ITEM NO. 845
Gate, Fencing, and Property Marker Details

845.1 DESCRIPTION: This item shall consist of gates, fences, and property markers installed, replaced, or modified in accordance with these specifications and as directed by the Engineer.

845.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 845 refer to the current reference standard published at the time of the latest revision date.

1. San Antonio Water System (SAWS):
   a. Specifications for Water and Sanitary Sewer Construction
   b. SAWS Materials Specifications
2. City of San Antonio (COSA) Standard Specification for Construction

845.3 SUBMITTALS: Contractor shall submit manufacturer's product data, installation instructions, recommendations, shop drawings, and any required installer certification(s). All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery.

845.4 MATERIALS: The materials for gate and fence installation and/or adjustment, as well as property marker installation shall conform to those as identified on drawings DD-903 Drawing Series.

1. Chain Link Fabric: 96" FABRIC, 1" PATTERN
   a. Hot dipped Galvanized chain link conforming to ASTM A392-89, Class 2; galvanized after weaving (GAW).
   b. Height: 96 inches, unless otherwise shown.
   c. Wire Gauge: No. 9.
   d. Pattern: 1"-inch diamond-mesh.
   e. Diamond Count: Manufacturer's standard and consistent for fabric furnished of same height.
   f. Loops of Knuckled Selvages: Closed or nearly closed with space not exceeding diameter of wire.
   g. Wires of Twisted Selvages.
   h. Twisted in a closed helix three full turns.
   i. Cut at an angle to provide sharp barbs that extend minimum 1/4-inch beyond twist top and bottom.
2. Do not install chain link until concrete has cured minimum of 7 days.
3. PIPE POSTS and LINE POSTS
   a. Steel pipe shall be galvanized and conform to ASTM F 1083-90 with strength and stiffness required by ASTM F 669-90a, Heavy Industrial Fence, except as modified herein.
   b. End, Corner, Angle, and Gate posts shall have a 4 inch outside diameter and a weight of 9.11 pounds per foot, in conformance with ASTM F 900-84.
   c. Line Post posts shall have a 2-3/8 inch outside diameter and a weight of 3.65 pounds per foot.
4. Installation of ground bonding shall be evaluated by the design engineer on a case-

by-case basis.

5. Design engineer shall be responsible for determine when ground bonding will be required.
6. TOP RAILS, MIDDLE RAILS, BOTTOM RAILS AND BRACE RAILS
   a. Galvanized steel pipe.
   b. Protective Coatings: As specified for posts.
   c. Strength and Stiffness Requirements: ASTM F1043-08, Top Rail, Heavy Industrial Fence.
   d. Steel Pipe:
      i. ASTM F1083-08.
      ii. Outside Diameter: 1-5/8-inch.
      iii. Weight: 2.27 pounds per foot.
7. FENCE FITTINGS: In conformance with ASTM F626-14, except as modified by this article.
8. Post and Line Caps:
   a. Designed to accommodate passage of top rail through cap, where top rail required.
   b. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.
9. Rail Fittings: Provide the following:
   a. Bottom and Top-Rail Sleeves: Pressed steel or round steel tubing not less than 7 inches long.
   b. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line to line posts.
10. Tension and Brace Bands: Pressed steel, 0.105 inch thick, minimum 0.75 inch wide, with 2.0-oz/sq. ft. metallic (zinc) coating.
11. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric with 2.0-oz/sq. ft. metallic (zinc) coating. Minimum cross section of 1/4-inch by 3/8-inch. Provide one bar for each gate and end post, and two for each corner and pull post unless fabric is integrally woven into post.
12. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment. Minimum 5/16-inch diameter truss rod.
13. Barb Arms: 45-degree arms facing outward for supporting three strands of barbed wire.
14. Tie Wires, Clips, and Fasteners: According to ASTM F 626 and ASTM F 1916.
15. High-Security Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
   a. Metallic-Coated Steel: 9 gauge wire with galvanized coating thickness matching coating thickness of chain-link fence fabric.
   b. Pre-formed steel post ties.
   c. Install with Easy Twist tool.
16. Finish:
   a. Metallic Coating for Pressed Steel or Cast Iron: Not less than 2.0-oz/sq. ft. metallic (zinc) coating.
   b. Aluminum: Mill finish.
17. TENSION WIRE

a. Metallic-Coated Steel Wire: 0.177-inch diameter, marcelled tension wire complying with ASTM A824 and the following:
b. Metallic Coating: Type II, zinc coated (galvanized) hot-dip process, with the following minimum coating weight:
c. Class 5: Not less than 2.0 oz./sq. ft. of uncoated wire surface.

18. BARBED WIRE
    a. Zinc-Coated Barbed Wire: ASTM A121-13, Chain Link Fence Grade:
        i. Line Wire: Three (3) strands of No. 12-1/2 gauge.
    b. Barbs:
        i. Number of Points: Four.
        ii. Length: 3/8-inch minimum.
        iii. Shape: Round.
        iv. Diameter: No. 14-gauge.
        v. Spacing: 5 inches.
19. GATES (UNLESS OTHERWISE SPECIFIED ELSEWHERE)
    a. Gate Operation: Opened and closed easily by one person.
    b. Welded Steel Joints: Paint with zinc-based paint.
    c. Chain Link Fabric: Attached securely to gate frame at intervals not exceeding 24 inches.
    d. Swing Gates: ASTM F900-84.
    e. Hinges:
    f. Furnished with large bearing surfaces for clamping in position.
    g. Designed to swing either 180 degrees outward, 180 degrees inward, or 90 degrees in or out, as shown, and not twist or turn under action of gate.
    h. Latches: Plunger bar arranged to engage stop, except single gates of openings less than 10 feet wide may each have forked latch.
    i. Gate Stops: Mushroom type or flush plate with anchors, suitable for setting in concrete.
    j. Locking Device and Padlock Eyes: Integral part of latch, requiring production lock carousel for locking both gate leaves of double gates.
    k. Hold-Open Keepers: Designed to automatically engage gate leaf and hold it in open position until manually released.
20. CHAIN LINK CANTILEVER SLIDE GATE
    a. ASTM F-1184.
    b. Classification: Fabricate chain link cantilever slide gates in accordance with ASTM F 1184-05.Type II Cantilever Slide, Class 2 with internal roller assemblies.
    c. The cantilever slide gate system shall be manufactured by Tymetal Corp., 2549 State Route 40 Greenwich, NY 12834. Ph. (800) 328-4283.
    d. Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification
    e. Record to insure conformance to the AWS D1.2 welding code. Upon request, Individual Certifications of Welder Qualifications documenting successful completion of the requirements of the AWS D1.2 code shall be provided.
    f. Dimensions: Per the Project Contract Plans.

