



**PURCHASING DEPARTMENT
DIVISION OF BUDGET & FINANCE**

**PUR-1623
ADDENDUM NO. 4
INVITATION TO BID**

SMITHSBURG WwTP ENR UPGRADE AND EXPANSION

DATE: Tuesday, September 12, 2023

**BIDS DUE: Wednesday, September 27, 2023
2:00 P.M. (EDT/EST)**

To Bidders:

This Addendum is hereby made a part of the Contract Documents on which all bids will be based and is issued to correct and clarify the original documents.

Please acknowledge receipt of this Addendum at the appropriate space on the Proposal Form. This Addendum consists of four (4) pages and two (2) attachments.

NOTE: All Bidders must enter the Washington County Administration Complex through either the front door at the 100 West Washington Street entrance or through the rear entrance (w/blue canopy roof) which is handicap accessible and must use the elevator to access the Purchasing Department to submit their bid and/or to attend the Pre-Bid Conference. Alternate routes are controlled by a door access system. The general public will be subject to wand search and will be required to remove any unauthorized items from the building prior to entry. Prohibited items include but are not limited to: Weapons of any type; Firearms, ammunition, and explosive devices; Cutting instruments of any type - including knives, scissors, box cutters, work tools, knitting needles, or anything with a cutting edge, etc.; Pepper spray, mace, or any other chemical defense sprays; and Illegal substances.

ITEM NO. 1: *Inquiry:* Can a Finish Schedule be provided for the floors, walls and ceilings of the areas to covered in the scope of work?

Response: For the Chemical Building, there is no flooring (exposed concrete) or wall base. The only finishes are painting of the walls and exposed "ceilings" which is covered in General Note J on Sheet A-1 which states the following: " Paint all Interior CMU Wall, Exposed Steel Roof Framing, and Metal Roof Deck."

ITEM NO. 2: *Inquiry:* Spec Section 03-41-13 Precast Concrete Hollow Core Planks Where are these to be utilized?

Response: The Precast Hollow Core Planks Specification Section: 03 41 13 applies to the DEOX Baffle Wall in the Pre-Anoxic Tank shown on Sheet PM-1.

ITEM NO. 3: *Inquiry:* Spec Section 03-42-00 Precast Structural Concrete Is there an option to utilize Precast concrete for the Tankage?

Response: Precast Structural Concrete Specification Section: 03 42 00 applies to the Precast Hollow Core Planks for the DEOX Baffle Wall in the Pre-Anoxic Tank shown on Sheet PM-1. The tankage shall be cast-in-place as shown.

ITEM NO. 4: *Inquiry:* Plan Sheet PM-1 New Deox Baffle Wall Can we get details of the materials that we are to install and supply?

Response: The DEOX baffle wall is a precast hollow core plank. Refer to specification Section: 03 41 13.

ITEM NO. 5: *Inquiry:* Spec Section 07-13-00 Sheet Water Proofing Does the below grade tankage get this material applied? Does the below grade foundation for the Chemical building get this material applied?

Response: Part 1 of Item No. 5 herein: Yes, on the Pre-Anoxic Tank per Section A/S-3 and on the Chemical Tank Containment area per Sections A & B/S-6.

Response: Part 2 of Item No. 5 herein: Sheet water Proofing is not required on the Chemical Building.

ITEM NO. 6: *Inquiry:* Spec Section 09-96-00 High Performance Coatings This section references this coating to go on the interior concrete and steel surfaces of The Booster Pump Station. The Booster Pump Station is not shown in the plans.

Response: Specification 09 96 00 -TNEMEC-High Performance Coatings was revised in Addendum No. 2, postdated Monday, August 28, 2023.

ITEM NO. 7: *Inquiry:* Can Geotechnical information be provided for new structures to be installed? The excavation for the Pre-Anoxic Tank is fairly deep and will require some type of shoring system.

Response: The September 27, 2019 "GEOTECHNICAL SUBSURFACE INVESTIGATION REPORT" prepared by AB Consultants, Inc. Was provided with Addendum No. 2, postdated Monday, August 28, 2023.

ITEM NO. 8: *Inquiry:* I was hoping to receive a list of the bidders that attended your pre-bid meeting on 8-14-23.

Response: The Sign-in sheet from Pre-Bid meeting was issued with Addendum No. 3, postdated Friday, September 8, 2023.

(NOTE: The wording of all "Inquiries" submitted are displayed exactly as received.)

ITEM NO. 9: Inquiry: On drawing E16 it shows a WB light fixture there is no spec for this fixture please provide one

Response: Specification 26 50 00 has been revised to address this issue. Please refer to revised specification section 26 50 00 below.

ITEM NO. 10: Inquiry: The electrical drawing show a 6 strand fiber optic cable in the new duct bank please provide a spec for this cable.

Response: The fiber optic cable is specified in Section 25 50 40.

ITEM NO. 11: Inquiry: I am in search of a planholders list for the subject project.

Response: The Plan Holder's List for PUR-1623 was issued with Addendum No.3, postdated Friday, September 8, 2023.

ITEM NO. 12: Inquiry: Page PM-9 questions. The pinch valve shown is not listed in the specifications 40 23 20. Please provide a spec for the pinch valve

Response: Specification 40 23 20 has been revised to address this issue. Refer to revised specification section 40 23 20 attached to this Addendum.

ITEM NO. 13: Inquiry: The valve specification 40 23 20 show tables that list valves that appear to be for another project, digesters, centrifuge, polymer feed. Please clarify these specs.

Response: Specification 40 23 20 has been revised to address this issue. Refer to revised specification section 40 23 20 attached to this Addendum.

