SP-152056
(New)

SPECIAL PROVISIONS
FOR
FLOOD CONTROL APPURTENANCES

Black Hawk County
BRM-CHBP-8155(770)--NB-07

Effective Date
September 21, 2021

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 GENERAL

1.1 SUMMARY

A. Fiberglass reinforced polyester (FRP) sluice gate with pedestal-mounted manual actuator and extension stems and wall-mounted stem guide accessories.

B. Wall mounted storm sewer flap gates.

C. Storm sewer concrete headwall structure.

1.2 RELATED REQUIREMENTS

A. Refer to Section 2503 of the Standard Specifications for requirements pertaining to furnishing, installing, and testing storm sewer piping.

B. Refer to Section 2504 of the Standard Specifications for requirements pertaining to furnishing, installing, and testing sanitary sewer piping.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Conform to AWWA C563 except as modified.
   2. Proportion for stresses occurring during continuous operation, and for additional stresses occurring during fabrication or installation to parts of various control structures.
   3. Sluice gate assemblies' maximum fiber stress (ultimate or yield whichever applies) shall not exceed 2.5 times working stress.
   4. Reinforce gates to withstand maximum seating head with deflection of less than L/360 of gate width or 1/4 inch, whichever is less.

5. Design gates with unseating heads for maximum deflection of L/360 of gate width or 1/16 inch, whichever is less at maximum operating head.
6. Gates shall be flat and level.
7. Warpage throughout entire gate shall not produce crown of more than 1/16 inch in any direction.
8. Gates shall be as shown on the drawings.

B. Performance Requirements:
   1. Field Leakage Criteria:
      a. Seating Head: Leakage shall not exceed 0.1 gallon per minute per foot of periphery under design head conditions.
      b. Unseating Head: Leakage shall not exceed 0.2 gallon per minute per foot of periphery under design head less than 20 feet. For heads greater than 20 feet, leakage shall not exceed 0.2 gallon per minute per foot plus 0.005 gallon per minute per foot for each foot of head greater than 20 feet.
   2. Composition of gate laminate shall be in accordance with the Quality Assurance Report for Reinforced Thermostat Plastic Corrosion Resistant Equipment, Society of the Plastics Industry, Inc., and Material Technology Institute of the Chemical Process Industries, Inc. For “Hand Lay-Up Laminates.” Composition of gate laminate shall meet specifications for Type 1, Grade 10 laminates.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer and manufacturer's type designation.
   2. Manufacturer's catalog data; confirm rated capacity, materials of construction.
   3. Parts list including materials of construction.
   4. Affidavit of compliance in accordance with AWWA C513.
   5. Proposed coating system. Submittal information for coating system.

B. Shop Drawings: Installation and assembly drawings and specifically prepared technical data for each gate assembly.

C. Operation and maintenance information for gates and operators.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver, handle, store, and protect equipment as recommended by manufacturer.

1.6 QUALITY ASSURANCE

A. Items of equipment shall be end products of one manufacturer in order to achieve standardization for maintenance, spare parts, operation, and manufacturer’s service.

B. Defects:
   1. No cracks, crazing, blisters, chips, pits, dry spots, fish eyes, burned areas or entrapped air.
   2. No wrinkles and solid blisters with maximum deviation of 10% of thickness, not to exceed 1/8 inch.
   3. No surface porosity (pinholes or pores in laminate surface).
   4. No exposed glass, exposure of cut edges.
   5. No scratches more than 0.002 inches deep.
   6. No foreign matter.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Plasti-Fab, Inc., Series Heavy Duty Titeseal, Tualatin, OR.

