CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 2

DATE: October 10, 2017
FROM: City of Grand Junction Purchasing Division
TO: All Offerors
RE: Kannah Creek Intake Rehabilitation IFB-4414-17-DH

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. Q. Does the well house have to remain operational?

   A. Please review project specifications for this information

2. Q. What is the size of conduits running up the hill to the pull boxes?

   A. Please review sheets E3 and E4 for this information.

3. Q. Do the pull boxes need to be flush with the ground or mounted on a post above ground?

   A. Pull boxes shall be installed flush with ground.

4. Q. Is the electrical permit a County or State issued permit?

   A. County Permit

5. Q. Where does the new building get power from?

   A. Power source is at the 12” power pole located north of the proposed debris screen at approximate STA 3+10

6. Q. Please confirm if water will or will not remain flowing through the tank with existing filter grate (new shed location).
   6.1 Water will not be able to flow through existing tank since it will be partially demolished and filled in.

7. Q. Is a licensed plumber required for the domestic well water line relocation and hookup?

A. Yes

8. Q. Concrete under the existing shed(s) may be difficult to cut and remove cleanly without it deteriorating during removal. The south end (pump house) won't be too bad because the hole will be filled in. On the north end (new shed location) could we leave top of concrete walls as is to receive new slab and raise grade with fill so it is "level" (as requested) with surrounding terrain?

   A. Please submit bids per current plans.

9. Q. Will spoils stay on site or do they need to be hauled away.

   A. Spoils may remain on site. All demolished material of existing shed, with the exception of its concrete foundation, must be hauled away. The foundation concrete rubble may be used to fill the existing tank.

10. Q. Is a plumbing permit required?

    A. See above.

11. Included with this addendum are the cut sheets for the new screen.

12. The project indicates that there are two 24" Slide Gates with Electric Actuators configured for Analog Position Control & Position Feedback. (Ref: SP-13/5.2/A & Bid Schedule).

    12.1 Q. The specified brand series designates Aluminum material for the slide gate. It is highly recommended to upgrade the material to Stainless Steel. Aluminum has not historically provided for a long service life as it is subject to severe galvanic corrosion, and the welds tend lose their integrity after several years. Many utilities find themselves replacing Aluminum slide gates after only 10 years of service.

    A. Slide gates have been changed from aluminum to stainless steel. Please see revised Bid Tab attached.

    12.2 Q. The plans & specifications do not provide details that are customarily provided for fabricated slide gates. There are many variants to consider with slide gates which and have significant influence on the cost & lead time. Please see the document at the following link which outlines the different mounting options, lift, and frame details. Alternatively, please provide images and details of the existing structure.

    A. Please see attached specifications for slide gate. Also attached are photos of the existing gate structure.

    12.3 Q. Fabricated Slide Gate Specification Booklet: http://watermanusa.com/wp-content/uploads/2017/03/Waterman_SS-250_SlideGates_Booklet_2017.pdf

    A. See attached specifications

    12.4 Q. Please see the attached sample specification which outlines all the details which are usually specified for a bid.

A. Please see attached specifications for slide gate.

12.5 Q. Please consider including Waterman as an acceptable brand of slide gate.

A. Waterman will be an acceptable brand of slide gate.

12.6 Q. There is no electric actuator specification. With this being a municipal slide gate with positioning application we recommend the design basis be an SIPOS/AUMA 7 Electric Actuator. Sample Specification & product information is attached.

A. Please see attached specifications for electric actuator.

13. With regards to the 8" valve intended to be used for Bypass flow control (Ref: Bid Schedule, SP-13/5.2/B).

13.1 Q. Resilient Wedge Gate Valves are not recommended for flow control applications, it may void the factory warranty if used for this purpose. For this application a comparably priced valve option would be to specify a Plug Valve.

A. Plug valves will be considered as an acceptable valve for application.

13.2 Q. ValMatic Plug Valves: http://www.valmatic.com/plugvalves.html

A. Val-Matic will be considered for the butterfly and combination air valves.

13.3 Q. If a Plug Valve is selected, please note that the plug valve should be installed with the valve shaft horizontal with the plug up when open.

A. Noted

13.4 Q. Please see the attached sample specification for Plug Valves.

A. Please see attached specification.

13.5 Q. The Device Control Criteria suggest that the actuator is ultimately controlling flow. This can be achieved by specifying an actuator with an integral process controller which is also an option for the AUMA/SIPOS 7 Electric Actuator. Alternatively, this actuator can be provided with a standard position control configuration similar to what is required for the slide gates, and user SCADA determines how to position the valve to achieve the desired flow rate.

A. The intent is to use SCADA to set position of valve to achieve desired flow rate.

14. For Butterfly Valves & Air Valves:

14.1 Q. Recommend requiring Fusion Bonded Epoxy Coating & Stainless Steel fasteners. These adders provide optimal corrosion protection and factories now days are able to provide these upgrades for very little cost.