ITEM NO. 14: Inquiry: The sump pump detail on PM-9 shows 3" piping. The discharge piping from the vault shows 2" on PM-9, but 3" piping on C-2. Please provide a spec for the sump pump and confirm the size piping and valves.

Response: Part 1 of Item No. 14 herein: Part 1 of Item No. 14 herein: New Specification Section 22 31 00 Submersible Sump Pumps has been added to address this issue.

Response: Part 2 of Item No. 14 herein: All sump pump discharge piping shall be 2".

ITEM NO. 15: Inquiry: Specification 46 33 00-1.2.B.1 notes a total of (4) Alum Pumps: (1) single and (1) triplex. However, only (3) are shown on the drawings, page PM-10: (1) single and (1) duplex. This section also references denitrification filters. Clarify this section.

Response: A total of four (4) Alum Pumps:(1 triplex) and (1) single is required. The triplex feeds SBR No.1, SBR No.2, and a spare that can feed either SBR. The single feeds the Post Equalization Tank. The references in the Specification to denitrification filters shall be removed and replaced with references to Post Equalization Tank.

(NOTE: The wording of all "Inquiries" submitted are displayed exactly as received.)

ITEM NO. 16: *Inquiry:* On drawing PM-1 there are two (2) each 6", 8", and 10" electrically actuated plug valves. A total of six (6) valves, while the specification section lists a need for three (3) 6" plug valves and one (1) 6" knife gate valve. Can you find out which of these two is accurate. The drawing or the spec?

Response: Specification 40 23 20 has been revised to address this issue. Refer to revised specification section 40 23 20 attached to this Addendum.

SPECIFICATION REVISIONS:

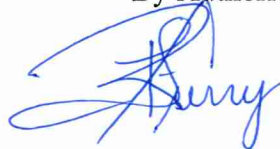
ADD new Specification Section 22 31 00 Submersible Sump Pumps in its entirety, attached.

Section 26 50 00, Lighting Fixtures, **ADD** light fixture WB to the Light Fixture Schedule in Paragraph 2.1.B as follows:

"4. WB: Wall mounted, 120-volt, high efficiency LED fixture. The fixture shall produce a minimum of 600 initial lumens and have a color temperature of 4000K. The fixture housing shall be constructed of die-cast copper-free aluminum with a corrosion-resistant industrial gray finish. Fixture shall have a frosted glass diffuser. Fixture shall be provided with a sealed gasket to protect against moisture and dust and shall be UL listed as suitable for wet locations. Fixture shall be Lithonia #OLVTWM, or equal."

REPLACE Specification Section 40 23 20 Process Valves and Actuators in its entirety with *Revised* Specification Section 40 23 20 Process Valves and Actuators, attached to this Addendum.

By Authority of:



Rick F. Curry, CPPO
Director of Purchasing

SECTION 22 31 00**SUBMERSIBLE SUMP PUMPS****PART 1-GENERAL****1.1 DESCRIPTION**

- A. The work of this section includes, but is not limited to:
 - 1. Sump Pumps
- B. Related work specified elsewhere
- C. Work performed under this section shall include, but is not limited to, furnishing, installing and testing new submersible sump pumps and appurtenances necessary for the complete and satisfactory installation of the pumps for application of sump pumps.

1.2 REFERENCES & DEFINITIONS

- A. ASTM - American Society for Testing and Materials
- B. U/L - Underwriters Laboratories

1.3 QUALITY ASSURANCE

- A. Pumps shall be supplied by the manufacturer as specified herein or by an approved equal and shall be designed for use intended in the application described.
- B. The pump shall be specifically designed to pump waste solids at heavy consistencies without plugging.
- C. Pumps to be manufacturer's standard catalog product.
- D. The contractor shall submit manufacturer's standard warranty and a performance affidavit for equipment to be furnished in accordance with this section. The performance affidavit must include a statement that the equipment will not clog or bind on solids typically found in the application set forth
- E. The sump pump manufacturer shall have a minimum of twenty (20) years of documented experience in the design and production of sump pumps of all types, and not less than five (5) years of experience in the production of the exact equipment as specified herein.

1.4 SUBMITTALS

- A. Submit in accordance with the General Conditions for Construction.
- B. Shop Drawings and Product Data:
 - 1. Submit manufacturer's product data, specifications, pump curves, and installation instructions.
 - a. Shop drawings for all accessory items.
 - b. Dimensional drawings inclusive of recommended location of anchor bolts.

- c. Manufacturer's literature as needed to supplement certified data.
 - d. Operating and maintenance instruction and parts lists.
 - e. Schematic control and power wiring.
 - f. Recommendations for long and short term storage.
 - g. Use tag numbers for all equipment as indicated and specified.
 - h. Qualifications of factory trained technician and the number of service man-days provided.
2. Submit detailed certified dimensional shop drawings and manufacturer's product data for materials and equipment, including wiring and control diagrams. Show complete information concerning materials of construction, fabrication, protective coatings, installation and anchoring requirements, fasteners and other details.
 3. Maintenance Data and Operating Instructions: Submit Approval of the shop drawings will not relieve the Contractor of any responsibility for accuracy of dimensions and detail.
 4. In addition to submitting working drawings for the pumping equipment, the Contractor shall obtain and submit to the Engineer certification from the manufacturer that the pump meets the requirements of the contract specifications
 - a. Before shipment, submit certified pump performance curves showing head/capacity relationships and required horsepower after pump assembly has been fabricated and performance tested at the factory.
 - b. Submit certified results of all start-up and performance tests.
- C. Maintenance data and operating instructions:
1. Submit the required number of copies of an Operation and Maintenance manual for the equipment furnished manuals including a detailed description of the function of each principal component, procedures for operation, and instructions for overhaul and maintenance. Include lubrication; include maintenance schedule, safety precautions, test procedures and parts lists.