21. DOUBLE GATES: Gates shall be lengths as required in scope constructed of 1½ inch diameter, galvanized 16 gauge steel tubing with all joints welded. Gates shall comply with ASTM F 900-84.
    a. Hinges shall be galvanized having large bearing surfaces for clamping in position and shall be designed to swing either 180 degrees outward, 180 degrees inward, or 90 degrees in and out, and not twist or turn during action of the gate. Bolt hooks shall be galvanized steel or stainless steel.
    b. Installation of gatekeepers and padlock keepers are not required except for hardware at cantilevered gates. Upon beneficial completion of the gate installations, SAWS will install chains and combination locks. Refer to details and drawings for hardware on cantilever gate.
    c. Gate Operation: Opened and closed easily by one person.
    d. Welded Steel Joints: Paint with zinc-based paint.
    e. Chain Link Fabric: Attached securely to gate frame at intervals not exceeding 15 inches.
    f. Only Tubular steel swing gates as indicated on the plans will be allowed.
    g. No temporary gap-type gates or panel gates will be allowed.
22. GATE OPERATORS
    a. HySecurity
    b. SlideDriver 50VF2/3
    c. Operator Specifications
    d. Duty Cycle Continuous
    e. Travel Speed Field adjustable, 2.2 ft. /s (70 cm/s) or 3 ft. /s (91 cm/s). Emergency Fast Operate 3 ft/s (91 cm/s)
    f. Gate Length Limited only by weight
    g. Gate Capacity up to 5,000 lb (2,268 kg)
    h. Operator HP 2 hp
    i. Drive Type Hydraulic
    j. Pull Force 300 lb (136 kg)
    k. UPS Optional 230V AC Power Supply w/HyInverter AC™ provides up to 3,000 ft (914 m) of gate travel after AC power loss.*
    l. Standard voltage system shall be
    m. Three Phase Voltages 230-Vac, 60-Hz. Other voltage systems will be accepted on a case-by-case basis.
    n. Minimum branch circuit for gate operators shall be stranded copper 10-AWG, XHHW run within a 1-inch dedicated conduit. All discrete signal circuits shall be installed in a dedicated 1-inch conduit. Any analog signal, if used, shall be installed in a dedicated 1-inch conduit.
    o. Gate Operator Disconnecting Means
    p. Disconnecting means shall be provided at the gate operator, and one spare 1-inch conduit shall be provided from panelboard source to the disconnecting means.
    q. Temperature Rating -40° to 158° F (-40° to 70° C) No heater necessary.

r. Communication RS-232, RS-485; Ethernet/fiber using optional HyNet™ Gateway accessory. Communication wiring from SAWS Security panel to gate operator board shall be installed in a dedicated 1-inch conduit. One spare 1-inch conduit from SAWS security panel to gate operator shall be provided.

s. User Controls Smart Touch Controller with 70+ configurable settings. Smart Touch keypad and 32 character, OLED display or a PC using S.T.A.R.T. software.

t. Relays three configurable user relays: one 30VDC, 3A solid state and two 250VAC, 10A electromechanical; Optional Hy8Relay™ for 8 additional relay outputs.

u. App Class Usage Class III, IV

v. Enclosure N/A

w. Finish Type Zinc plated with powder coating

x. * *The operator's normal duty cycle and the actual number of gate cycles available from battery depends upon gate length/weight, battery size, state of charge and health, ambient temperature, accessory power draw and frequency of gate cycles during power outage. The design consultant shall be responsible for evaluating how critical is accessibility to the facility, what is the expected peak gate cycles per day and to provide a recommendation.

23. CONCRETE & CONCRETE FOOTING DETAILS

a. Concrete shall achieve a 21 day compressive strength of at least 3,000 psi.

b. Installation of a continuous concrete footing throughout the entire length of the new fence with proper formwork continuous.

c. All fence posts (corner, line etc.) are to be centered and incorporated into the concrete footing.

d. Bottom of fencing shall be flush with proposed footing, fencing shall be secured to the footing by a galvanized rod at two foot intervals or as submitted by Contractor and approved by the Owner.

e. Footing shall be a continuous "mow strip" 12"W x 6"D and flush with existing ground elevation. Any significant grade change will require a step in fencing and "Mow strip" footing shall step as required with fence. Contractor to verify any drops in existing grades and step in footing with owner prior to setting formwork.

   i. When the potential for storm runoff entering the site exist, the "mow strip" shall be raised 8" above finish grade to provide a protection concrete barrier. Design engineer shall be responsible for adjusting dimensions to compensate for raised "mow strips" and to incorporate site draining means to prevent puddling within the site.

f. Concrete shall conform with the A - Classification for 3,000 PSI concrete as specified in Specification Item No. 300 "Concrete (Natural Aggregate).

g. Footing shall have two number four (#4) rebar throughout the entire

length, with #3 rebar at 10" o.c. as shown on attached drawings expansion joints shall be installed at forty foot intervals while dummy joints shall be placed every 10'.

i. When "mow strip" needs to be raised for storm runoff protection, the design engineer shall be responsible for determine any additional rebar to assure the raised mow strip has proper resistance to cracking.

h. Check size and spacing of rebar and footing width and depth. Ensure that there is a minimum of 3" between earth and rebar. Rebar should be centered in footing as shown on drawings.

i. Rebar must be properly supported/tied to maintain its position during concrete placement operations through the use of wire ties (18 gauge or greater), chairs, spacers or other approved supporting devices. Do not allow the use of rocks, wood blocks, or other unapproved material as support for reinforcement. Reinforcement support chairs shall be spaced typically every 5 to 6 feet. Wire tie ends shall be twisted away from concrete surfaces (toward the interior of the footer.)

j. Formwork must be properly braced and supported to prevent "blowouts" or unacceptable deformation of the formed surfaces. All formed surfaces shall be coated with approved form oil before placement of reinforcement so as to avoid coating the reinforcement.

k. During hot weather (temperatures above 80 degrees F) or during high winds, care must be taken to prevent excessive moisture loss in the concrete which can lead to surface shrinkage cracking.

l. Top of concrete at continuous footing shall have a continuous crown to readily shed water before concrete sets.

m. Top of concrete at continuous footing shall be sloped to readily shed water away from base of posts before concrete sets.

n. Where mow-strip is installed through asphalt, the asphalt shale be saw cut to provide smooth edges. Any broken asphalt will require patching.

o. Mow Strip to be continuous across gate openings.

845.5 CONSTRUCTION: Install chain link fences and gates in accordance with ASTM F567-14a except as modified in this section, and in accordance with fence manufacturer's recommendations, as approved by the Engineer. Erect fencing in straight lines between angle points.