A. Please ensure fasteners are epoxy coated or stainless steel for corrosion resistance.

14.2 Q. Please consider including ValMatic as allowed brands for air valves and butterfly valves.

A. The City will consider this brand for this application

15. The City of Grand Junction does not currently have a “pre-qualification” process in service. However, the City would like to take this opportunity to emphasize that contractor experience with a project of this scope and size is important to the success of this project.

Due to the general complexities of the project, and critical aspects of the project, the contractor shall submit a minimum of 3 references, with their bid submittal, of projects of similar scope and size in which the contractor was the General Contractor for those projects.

Please include:
-Project Title and a brief description of the project:
-Company Name;
-Point of Contact information;
-Project Location;
-and Dollar Amount.

These references shall be taken into consideration for selecting the awarded bidder.

16. Q. Could you please provide a drawing or detail for the Slide Gates, or let us know what the distance from the centerline of opening to top of structure is?

A. At the slide gate the height from invert to operation floor elevation (top of concrete) is 6’-5”. Intake channel width at slide gate measures 4’-8” across. See photos for detail.

17. Q. Is Waterman an approved equal to the Whipps gate?

A. See above

18. Q. For the valves, is Proco an acceptable equal to the Tideflex Check Valves, and Val-Matic for the Butterfly and Combination Air Valves?

A. Proco is an acceptable alternative for the check valves. Val-Matic - See above

19. Project should be bid planning to reset existing water treatment equipment.

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Respectfully,

Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado

Bid Schedule: Kannah Creek Intake Rehabilitation

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
1	108.2	Irrigation Pipe (6") (SDR 35 PVC)	38.5	LF	$ _____	$ _____
2	108.2	Water Main (6") (C900, DR-18)	27.	LF	$ _____	$ _____
3	108.2	Water Main (8") (C900, DR-18)	34.	LF	$ _____	$ _____
4	108.2	Water Main (18") (C-905, DR-18) (Includes all Bell Joint Restraints and Connection to existing pipe)	282.	LF	$ _____	$ _____
5	108.2	Water Main (24") (C-905, DR-18) (Includes all Bell Joint Restraints and Connection to existing pipe and intake inlet)	237.		$ _____	$ _____
6	108.3	Check Valve (6") (Tideflex Checkmate Series 35 or Engineer approved	2.	EA	$ _____	$ _____
7	108.3	Check Valve (8") (Tideflex Checkmate Series 35 or Engineer approved	1.	EA	$ _____	$ _____
8	108.3	Combination Air Valve and Vault Assembly (6") (Includes Bedding material, flanged butterfly valve w/ 90o angle nut, air valve, 60" concrete vault, frost proof ring and cover, galvanized vent pipe, and all necessary fittings to complete	2.	EA	$ _____	$ _____
9	108.3	Elbow (2" x 90 deg)	14.	EA	$ _____	$ _____
10	108.3	Elbow (6" x 22.5 deg)	1.	EA	$ _____	$ _____
11	108.3	Elbow (6" x 90 deg)	2.	EA	$ _____	$ _____
12	108.3	Elbow (8" x 90 deg)	3.	EA	$ _____	$ _____
13	108.3	Elbow (18" x 22.5 deg)	1.	EA	$ _____	$ _____
14	108.3	Elbow (18" x 45 deg)	4.	EA	$ _____	$ _____
15	108.3	Elbow (24" x 11.25 deg)	2.	EA	$ _____	$ _____
16	108.3	Elbow (24" x 22.5 deg)	1.	EA	$ _____	$ _____
17	108.3	Electromagnetic Flow Sensor (8") (Spirax-Sarco MagFlow MAG 5100 W or Engineer approved equal) (Includes fittings to connect to waterline)	1.	EA	$ _____	$ _____
18	108.3	Electromagnetic Flow Sensor (18") (Spirax-Sarco MagFlow MAG 5100 W or Engineer approved equal) (Includes fittings to connect to waterline)	1.	EA	$ _____	$ _____
19	108.3	Gate Valve (6") (Manual)	1.	EA	$ _____	$ _____
20	108.3	Gate Valve (8") (Includes Actuator)	1.	EA	$ _____	$ _____
21	108.3	Slide Gate (24") (Whipps 900 Series or Engineering approved equivalent) (Includes modification of existing concrete structure to accommodate new gate and actuator)	2.	EA	$ _____	$ _____
22	108.3	Tee (18" x 6")	1.	EA	$ _____	$ _____
23	108.3	Tee (18" x 8")	1.	EA	$ _____	$ _____