1.5 DELIVERY, STORAGE & HANDLING

- A. Deliver equipment components to the site in the manufacturer's unopened shipping containers.
- B. Store and handle equipment in such a manner as to prevent cracking, breakage, distortion, contamination or other damage.

1.6 FIELD SERVICES - NOT USED

1.7 WARRANTY

- A. Manufacturer's warranty shall be for a period of one (1) year, from date of conditional acceptance, with no hour limitation.

1.8 SPARE PARTS

- A. One set of special tools shall be provided for servicing all pumps. In addition, the following spare parts shall be provided for each size and type of pump:
 - 1. One complete set of manufacturer’s recommended spare parts.
 - 2. One (1) year’s supply of required lubricants for Manufacturer’s recommended equipment maintenance.
- B. Spare Parts shall be properly bound and labeled for easy identification without opening the packaging and suitably protected for long term storage.

PART 2 – PRODUCTS

2.1 SUBMERSIBLE SUMP PUMP

- A. Furnish and install submersible sump pumps where shown on the Contract Drawings. Pump shall be Model LSR2.4S-61 as manufactured by Tsurumi Pump or model V-A1 as manufactured by Hydromatic®.
- B. Schedule of Submersible Sump Pumps:

Pump location	Flow (gpm)	TDH (feet)	On/off levels (in.)	Min. Solids Handling (in.)
SBR Valve Vault	20	20	7.9/3.4	0.5
Pinch Valve and Metering Vault	20	20	7.9/3.4	0.1

- C. Pump Construction: Provide pumping units consisting of a gray cast iron or aluminum motor frame; 403/304 stainless steel shaft; pump casing of gray cast iron or ethylene propylene rubber. Furnish with a dual inside mechanical seal. The upper and lower bearings are to be of double-shielded ball bearing construction and pre-lubricated. Pump to have a 15’ power cord water resistant UL or CSA approved, with double insulation, and sized as a function of Amp draw.
- D. Motor: Continuous duty oil-filled motor dynamically balanced with thermal overload protection and integral start capacitor. Free circulation of process fluid around motor provides heat dissipation. Motor to be non-overloading throughout entire pump performance range. Motor shall be 115 volt/60hz/1 phase. The motor HP shall be a maximum of 1.0 and shall have a maximum speed of 3,600 RPM.
- E. Shaft Assembly: Shaft with Silicon Carbide seal and double-shielded ball bearings.
- F. Impeller: Thermoplastic or urethane rubber impeller
- G. Controls
 - 1. Provide plug-in electrical connection with integral float switches
- H. Connection
 - 1. Discharge size shall be at least 1 1/2".

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install pumps as indicated on Contract Drawings and in accordance with manufacturer's instruction.
- B. Provide and connect piping, accessories and power as required to ensure a complete operable unit.
- C. Obtain and provide the Owner with an Installation Certificate signed by the equipment manufacturer's representative attesting that the equipment has been properly installed and is ready for start-up and performance testing.

3.2 PRE-OPERATIONAL CHECK

- A. Before operating pump make following check:
 - 1. Assure that piping and sump are clear of debris which might clog pump.
 - 2. Check level settings.
 - 3. Check for proper motor rotation.
 - 4. Check pump and drive units for proper lubrication.
 - 5. Vent air from system to assure water in the pump.

3.3 START-UP AND PERFORMANCE TESTING

- A. Operate pumps on clear water at the design point for a minimum of 2 continuous hours or through 4 complete pumping cycles, whichever is greater, under the supervision of the manufacturer's representative.
 - 1. Check for high bearing temperatures.
 - 2. Check for motor overload by taking ampere readings.
 - 3. Adjust level switch settings for proper operation.

3.4 EQUIPMENT ACCEPTANCE

Adjust, repair, modify or replace any components which fail to perform as specified and rerun the tests. Make final adjustments under the direction of the manufacturer's representative and to the satisfaction of the Engineer.

END OF SECTION 22 31 00

SECTION 40 23 20**PROCESS VALVES AND ACTUATORS****PART 1 GENERAL****1.1 SUMMARY**

- A. The Contractor shall furnish and install all process valves as shown on the drawings and as specified herein. The Contractor shall be responsible for the storage, handling and installation of all valves.

1.2 SUBMITTALS

- A. Provide submittals in accordance with the requirements of Sections 01 30 00.
- B. Product Data:
1. Provide for each power-operated valve assembly:
 - a. Assembly instructions and manufacturer's recommended spare part list.
 - b. Preventative/corrective instructions.
 - c. Certificate of seat compatibility with expected fluid exposure.
 2. Provide full information concerning actuator dimensions and weights.
 3. Provide actuator sizing calculations.
- C. Shop Drawings:
1. Product data sheets for each device and accessory.
 2. Catalog information, descriptive literature, manufacturer's specifications and identification of materials of construction.
 3. Power and control wiring diagrams, including terminals and numbers. Include:
 - a. Motor currents at the specified voltage corresponding to locked rotor.
 - b. Maximum seating torque.
 - c. Average running load and speed.
 - d. Full information concerning actuator dimensions and weights.
 - e. Detailed control schematics.
 - f. Complete nameplate data.
- D. Submittal data shall reference valve identifiers and device tag number for each item of equipment.
- E. Quality Control Submittals:
1. Tests and inspection data.
 2. Manufacturer's Certification of Proper Installation.
 3. Operation and Maintenance Manual.
- F. In addition to submitting working drawings for the valves and actuators, the Contractor shall obtain and submit to the Engineer certification from the valves actuator manufacturers that the valves and actuators meet the requirements of the contract specifications. This certification shall be provided by way of the Equipment Warranty and Certification Form.

