contact List. Provide the names and email addresses of all person(s) who should be contacted in regards to this waiver request:
 - Shawn Maurer, BNWRD, smaurer@bnwrdil.gov
 - Zach Knight, Farnsworth Group, Inc., zknight@f-w.com

Waiver Request Information

1. Under which domestic preference requirements is the waiver being requested? **Please select only one.** If applying for a waiver under BABA, there is no need to apply for a separate waiver under AIS.
 AIS BABA

2. Type of waiver being requested:
 Product Availability Public Interest Cost

3. Provide a brief explanation of the need for a waiver:

The submitted waiver for the eight (8) valves identified below is requested due to the lead time required for fabrication and delivery to the project site. Based on current communication with the supplier and manufacturer – the AIS compliant valves are currently projected to be available for delivery by April 2025 while the non-AIS compliant valves would be available by October 2024. The 2025 delivery would push the project schedule back while we waited for the valves to be delivered so the excavation could be backfilled and built upon, creating a bottleneck domino effect. It is worth noting, the identified 8 valves are only a few of the total 88 valves planned for the job – the other 80 valves are expected to be AIS compliant.



4. For **product availability** waiver requests, complete the following table to provide information about the product(s) for which the waiver is being requested. **For each product listed, attach a copy of the relevant technical specifications of the product to this form.**

Product Name	Brief description (material type and size)	Unit Cost of non-domestic product	Unit Cost of domestic product *	Quantity Needed	Date product is needed
Val-Matic Model 8906W.1XP	6" Check Valve			2	10/15/2024
Val-Matic Model 2006/1B08XP	6" Butterfly Valve			2	10/15/2024
Val-Matic Model 5708F/6A02XP	8" Plug Valve	Redacted	Redacted	1	10/15/2024
Val-Matic Model 5620F/5Q30XP	20" Plug Valve			1	10/15/2024
Val-Matic Model 5730/6W02XP	30" Plug Valve			2	10/15/2024

*Complete this column only if domestic products are available.

5. For **product availability** waiver requests, describe the efforts made to source products compliant with AIS or BABA. The narrative may include a list of manufacturers or suppliers contacted and responses received. Include any email correspondence with manufacturers or suppliers as an attachment to this form.

Equipment sourcing for valves including bidding efforts in compliance with AIS requirements. Contractor contacted specified valve manufacturers during bidding process to securing pricing and availability to meet project requirements including AIS certifications. Val-Matic was the manufacturer provided by selected contractor. AIS compliant valves are available as mentioned above but lead times are problematic.

6. For **public interest** waiver requests, please provide a brief explanation why compliance with AIS or BABA is not in the public's interest. Public interest waivers may be requested for the entire project or for specific products. If the waiver is being requested for specific products, please include a list of the products in the narrative.

N/A

7. For **cost** waiver requests, identify the total project cost without AIS or BABA requirements and demonstrate that the total project cost increases by more than 25 percent with the requirements. Include supporting costs documentation, such as itemized cost estimates comparing projects costs with either AIS or BABA requirements versus without the requirements, as an attachment to this form.

8. N/A



9. For all waiver requests, identify the total estimated material cost of the project:

\$17,228,300.00

Signature: The undersigned is an authorized representative of the (prospective) borrower. By signing below the undersigned is certifying that the borrower or prospective borrower made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and nonproprietary communications with the prime contractor.

Signature:  _____

Date Signed: 8-26-2024

Name: Tim Ervin
Title: Executive Director
Organization: Bloomington-Normal Water Reclamation District
Phone: 309-827-4396
E-mail: tervin@bnwrdil.gov

DIVISION 46 - WATER AND WASTEWATER EQUIPMENT
SECTION 461100 - PROCESS PIPING, VALVES, FITTINGS AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Special Provisions, and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes process piping, fittings, valves, supports and accessories necessary for installation of piping and connection to equipment and structures as shown on the Plans.
 - 1. Section 011010 – Summary of Work Sequence
 - 2. Section 011400 – General Coordination
 - 3. Section 013300 – Submittals
 - 4. Section 099000 – Process Equipment and Ferrous Metal Painting
 - 5. Section 461000 – General Requirements
 - 6. Section 461105 – Electric Actuators
 - 7. Division 46 – Process Equipment
 - 8. Division 26 - Electrical

1.3 SUBMITTALS

- A. Manufacturers' literature and shop drawings demonstrating compliance with this Specification.
- B. Submittals required by this section shall be made in one (1) group for review by the Engineer.
- C. Contractor shall provide a piping layout shop drawing and schedule of materials for all proposed piping, fitting, valves and supports 8-in. diameter and larger between process units and between process units and equipment. All piping installation shall be provided with flexibility to allow removal and re-installation of select piping and fittings.
- D. Provide a tabulated schedule identifying valve or pipe size, type, location, Plan Sheet and accessories. A submittal with a general list of materials that does not identify specific locations of the equipment will be rejected.
- E. The manufacturer shall verify with the submittal the correct valve actuator orientation (manual and electric motor actuators). Verify that the valve and actuator assembly will fit in the space provided in the design locations shown on the drawings with the submittal. Any conflicts shall be brought to the immediate attention of the Engineer.
- F. Shop drawings shall include electric actuators per specification Section 461105 for all valves to receive electric actuators, detailing compliance with both specifications for a complete valve and actuator installation (inclusive of necessary startup services specified).
- G. For manufacturer/vendor supplied control panel specified, comply with Specification Section 461030 – Programmable Logic Controllers and 461040 – Control Panels. Submit,

for the Owner's maintenance use on the PROJECT WWTP site only, a fully documented and tagged I/O (Control Process Input and Output) tabulated list and a fully documented copy of the PLC Ladder Logic Program operating the equipment via the specified Allen-Bradley PLC.