Bid Schedule: Kannah Creek Intake Rehabilitation

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
24	108.4	Irrigation Connection (2") (Include connection to Irrigation pump, pump starter, well pump VFD)	Lump	Sum	- - -	$ _____
25	108.4	Irrigation Service Line (2") (Sch 40) (Include Elbows and Fittings to complete assembly and connect to Tapping Saddle and service line)	56.	LF	$ _____	$ _____
26	108.4	Water Service Line (2") (Sch 40) (Include Elbows and Fittings to complete assembly and connect to existing well and service line)	53.	LF	$ _____	$ _____
27	108.4	Water Treatment Connection (Includes Water meter, Expansion Tank, Filters, UV Filter, Water Softener, Potable Water System Pressure Transmitter, Conduit, Fittings and Connects) (Water service to house must remain in operation for the duration of the project)	Lump	Sum	- - -	$ _____
28	108.5	Pipe Valve Vault (60" I.D.) (8' Inside Height) (Inverted Ring/Cover) (Includes 6" thick Type A Bedding, adjustable pipe saddles (2) and all necessary fittings to complete	4.	EA	$ _____	$ _____
29	201	Clearing and Grubbing (Includes trees, bushes, and native vegetation)	0.27	AC	$ _____	$ _____
30	202	Abandon Pipe (Abandon pipe by plugging both ends with concrete)	1.	EA	$ _____	$ _____
31	202	Remove Building (Includes removal of concrete spillway and foundation wall to minimum 12" below finished grade)	Lump	Sum	- - -	$ _____
32	202	Remove Existing Air Valve	1.	EA	$ _____	$ _____
33	202	Remove Existing Pipe (Size as shown on plans)	350.	LF	$ _____	$ _____
34	202	Remove Sidewalk	6.44	SY	$ _____	$ _____
35	203	Embankment Fill (Complete-in-Place)	735.	CY	$ _____	$ _____
36	203	Rock Excavation (1 CY and larger)	75.	CY	$ _____	$ _____
37	207	Stripping and Stockpiling Topsoil	90.	CY	$ _____	$ _____
38	207	Topsoil	160.	CY	$ _____	$ _____
39	210	Modify Structure (Remove Steel bars from inlet opening)	Lump	Sum	- - -	$ _____
40	212	Seeding (Native)	0.3	AC	$ _____	$ _____
41	202	Seeding (Lawn)	0.02	AC	$ _____	$ _____
42	216	Soil Retention Blanket (Biodegradable Straw/Coconut)	725.	SY	$ _____	$ _____

Bid Schedule: Kannah Creek Intake Rehabilitation

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
43	304	Aggregate Base Coarse (Class 3) (Place in maximum 12" lifts compacted to 95% Standard Proctor)	70.	CY	$ _____	$ _____
44	506	Riprap Protection (6" D50 CDOT Gradation) Contractor shall use as much riprap from project trench excavation for rock protection where called out on the plans)	13.	CY	$ _____	$ _____
45	608	Concrete Sidewalk (4") (Includes 6" Class 6 Aggregate Base Coarse)	11.	SY	$ _____	$ _____
46	620	Sanitary Facility	Lump	Sum	- - -	$ _____
47	625	Construction Surveying	Lump	Sum	- - -	$ _____
48	626	Mobilization	Lump	Sum	- - -	$ _____
49	SP	Electrical & Control	Lump	Sum	- - -	$ _____
50	SP	FCA Modular Farmers Screen (Installation only)	Lump	Sum	- - -	$ _____
51	SP	Prefabricated Shed (10' x 12' Interior Dimensions) (Refer to Appendix _ for information) (Include 4" concrete foundation on 6" Class 6 Aggregate Base Coarse	Lump	Sum	- - -	$ _____
52		Dewater Inlet	Lump	Sum	- - -	$ _____
MCR		Minor Contract Revisions	- - -	- - -	- - -	$ 30,000.00
				Bid Amount:		**$** _____

Bid Amount:

_____ **dollars**

ECCENTRIC PLUG VALVE
Val-Matic® Specification

1 Scope
1.1 This specification covers the design, manufacture, and testing of 1/2 in. (15 mm) through 3 in. (80 mm) Threaded Eccentric Plug Valve, 2 ½ in. (60 mm) through 60 in. (1500 mm) Eccentric Plug Valve, and 4 in. (100 mm) through 60 in. (1500 mm) 100% Port Eccentric Plug Valve suitable for water or wastewater service with pressures up to 250 psig (1725 kPa).
1.2 Plug Valves shall be quarter-turn, non-lubricated with resilient encapsulated plug.

2 Standards, Approvals and Verification
2.1 2 ½ in. (60 mm) through 60 in. (1500 mm) plug valves shall be designed, manufactured and tested in accordance with American Water Works Association Standard ANSI/AWWA C517.
2.2 All Plug Valves shall be certified Lead-Free in accordance with NSF/ANSI 372.
2.3 Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.

3 Connections
3.1 Threaded valves shall have threaded NPT full size inlets. The connection shall be hexagonal for a wrench connection.
3.2 Flanged valves shall have flanges with drilling to ANSIB16.1, Class 125.
3.3 Mechanical Joint valves shall fully comply with ANSI/AWWA C111/A21.11.