PART 2 PRODUCTS**2.1 GENERAL NOTES – VALVES**

- A. Valves specified herein shall have the type of ends specified or as indicated on the drawings or as required by equipment connections.
- B. Non-rising stem valves shall be equipped with needle-and-slot type valve position indicators.

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- C. Unless otherwise shown on the Drawings or specified, all valves on horizontal pipes with centerline 6 feet or closer to the floor shall have their stems in the vertical up position. Orientation of stems described above may be altered if approved by the Engineer to better suit space conditions with the exception that no valves shall be installed with stems in the vertical down position.
 - D. All valves on vertical pipes shall have their stems oriented to give maximum operational clearance, or shall be oriented as directed by the Engineer. Valves in vertical pipes located higher than 4 feet above the floor shall include galvanized levers and chains, or chain wheels and chains, extending to within 4 feet of the floor.
 - E. Each piece of equipment or appliance shall be separately valved so that supply and return services can be shut off and the piece of equipment or appliance removed if desired, without disturbing the piping systems. Valves shall be located so as to be easily accessible to the plant personnel. Valves shall be installed whether shown on the drawings or not.
 - F. All valves 2" and under which will be used for throttling services shall be globe type except as shown or specified otherwise. Gate valves shall be used for cutoff or stop service except as shown or specified otherwise.
 - G. Check valves shall be protected by plug valves or butterfly valves so that they may be repaired without removal from the line.
 - H. Valves connected to nickel plated or chromium plated piping (primarily in toilet rooms) and exposed to view, shall be corresponding nickel or chromium plated.
 - I. Where extension stems are required, they shall be doweled or otherwise securely attached to the valve stem.
 - J. The valve and operator shall be the responsibility of the valve manufacturer.
 - K. All valves shall open left, counterclockwise.

2.2 **BALL VALVES**

- A. PVC Ball Valves
 1. Valves three (3) inches and smaller shall be PVC double-union type ball valves unless otherwise noted on the drawings.
 2. Valves shall have socket welded union type ends. Valves shall be constructed of rigid, unplasticized, type I polyvinyl chloride, body and ball. Valves shall include Teflon ball seats and viton "O" ring seals.
 3. PVC ball valves shall incorporate full flow ball port and shall be capable of withstanding 150 psi water service. Valves shall be used in sludge sample lines and at other locations where shown on the drawings. Size shall be as shown on the drawings.
 4. PVC ball valves shall be the product of Hayward Manufacturing Company, Inc., the Plastic Piping Systems, Inc., or approved equal.
- B. Metal-Body Ball Valves
 1. Metal body ball valves shall be full port, ANSI 150 flanged, split body type with manual actuators, having a working pressure rating of 275 psig. Valves shall be used in sludge sample lines and at other locations where shown on the drawings. Size shall be as shown on the drawings.
 2. Body, body cap, ball and stem shall be of Type 316 stainless steel. Seat, body seal, and stem seal shall be of TFE. Secondary stem seal shall be of graphite. Spring washer shall be of zinc plated carbon steel. Indicator stop, stem nut, handle, and cap screw shall be of carbon steel. Compression ring, identification tag, and drive screw shall be of stainless steel.
 3. Ball valves shall be Jamesbury Type 6150, or approved equal.

2.3 PLUG VALVES

- A. Eccentric plug valves shall be as manufactured by DeZurick Corporation, or approved equal.
- B. Plug valves shall be of the non-lubricated eccentric type with resilient faced plugs. All force main valves shall be furnished with mechanical joint connections, AWWA C111. Port areas of all plug valves shall be at least 100% of full pipe area.
- C. Valve bodies shall be of ASTM A126, Class B cast iron in compliance with AWWA Standard C504, Section 5.4. All exposed nuts, bolts, springs, washers, etc. shall be stainless steel. Resilient plug facings shall be of neoprene, suitable for use with sewage.
- D. Valves shall be furnished with replaceable sleeve type bearings in the upper and lower journals. These bearings shall comply with AWWA Standard C507, Section 8, paragraphs 8.1, 8.3, and 8.5 and with AWWA Standard C504, Section 9.
- E. Valve shaft seals shall comply with AWWA Standard C507-73, Section 10, and with AWWA C504, Section 10.
- F. Valve pressure ratings shall be as follows and shall be established by hydrostatic tests as specified by ANSI Standard B16-1. Pressure rating shall be 175 psi. Valves shall be capable of providing drip-tight shutoff up to the full rating with pressure in each direction.
- G. Valve operators shall be completely enclosed in an air, water, and oil-tight housing mounted directly on the valve and providing access to the valve stem packing. The housing shall comply with AWWA Standard C504, Section 11.2.3 and 11.3. Both worm gear shafts and gear quadrants shall be furnished with replaceable sleeve type bearings the same as the valve bearings. Shaft seals shall be provided to seal all external shafting. All valves shall be completely sealed including the valve stem packing box. Open and closed stops shall be provided to comply with AWWA C504, Section 11.3.