B. Engineer approved equivalent.

2.2 MATERIALS

A. Head Frames, Guides, Operator Support Yoke: Type 316 Stainless Steel.

B. Gates:
1. Fiberglass reinforced polyester (FRP) totally encapsulating an internal reinforcing structure.
2. Structural characteristics for 1/8 inch glass mat laminate shall meet minimum physical properties:
   a. Tensile Strength: 17,900 psi
   b. Flexural Modulus: 800,000 – 900,000 psi
   c. Flexural Strength: 27,600 psi
   d. Compressive Strength: 22,000 psi
   e. Impact Strength: 9.0 ft-lbs/in
   f. Water Absorption 0.13% (in 24 hours)

C. Stems and Gate Hardware: 326 Stainless Steel.

D. Closure Seals:
1. Hollow Bulb J-Seals and Bottom Wedge Seal – Molded of extruded virgin neoprene with vulcanized corners per ASTM D 2000.
   a. Specific Gravity: 1.25
   b. Hardness: 55 – 65 Shore A Durometer
   c. Tensile Strength: 15,000 psi min.
   d. Elongation 300%
   e. Low Temperature Brittleness -40°F
2. J-Seal Clamping Bars and Fasteners: FRP
3. Wear Strips – UHMW Polyethylene.
   a. Tensile Strength: 5600 psi
   b. Water Absorption: 0.01% (in 24 Hours)
   c. Flexural Modulus (@ 731 F) 130,000 – 140,000 psi
   d. Coefficient of Friction 0.15

2.3 MANUAL OPERATORS

A. Lift Nuts and Thrust Nuts - Manganese Bronze. ASTM B 584, Alloy 865.

B. Thrust Collar - Cast Iron. ASTM A 126 Class B.

C. Anchor Bolts - T-316 Stainless Steel.

2.4 GENERAL CONSTRUCTION

A. In conformance with AWWA C563-12.

B. Sluice Gate Cover: Fiberglass reinforced polyester totally encapsulating an internal reinforcing structure. Ultraviolet stabilized and seamless to protect inner structural members from corrosion caused by exposure to water or corrosive chemicals.

C. Furnish with complete frames, slides, J-seals, UHMW wear strip, operating stems, operators and necessary appurtenances.

2.5 GATES

A. Mold gate individually to dimensions specified:
   1. Manufacture of reinforced thermoset plastic containing ultraviolet absorbers.
   2. Surface shall be resin rich to depth of 0.010 inches to 0.020 inches and reinforced with C-glass or polymeric fiber surfacing material.
   3. Surface shall be free of exposed reinforcing fibers.
   4. Composition of layers shall be approximately 95% (by weight) resin.
   5. Remaining laminate shall be made up of copolymer composite and reinforcing fibers in form, orientation and position to meet strength requirements.
   6. Use structural reinforcing to attain necessary stiffness to meet deflection requirements and encapsulate with laminate not less than 1/4 inch thick on each side to ensure against permeation by water to core areas.

B. Bolt Type T-316 stainless steel stem mounting bracket to gate. Bolts shall not pass through or contact internal steel reinforcing.

C. Core Material: 100% resistant to decay and attack by fungus and bacteria and resistant to hydrocarbons.

2.6 SEALS

A. Elastomeric J-seals made of molded or extruded neoprene having hardness range of 55 to 65 shore A durometer and conforming to ASTM D 2000. Maximum compression set of 25% and low temperature brittleness to meet suffix F-17 (-40°F).

B. Mount seals on gate covers with T-316 stainless steel capscrews and 316 stainless steel or FRP clamping bars. Provide means of repair, and replacement without dewatering channel.

C. Fasten 1/4 inch thick UHMW wear strip to opposite side of gate from J-seals along both sides, with coefficient of friction less than 0.15.

2.7 FRAMES AND GUIDES

A. Design guides for embedment, wall mounting to meet Project requirements.

B. Fabricate guides from 316 stainless steel and have slot for mating with gate cover.

C. Equip guides bolted to head wall with heavy duty slotted clips for ease of mounting to wall by using T-316 stainless steel anchors.

D. Guides extending above operating floor level to form bench stand upon which lift mechanism is fastened, shall be strong and rigid without use of additional stiffening members.

E. Head rail shall also be of 316 stainless steel and shall be affixed so as to allow gate to be removed from guide without disassembly.

F. Head rail shall have maximum deflection of 1/4 inch when subjected to horizontal force of four times 40 pound maximum handwheel pull.