4 Design
4.1 Threaded and all other valves under 4" (100mm) shall have port areas of not less than 100% of pipe area. Port areas on other sizes are 85% on 16" (400 mm) and smaller, 80% on 18"-24" (150 mm- 600 mm), and 75% on 30" (800 mm) and larger.
4.2 Threaded valve seat shall be a machined seating surface.
4.3 2 ½ in. (60 mm) through 60 in. (1500 mm) plug valves shall have a valve seat that is a welded overlay of 95% pure nickel applied directly to the body on a pre-machined, cast seating surface and machined to a smooth finish.
4.4 Threaded valves shall have shaft seals which consist of V-type lip seal in a fixed gland with a resilient O-ring spring.
4.5 2 ½ in. (60 mm) through 60 in. (1500 mm) plug valves shall have shaft seals which consist of V-type packing in a fixed gland with an adjustable follower designed to prevent over compression of the packing and to meet design parameter of the packing manufacturer. Removable POP™ shims shall be provided under the follower flanges to provide for adjustment and prevent over tightening.
4.6 Permanently lubricated, radial shaft bearings shall be supplied in the upper and lower bearing journals. Thrust bearings shall be provided in the upper and lower journal areas, except for threaded type which only have upper thrust bearings.
4.7 Both the packing and bearings in the upper and lower journals shall be protected by a Grit-Guard™ "drip tight" Buna-N shaft seal located on the valve shaft to minimize the entrance of grit into the bearing journal and shaft seal areas.
4.8 The threaded valve body shall have 1/8" NPT upstream and downsteam pressure ports.

5 Materials
5.1 Valve bodies and covers shall be constructed of ASTM A126 Class B cast iron for working pressures up to 175 psig (1200 kPa) and ASTM A536 Grade 65-45-12 for working pressures up to 250 psig (1725 kPa). The words "SEAT END" shall be cast on the exterior of the body seat end.
5.2 Threaded valve plugs in sizes 1/2 in. (15 mm) through 3 in. (80 mm) shall be of one-piece construction and made of ASTM A126 Class B cast iron fully encapsulated with a resilient facing per ASTM D2000-BG and ANSI/AWWA C517 requirements.
5.3 2 ½ in. (60 mm) through 60 in. (1500 mm) plugs shall be of one-piece construction and made of ASTM A126 Class B cast iron or ASTM A536 Grade 65-45-12 ductile iron and fully encapsulated with resilient facing per ASTM D2000-BG and ANSI/AWWA C517 requirements.
5.4 Threaded valves shall have radial shaft bearings constructed of self-lubricating Type 316 stainless steel. The top thrust bearing shall be Teflon.
5.5 2 ½ in. (60 mm) through 60 in. (1500 mm) plug valves shall have radial shaft bearings constructed of self-lubricating Type 316 stainless steel. The top thrust bearing shall be Teflon. The bottom thrust bearing shall be self-lubricating Type 316 stainless steel. Cover bolts shall be corrosion resistant with zinc plating.

6 Actuators
6.1 Threaded valves shall be equipped with a hand lever with a dial indicator and open memory stop.
6.2 Valves 2 ½ in. (60 mm) to 8 in. (200 mm) and 4 in. (100mm) to 6 in. (150 mm) 100% ported shall be equipped with a 2 inch square nut for direct quarter turn operation. The packing gland shall include a friction collar and an open position memory stop. The friction collar shall include a nylon sleeve to provide friction without exerting pressure on the valve packing.
6.3 When specified valves 4 in. (100 mm) and larger shall include a totally enclosed and sealed worm gear actuator with position indicator (above ground service only) and externally adjustable open and closed stops. The worm segment gear shall be ASTM A536 Grade 65-45-12 ductile iron with a precision bore and keyway for connection to the valve shaft. Bronze radial bearings shall be provided for the segment gear and worm shaft. Alloy steel roller thrust bearings shall be provided for the hardened worm.

6.4 All gear actuators shall be designed to withstand, without damage, a rim pull of 200 lb. on the hand wheel and an input torque or 300 ft-lbs. for nuts.
6.5 Buried service actuators shall be packed with grease and sealed for temporary submergence to 20 feet of water. Exposed worm shafts shall be stainless steel.

7 Required Options
7.1 External Fasteners shall be stainless steel.
7.2 The interior and exterior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded epoxy.

8 Manufacture
8.1 Manufacturer shall demonstrate a minimum of ten (10) years' experience in the manufacture of plug valves. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings and operation and maintenance manuals.
8.2 The exterior of the valve for above ground service shall be coated with a universal alkyd primer. Valve exterior for buried service shall be coated with an epoxy coating.
8.3 Valve shall be marked with the Serial Number, Manufacturer, Size, Cold Working Pressure (CWP) and the Direct and Reverse Actuator Pressure Ratings on a corrosion resistant nameplate.
8.4 Plug Valves shall be Series # 5600R/5600F (100% Port Flanged), 5700R/5700F (100% Port Mechanical Joint), 5800RTL (Threaded), 5800R (Flanged), 5800HP (Flanged), 5900R (Mechanical Joint) or 5900HP (Mechanical Joint) as manufactured by Val-Matic Valve and Mfg. Corporation, Elmhurst, IL. USA or approved equal.