2.4 CHECK VALVES

- A. Check valves in pump discharge piping shall be air-cushioned and shall swing open smoothly at pump start and close quickly and quietly upon pump shutdown to prevent flow reversal. When closed, the valve shall seat drop tight. Air-cushioned check valves shall be GA Industries Figure 250-D, or approved equal.
- B. The check valves shall have a heavy-duty body constructed of high-strength cast iron conforming to ASTM A126 Class B with integral flanges, faced and drilled per ANSI B16.1 Class 125. The valve body shall be the full waterway type, designed to provide a net flow area not less than the nominal inlet pipe size when swung open no more than 25-degrees. The valve shall have a replaceable stainless steel body seat.
- C. Valve disc shall be cast iron and faced with a renewable resilient seat ring of rubber or other suitable material, held in place by a follower ring and stainless steel screws.
- D. The disc arm shall be ductile iron or steel, suspended from and keyed to an austenitic stainless steel shaft, which shall be completely above the waterway and supported by each end by heavy bronze bushings. The shaft shall rotate freely without the need for external lubrication. The shaft shall be sealed where it passes through the body by means of a stuffing box and adjustable packing. Simple O-ring shaft seals are not acceptable.
- E. The valve shall be supplied with an outer lever and adjustable counterweight to initiate valve closure. Final closure shall be dampened by means of a single, side-mounted bronze air-cushion assembly directly mounted to the valve body on machined pads. The amount of cushioning shall be easily adjustable without the need for pre-charged air chambers. Commercial air cylinders, which pivot and/or are attached with fabricated brackets, are not acceptable.

2.5 PINCH VALVES

- A. Pinch valves 4-inches and larger shall be manufactured by Red Valve Series 5200E or approved equal. Pinch valves shall be centerline closure, have true feedback positioning, and repeatable variable venturi flow control.
- B. The pinch valve shall be equipped with EPDM cone sleeves, the flanges shall be drilled and tapped to mate with ANSI B16.5 Class 150 flanges.
- C. The body of the valve shall be ductile iron.
- D. Pinch valve shall be electrically-actuated with modulating service as described below.
Influent EQ Basin to Pre-Anoxic tank:
Flow: 0 – 420 gpm
Max. Pressure: 20 PSI

2.4 BUTTERFLY VALVES (METAL BODY)

- A. Rubber seated, tight-closing type designed, manufactured and tested in accordance with AWWA C504, latest revision.
- B. Valve Body: Cast iron, ASTM A126, Class B.
- C. Body Seat: 18-8, 304 or 316 stainless steel if a resilient seat ring is provided in the valve vane. Body seat shall be Buna-N or EPDM if a stainless steel seat ring is provided in the valve vane.
- D. Valve Seats: Elastomer seat recess mounted, bonded, or mechanically secured to the valve body or disc. When the seats are on the disc, secure seat to the disc with a serrated 18-8 stainless steel clamping ring. When the seat is on the body, furnish the disc with a stainless steel seating edge.
- E. Valve Vane: Ductile iron, A536, Grade 65-45-12.
- F. Valve Shafts: 18-8 Type 304 stainless steel with diameter equal or greater than as shown in AWWA C504.
- G. 200 psi working pressure. Valves used on blower discharge piping shall have a 350 degree F working temperature rating.
- H. Furnish with valve position indicator.
- I. Notch-plate lever throttling handles for valves 6" size and smaller.
- J. Heavy-duty manual actuators for valves larger than 6" size.
 - 1. Sealed and permanently lubricated. Fully supported, exert no thrust or load on valve shaft.
 - 2. Vertical, right-angle or buried type as applicable. Crank handle, handwheel, or square nut operator as indicated on the Drawings.

2.5 MISCELLANEOUS VALVES

- A. All valves shall be provided with the type of ends indicated, unless otherwise specified. All valves of any one classification shall be of the same manufacturer.
- B. Unless otherwise specified herein for specific items, valves shall be as follows: Equal valves of the Rensselaer Valve Company, Darling Valve and Manufacturing Company or approved equal.

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|-----|---|---|
| 1. | Gate, on 3" ferrous process piping | Stockham Cat. No. G623, flanged ends
Kennedy Fig. 1566, flanged ends |
| 2. | Gate, on ferrous piping smaller than 3" | Stockham Cat. No. B105, screwed ends
Kennedy Fig. 66, screwed ends |
| 3. | Gate, on ferrous piping | *Stockham Cat. No. B112 |
| 4. | Check, on ferrous process piping | Stockham Cat. No. B319
Kennedy Fig. 106 |
| 5. | Check, on non-ferrous piping | *Stockham Cat. No. B309
Kennedy Fig. 440SD |
| 6. | Pressure regulating, 2-1/2" and larger | GA. Ind. Golden Anderson 43-D
Spence Engineering Co. Type D34 |
| 7. | Pressure regulating, 2" and smaller | GA. Ind. Golden Anderson 4500D
Spence Engineering Co. Type D34 |
| 8. | Pressure reducing, 2" and smaller | Spence Engineering Co. Type D34
Cashco, Type 8310 |
| 9. | Pressure relief, liquid | |
| 10. | Globe, on 2" and smaller Non-ferrous process piping | *Stockham Cat. No. B-29
Crane Co. No. 14-1/2P |
| 11. | Globe, on 3" and smaller ferrous process piping | Lunkenheimer No. 16PS
Crane Co. No. 254XR |

* Soldered-end valves shall be installed with unions adjacent to the valves. In lieu of the combination of soldered-end valves and unions, the Contractor may use screwed union-end type valves.

- C. Interior hose valves, of 1-1/2" size, shall be similar to the Watts Regulator Series 40, Taco, Inc., Model No. 333 or approved equal bronze hose gate valve with malleable iron wheel and non-rising stem with National Standard threaded hose connection. Interior hose valves of size 3/4 inch shall be similar to the Watts Regulator Series GV or approved equal bronze hose valve, with National Standard threaded hose connection. All hose valves shall be furnished with a bronze cap and chain.