G. Where wall-mounted guide frame extends above concrete wall, top anchor bolt shall be not more than 6 inches below top of wall.

H. Gate inverts shall be flush with channel bottom.

I. Do not use wall thimbles for installation.

2.8 OPERATING STEMS

A. Equip each slide gate with rising operating stem.

B. Stem shall be Type 316 stainless steel with Acme threads and provided with adjustable stop collars to limit upward and downward travel.

C. Stems shall have maximum L/R of 200.

D. Stem guides with FRP bushings shall be used to maintain an L/R of 200.

2.9 STEM COVERS

A. Galvanized steel stem covers shall be provided with vent holes to minimize condensation.

B. Stem covers shall be attached by a padlocked, threaded connection and be marked with "Open" and "Closed" position indicators.

C. Stem covers shall be factory primed as per Article 2.13 of this specification, and field painted in accordance with Article 2.13 of this specification and the plans.

2.10 ADJUSTABLE WEDGING DEVICE

A. Provide adjustable assembly to achieve specified leakage rate.

B. Adjustable wedging assembly shall be comprised of T-316 stainless steel wedging bar and silicon bronze adjusting bolts with locking nuts.

C. Adjusting bolts shall be non-galling for long-term easy adjustment.

D. Adjust gate seals at factory and in field to less than specified leakage rate.

2.11 ANCHOR BOLTS

A. Adhesive Anchors: Ramset/Red Head Epcon System or Hilti HIT System.

B. Not less than 1/2 inch diameter.

C. Provide anchor bolts with size to withstand force created by operation of gate.

2.12 COATING

A. Manufacturer shall be responsible for factory surface preparation, shop priming of any exposed ferrous metal surfaces. Do not paint or coat fiberglass components or stainless steel. Contractor is responsible for field painting. System shall comply with:
   1. Surface Preparation: Ferrous Metal - SP6.
   2. First Coat: 3.0 DFT/Series 90-97 Zinc Rich Primer by Tnemec.
   3. Second Coat: 3.0 to 4.0 DFT/73-Color Endura-Shield III by Tnemec.

B. Coat machined or bearing surfaces and holes with protective grease until installation.

2.13 MANUALLY OPERATED FLOOR STANDS

A. Maximum effort of 40 pounds shall be required to unseat gate and maximum of 25 pounds to operate gate after it is unseated.

B. Enclosed gear type with crank capable of manual operation or by means of portable electric, gasoline or hydraulic powered operator. Equipment to match existing City of Waterloo operators. Provide bracket (permanent or removable) for mounting of City of Waterloo's hydraulic operator to floor stand.

C. Provide single or double gear reduction, depending upon lifting capacity required.

D. Type 316 stainless steel gears with machine cut teeth designed for smooth operation.

E. Mount gearing and lift nut in Type 316 stainless steel housing and support with Type 316 stainless steel pedestal to place input shaft or crank arm approximately 36 inches above floor.

F. Provide lubrication fittings in gear housing to permit lubrication of gears and bearings.

G. Removable Type 316 stainless steel crank arm with revolving Type 316 stainless steel grip. Equipment to match existing City of Waterloo operators.

2.14 FLAP GATE

A. Flap gate shall be heavy-duty with circular opening and double-hinged. Top pivot points shall be adjustable. The seat shall be one-piece cast or ductile iron with raised section around the perimeter of the waterway opening to provide the seating face. The seating face of the seat shall be cast or ductile iron. The cover shall be one-piece cast or ductile iron with necessary reinforcing rib, lifting eye for manual operation, and bosses to provide a pivot point connection with the links. The seating face of the cover shall be cast or ductile iron. Links or hinge arms shall be cast or ductile iron. Holes of pivot points shall be bronze bushed. All fasteners shall be either galvanized steel, bronze or stainless steel.

B. Flap gate frame shall be fastened securely to the storm water discharge face shown on the drawings using either a thimble or securing directly to the discharge face. Thimbles shall be of similar material to flap gate materials and be milled to fit flap gate.