Revised 3-23-16

Whipps, inc.

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Athol, Massachusetts 01331
Phone: (978) 249-7924
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SECTION 11000
STAINLESS STEEL GATES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The CONTRACTOR shall furnish all labor, materials, equipment and incidentals required to install, ready for operation and field test stainless steel gates and appurtenances as shown on the Contract Drawings and as specified herein.
B. The gates and appurtenances shall be supplied in accordance with the latest edition of AWWA C561 Standard for Fabricated Stainless Steel Slide Gates as modified herein. The allowable leakage rate for the stainless steel gates in this specification shall be 1/2 the allowable leakage listed in the latest revision of AWWA C561.
C. Gates installed in drinking water or water treatment applications shall be NSF/ANSI 61 certified. Provide manufacturer certification of conformance to this standard.

1.02 SUBMITTALS

A. Provide the following information to confirm compliance with the specification in addition to the submittal requirements specified in Project Submittal Form
   1. Complete description of all materials including the material thickness of all structural components of the frame and slide.
   2. Installation drawings showing all details of construction, details required for installation, dimensions and anchor bolt locations.
   3. Maximum bending stress and deflection of the slide under the maximum design head.
   4. The location of the company headquarters and the location of the principle manufacturing facility. Provide the name of the company that manufactures the equipment if the supplier utilizes an outside source.

1.03 QUALITY ASSURANCE

A. Qualifications
   1. All of the equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 20 years experience designing and manufacturing water control gates. The manufacturer shall have manufactured water control gates for a minimum of 100 projects.
   2. Any gate imported into the United States must be fully shop tested at a test location within the US and shall be witnessed by a representative of the engineer. The cost of travel for the Engineer's representative shall be borne by the gate manufacturer.
   3. The specification is based on the 900 Series Stainless Steel Gate as manufactured by Whipps, Inc. of Athol, Massachusetts.

PART 2 EQUIPMENT

2.01 GENERAL

A. Gates shall be as specified herein and have the characteristics and dimensions shown on the Contract Drawings.
B. Leakage shall not exceed 0.05 gpm/ft of wetted seal perimeter in seating head and unseating head conditions.
C. The gate shall utilize self-adjusting seals. Due to the difficulty of accessing gates when they are in service, gates that utilize adjustable wedges, wedging devices or pressure pads are not acceptable.
D. All structural components of the frame and slide shall be fabricated of stainless steel having a minimum thickness of 1/4-inch and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
E. Slide gate frames shall be shipped fully assembled with the invert member welded to the side frames and the slide installed in the frame unless the overall width of the slide gate exceeds 96 inches or the overall height of the slide gate exceed 25 feet.
F. All welds shall be performed by welders with AWS D1.6 certification.
G. Finish: Mill finish on stainless steel. Welds shall be sandblasted to remove weld burn and scale. All iron and steel components shall be properly prepared and shop coated with a primer.
H. Materials:

Components	Materials
Frame Assembly and Retainers	Stainless Steel, Type 304L or 316L, ASTM A240
Slide and Stiffeners	Stainless Steel, Type 304L or 316L, ASTM A240
Stem	Stainless Steel, Type 304 or 316, ASTM A276
Anchor Studs	Stainless Steel, Type 316, ASTM A276
Fasteners and Nuts	Stainless Steel, Type 316, ASTM F593/F594
Invert Seal (Upward Opening Gates Only)	Neoprene or EPDM ASTM D-2000
Seat/Seals and Facing	Ultra-High Molecular Weight Polyethylene ASTM D4020
Lift Nuts	Bronze ASTM B584
Pedestals and Wall Brackets	Stainless Steel, Type 304L or 316L, ASTM A240
Operator Housing	Cast aluminum or ductile iron

2.02 FRAME

A. The frame assembly, including the guide members, invert member and yoke members, shall be constructed of formed stainless steel plate with a minimum thickness of 1/4-inch.
1. Frame design shall allow for embedded mounting, mounting directly to a wall with stainless steel anchor bolts and grout or mounting to a wall thimble with stainless steel mounting studs and a mastic gasket material. Mounting style shall be as shown on the Contract Drawings.
2. All wall mounted or wall thimble mounted gates shall have a flange frame. Flat frame gates are not acceptable.
3. The structural portion of the frame that incorporates the seat/seals shall be formed into a one-piece shape for rigidity. Guide members that consist of two or more bolted structural members are not acceptable. Guide member designs where water loads are transferred through the assembly bolts are specifically not acceptable.
4. Gussets shall be provided as necessary to support the guide members in an unseating head condition. The gussets shall extend to support the outer portion of the guide assembly and shall be positioned to ensure that the load is transferred to the anchor bolts or the wall thimble studs.
5. The frame shall extend to accommodate the entire height of the slide when the slide is in the fully opened position on upward opening gates or downward opening weir gates.