- H. Operation and Maintenance Manual: The Manufacturer shall submit two (2) complete copies of an Operation and Maintenance Manual and an electronic copy per Section 013300 – Submittals. The manuals shall be in a 3-ring binder and be sectioned by component with appropriate indexing. Addresses, phone numbers and points of contact for repair and replacement equipment parts and service shall be included.

PART 2 PRODUCTS

2.1 PIPING MANUFACTURERS/MATERIALS (ALL SIZES IPS)

A. Ductile Iron Pipe (D.I.)

1. Clow or equal
2. Latest edition AWWA C-151/C21.51
 - a. Cement lining, ANSI/AWWA C-104/A21.4; exterior primed per Section 099000.
 - b. **AIR SERVICE PIPING AND FITTINGS SHALL BE UNLINED**
3. Class 53 or as noted.
4. Primed per Section 099000
5. Joints
 - a. Flanged ANSI/AWWA C-115/A21.15
 - 1) American Standard Class 125 Ductile Iron
 - 2) Gaskets:
 - a) Wastewater, sludge, and water piping: Garlock MULTI-SWELL Style 3760, or equal. 0.063" thickness
 - b) All Air Service Piping shall have Garlock Style 9912 BUNA-N or Style 9938 FKM rubber gaskets for high temperature conditions. Gaskets shall be rated for at least 250°F.
 - 3) Bolts and nuts best quality fine bar iron, square headed hexagonal nuts ANSI B16.1 Standard, Cadmium plated, SAE Grade 2 or better, , except for use in underground valve vaults, meter manholes, process tank interiors, pump wet wells, or other areas subject to corrosion (such as the Residuals Building, Aeration Basin, Supplemental Influent Lift Station, Bypass Bar Rack Structure, etc.) which shall be stainless steel conforming to the physical properties of ASTM A-193, Grade B-8, Class 2, Type 304.
 - 4) Lug retained flanges requires written permission of the Engineer for use in specific requested locations.
 - 5) All piping installation shall be provided with flexibility to allow removal and re-installation of select piping and fittings.
 - b. Mechanical ANSI/AWWA C-111/A21.11

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6. Fittings
 - a. Latest edition ANSI/AWWA C-110
 - b. Same as pipe
 - c. Primed per Section 099000
 - d. Rated for 250 psi working pressure.
 7. Wall pipe/sleeves
 - a. Joints per Plans. Buried exterior MJ-Joints shall be restrained-joint.
 - b. Intermediate collar or water seal
 - c. Primed per Section 099000
- B. Plastic Pipe (PVC)
1. Schedule 80, Type I, Grade I per ASTM D-1784, D-1785 and NSF Standard 14
 2. Solvent cement ASTM D-2564
 3. Fittings
 - a. Same material as pipe
 - b. Schedule 80: ASTM D-2467 solvent weld joints
 - c. Flanged joints: Class 150 ANSI B16.5, flat-faced, socket-end type. Solid gaskets SBR, Garlock, or equal; 1/16 in. thick and full-faced. Bolts and nuts shall be stainless steel.
 4. Design Stress Rating 200 psi at 73° F
 5. Stamped with NSF seal of approval and schedule number.
- C. Carbon Steel (Interior air or gas) and Stainless-Steel Pipe (Exterior Air Service)
1. Seamless Carbon Steel Pipe, ASTM A-106, Grade B; Seamless Stainless Steel Pipe ASTM A-312
 2. Wall Thickness: 2-in. and smaller Schedule 80 or Schedule 80 stainless per plan; 2-1/2 or larger Schedule 40 or Schedule 40 stainless per plan
 3. Joints: Butt-Weld with flat-backing-ring. Welding end detail per Std. MF-270.8.4.
 4. Flanged Joints: ASTM A-105 or A-181, Gr. II, 150 lb. Stainless Steel ASTM A-182; Std.; 2-in. and smaller socket or slip-on weld; 2-1/2 and larger weld-neck or slip-on; 1/16-in. raised face with serrated face finish.
 5. Bolts: Stud Bolts. ASTM A-193, Gr. B7; ASTM S593 Gr. 2 316 stainless steel.
 6. Nuts: ASTM A-194, Gr. 2H; ASTM S594, Gr. 2, 316 stainless steel
 7. Gaskets: Garlock Style 9912 BUNA-N or Style 9938 FKM rubber gaskets for high temperature conditions. Gaskets shall be rated for at least 250°F.
 8. Fittings: 2-in. and smaller socket weld, 3,000-lb. Std., ASTM A-105 or A-181 Gr. II; 1-1/2 in. and larger, butt-weld, ASTM A-234, Gr. WPB; Stainless Steel ASTM A-403.
 9. Flanged Fittings: Carbon steel ASTM A-105 or A-181 Gr. II, 150 lb. Std. ANSI B16.5; Stainless Steel ASTM A-182.
- D. Grooved Carbon Steel Pipe (Alternative for Interior Air Service)
1. Wall Thickness: Schedule 40.
 2. Joints: Couplings consisting of two ductile iron housing segments conforming to ASTM A536 Grade 65-45-12, pressure responsive elastomer gasket (grade to suit the intended service), and ASTM A449 compliant bolts and nuts.
 - a. Rigid Type: Housings cast with offsetting, angle-pattern, bolt pads to provide