1. Provide all necessary hardware for a complete fence and gate installation.
2. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting.
3. Do not begin installation before final grading is completed, unless otherwise permitted by the Engineer.
4. Proceed with installation only after unsatisfactory conditions have been corrected.
5. Preparation
    a. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 100 feet or line of sight between stakes. Indicate locations

of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

6. Post Setting
    a. Driven posts are not acceptable.
    b. Post Hole Depth and Diameter :
        i. Minimum 38 inches below finished grade.
    c. 2 inches deeper than post embedment depth below finish grade.
    d. Diameter SAWS standard 18".
    e. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
    f. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter. Blend with concrete mow strip.
7. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
8. Line Posts: Space line posts uniformly at 10 feet o.c.
9. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.
    a. Locate horizontal braces at mid-height of fabric 6 feet or higher, on fences with top rail, and at 2/3 fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
10. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.
11. Tie Wires: Power-fastened or manually fastened ties configured to wrap a full 360 degrees around rail or post and a minimum of 1 complete diamond of fabric. Twist ends one and one-half machine twists or three full manual twists, and cut-off protruding ends to preclude untwisting by hand.
    a. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
12. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
    a. Do not install fabric until concrete has cured minimum *7 calendar* days.
    b. Install fabric with twisted and barbed selvage at top.
13. Barbed Wire
    a. Install three strands of barbed wire on brackets, tighten, and secure at each bracket.
    b. Brackets to be vertical facing outward.
14. Gate Frame:
    a. The gate frame shall be fabricated from 6063-T6 aluminum alloy

extrusions. The top member shall be a 3 inch x 5 inch (76 mm x 127 mm) aluminum structural channel/tube extrusion weighing not less than 3.0 lb/lf (4.4 kg/m).

b. To maintain structural integrity this frame member shall be "keyed" to interlock with the "keyed" track member.
c. If fabricated as a single horizontal piece, the bottom member shall be a 2 inch x 5 inch (51 mm x 127 mm) aluminum structural tube weighing not less than 2.0 lb/lf (2.9kg/m).
d. When the gate frame is manufactured in two horizontal pieces or sections, they shall be spliced in the field (the gate frame shall be fabricated in one or multiple sections depending on size requirements or project constraints.

15. Vertical Members:
    a. The vertical members at the ends of the gate frame shall be "P" shaped in cross section with a nominal base dimension of no less than 2 inch x 2 inch (51 mm x 51 mm) and weighing not less than 1.1 lb/lf (2.3kg/m).
    b. Major 2 inch x 2 inch (51 mm x 51 mm) vertical members weighing not less than 1.1 lb/lf shall separate each bay and shall be spaced at less than gate height intervals.
    c. Intermediate 1 inch x 2 inch (25mm x 51mm) vertical members weighing not less than 0.82 lb/lf shall alternate between 2 inch x 2 inch major members.
16. Gate Track
    a. The gate frame shall have a separate semi-enclosed "keyed" track, extruded from 6005A-T61 or 6105-T5 aluminum alloy, weighing not less than 2.9 lb./lf (4.2 kg/m).
    b. The track member is to be located on only one side of the top primary.
    c. Welds to be placed alternately along the top and side of the track at 9 inch (229) centers with welds being a minimum of 2 inch (51 mm).
17. Welds
    a. All welds on the gate frame shall conform to Welding
    b. Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 Structural Welding Code.
    c. All individual welders shall be certified to AWS D1.2 welding code.
18. Gate Mounting
    a. The gate frame is to be supported from the track by two (2) swivel type, self-aligning, 8-wheeled, sealed lubricant, ball-bearing truck assemblies.
    b. The bottom of each support post shall have a bracket equipped with a pair of 3 inch (76 mm) UHMV guide wheels.
    c. Wheel cover protectors shall be included with bottom guides to comply with UL325.
    d. Gap protectors shall be provided and installed, compliant with ASTM F 2200-05.
19. Diagonal Bracing
    a. Diagonal "X" bracing of 3/16 inch (5 mm) minimum diameter stainless steel aircraft cable shall be installed throughout the entire gate frame.
    b. The gate shall be completed by installation of approved filler as specified.

20. Chain Link: 1 inch x 1 inch, 9 gauge galvanized steel chain link fabric shall extend the entire length of the gate (if operated gate, counterbalance must also have fabric to prevent reach through and comply with ASTM F2200.
    a. Fabric shall be attached at each end of the gate frame by standard fence industry tension bars and tied at each 2 inch x 2 inch and 1 inch x 2 inch vertical members with standard fence industry ties at three different places each member.
    b. ASTM F2200 requires attachment method that leaves no leading or bottom edge protrusions (cannot exceed 0.5 inch).
    c. Chain link fabric must have a triple twisted selvage top and bottom with a cut at slant ¼ inch above twist.
21. Finish: Gate to be mill finish aluminum.

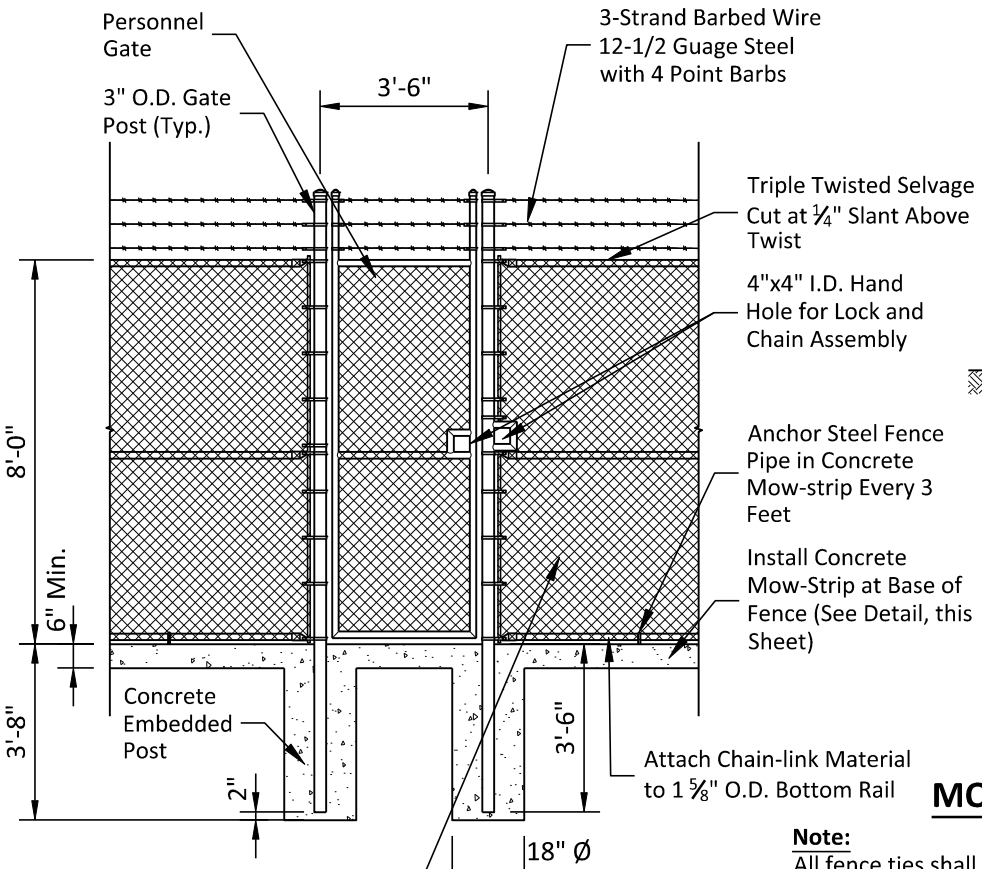
845.6 MEASUREMENT:

1. Measurement for fencing installed will be measured by the linear foot for each size and type shown installed, replaced, or modified herein or as superseded by the contract documents.
2. Measurement for gates installed will be measured by the unit of each hinged or cantilevered assembly shown installed herein or as superseded by the contract documents.
3. Measurement for property markers will be measured by the unit of each assembly shown installed herein or as superseded by the contract documents.