6. On self-contained gates, a yoke shall be provided across the top of the frame. The yoke shall be formed by two structural members affixed to the top of the side frame members to provide a one-piece rigid assembly. The yoke shall be designed to allow removal of the slide. The Yoke shall be sized to withstand normal operating loads as well as the maximum hoist output. The Yoke deflection shall not exceed 1/360 of the gate width or a maximum of ¼" whichever is less at maximum operating load.
7. A rigid stainless steel invert member shall be provided across the bottom of the opening. The invert member shall be of the flushbottom type on upward opening gates.
8. A rigid stainless steel top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.
9. A rigid stainless steel member shall be provided across the invert of the opening on downward opening weir gates.

2.03 SLIDE

A. The slide and reinforcing stiffeners shall be constructed of stainless steel plate. All structural components shall have a minimum thickness of 1/4-inch.

1. The slide shall not deflect more than 1/720 of the span or 1/16 inch, whichever is smaller, under the maximum design head.
2. When the width of the gate opening in feet multiplied by the maximum design head in feet is greater than 80square feet the portion of the slide member that engages the guide shall be 1/2" thick. When the width of the gate opening in feet multiplied by the maximum design head in feet is greater than 120 square feet, the portion of the slide that engages the guide members shall be of a "thick edge" design. The thick edge portion of the slide shall have a minimum thickness of 2.5 inches.
3. Reinforcing stiffeners shall be welded to the slide and mounted horizontally. Vertical stiffeners shall be welded on the outside of the horizontal stiffeners for additional reinforcement. When required to maintain proper plate stress and deflection intermediate vertical gussets shall be provided. Appropriate safety factors shall be applied to the ultimate tensile and yield strength of the material.
4. The stem connector shall be constructed of two angles or plates. The stem connector shall be welded to the slide. A minimum of two bolts shall connect the stem to the stem connector.

2.04 SEALS

A. All gates shall be provided with a self-adjusting seal system to restrict leakage in accordance with the requirements listed in this specification.
    1. All gates shall be equipped with UHMW polyethylene seat/seals to restrict leakage and to prevent metal to metal contact between the frame and slide. Seat contact pressure shall not exceed 600 psi at the design head.
    2. The seat/seals shall extend to accommodate the 1-1/2 x the height of the slide when the slide is in the fully closed or fully opened position.
    3. All upward opening gates shall be provided with a resilient seal to seal the bottom portion of the gate. The seal shall be attached to the invert member or the bottom of the slide and it shall be held in place with stainless steel attachment hardware.
    4. All downward opening weir gates shall be provided with UHMW polyethylene seat/seals across the invert member.
    5. The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or suffering damage.
    6. All seals must be bolted or otherwise mechanically fastened to the frame or slide. Arrangement with seals that are force fit or held in place with adhesives are unacceptable.
    7. The seals shall be mounted so as not to obstruct the water way opening.

8. Gates that utilize rubber “J” seals or “P” seals are not acceptable.
9. The seal system shall have been factory tested to confirm negligible wear (less than 0.01”) and proper sealing. The factory testing shall consist of an accelerated wear test comprised of a minimum of 25,000 open-close cycles using a well-agitated sand/water mixture to simulate fluidized grit.

2.05 STEM

A. A threaded operating stem shall be utilized to connect the operating mechanism to the slide. On rising stem gates, the threaded portion shall engage the operating nut in the manual operator or motor actuator. On non-rising stem gates, the threaded portion shall engage the nut on the slide.
   1. The threaded portion of the stem shall have a minimum outside diameter of 1-1/2 inches. Stem extension pipes are not acceptable.
   2. The stem shall be constructed of solid stainless steel bar for the entire length, the metal having a tensile strength of not less than 75,000 psi.
   3. The stem shall be threaded to allow full travel of the slide unless the travel distance is otherwise shown on the Contract Drawings.
   4. Maximum L/R ratio for the unsupported part of the stem shall not exceed 200.
   5. The operating stem shall be designed to transmit in compression at least 2 times the rated hoist output with an effort of 40 lb on the crank or handwheel. The Euler column formula shall be utilized. Where a hydraulic or electric actuator is used, the stem design load shall not be less than 1.25 times the output thrust of the hydraulic cylinder with a pressure equal to the maximum working pressure of the fluid supply or 1.25 times the output thrust of the electric actuator at the stalled condition..
   6. The stem shall be designed to withstand the tension load caused by the application of a 40 lb effort on the crank or handwheel without exceeding 1/5 of the ultimate tensile strength of the stem material.
   7. The threaded portion of the stem shall have machine rolled threads of the full Acme type with a 16 microinch finish or better. Stub threads are not acceptable.
   8. Stems of more than one section shall be joined by stainless steel or bronze couplings. The coupling shall be bolted to the stems.
   9. Stems, on manually operated gates, shall be provided with adjustable stop collars to prevent over closing of the slide.