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- system rigidity and support and hanging in accordance with ANSI B31.1 and B31.9. Installation-Ready for complete installation without field disassembly. Basis of Design: Victaulic Style 107N.
- b. Flexible Type: For use in locations where vibration attenuation and stress relief are required: Basis of Design: Victaulic Installation-Ready Style 177 or Style 77.
 - c. AGS two-segment couplings for pipe sizes 14” and larger, with wide-width FlushSeal® gasket and lead-in chamfer on housing key. Basis of Design: Victaulic Style W07 (rigid) and Style W77 (flexible).
3. Fittings: Ductile iron conforming to ASTM A536, Grade 65-45-12; wrought steel conforming to ASTM A234, Grade WPB; or factory-fabricated from ASTM A53 steel pipe.
 4. Flange Adapters: For direct connection to ANSI Class 125 / 150 flanged components. Basis of Design: Victaulic Style 741 / AGS W741.
 5. Gaskets: Pressure, responsive, grade to suit the intended service. [Fluoroelastomer; i.e. FKM, Style 9938 manufactured by Garlock, or equal].
 - a. Installation-Ready gaskets are “center-leg”, with pipe stop to ensure proper groove engagement, alignment, and pipe insertion depth.
 6. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
- E. Grooved End Stainless Steel Pipe (Alternative for Exterior Air Service)
1. Wall Thickness: Schedule 10S or Schedule 40S.
 2. Joints: Couplings consisting of [two ductile iron housing segments conforming to ASTM A536 Grade 65-45-12, with ASTM A449 compliant bolts and nuts] [and] [stainless steel housing segments conforming to ASTM A351 Grade CF8M, with ASTM F593 / F594 compliant bolts and nuts], and pressure responsive elastomer gasket (grade to suit the intended service).
 - a. Rigid: Housing key shall engage the bottom of the groove. Basis of Design: Victaulic Style 89 (ductile iron) or Style 489 (stainless steel).
 - b. Flexible Type: For use in locations where vibration attenuation and stress relief are required. Basis of Design: Victaulic Style 77S and 77DX.
 - c. AGS two-segment couplings for pipe sizes 14” and larger, with wide-width gasket and lead-in chamfer on housing key. Basis of Design: Victaulic Style W89 (rigid).
 3. Fittings: Wrought stainless steel conforming to ASTM A403, or factory-fabricated from ASTM A312 stainless steel pipe.
 4. Flange Adapters: For direct connection to ANSI Class 125 / 150 flanged components. Basis of Design: Victaulic Style 441.
 5. Gaskets: Pressure, responsive, grade to suit the intended service. [Fluoroelastomer].
 6. Schedule 10S pipe shall be roll grooved using a Victaulic grooving tool equipped with RX roll sets, specifically designed for stainless steel pipe.
 7. Verify pressure ratings specific to schedule of pipe prior to installation.
 8. All grooved couplings, fittings, valves, and specialties shall be the products of a single

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manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

- F. Copper Tubing
 1. ASTM B75/B88 Type K, L
 2. Drawn Temper, ASTM B88
 3. Joints: Solder (95-5 tin-antimony)
 4. Flanges: 150-lb. ANSI B 16.24, ASTM B61/B62
 5. Bolting: Carbon Steel, ASTM A-307
 6. Wrought Copper Fittings (ASTM B16.22)

- G. Black Steel Pipe and Fittings (Gas)
 1. ASTM A53, Schedule 40 Black Steel Pipe
 2. Fittings 2-in. and smaller ASME B16.3, Class 150 Malleable screwed with thread ends ASME B1.20.1
 3. Fittings 2-1/2 in. and larger butt weld fittings ASME B16.9 or ASME B16.11
 4. Unions 2 in. and smaller 150 lb. screwed and flanged ASME B16.39 Class 150; 2-1/2 in. or larger weld-neck forged steel bolted flanges ASME B16.5, ASTM A-181, Grade 1, 150 lb.
 5. Joint compound and type suitable for natural gas.
 6. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for all below-grade (buried) piping.

- H. Polyethylene Pipe
 1. PE 3408 high-density, extra high-molecular weight polyethylene
 2. ASTM D-3350, cell classification PE 345434C
 3. Minimum SDR rating 11 (SDR-11) with minimum pressure rating of 160 psi at 23°C
 4. Fittings: molded polyethylene; same pressure rating as pipe
 5. Joints: Heat fusion according to manufacturer's instructions
 6. Manufacturer: Phillips Drisco Pipe, Chevron Plexco, or equal

2.2 VALVES AND ACCESSORIES

- A. Plug Valves (4-inches and larger)
 1. DeZurik PEC Eccentric Plug Valves, or equal.
 2. Valves shall be eccentric plug valves and shall meet the following minimum requirements:
 - a. Non-lubricated eccentric-type with resilient-faced plugs.
 - b. End connection as shown on the Plans.
 - c. Port areas of not less than 100% pipe area shall be supplied on 4" valves, 85% on 6"-16" valves, and 75% on 30" and larger.
 - d. Valve bodies: ASTM A-126 Class B cast iron; factory primed per Specification Section 099000.
 - e. Bodies seating surface shall be furnished with a welded overlay of not less than 99% pure nickel.
 - f. Plugs: ASTM A-126 Class B cast iron, one-piece construction and resilient-faced with neoprene or hycar
 - g. Radial journal bearings shall be 316 stainless steel, of the permanently lubricated type. Two thrust bearings shall be provided in the upper journal area, one of stainless steel and one of Teflon. The lower journal shall have one

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- stainless steel thrust bearing of the non-adjustable type. Grit seals shall be furnished in the upper and lower journals to prevent abrasive media from entering the bearing and seal areas.
- h. Shaft seals shall be O-ring type per AWWA C-504-80 externally adjustable, repackable without removing the bonnet or actuator from the valve and repackable under pressure. Seal shall withstand 28-in. vacuum without leaking.
 - i. Pressure ratings: 175 psi seating/unseating through 12 in. and 150 psi seating/unseating 14 in. or larger (both directions).
 - j. Manual valves shall be equipped with handwheel gear actuators unless otherwise indicated. Valves 7 ft 0 in. or higher above FFE with chainwheel geared actuator. All gearing shall be enclosed in a semi-steel housing suitable for running in a lubricant with seals provided on all shafts. Actuator shaft and quadrant to be supported on permanently lubricated bronze bearings. All exposed nuts, bolts, springs and washers shall be stainless steel.
 - k. Provide operating stem (stainless steel where indicated), valve stand, stainless steel valve stand support bracket and stainless steel stem guides and/or geared valve stand where indicated on the Plans.
 - l. Service condition (submerged, buried, non-submerged, interior, exterior) as noted for valve location on the plans. Verify valve orientation and dimensional spacing to confirm valve can be located, oriented, positioned and installed as noted on the drawings.
 - m. Provide geared actuator and/or stand for electric motor actuator where indicated on the Plans.
 - n. Electric Actuators shall be provided for valves where called out on the Plans. Electric Actuators shall comply with Specification 461105 inclusive of startup services specified therein.
 - o. Provide a tabulation with tag list of each valve keyed to the design plan location.
- B. Plug Valves (3-inches and smaller)
- 1. DeZurik PEC Eccentric Plug Valves, or equal.
 - a. Valves shall be non-lubricated, eccentric type with resilient faced plugs with end connections as shown or specified. Port areas of not less than 100" of pipe area shall be supplied on 3" and smaller valves. Bodies – ASTM A126 Class B cast iron AWWA C-504 Section 2.2. bodies in 3-inch and larger valves furnished with welded overlay seat of not less than 90% pure nickel AWWA C-507 Section 7.2. Plugs ASTM A126 Class B cast Iron AWWA C-504 and resilient faced with neoprene or hycar.
 - b. Valves furnished with replaceable, sleeve-type metal bearings AWWA C-504-80, Section 3.6 and AWWA C-507-73, Section 8. Bearings of sintered, oil-impregnated, and permanently lubricated Type 316 ASTM A743 Grade CFO8M or AISI Type 817L stainless steel. Valve shaft seals – multiple V-ring type externally adjustable, repackable without removing bonnet or actuator from valve and repackable under pressure. Shaft seals AWWA C-504-80, Section 3.7. and AWWA C-507-73, Section 10.2.
 - c. Pressure ratings: 175 psi
 - d. All gearing shall be enclosed in a semi-steel housing suitable for running in a lubricant with seals provided on all shafts. Actuator shaft and lubricant with seals provided on all shafts. Actuator shaft and lubricant to be supported on

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- permanently lubricated bronze bearings.
 - e. All exposed nuts, bolts and washers shall be stainless steel.
 - f. Valves shall be furnished with extension stem with operating nut and floor stand suitable for mounting of an electric actuator where shown on the Plans. Electric actuators shall comply with Specification 461105 inclusive of startup services specified therein.
- C. Butterfly Valve
- 1. DeZurik General Service Resilient Seated Butterfly Valve, or equal.
 - 2. Valves shall meet the following minimum requirements:
 - a. Conform to AWWA C-504, ANSI Class 125/150 flange drilling.
 - b. Cast iron body, flanged end connections.
 - c. EPDM seat seal
 - d. Stainless seal shaft
 - e. Ductile iron epoxy coated disc.
 - f. Manual Valves with geared handwheel actuator unless otherwise indicated. Interior located manual valves 7 ft 0 in. above FFE with chainwheel geared actuator. Manual air control valves shall be Lever (locking) actuated.
 - g. Provide geared actuator for electric motor actuator where indicated on the plans.
 - h. Factory primed per Specification Section 099000.
 - i. Electric Actuators shall be provided for valves where called out on the plans. Electric Actuators shall comply with Specification 461105 inclusive of startup services specified therein.
- D. PVC Ball Valve
- 1. Hayward Safe Block True Union Ball Valve or equal
 - 2. PVC, socket end connection
 - 3. True Union to allow easy installation and removal
 - 4. Full Port opening
 - 5. PVC Ball Valve Actuators: Per Plan Locations
 - a. Manufacturer: Hayward Flow Control Series EAU1 Electronic Actuators, or equal.
 - b. For use with two-way and three-way PVC ball Valves
 - c. Voltage: 120V
 - d. Full Load Amps: 2A
 - e. Rated Torque: 120ftlbs
 - f. Enclosure: NEMA 4X
 - g. Conduit Size: 1/2" EMT
 - h. Thermal Protection: Motor Thermal Protection, Mechanical Brake Motor
 - i. Controls: Wired to the Plant PLC, operator selectable position, and position feedback.
- E. PVC Ball Check Valve
- 1. Flo-Matic Type 208 or equal
 - 2. PVC – Socket end connection
 - 3. Y-Patkin, full port flow with access port and nitrite seal
 - 4. Nitrile (BUNA-N) ball
 - 5. Fitted piping with true-union connections for easy installation and removal

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- F. Valves in Copper Tubing (Globe and Check)
 - 1. Acceptable manufacturers
 - a. Nibco
 - b. Apollo
 - c. Jenkins
 - 2. Bronze body, screwed type with brass adapters. No solder or brazed ends allowed.
 - 3. Valves drip-tight, rated for continuous duty for a minimum of 25 psi and 25° F higher than duty imposed.
 - 4. Class 150 bronze globe, silicon bronze stem, bronze packing gland and nut, bronze body, disc holder, disc, MSS SP-80.
 - 5. Class 150 bronze check, horizontal swing, y-pattern, renewable seat and disc MSS SP-80, all bronze construction.