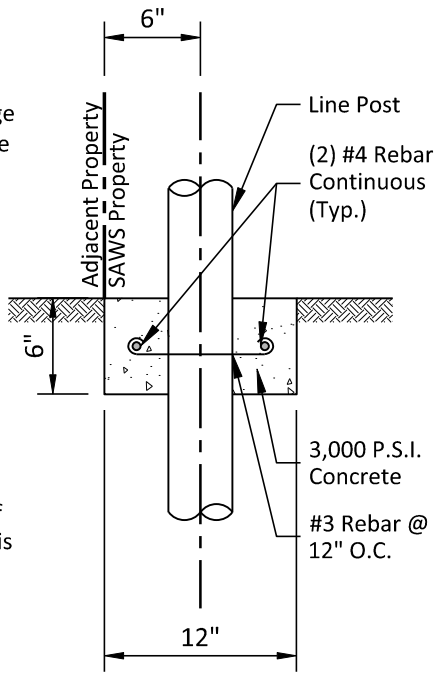
845.7 PAYMENT:

1. Payment for fencing will be made at the unit price bid for each linear foot installed.
2. Payment for gates will be made at the unit price bid for each such assembly of the type and size installed in accordance with the details shown in the Standard Drawing DD-903 Drawing Series, or as superseded by the contract documents.
3. Payment for property markers will be made at the unit price bid for each such assembly of the type and size installed in accordance with the details shown in the Standard Drawing DD-903 Drawing Series, or as superseded by the contract documents.

-End of Specification-

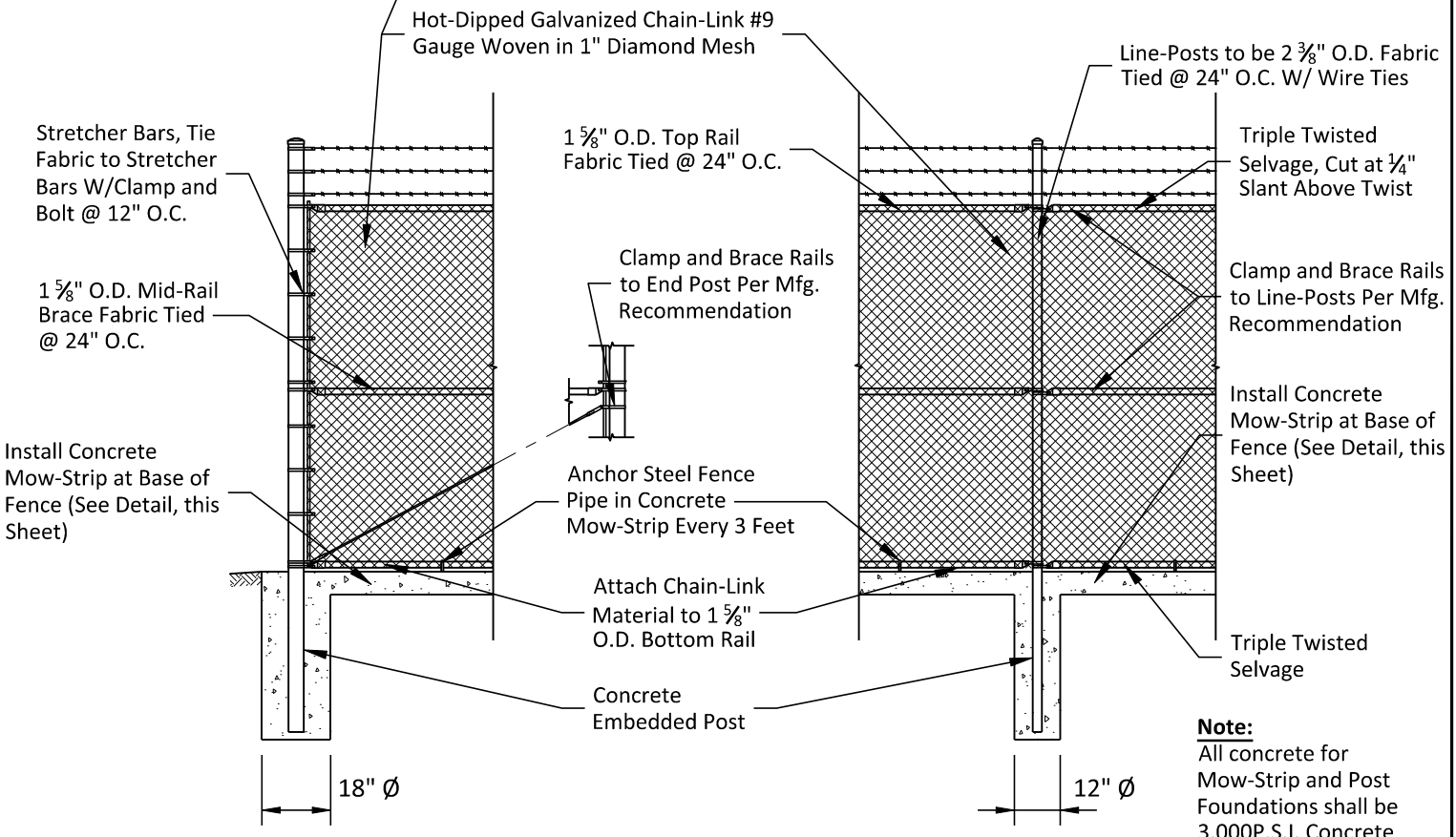


PERSONNEL GATE



MOW-STRIP SECTION DETAIL

Note:
All fence ties shall be 9 Gauge Galvanized Steel to be twisted on the inside of fence.