2.06 STEM GUIDES

A. Stem guide shall be provided when necessary to ensure that the maximum L/R ratio for the unsupported part of the stem is 200 or less.
   1. Stem guide brackets shall be fabricated of stainless steel and shall be outfitted with UHMW or bronze bushings.
   2. Adjustable in two directions.

2.07 WALL THIMBLES

A. Wall thimbles shall be provided when shown on the Contract Drawings.
   1. The wall thimble depth shall be equal to the thickness of the concrete wall in which the thimble is to be mounted.
   2. Wall thimbles shall be fabricated stainless steel construction of adequate section to withstand all operational and reasonable installation stresses.
   3. Wall thimbles shall be constructed of 1/4-inch minimum thickness stainless steel and the front face shall have a minimum thickness of 1/4–inch.

4. The fabrication process shall ensure that the wall thimble is square and plumb and the front face is sufficiently flat to provide a proper mounting surface for the gate frame.
5. The face of the wall thimble shall only be machined if recommended by the gate manufacturer. If the wall thimble is to be machined, the front face shall have a minimum thickness of 1/4-inch after machining.
6. A water stop shall be welded around the periphery of the thimble. Wall thimbles shall be designed to allow thorough and uniform concrete placement during installation.
7. Studs and nuts shall be stainless steel. Water stop may be stitch welded.
8. A suitable gasket or mastic shall be provided to seal between the gate frame and the wall thimble.

2.08 MANUAL OPERATORS

A. Unless otherwise shown on the Drawings, gates shall be operated by a manual handwheel or a manual crank-operated gearbox. The operator shall be mounted on the yoke of self contained gates or on the pedestal of non-self contained gates.
   1. The gate manufacturer shall select the proper gear ratio to ensure that the gate can be operated with no more than a 40 lb effort when the gate is in the closed position and experiencing the maximum operating head.
   2. An arrow with the word "OPEN" shall be permanently attached or cast onto the operator to indicate the direction or rotation to open the gate.
   3. Handwheel operators shall be fully enclosed and shall have a cast aluminum housing.
      a. Handwheel operators shall be provided with a threaded cast bronze lift nut to engage the operating stem.
      b. Handwheel operators shall be equipped with roller bearings above and below the operating nut.
      c. Positive mechanical seals shall be provided above and below the operating nut to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.
      d. The handwheel shall be removable and shall have a minimum diameter of 15 inches.
   4. Crank-operated gearboxes shall be fully enclosed and shall have a cast aluminum or ductile iron housing.
      a. Gearboxes shall have either single or double gear reduction depending upon the lifting capacity required.
      b. Gearboxes shall be provided with a threaded cast bronze lift nut to engage the operating stem.
      c. Bearings shall be provided above and below the flange on the operating nut to support both opening and closing thrusts.
      d. Gears shall be steel with machined cut teeth designed for smooth operation.
      e. The pinion shaft shall be stainless steel and shall be supported on ball or tapered roller bearings.
      f. Positive mechanical seals shall be provided on the operating nut and the pinion shafts to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.
      g. The crank shall be cast aluminum or cast iron with a revolving nylon grip.
      h. The crank shall be removable.
   5. All gates having widths in excess of 72 inches and widths greater than twice their height shall be provided with two gearboxes connected by an interconnecting shaft for simultaneous operation.
      a. Interconnecting shafting shall be constructed of aluminum or stainless steel.
      b. Flexible couplings shall be provided at each end of the interconnecting shaft. Couplings shall be stainless steel or non-metallic.
      c. One crank shall be provided to mount on the pinion shaft of one of the gearboxes.
      d. If the operating assembly is motorized, a stainless steel enclosure shall be provided over the interconnecting shaft to comply with OSHA regulations.

6. An extended operator system utilizing chain and sprockets shall be furnished by the manufacturer when the centerline of the crank or handwheel, on a non-geared operator, is located over 48-in above the operating floor. Chain wheels are not acceptable.
    a. A removable stainless steel or aluminum cover shall be provided to enclose chain and sprockets.
    b. The extended operator system shall lower the centerline of the pinion shaft to 36-in above the operating floor.
    c. A handwheel may be utilized in conjunction with a gearbox in lieu of the extended operator system if the centerline of the pinion shaft is 60-in or less above the operating floor.
7. Pedestals shall be constructed of stainless steel. Aluminum pedestals are not acceptable.
    a. The pedestal height shall be such that the handwheel or pinion shaft on the crank-operated gearbox is located approximately 36-in above the operating floor.
    b. Wall brackets shall be used to support floor stands where shown on the Drawings and shall be constructed of stainless steel.
    c. Wall brackets shall be reinforced to withstand in compression at least two times the rated output of the operator with a 40 lb effort on the crank or handwheel.
    d. The design and detail of the brackets and anchor bolts shall be provided by the gate manufacturer and shall be approved by the ENGINEER. The gate manufacturer shall supply the bracket, anchor bolts and accessories as part of the gate assembly.
8. Operators shall be equipped with fracture-resistant clear butyrate or lexan plastic stem covers.
    a. The top of the stem cover shall be closed.
    b. The bottom end of the stem cover shall be mounted in a housing or adapter for easy field mounting.
    c. Stem covers shall be complete with indicator markings to indicate gate position.
9. When shown on the Contract Drawings, provide 2 inch square nut, mounted in a floor box, with a non-rising stem.
    a. The square nut shall be constructed of bronze.
    b. The floor box shall be constructed of stainless steel or cast iron and shall be set in the concrete floor above the gate as shown.
    c. Provide one aluminum or stainless steel T-handle wrench for operation.