- G. Stainless Steel Ball Valves
 - 1. Apollo 76 series or equal.

- H. Gas Valves
 - 1. Gas Cock, equipment shut-off, 2 in. and smaller.
 - a. ASME B16.33, IAS listed bronze body, stainless steel discs
 - b. Dupont Viton fluoroelastomer O-ring seal
 - c. 175 psi; -30 to 350°F
 - d. Quarter turn open/close
 - e. ASA certified for gas
 - f. Crane, Red-White, Watts, Nibco or equal

 - 2. Gas Cock, Main or Equipment Shut-Off 2-1/2 in. or larger
 - a. Lubricated plug valve with lever handle
 - b. UL 842 listed
 - c. AGA certified for gas

- I. Water Hammer Arrestors, Precision Plumbing Products, Portland, OR.
 - 1. Model SC-1000
Operating Pressure 0-200 psi
Max Spike Pressure 400 psi
Connection threaded brass
Cap free turning brass
Piston free turning brass
O-Ring EPDM
Seal Lubricant Dow silicone compound #111
Factory Charged40
Nitrogen pressure (psi)
 - 2. Water hammer arrestors shall be precharged in the factory.
 - 3. Provide a S.S. Ball Valve at each Surge Arrestor for maintenance removal.
 - 4. Provide of four (4) surge arrestors on the NPW (2 ea) and Potable water distribution lines (2 ea) in each site building and new service into an existing building. Water hammer arrestor locations will be field verified and determined.

- J. Solenoid Valves
 - 1. Solenoid Actuated Valves shall be ASCO or equal, Red Hat Class 1/Div 2, 120V, 304

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stainless steel construction, NPT connection for the sized pipe indicated on the plans.
Normally closed operation (power to open).

2. Valve on Non-potable water line connections shall meet the pressure classification of the connection pipe or equipment.

K. Air Release Valves

1. Acceptable Manufacturers

- a. Val-Matic Valve and Manufacturing Corporations Model 801A Wastewater Combination Air Valve, Crispin S/SL, or equal

1) Operation

- a) Specifically designed to operate with liquids carrying solid particles (e.g. wastewater).
- b) Discharges air/gas during pumps the filling of the system (turn on).
- c) Allows air to re-enter the system during draining of the system (pumps off).
- d) Contains an internal baffle that maintains separation between the upper float seal and wastewater.

2) Design Conditions

- a) Working pressure: 3-150 psi
- b) Testing pressure: 250 psi
- c) Maximum working temperature: 140°F.
Maximum intermittent temperature: 194°F.
- d) Connection to Forcemain: 2", Flanged ANSI Class 125.
- e) Outlet size (gas discharge): 1 1/2", NPT Female.
- f) Model VM-801A (Dual body construction).
- g) Additional connections include 2" NPT draw out and 1" NPT drain.

3) Materials of Construction

- a) Upper and lower body constructed of ASTM A126 Class B Cast Iron.
- b) Floats, plugs, guide shafts and bushings constructed of 316 stainless steel.
- c) Seats and seals constructed of BUNA-N.
- d) Interior coated with an NSF/ANSI 61 certified fusion epoxy in accordance with AWWA C550.
- e) Exterior coating: per Specification 099000.

L. MUD Valves

1. Manufacturer: Stainless Steel MUD Valves

- a. Whipps, Inc. (Athol, MA) c/o Drydon Equipment, Inc. (224) 629-4060
- b. RW Gate Company c/o CE Soling and Associates, (847) 406-8493
- c. or equal

2. Submittals shall include, at a minimum, detailed custom drawings of the mud valve assembly with dimensional and mounting information and a listing of the materials of construction. General arrangement drawings and cut sheets are not considered acceptable drawings.

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3. Quality Assurance
 - a. All valves shall be shop inspected for proper operation prior to shipment.
 - b. Welds shall be performed by welders with ASME Section IX certification.
 - c. The valve manufacturer shall be ISO 9001:2015 certified.

4. Materials of Construction
 - a. All stainless steel referenced in this specification shall be Type 304), ASTM A240 or ASTM A276 unless otherwise indicated herein.
 - b. All welded stainless steel components shall be constructed of minimum ¼-inch stainless steel.
 - c. All non-welded stainless steel components, excluding anchor bolts and assembly bolts, shall be Type 304 stainless steel.
 - d. Anchor bolts and assembly bolts shall be Type 316 stainless steel.

5. Assembly
 - a. The mud valve shall be a one-piece assembly with a non-rising stem, a movable cover, and a fixed, integral frame.
 - b. The frame will be provided with a bolt pattern to mount to a pipe flange or to a concrete floor.
 - c. The mud valve cover shall be designed to lower into place over the opening for tight shut-off.
 - d. The cover and frame shall be constructed of stainless-steel plate.
 - e. A resilient seal shall be mounted to the bottom of the cover. Mud valves with metallic seats are not acceptable.

6. Operating stem
 - a. The operating stem shall be of stainless steel and shall be designed to transmit in compression at least 2 times the rated output of the manual operating mechanism with an 80 lbs effort.
 - b. The stem shall have a slenderness ratio (L/r) less than 200.
 - c. The threaded portion of the stem shall have a minimum diameter of 1-1/2 inches.
 - d. The threads shall have machine rolled, full depth ACME threads.
 - e. Stub threads are not acceptable.
 - f. Stems provided in multiple pieces shall be provided with couplings.
 - g. Couplings shall be bronze or stainless steel and shall be internally threaded and keyed or bolted.
 - h. Stem guides shall be constructed of stainless steel with UHMWPE bushings.