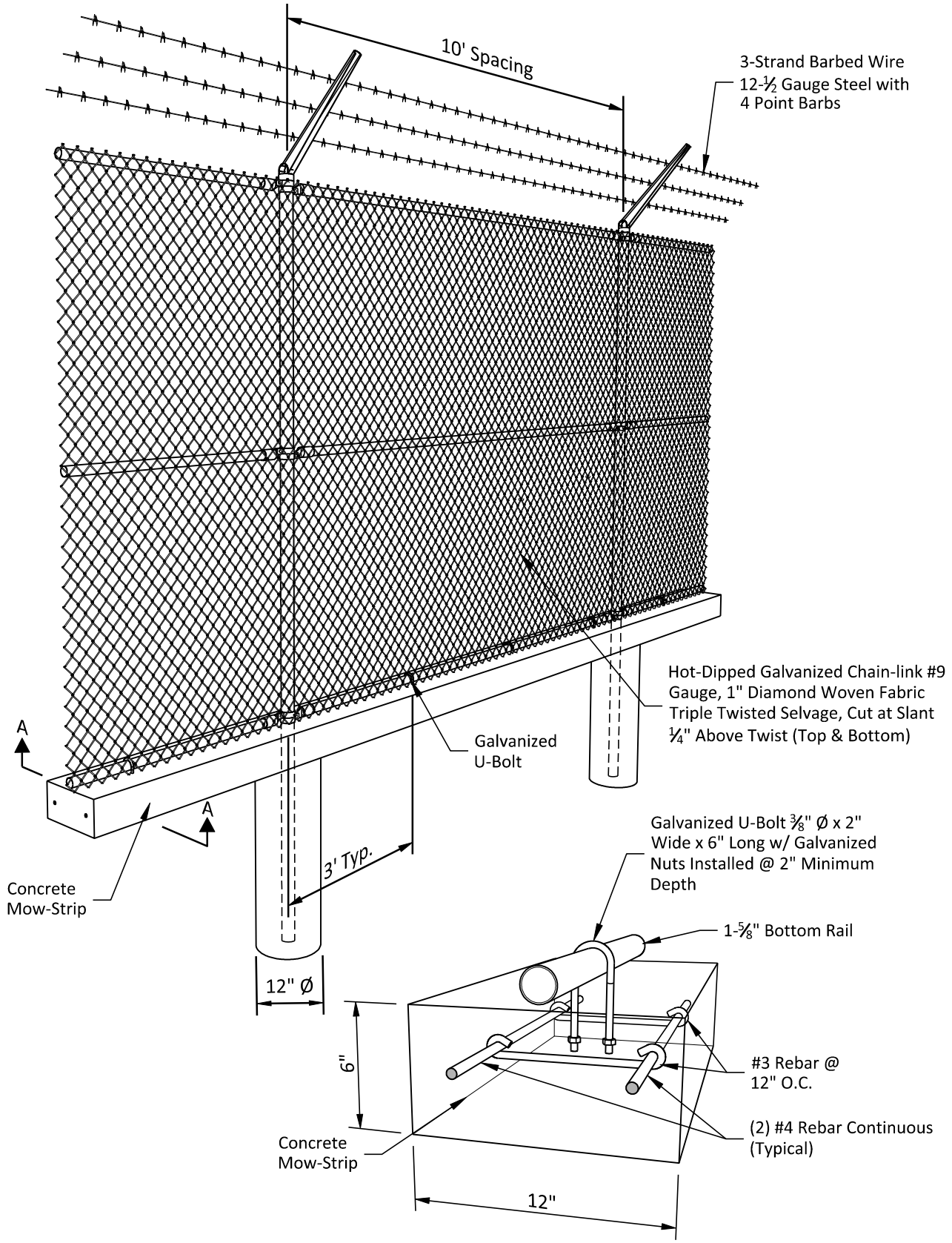


FENCE CORNER-POST

INLINE-POST

Note:
All concrete for Mow-Strip and Post Foundations shall be 3,000P.S.I. Concrete

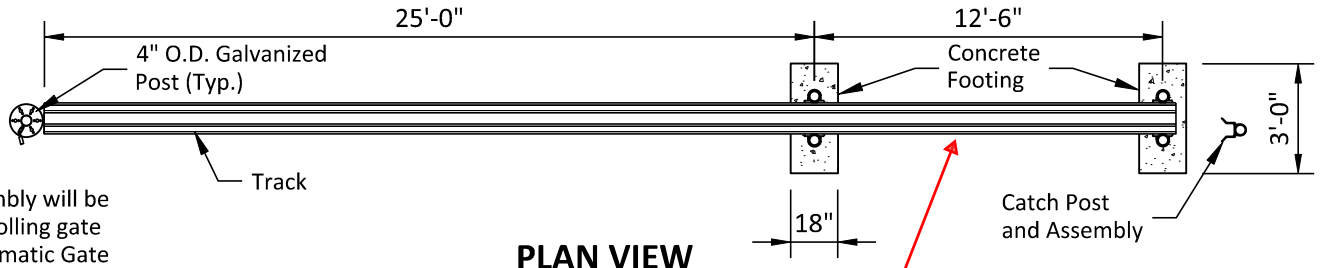
PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	FENCE DETAILS	APPROVED MARCH 2011	REVISED AUG 2019
		DD-903-17	SHEET 1 OF 2



NOTE:
All fence ties shall be 9 Gauge Galvanized steel to be twisted on the inside of the fence

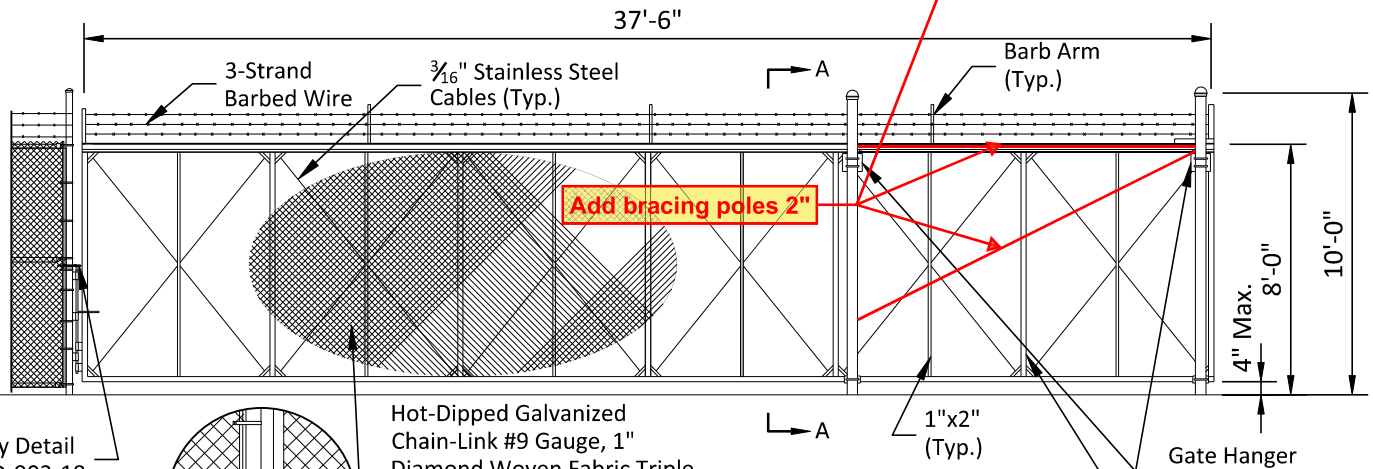
SECTION A-A

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	FENCE DETAILS	APPROVED MARCH 2011	REVISED AUG 2019
		DD-903-17	SHEET 2 OF 2

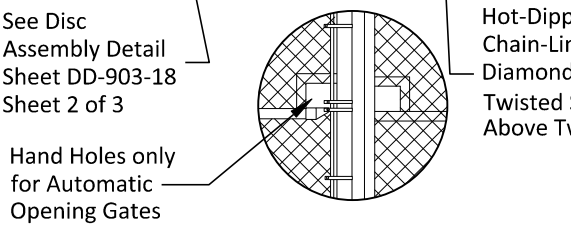


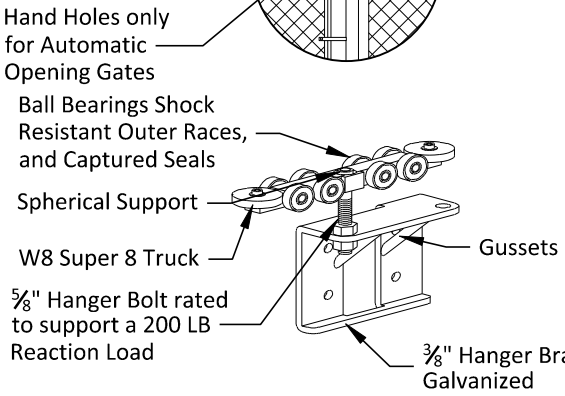
Note:
No Disc Assembly will be used on any rolling gate with an Auto-matic Gate Opener.