2.6 VALVE BOXES

- A. Valves to be direct buried and shall be provided with roadway valve boxes. Roadway valve boxes shall be cast iron and inside riser diameter of 5-1/4" and to be of the two-piece threaded adjustable type with drop cover marked for sewer service and water service as applicable both the inside and outside of the valve box and cover shall be thoroughly cleaned and coated with asphalt varnish, applied hot, before leaving the foundry. Extension stems with standard 2" square operating nuts shall be provided where depth from finished grade to valve operating nuts exceeds 5 feet. Extension stems shall be securely attached to the valve operating nut and shall be provided with means for centering the operating nut within the roadway valve box.

2.7 CHAIN WHEELS

- A. Where required, for overhead installation, chain wheels will be provided of a babbitt type which will bolt to existing handwheel. Rust proof chain to ASTM A153-71. Chain wheels shall be of the adjustable sprocket type which allow free fall of the chain with no binding.

2.8 ELECTRIC MOTOR ACTUATORS

A. Actuator

1. The actuator shall be suitable for use on a normal 480 volt, three phase, 60 hertz power supply and incorporate motor, integral reversing starter, local control facilities, and terminals for remote control and indication connections.
2. Actuator local control and position indicator orientation.
 - a. Shall be the responsibility of the valve supplier.
 - b. Actuator orientation for the valves shall be as shown on the drawings. Otherwise, actuator for quarter-turn valve shall be oriented so the local position/status display and controls are viewable in a normal configuration from the floor.

Normal is:

- i. If display orientation is vertical, display is easily readable with the operator standing with head erect (i.e., text shall be read left-to-right, top-to-bottom).
- ii. If display orientation is horizontal, the display is easily readable by looking upwards.
- iii. If the valve centerline is less than 5 feet above the floor the actuator display and controls shall be vertical and oriented toward the walkways and the handwheel shall be horizontal and oriented upward.
- iv. If the valve centerline is more than 5 feet but less than 8 feet above the floor the actuator display and controls shall be vertical and oriented toward the walkways and the handwheel shall be horizontal and oriented downward.
- v. If the valve centerline is more than 8 feet above the floor the actuator display and controls shall be horizontal and viewable from directly below and the handwheel shall be vertical.
- vi. If mounted below floor level the actuator display and controls shall be horizontal and viewable from directly above.

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- c. When valves and their corresponding actuators are mounted in locations not easily accessible, a remote OEM control station shall be provided mounted to the nearest wall.
 3. Electric actuators shall be non-intrusive type and be suitable for 1200 modulations per hour. Electric actuators shall be manufactured by Rotork, or approved equal. The electric actuators shall be provided with valve position indicators, indicating percent open.
- B. Actuator Sizing
1. The actuator shall be sized to guarantee valve closure at the specified differential pressure or head.
 2. All butterfly and plug valves shall operate in 60 seconds or less unless otherwise specified.
 3. Gate speed shall be approximately 12 in/min or more.
 4. The safety margin of motor power available for operating the valve or gate shall be sufficient to ensure torque switch trip at maximum valve torque with the supply voltage 10% below nominal.
- C. Actuator Temperature Range
- The actuator shall be capable of functioning in an ambient temperature ranging from minus -22°F (-30°C) to $+160^{\circ}\text{F}$ ($+70^{\circ}\text{C}$).
- D. Actuator Motor
1. The electric motor for ON/OFF and POSITIONED service shall be Class F insulated with a time rating of at least 15 minutes at 104°F (40°C) or twice the valve stroking time, whichever is longer, at an average load of at least 33% of maximum valve torque.
 2. The electric motor for MODULATING duty service shall be Class H insulated with a time rating of at least 30 minutes at 104°F (40°C), at an average load of at least 33% of maximum valve torque.
 3. Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the gear case.
 4. Plugs and sockets are not acceptable as a means of electrical connection to the motor.
 5. A suitable self-resetting thermal protection device shall be incorporated in the motor or motor starter circuits.

E. Actuator Gearing

1. The design should be such as to permit the gearcase to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service.
2. The actuator gearing shall be totally enclosed in oil.
3. Any mounting restriction shall not be permitted.
4. All on/off and position actuators shall incorporate a lost motion hammer blow feature.
5. All modulating actuators shall have the hammer backlash omitted.
6. All modulating actuators shall use an aluminum bronze worm wheel in the final output stage.
7. For rising stem valves, the output shaft shall be hollow to accept the rising stem and incorporate thrust bearings of the ball or roller type at the base of the actuator.
8. For quarter-turn valves all gearing shall comply with the latest issue of AWWA C504.
9. All main drive gearing must be of metal construction.
10. The combined gear ratio shall ensure “self locking” characteristics at all times and shall be sufficient high ratio as to inhibit “backdriving” the actuator.

F. Actuator Hand Operation

1. A handwheel shall be provided for emergency operation.
2. Maximum rimpull shall be 80 ftlb.
3. The handwheel shall be engaged when the motor is declutched by a lever or similar means.
4. Motor drive shall be restored automatically by starting the motor.
5. The hand/auto selection level should be padlockable in both “Hand” and “Auto” positions.
6. It shall be possible to disengage the electric drive with the declutch level. This disengagement and any subsequent reengagement shall not cause any damage to the valve or operator – even with the motor running.