7. Operating Mechanism
 - a. Operating mechanisms shall be provided by the valve manufacturer.
 - b. Manual operators shall be a 2-inch square operating nut unless or valve stand otherwise shown on the Plans.
 - c. The operating nut shall be mounted on a stainless-steel wall bracket unless otherwise shown on the Plans.

8. Anchor bolts shall be 316 stainless steel, fully threaded and shall have a minimum diameter of 1/2-inch. Anchor bolts shall be of the epoxy type.

9. All heat tint and slag from the welding process shall be passivated in accordance with

ASTM A380.

10. Installation shall be performed in accordance with the valve manufacturer’s installation instructions and the approved installation drawings.

2.3 PRESSURE GAUGES

- A. Pressure gauges shall be installed on the suction and discharge of all process pumps for the project (except for sump pumps). Submersible pumps shall have discharge pressure gauges only.
- B. All gauges shall be tapped from the process piping with a brass isolation cock and a diaphragm seal to separate the gauge from the process fluid.
- C. Ashcroft 45-1279-A-04-L or equal
 1. Type 100 Ashcroft diaphragm seal
 2. 4-1/2 in. dial diameter, brass wetted material, ½ in. NPT, glycerin filled (discharge gauges), silicon filled (compound suction gauges).
 3. Diaphragm seal ½ in. NPT, 316 stainless steel diaphragm and housing, glycerin filled (discharge gauges), silicon filled (compound suction gauges).
 4. Pressure ranges (unless otherwise indicated on the Plans)
 - a. Suction side compound 30 in. Hg/60 psi
 - b. Discharge side 0/100 psi

2.4 HORIZONTAL SWING FLAP CHECK VALVES

- A. Check Valve Val-Matic Swing Flex Model 500A BF as manufactured by Val-Matic Valve and Manufacturing Corp., Elmhurst, IL.

1. Materials shall conform to the following:

Body/Cover	Cast Iron ASTM A126, Class B
Disc	BUNA-N, ASTM D2000-BG; Fabric Reinforced
Gasket	Lexide NK-511
Cover Bolts	Stainless Steel
Backflow Bushing	Brass ASTM B16, A360
Backflow Rod	Stainless Steel T304, ASTM A276
Rod Wiper	Molythane
O-Ring Seal	BUNA-N
Handle	Stainless Steel
Jam Nut	Brass ASTM B16, A360
Retaining Ring	Carbon Spring Steel

2. Interior Factory Finish Coated with epoxy system compliant with Specification Section 099000.
3. Exterior Factory primed per Specification Section 099000.
4. ANSI Flanged Ends
5. Backflow Actuator Factory Installed.
6. Mechanical Disc Position Indicator, Factory Installed.
7. Pre-wired Open/Close Limit Switch, NEMA 4, 12 VdC.

8. Full Body Flanged, Domed Access Cover
9. The valve body shall have full flow equal to nominal pipe diameter at any point, through the valve. The seating surface shall be on a 45° angle to minimize disc travel. The top access port shall be full size, allowing removal of the disc without removing the valve from the pipeline. The access cover shall be domed in shape to allow the disc to be fully operational in lines containing a high-solids content.
10. The disc shall be of one-piece construction, precision molded with an integral O-ring type sealing surface and contain steel and nylon reinforcements in both the Memory-Flex™ and central disc areas. The flex portion of the disc shall be warranted for 25 years. Non-slam closing characteristic shall be provided through a short 35° disc stroke and a Memory-Flex™ disc return action.
11. Backflow capabilities shall be available by means of screw type backflow actuator. The actuator shall be field installable without modification to the valve, a need for special tools or removal of the valve from line.
12. The valve shall be cycle-tested 1,000,000 times with no signs of wear or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures. The tests' results shall be independently certified.
13. The valve shall be capable of withstanding the working pressure for the pumps specified and surge pressure.

2.5 DOUBLE-CHECK BACKFLOW-PREVENTION ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ames Co.
 2. Conbraco Industries, Inc.
 3. FEBCO; SPX Valves & Controls.
 4. Flomatic Corporation.
 5. Watts Industries, Inc.; Water Products Div.
 6. Zurn Plumbing Products Group; Wilkins Div.
- B. Material
 1. Standard: ASSE 1015.
 2. Operation: Continuous-pressure applications, unless otherwise indicated.
 3. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
 4. Body: Cast iron with interior lining complying with AWWA C550 or that is FDA approved.
 5. End Connections: Flanged.
 6. Configuration: Designed for horizontal, straight through flow.
 7. Accessories:
 - a. Valves: Outside screw and yoke gate-type with flanged ends on inlet and outlet.

2.6 PRESSURE RELIEF VALVES

- A. Suitable for passage of a polymer solution diluted to 1.0% polymer to 99.0% non-potable water
- B. Size and location per Plans and schedules on the Plans.
- C. Acceptable Manufacturer: Plast-o-Matic RVDT series, or equal

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- D. Body: CPVC
- E. Relief Setting: 5-100 psi
- F. Maximum inlet pressure is 150 psi.
- G. Springs (non-wetted): zinc plated music wire, powder coated chrome silicon.
- H. External fasteners: stainless steel
- I. Lock nut and adjusting screw: thermoplastic,
- J. Female NPT connections suitable for joining SCH 80 PVC.