PLAN VIEW

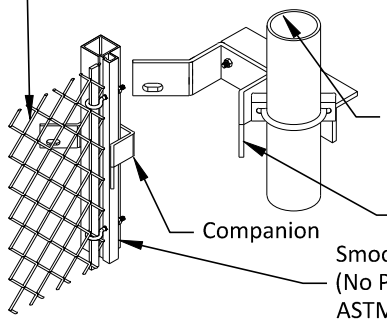


ELEVATION

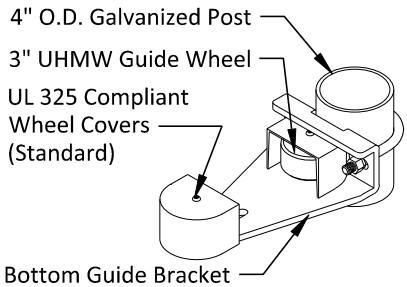




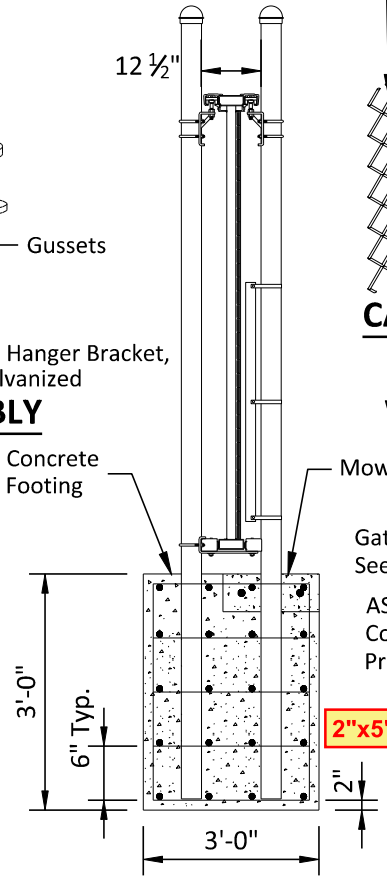
GATE HANGER ASSEMBLY



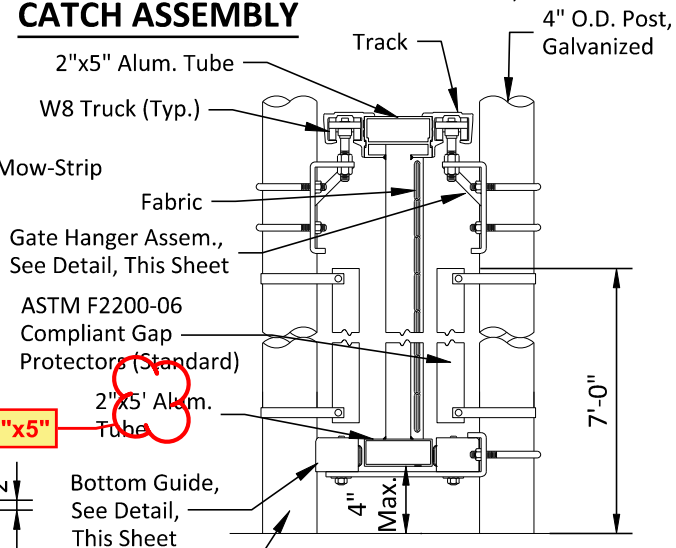
CATCH ASSEMBLY



BOTTOM GUIDE



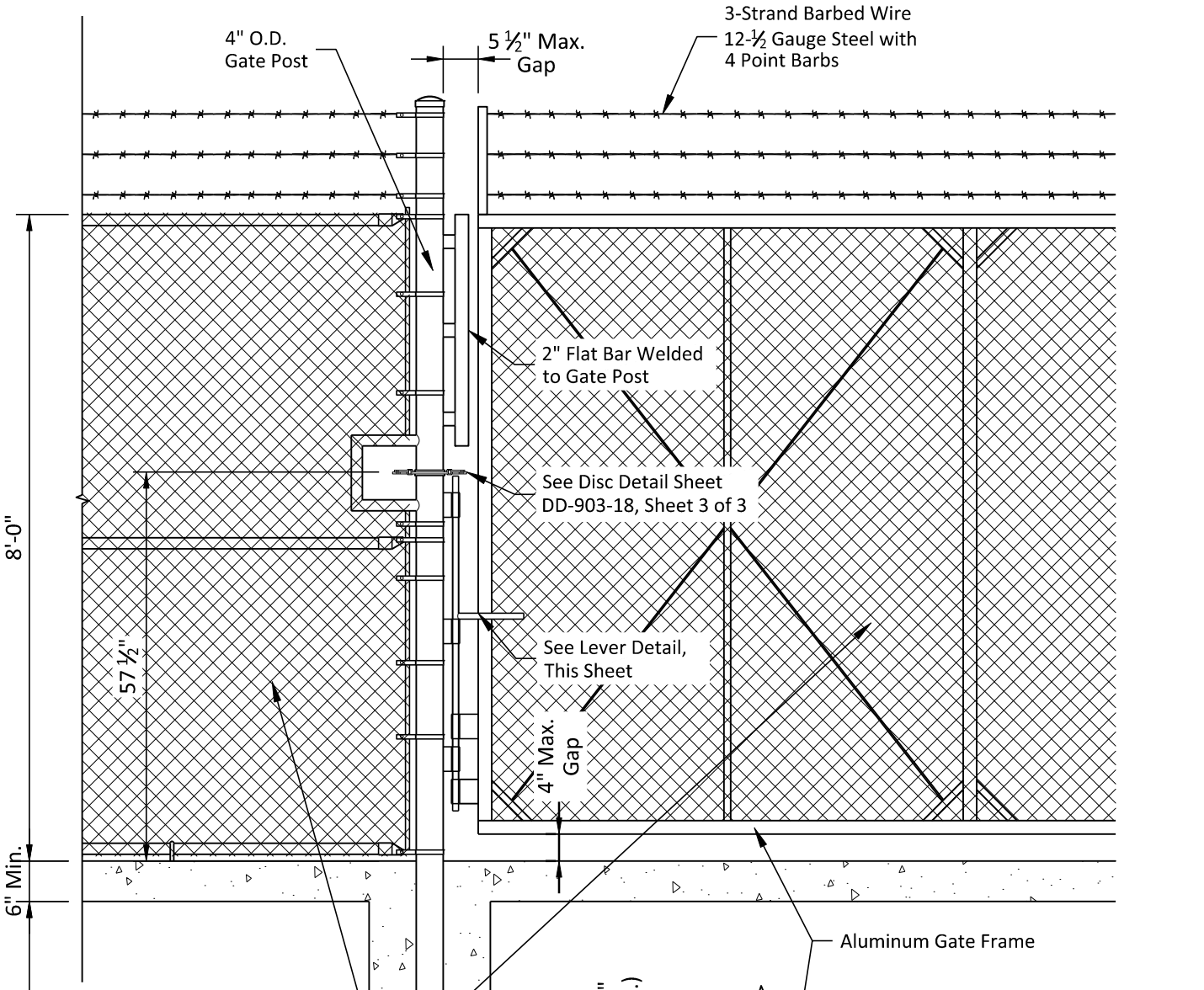
SECTION A-A

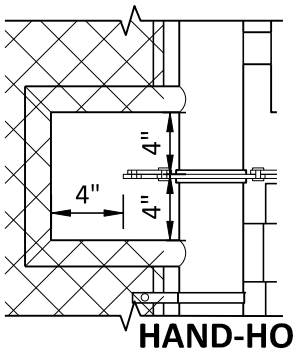


ENLARGED SECTION

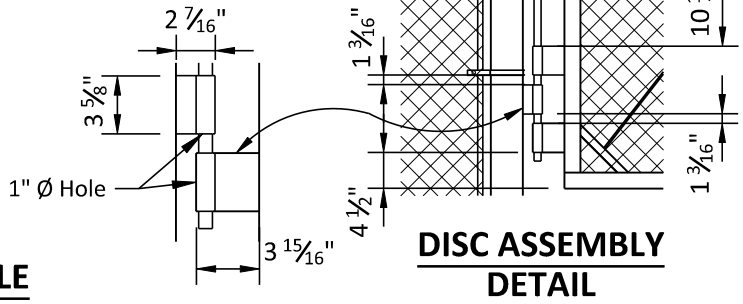
Notes:
1. Gate Frame to be fabricated from 6063 - T6 Aluminum Alloy Extrusions.
2. Gate Track to be fabricated from 6006A Aluminum Alloy Extrusions