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7. The handwheel drive must be mechanically independent of the motor drive gearing so a fused motor or any failure in the motor gears shall not inhibit handwheel operation.
 8. The handwheel gearing shall allow for emergency manual operation in a reasonable time.
 9. A clockwise rotation of the handwheel shall provide a clockwise rotation of the output drive sleeve.
- G. Actuator Drive Bushing
1. The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft.
 2. A thrust bearing when required shall be housed in a separate thrust base and is a sealed-for-life design.
- H. Actuator Integral Control and Protection Facilities
1. Integral Starter
 - a. The reversing starter, control transformer, and local controls shall be integral to the valve actuator.
 - b. The reversing starter, control transformer, and local controls shall be suitably housed to prevent breathing and condensation buildup.
 - c. For ON/OFF and POSITIONED service, this starter shall be a electromechanical type suitable for 60 starts per hour and of rating appropriate to motor size.
 - d. For MODULATING duty, the starter shall be a solid state type suitable for 1,200 starts per hour.
 2. Integral Transformer
 - a. The controls supply transformer shall be fed from two (2) of the incoming three phases.
 - b. Shall have the necessary tappings and be adequately rated to provide power for the following functions.
 - c. Energization of the contactor coils
 - d. 24 VDC or 120 VAC output as indicated on the control system data for actuator remote controls
 - e. Supply all internal control circuits.
 - f. Fuses shall protect the primary windings.

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- g. A self-resetting fuse shall protect secondary winding.
3. Integral Push-Buttons and Selector
- a. Shall include local controls for Open, Close, and Stop.
 - b. Shall include a local/remote selector switch padlockable in any one of the following three positions.
 - i. Local Control Only
 - ii. Off (No Electrical Operation)
 - iii. Remote Control Only
 - c. Shall be arranged so that the direction of travel can be reversed without the necessity of stopping the actuator.
 - d. It shall be possible to select maintained or non-maintained local control without exposing the electronics to the environment.
 - e. No dynamic penetration of the electrical enclosure by the local controls shall be permitted.
- I. Control Facilities
1. Unless noted in the control system specification or drawings, the necessary circuits, wiring and terminals shall be provided in the actuator for the following control functions:
- a. Removable links or contact points for external interlocks to inhibit valve opening and/or closing.
 - b. Limit contacts that are field adjustable. A total of eight shall be provided unless otherwise indicated by the valve control diagram.
 - c. Connections for external remote controls fed from an internal 24V DC supply and/or from an external supply of (min. 12V, max. 120V) to be suitable for any one or more of the following methods of control:
 - i. Open, Close, and Stop
 - ii. Open and Close
 - iii. Overriding Emergency, Shutdown to Close (or Open) Valve from a "Make Contact".
 - iv. Two-Wire Control, Energize to Close (or Open), De-Energize to Open (or Close).
 - d. Selection of maintained or push-to-run control for mode (a) and (b) above shall be provided.
 - e. To control hydraulic shock an interrupter timer shall be provided for all actuators

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- i. Shall effectively lighten the stroke time by automatically pulsing the motor.
 - ii. Shall provide for independent motor on and off times for maximum control.
 - iii. Shall be selectable to operate over any portion of the valve stroke.
 - iv. Shall provide for independent adjustment in the open direction of the stop set point and in the close direction of the start of the start set point.
 - i. It shall be possible to reverse valve travel without the necessity of stopping the actuator.
 - 2. The actuator shall include a device to automatically ensure that the motor runs with the correct rotation for the required direction of valve travel with either phase sequence of the three-phase power supply connected to the actuator.
 - 3. The actuator shall not allow the motor to run if a phase of the power supply is lost.
 - 4. The motor shall be deenergized in the event of a stall when attempting to unseat a jammed valve.
 - 5. Torque protection reset shall not allow repeated starting in the same direction when control signal is maintained.
 - 6. The electric circuit diagram of the actuator should not vary with valve type remaining identical regardless of whether the valve is to open or close on torque or position limit.
- J. Actuator Torque Protection
- 1. Each actuator shall be provided with both open and close torque protection.
 - 2. For security purposes, all adjustments to torque settings shall be limited to a removable intrinsically safe setting tool.
 - 3. Torque sensing
 - a. Must be affected purely electrically or electronically.
 - b. Torque protection range shall be 40 to 100 percent of the rated torque.
 - c. Torque sensing shall be “Latched” to inhibit torque-off during unseating or during starting in mid-travel against high inertia loads.
- K. Actuator Position and Status Indication
- 1. At least one change over indication at each end of travel shall be available for remote indication and interlocking.
 - 2. For security purposes, all adjustments to limit settings shall be limited to a removable intrinsically safe setting tool.

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3. Position setting range: 2.5 to 10,000 turns – with resolution not to exceed 7.5 degrees of one actuator center column revolution.
 4. In the event of a (main) power (supply) loss or failure, the position contacts must continue to supply discrete position indication and maintain interlock capabilities.
 5. If batteries are required to maintain contact functionality the actuator vendor shall provide a supply sufficient for 30 continuous days of unpowered operation with one complete valve cycle every hour.
- L. Additional Actuator Valve Position/Actuator Status Indication
1. To ensure reliable operation all positioners or position transmitters shall be contactless.
 2. A proportional controller that responds to a 4-20mA analog signal to position the valve remotely shall be provided unless otherwise indicated.
 3. For security purposes, all adjustments to position controller settings shall be limited to a removable intrinsically safe setting tool.
 4. Accuracy shall be 1.0% minimum.
 5. Deadband shall be adjustable from 0.1% to 10.0%.
 6. Must be affected purely electrically or electronically.

A transmitter to provide a 4-20mA analog output signal corresponding to valve position shall be provided unless otherwise indicated.
 7. Eight contacts shall be provided unless otherwise indicated in the actuator control controls.
 8. It shall be possible to indicate any position of the valve with each contact selectable as normally open or normally closed.
 9. The contacts shall be rated at 5A, 250VAC, 30VDC.
 10. Unless noted the actuator shall be provided with contacts for monitoring actuator operation and availability as follows:
 - a. Monitor (actuator available for remote control) relay
 - i. Shall have one change-over contact
 - ii. The contact shall be energized from the control transformer only when the Local/Off/Remote selector is in the “Remote” position to indicate that the actuator is available for remote (control room) operation.