2.15 FLAP GATE ACCEPTABLE MANUFACTURERS

A. Rodney Hunt.

B. Waterman Industries, Inc.

C. Golden Harvest, Inc.

D. Hydro Gate Corporation.

E. H. Fontaine Ltd.

F. Or equal.

2.15 CONCRETE FLARED END STRUCTURE

Materials and details of construction as indicated in the contract documents.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install sluice gates and flap gates in accordance with manufacturer's written recommendations and approved submittals.

B. Install on wall as indicated on drawings.

C. Adjust wedges to ensure gates seat properly.

D. Test gate as specified.

3.2 FIELD PAINTING

Touch up to match manufacturer's standard.

3.3 FIELD QUALITY CONTROL

A. After installation has been completed, test sluice gates under normal operating conditions in presence of ENGINEER.

B. Perform field operating and leakage tests as specified in Section 4.5, AWWA C513.

C. Repair leaks or other imperfections found upon testing.

3.4 FIELD TESTING

A. Preparation:
   1. Schedule field testing which affects operation through City 48 hours before testing.
   2. Maintenance:
      a. Perform maintenance on equipment throughout course of Work.
      b. Perform preventative maintenance in accordance with manufacturer’s recommendations.
      c. Keep maintenance records with equipment and make records available for examination during Work.
   3. Before start of testing:
      a. Have O&M manuals on-site during testing.
      b. Have spare parts, expendables and test equipment pertinent to equipment being tested on-site during testing.
      c. Check equipment against submittals.
      d. Verify equipment is installed properly.

B. Testing:
   1. Testing in accordance with contract documents and manufacturer’s recommendations.
   2. Correct deficiencies found during testing.
   3. Testing shall be to requirements of Article 1.02.B.1 of this specification. If adequate head cannot be maintained for testing, or at the Contractor’s sole discretion, testing may be performed with video monitoring equipment at no additional cost to City.

3.5 GATE SCHEDULE

Equip. No.	Size, Inches[a]	Gate Type	Opening Direction[b]	Design head, feet [c]	Remarks

				Seating	Unseating	
SG-1	36" RCP	Slide	U	20	9	New Gatewell – Storm Sewer
SG-2	12" PVC	Slide	U	22	11	New Gatewell – San. Sewer
FG-1	36" RCP	Flap	N/A			Storm Sewer Outlet

Notes:
(a) Dimensions for gates are shown as clear opening width by height. Widths listed do not include slide gate seating area. Gate sizes are approximate; Contractor shall verify dimensions prior to fabrication.
(b) U = upward opening; D = downward opening
(c) Calculated as difference between maximum water level and gate centerline elevation.
(d) Gate manufacturer shall coordinate with precast concrete manufacturer to ensure top slab design is compatible with gate loads.
(e) All gates shall be non-self-contained.
(f) Field verify depths prior to issuing shop drawings.

3.6 CONCRETE FLARED END STRUCTURE

Install per standard specifications for structural concrete and as indicated in the contract documents.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 METHOD OF MEASUREMENT

A. Sluice Gate: Each type and size of slide gate installed will be counted.

B. Flap Gate: Each type and size of flap gate installed will be counted.

C. Sluice Gate Operator: Slide gate operator is considered incidental to the installation of the slide gate.

D. Concrete Flared End: Each type and size of concrete flared end section will be counted.

4.2 BASIS OF PAYMENT

A. Sluice Gate:
1. Payment will be the contract unit price for each size of sluice gate.
2. Payment is full compensation for furnishing and installing the sluice gate, operator and all appurtenant items. Price includes testing for sluice gate.

B. Flap Gate.
1. Payment will be at the contract unit price for each flap gate.
2. Payment is full compensation for furnishing and installing the flap gate and all appurtenant items.

C. Concrete Flared End
1. Payment will be at the contract unit price for each concrete flared end section.
2. Payment is full compensation for furnishing and installing the flared end section including excavation, backfill, bedding, reinforcement, and all appurtenant items to the construction of the concrete flared end section.