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	HEAVY DUTY CANTILEVER SLIDE GATE	APPROVED MARCH 2011	REVISED AUG 2019
		DD-903-18	SHEET 1 OF 3

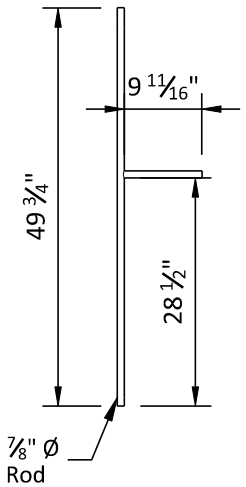




HAND-HOLE



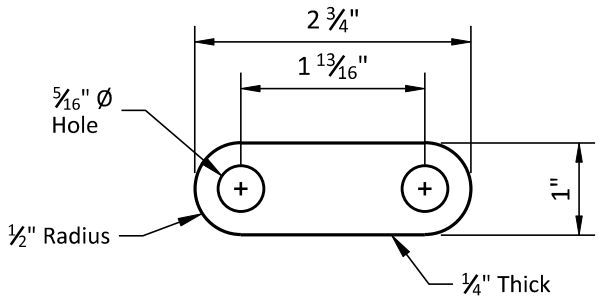
DISC ASSEMBLY DETAIL



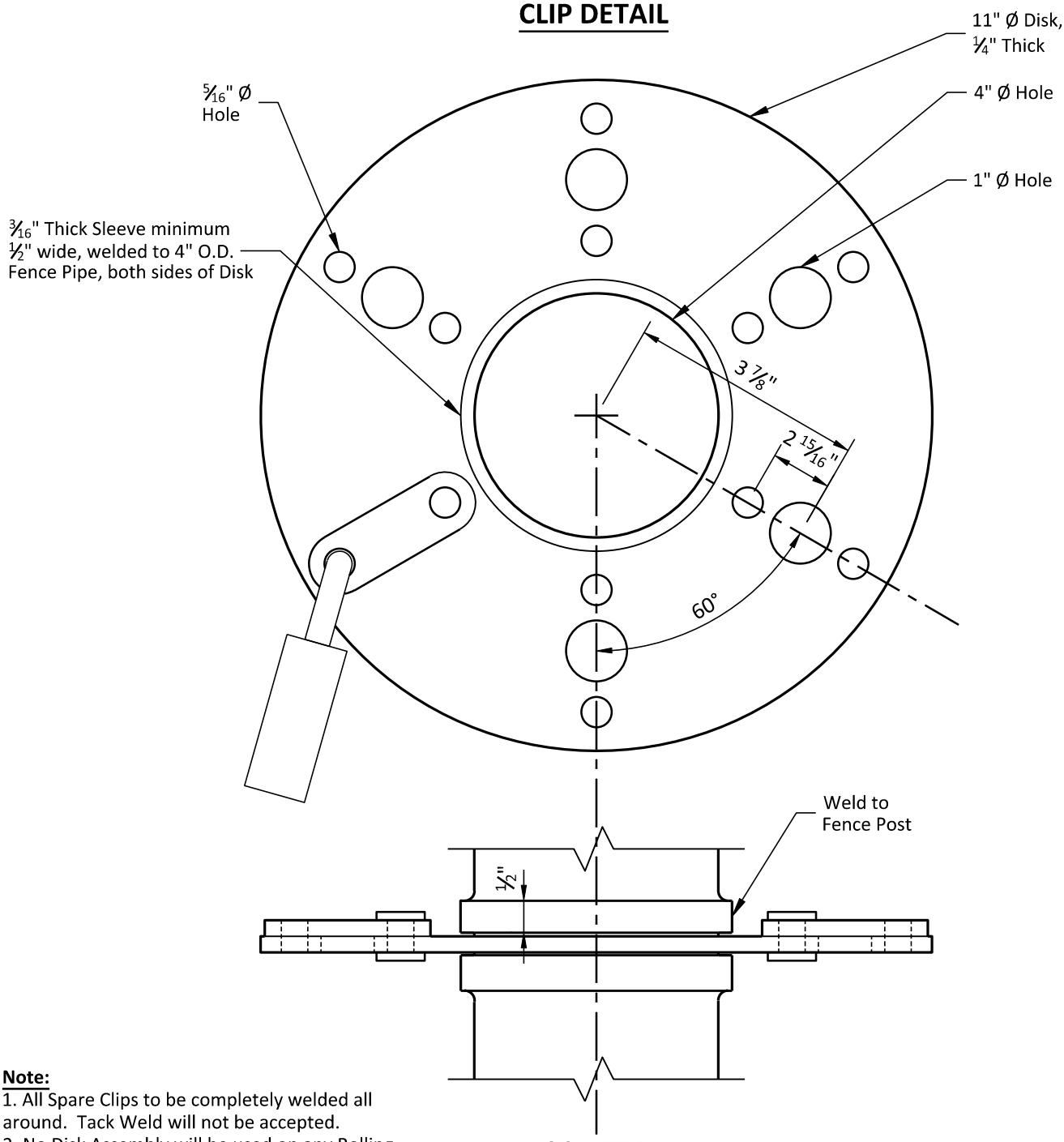
LEVER DETAIL

Note:
All concrete for Mow-Strip and Post Foundations shall be 3,000 PSI

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	HEAVY DUTY CANTILEVER SLIDE GATE	APPROVED MARCH 2011	REVISED AUG 2019
		DD-903-18	SHEET 2 OF 3