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- b. Each contact shall be capable of providing the following status conditions as a NO or NC contact.
 - i. Thermostat trip
 - ii. “Remote” selected as discrete signals
 - iii. Loss of main supply
 - iv. Loss of internal control circuit supply
 - v. Motor thermostat tripped (where applicable)
 - vi. “Stop” function on actuator operated.
- M. Actuator Local Display and Indications:
- 1. Shall show the following conditions simultaneously, either with LED’s or LCD’s display when they occur.
 - a. Green: Valve closed
 - b. Red: Valve opened
 - c. Yellow: Intermediate travel
 - 2. Valve, scum pipe or gate position in 1% increments from full open (100%) to full close (0%).
 - a. The position shall be displayed even when the power to the actuator is isolated or turned off.
 - b. Shall be visible from a distance of six feet (6’) when the actuator is powered up.
 - 3. Actuator torqued switch trip.
 - 4. If batteries are required, Low battery condition.
 - 5. Actuator Fault.
 - 6. All enclosures must be rated the same as the actuator.
- N. Actuator Monitoring & Diagnostics Facilities
- 1. Each actuator shall include a diagnostic module
 - 2. Shall store historical actuator data
 - 3. Permit analysis of changes in actuator or valve performance

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4. A software tool shall be provided to allow reconfiguration and diagnostic information to be reviewed and analyzed.
 - a. Software shall be compatible with Internet Explore software for uploading and downloading all variables for the actuator.
 - b. Software shall be compatible with Internet Explore software for performing detailed analysis of diagnostic data.
 - c. All hardware required for running the software shall be provided.
 5. Diagnostic data shall be available over a non-intrusive, bi-directional communication port, which can be relayed to a remote facility.
 6. Diagnostic information shall be available from both an integrally mounted display window and through non-intrusive means of reading and writing data to the actuator.
 7. Local status screens must be provided to show multiple functions simultaneously so troubleshooting can be affected rapidly and efficiently.
 8. All actuator diagnostic information should be contained on no more than eight (8) screens so multiple functions can be checked simultaneously.
 9. A local display (LCD or LED) shall be provided to display instantaneous valve torque demands as a percent of rated actuator torque and position simultaneously.
 10. Two-way non-intrusive communications must be possible to facilitate downloading actuator setup.
- O. Actuator Wiring and Terminals
1. Internal wiring shall be tropical grade PVC insulated stranded cable of appropriate size for the control and the power supply.
 2. Each wire shall be clearly identified at each end.
 3. The terminals shall be embedded in a terminal block of high tracking resistance compound.
 4. The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight seal.
 5. The terminal compartment of the actuator shall be provided with at least three (3) threaded cable entries.
 6. All wiring supplied as part of the actuator to be contained within the main enclosure for physical and environmental protection. External conduit connections between components are not acceptable.

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7. A durable terminal identification card showing a diagram of terminals shall be provided attached to the inside of the terminal box cover indicating:
 - a. Serial Number
 - b. External Voltage Values
 - c. Wiring Diagram Number
 - d. Terminal Layout
 - e. Space for cable core inscription
- P. Actuator Enclosure
1. Actuators shall be 'O' ring sealed, watertight to NEMA 6 (FM rated, 10 ft. for 48 hours).
 2. The enclosure shall have an inner watertight and dustproof 'O' ring seal between the terminal compartment and the internal electrical elements of the actuator.
 3. The inner seal shall fully protect the motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed on site for cabling.
 4. Actuators for explosion/hazardous applications shall also be certified flameproof (explosion proof) to NEMA 7 for Zones 1 and 2 (Divisions 1 and 2) Group C and D gases.
 5. Enclosure must allow for site storage without the need for electrical supply connection.
 6. Sheet metal construction shall not be acceptable.
 7. All actuator external fasteners shall be made of stainless steel.

PART 3 EXECUTION

3.1 INSPECTION

- A. Inspect for damages immediately before installation. Repair defects before assembly.
- B. Assure that bolt holes align before starting assembly.

3.2 INSTALLATION

- A. As per manufacturers written instructions.
- B. Test and demonstrate for proper operation, calibration, and adjustment.

3.3 MANUFACTURER'S FIELD SERVICES

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- A. Provide the following services for each different type of power-operated valve assembly or motorized actuator on existing items of equipment.
1. The actuator manufacturer shall provide representatives for a minimum of one day (or as required to complete the following) during start-up period to:
 - a. Inspect, test, calibrate, and adjust all equipment, accessories and controls;
 - b. Certify that the equipment installation is complete and ready for operation.
 - c. Assist the Contractor to verify that the control system functions and controls the equipment as intended.
 - d. Adjust positioners and actuators for proper control with process systems on-line and operating.
 - e. Correct any malfunctions appearing during the testing by replacement of defective components or adjustments of maladjusted parts and equipment.
 - f. Perform additional testing, as directed by the County, to assure that the replaced or readjusted equipment will perform satisfactorily.
 2. The manufacturer shall start, stop and run all equipment to verify that it is free from defects such as overheating, overloading, undue vibration or noise, leaks, etc.
 3. Upon completion of the tests, the manufacturer shall clean-up all tools, equipment, and debris and provide to the City written certification that the equipment is completely and correctly installed and ready for continuous duty.
- B. Provide the following training services for each different type of power-operated valve assembly or motorized actuator installed on existing items of equipment.
1. Minimum of one day per assembly and actuator type.
 2. Instructor shall be a Manufacturer's technical representative, specifically trained on the specified equipment.

END OF SECTION 40 23 20