2.7 CARTRIDGE FILTERS

- A. Cartridges:
 - 1. Materials – 304 stainless steel with 50 micron openings
 - 2. Dimensions – 2.75” diameter x 9.75” length
 - 3. Opening size – 50 to 60 microns
 - 4. Pressure rating – 100psi
- B. Cartridge Housing
 - 1. Pressure Rating – 100psi
 - 2. Capable of housing the specified cartridges
 - 3. Inlet and outlet connections – 1 inch NPT

2.8 AIR CONTROL VALVES

- A. Iris/Aperture Valves – Aeration Service:
 - 1. Manufacturer:
 - a. Egger
 - 2. Valve Type:
 - a. Multi-segment valve designed to maintain the valve port geometry with central axial flow from open to close.
 - 1. Minimum of six (6) segments
 - 2. Hysteresis free
 - b. Provide valve with gear for operation with rotary motion
 - c. Provide position indicator
 - d. Maintenance-free greaseless spindle operation

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- e. Provide valves optimized in accordance with DIN EN 60534
3. Valve Working Pressure: 87 psi (6 bar).
4. Valve Temperature Rating: 284 deg F (140 deg C)
5. Body Type: Flanged
6. Materials:
 - a. Valve Body:
 1. Type 316SS EN1.4408
 - b. Valve Disc Segments:
 1. Stainless steel: AISI Type 316L or DIN 17440/41
 2. Provide segments with rounded edges and self cleaning characteristic.
 - c. Elastomers:
 1. FPM
 - d. Hardware: Type 316 stainless steel
7. Ends: Flanged, ANSI B16.5 Class 150
8. Performance:
 - a. Minimum Control Range Turndown: 10:1
 - b. Maximum Required Pressure Drop for Control: 0.15 psi (10 mbar)
 - c. Hysteresis-free performance
 - d. Aeration Control Valve Schedule: As indicated
 - e. Gain $\left(\frac{\Delta Q}{\Delta H}\right)$ with Q = flow and H = relative stroke: The gain must be $0.50 < \frac{\Delta Q}{\Delta H} < 2.0$ for the complete regulation range
9. Provide the following submittal information:
 - a. Valve Cv
 - b. Valve pressure drop and position for each valve for maximum and minimum flow rates indicated

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10. Hydrostatically test valve body and head for a minimum of 10 minutes and at a pressure of 1.50 times the working pressure as specified herein.
 11. Coat internal and external ferrous surfaces of valve per Specification Section 099000.
- B. Elliptical Diaphragm Valves – Aeration Service:
1. Manufacturer:
 - a. Binder
 2. Valve Type:
 - a. The valve must have an elliptical control orifice with falling flow axis for pressure recovery, reduced total pressure drop, and precise control of airflow to individual control zones with continuous adjustment from 0% to 100% open over a large airflow range.
 - b. The valve must have an integrated pressure wave breaker to prevent high-pitched noise generation.
 - c. Provide position indicator
 - d. Maintenance-free greaseless spindle operation
 3. Valve Working Pressure: 87 psi (6 bar).
 4. Valve Temperature Rating: 284 deg F (140 deg C)
 5. Body Type: Wafer-Lug Style
 6. Materials:
 - a. The spindle and screws must be 306 SS
 - b. The diaphragm material must be 316 SS.
 - c. Guides and seals must be Teflon/carbon/HBNR.
 - d. The valve body must be galvanized carbon steel St. 37, Structural length is according to DIN 3202/K1, flange borings with threads are made according to DIN 2501/ PN10.
 - e. Coating: three-layer coats (passivation, powder-coated epoxy, and powder-coated UV resistant layer of Polyurethane RAL 5020)
 - f. Hardware: Type 316 stainless steel

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7. Ends: Flanged, ANSI B16.5 Class 150
 8. Performance:
 - a. Valve positioning repeatability must be less than 0.30% of the full open range (0-100% open). Repeatability is the smallest change in valve position that the valve can repeatedly achieve (as a percentage of the full range 0-100% stroke) after a change in direction of the valve movement (i.e. open to close or close to open).
 - b. Valve resolution must be equal to or less than 0.1% of the full range (0-100% stroke). Resolution is the smallest change in valve position the valve can repeatedly achieve (as a percentage of the full range 0-100% stroke) in the same direction of the valve movement (i.e. open to open or close to close)
 - c. The valve must have a largely linear control curve
 - d. The valve must close gas-tight.
 - e. The pressure loss of the valve (differential pressure across the valve during control operation) may not exceed 0.15 psi (10 mbar) at the maximum specified flow rate and valve stroke of maximum 80% open
 - f. In wide open position, the valve must open the entire pipe diameter for minimal pressure loss
 9. Provide the following submittal information:
 - a. Valve Cv
 - b. Valve pressure drop and position for each valve for maximum and minimum flow rates indicated
 10. Hydrostatically test valve body and head for a minimum of 10 minutes and at a pressure of 1.50 times the working pressure as specified herein.
 11. Coat internal and external ferrous surfaces of valve per Specification Section 099000.
 12. Electric actuators shall be provided per Specification Section 451105.
- C. Provide services of factory-trained Service Technician, specifically trained on type of equipment specified:
1. Service Technician must be present on site for all items listed below.

2. Final Installation: Inspect grouting, location of anchor bolts; setting, leveling, alignment, field erection; coordination of piping, electrical and miscellaneous utility connection:
3. Functional Testing with Actuators: Calibrate, check alignment and perform a functional test. Tests to include all items specified.
4. Vendor Training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts and preparation to lead and teach classroom sessions.
5. Manufacturer shall provide for 2 trips of 2 – 8 hour days each.

2.9 FLOW INDICATION DEVICES

A. Pressure Switches

1. Manufacturer: Square D Series 9012GAW-4, or equal
2. Range of Detection: 1.5 to 75psi, adjustable differential
3. Maximum Operating Pressure: 240psi
4. Cable Entry: 0.5 inch NPT
5. Process Connection: 1/4-inch, Contractor to provide additional fittings as required for functional installation.
6. Voltage: 120V
7. Full Load Amps: 3A
8. Locations: Per process and electrical drawings
9. Wiring: Per electrical drawings, capable of providing feedback to both pump VFDs and local PLC as required.

B. Flow Switches

1. Manufacturer: Turck Model FCS-N1/2A4P-AP8X-H1141
2. Operating Range: 0.1 to 5 ft/s
3. Process Connection: 1/2-inch, Contractor to provide additional fittings as required for functional installation.
4. Operating Voltage: 19 to 28.8 VDC
5. Full Load Amps: 0.4A
6. Housing: Stainless Steel, Protection Class: IP67
7. Locations: Per process and electrical drawings.
8. Wiring: Per electrical drawings, capable of providing feedback to both pump VFDs and local PLC as required.

2.10 PIPE SUPPORTS

- A. Pipe supports will be required and located so the weight of interconnecting pipe will not be supported by equipment and so that all piping is adequately braced and supported as required to prevent movement.
 1. Concrete type – as shown on plans
 2. Piping Pipe Supports
 - a. Floor supports
 - 1) Grinnel Fig. 264, B-Line or equal with floor plate or equal. Cast iron vertical Section DI 3 in. minimum diameter for 4 ft or less stand

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- height. DI 4 in. minimum diameter for 4-ft or higher stand height.
 - 2) 2 in. and Smaller Pipe Supports: Grinnel Fig. 192 with floor plate or equal. Cast iron vertical Section DI 1 in. minimum diameter.
 - 3) Provide shielding and/or neoprene liner to isolate dissimilar metals.
- b. Hangers
- 1) Grinnel Fig. 260, B-Line or equal adjustable clevis type. Stainless steel hanger and rod where noted on the plans.
 - 2) Maximum load shall be 1,000 lbs. per hanger.
 - 3) Anchorage to ceiling suitable for concrete or hollow core pre-cast concrete panel per plan.
 - 4) Hangar anchorage and rod diameter per pipe weight, suitable for full-pipe and appurtenance loads. New concrete insert Fig. 283. Existing concrete single lug plate Fig. 47 with S.S. Hilti Epoxy Drilled Anchors.
 - 5) Provide shielding and/or neoprene liner to isolate dissimilar metals.
 - 6) Support hanging pipe segments with cross-braces to adjoining walls or ceiling as required to prevent movement.
- B. Copper Tubing Supports
- 1. Plastic coated adjustable “J” hangers, B-Line Model #B3690-C or equal, for wall or ceiling mounting.
 - 2. Maximum spacing between supports for 1 in. and smaller copper tubing shall be 7 ft.
- C. Plastic Piping Pipe Supports
- 1. All plastic piping shall be supported by a non-metallic channel framing strut and/or strapping system by Aickinsrut, B-line, or equal. Provide lateral bracing support on all hanging pipe as required to prevent movement.
 - 2. Universal pipe clamps shall be non-metallic and non-conductive. They shall be made by the injection molding process using polyurethane base resin suitably compounded for corrosion service.
 - 3. All channel framing connections shall be made with stainless steel nuts and bolts.
 - 4. All installation cuts and/or exposed ends of fiberglass struts shall be sealed with an epoxy sealant, such as Dercon five-minute epoxy. Lateral bracing shall be provided as required to prevent pipe movement.
 - 5. Provide shop drawing submittal of support system and materials and support location/layout.
- D. Flexible Tube Piping
- 1. B-line or equal.
 - 2. Fiberglass strut system wall, ceiling, or rack supported per the plan pipe routing. Provide lateral cross-bracing as required on hanging pipe segments to prevent pipe movement. Anchor bracing, channels and supports to walls and ceilings required with S.S. Anchors.
 - 3. Provide shop drawings submittal of support system and materials, and support location/layout.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install each item per manufacturer's instructions.
- B. Horizontal spacing on supports for D.I. 6 ft maximum. PVC and P.E. at spacing to prevent sag or deflection per the pipe manufacturer's instructions.
- C. Vertical support spacing 4 ft maximum.
- D. Sleeves and wall pipes positioned and supported in structural concrete form work. Locations per plans.

3.2 PIPING CONSTRUCTION

- A. All pipe ends capped during construction period.
- B. All exposed ends provided with blind flanges in D.I. piping or capped PVC/P.E.
- C. For PVC/P.E. pipe provide off-sets, bends and other fittings provided to fit plan pipe route.
- D. The Engineer to approve piping work prior to burying, covering or concealing.
- E. All gauges and switches connected to piping shall have isolation valves.
- F. All gauges and switches shall be fitted with snubbers for control of water hammer and pressure surging.

3.3 TESTING

- A. All building piping to be pressure-tested hydrostatically.
- B. Contractor furnish labor/materials/tools for testing at no extra compensation.
- C. Test method to be approved by the Engineer.
- D. Pressure maintained continuously for two hours minimum.
- E. Test pressures
 - 1. Process piping – 125 psi
- F. Metallic (excluding copper, PVC and stainless steel) piping, fittings, supports, stands, valves and accessories to be painted per Section 099000. All piping, fittings and valves shall be shop-primed at the factory per Specification Section 099000.

3.4 STARTUP SERVICES - PER SPECIFICATION SECTION 461105 FOR ALL VALVES SUPPLIED OR SPECIFIED WITH ELECTRIC MOTOR ACTUATORS.

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3.5 PERFORMANCE GUARANTEE

- A. The Equipment Manufacturer shall warrant operation of the equipment and materials for one year following startup and acceptance. Equipment process disruptions or failures during the warranty period shall be corrected by the Manufacturer.

END OF SECTION 461100