CLIP DETAIL



DISC DETAIL

Note:

1. All Spare Clips to be completely welded all around. Tack Weld will not be accepted.
2. No Disk Assembly will be used on any Rolling Gate with an Auto-matic Gate Opener.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	HEAVY DUTY CANTILEVER SLIDE GATE	APPROVED MARCH 2011	REVISED AUG 2019
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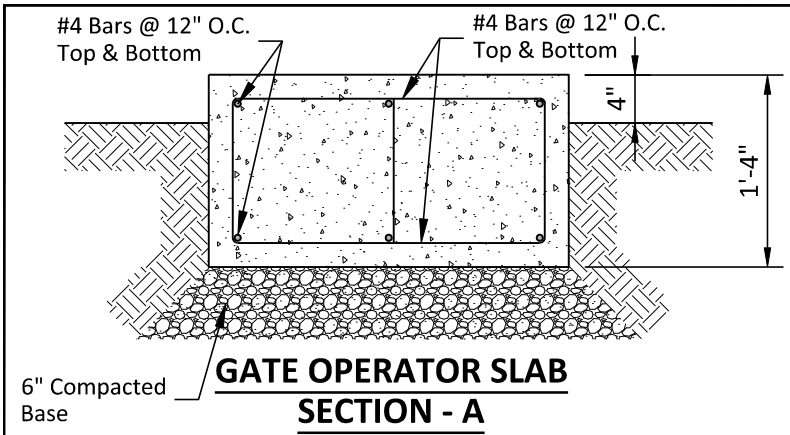
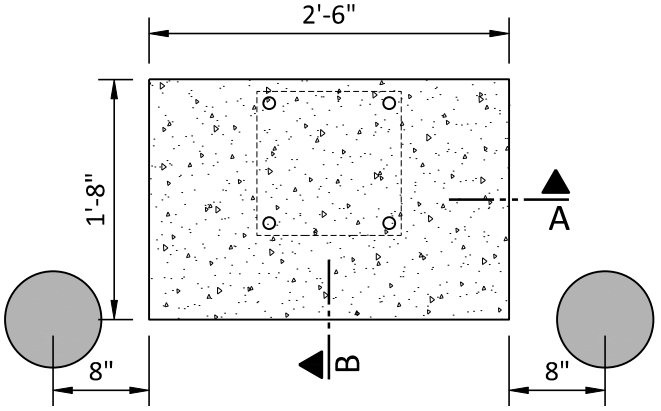
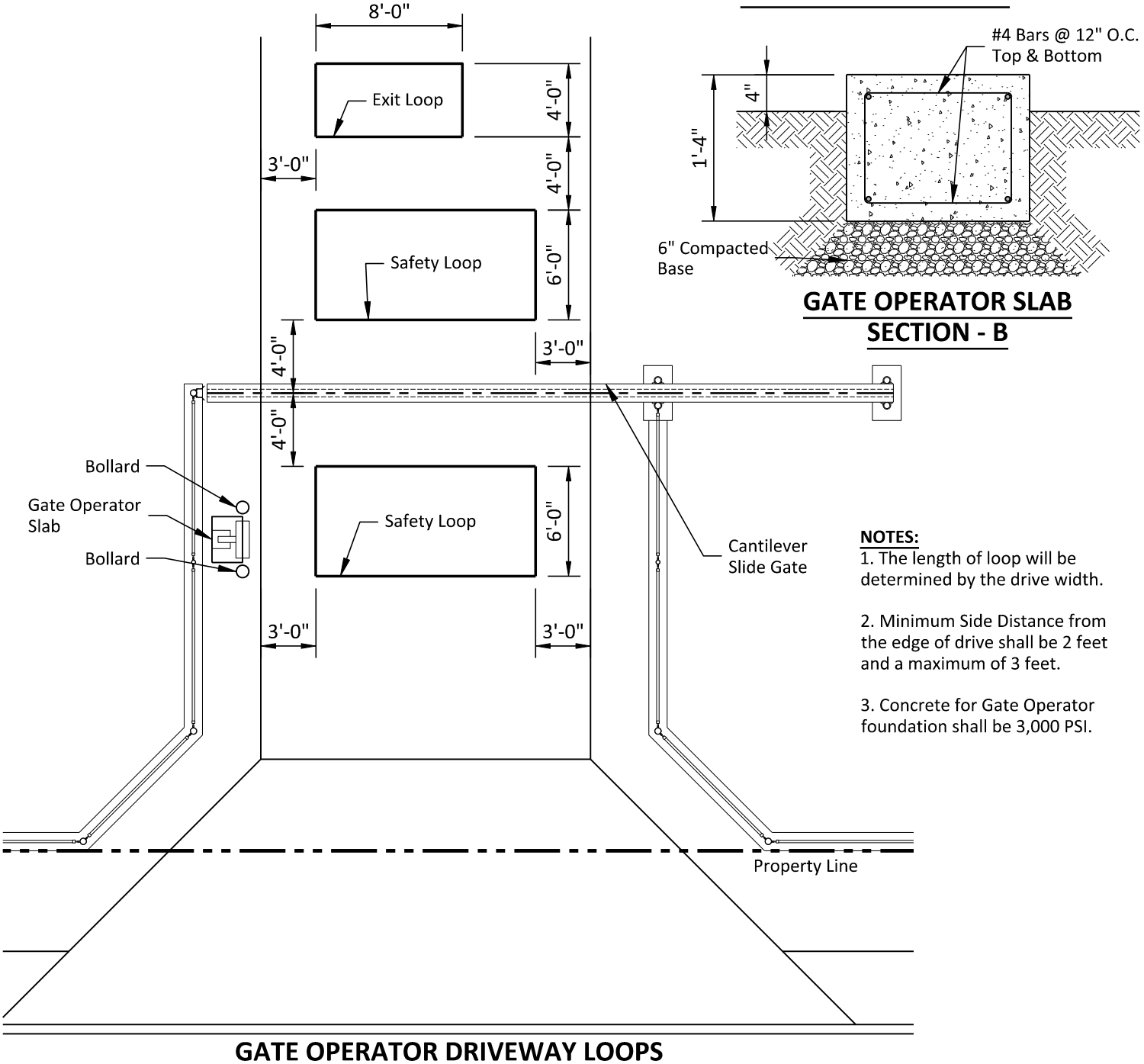


GATE OPERATOR SLAB
SECTION - A



GATE OPERATOR SLAB



GATE OPERATOR SLAB
SECTION - B

NOTES:

1. The length of loop will be determined by the drive width.

2. Minimum Side Distance from the edge of drive shall be 2 feet and a maximum of 3 feet.

3. Concrete for Gate Operator foundation shall be 3,000 PSI.

GATE OPERATOR DRIVEWAY LOOPS

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	GATE LOOP AND OPERATOR SLAB	APPROVED AUGUST 2019	REVISED
		DD-XXX-XX	SHEET X OF X