2.09 ELECTRIC MOTOR ACTUATORS

A. See Section 02515.

2.10 ANCHOR BOLTS

A. Anchor bolts shall be provided by the gate manufacturer for mounting the gates and appurtenances.
    1. Quantity and location shall be determined by the gate manufacturer.
    2. If epoxy type anchor bolts are provided, the gate manufacturer shall provide the studs and nuts.
    3. Anchor bolts shall have a minimum diameter of 1/2-inch.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation of the gates and appurtenances shall be done in a workmanlike manner. It shall be the responsibility of the CONTRACTOR to handle, store and install the equipment specified in this Section in strict accordance with the manufacturer's recommendations.
B. The CONTRACTOR shall review the installation drawings and installation instruction prior to installing the gates.
C. The gate assemblies shall be installed in a true vertical plane, square and plumb.
D. The CONTRACTOR shall fill the void in between the gate frame and the wall with non-shrink grout as shown on the installation drawing and in accordance with the manufacturer's recommendations.
E. The CONTRACTOR shall add a mastic gasket between the gate frame and wall thimble (when applicable) in accordance with the manufacturer's recommendations.

3.02 FIELD TESTING

A. After installation, all gates shall be field tested in the presence of the ENGINEER and OWNER to ensure that all items of equipment are in full compliance with this Section. Each gate shall be cycled to confirm that they operate without binding, scraping, or distorting. The effort to open and close manual operators shall be measured, and shall not exceed the maximum operating effort specified above. Electric motor actuators shall function smoothly and without interruption. Each gate shall be water tested by the CONTRACTOR, at the discretion of the ENGINEER and OWNER, to confirm that leakage does not exceed the specified allowable leakage.

3.03 MANUFACTURERS FIELD SERVICE

END OF SECTION

A. Actuators:
   1. Electric Motor Actuators:
      a. Provide factory-mounted electric motor actuators capable of varying the valve rotational speed during the 90 degree stroke via programmable integral frequency converter.
      b. Actuators shall operate on 480V, 60-hertz, three phase ac power.
      c. During normal operation, actuator shall move disc from fully-open to fully-closed position, or reverse, in a minimum of __140__ seconds.
      d. During emergency operation, actuator shall move disc from fully open to fully closed in __60___ seconds.
      e. Emergency operation shall be selectable between either constant rotational speed or a proportionally scaled version of the normal operation speed curve.
      f. Provide indicator on primary gearing to show position of actuated equipment.
      g. Motor frequency converter shall be an integral part of the valve actuator and shall be the foundation upon which the actuator functions. No external frequency converters, drives, third parts hardware or components will be acceptable.
      h. Actuator shall have the ability to continuously monitor valve position and provide feedback via selectable 4-20mA analog signal output.
      i. Actuator shall have programmable outputs for full open and full closed position as well as capability for an intermediate positions. Supplier representative shall be factory trained to adjust these settings and shall ensure proper setpoints have been obtained once the valves are installed.
      j. Actuator shall continuously monitor torque and provide selectable outputs for individual or combined over-torque condition.
      k. Provide local controls for push button electrical operation of the actuator.
      l. Supplier representative shall be qualified in the setup, commissioning, programming, testing and training necessary for a successful installation and provide permanent record of all field programmable outputs, valve torque curves and speed-time curve setpoints in the operations manuals.
      m. Actuator electronics shall be capable of remote mounting to move the controller away from the gears and out of a location where possible flooding can occur.
      n. Actuator shall be SIPOS/AUMA 7 HiMod or engineer approved equal.
B. Actuator Controls:
   1. Operate actuator to perform control function required.
      a. Position Controller:
         (1) Receive analog signal proportional to SCADA determined position setpoint.
         (2) Modulate actuator to achieve the desired position setpoint.
      b. Process Controller (If indicated on the project plans & schedule):
         (1) Receive live analog signal for process condition from external instrument.
         (2) Receive analog process condition setpoint from SCADA.
         (3) Modulate actuator to achieve the desired process condition.

C. Actuator Schedule: