

San Antonio Water System Standard Specifications for Construction

ITEM NO. 852

Sanitary Sewer Manholes

852.1 DESCRIPTION: This item shall govern the construction of standard sanitary sewer manholes complete in place and the materials therein, including manhole rings and covers.

852.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 852 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) Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ)
 - a. Chapter 217 Design Criteria for Domestic Wastewater Systems
 - b. Chapter 213 (“Edwards Aquifer”)
4. AASHTO – American Association of State Highway and Transportation Officials:
 - a. M306: Standard Specification for Drainage, Sewer, Utility, and Related Castings.
5. ASTM – American Society for Testing and Materials:
 - a. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile
 - b. A536: Standard Specification for Ductile Iron Castings.
 - c. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - d. ASTM C 443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
 - e. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
 - f. ASTM C 890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
 - g. ASTM C 913 – Standard Specifications for Precast Concrete Water and Wastewater Structures.
 - h. ASTM C 990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
 - i. ASTM D638: Test Method for Tensile Properties of Plastics.
 - j. ASTM D648: Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
 - k. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft.)

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- l. ASTM D790: Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - m. ASTM D1238: Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
 - n. ASTM D1505: Standard Test Method for Density of Plastics by the Density-Gradient Technique.
 - o. ASTM D1693: Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
 - p. ASTM D 2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
 - q. ASTM D 2996 - Standard Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
 - r. ASTM D 2997 - Standard Specification for Centrifugally Cast “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe
6. American Society of Mechanical Engineers
- a. ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings

852.3 SUBMITTALS: Contractor shall submit manufacturer’s product data, instructions, recommendations, shop drawings, and certifications. All submittals shall be in accordance with Engineer’s requirements, and submittals shall be approved by the Engineer prior to delivery.

- 1. Plan operations so as to minimize disruption of utilities to occupied facilities or adjacent property.
- 2. Submit all test reports and pre and post sewer television inspection video.
- 3. Videos become property of SAWS.

852.4 MATERIALS: All constructed manholes shall be watertight and equipped with pre-tested and approved ring and covers. Sewer manhole ring and cover castings shall meet the current requirements of the American Association of State Highway and Transportation Officials (AASHTO) Designation M306-10.

- 1. Concrete Manhole Components: For new concrete manholes, all concrete manhole components (cast-in-place or precast manhole base, precast risers, precast cone sections, cast-in-place or precast flat tops, and as applicable) for new manholes shall conform to the applicable requirements of ASTM Designation C478, except as modified below.
 - a. Concrete Grout: All concrete grout used for patching or other similar fill-in work shall be of non-shrink type made with the Komponent[®] admixture specified above, or approved alternate, in accordance with the manufacturer’s recommended formulation with Portland cement, fine aggregate, water, and water reducer to produce a compressive strengths of approximately 4,800 psi within 7 days and 7,250 psi within 28 days at a 70 °F baseline temperature.

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2. The manhole ring and cover shall be of ductile iron or gray cast iron construction. The cover shall be solid with no vent or pick holes; hinged with underlying special hinge area leakage protection; the cover secured with four (4) stainless steel bolts; and shall have a recessed “pick bar” for cover opening. Cam lock type covers shall not be allowed.
 - a. Approved manufacturers, as listed in the SAWS Approved Products List (APL), have previously completed required inflow leakage shop testing and have met a maximum allowable leakage rate criterion of 1 gallon per minute (gpm) at 12 inches of water submergence above the manhole cover.
 - b. Nominal cover diameter shall be 32 inches, with 30 inch clear opening, as required by TCEQ
 - c. Vented Manhole Covers will be specified by Engineer.
3. “Throat rings” shall be made of HDPE and have a maximum thickness of 2 inches. No concrete throat rings shall be used.
 - a. The internal diameter shall match that of the ring and cover’s opening. HDPE “throat rings” are to be used in conjunction with a UV stabilized internal polyethylene liner for the purpose of providing an infiltration/inflow (I/I) barrier.
 - b. The I/I Barrier shall be as manufactured by Strike Tool Products of Cannon Falls, MN. See SAWS APL.
 - c. Note of Clarification: A minimum of two and a maximum of six “throat rings” may be used at each adjusted manhole. “Throat rings” are limited to a minimum of two and a maximum of four rings for new manhole construction. Throat rings shall be a maximum thickness of two (2) inches.
4. Bitumastic Joint Sealant, flat tops, and between the ductile or gray cast iron ring (frame) and the uppermost adjustment ring or flat top: See Approved APL.
5. For rehabilitated manholes; first, apply a combination of cementitious coatings followed by an approved epoxy coating. Kerneos SewperCoat 2000 HS and PG and APM Permacast MS-10,000 with ConShield, applied at the required one inch thick application, is the only product approved which does not require a subsequent epoxy coating.
6. Other approved materials are located on SAWS website under SAWS Approved Products List. The list is periodically updated and should be checked by Contractor prior to start of construction.
7. For reconstructed manholes; first, apply a combination of cementitious coatings followed by an approved epoxy coating with the cementitious coating first. Kerneos SewperCoat 2000 HS and PG and APM Permacast MS-10,000 with ConShield, applied at the required one inch thick application, is the only product approved which does not require a subsequent epoxy coating.
8. Other approved materials are located on SAWS website under SAWS Approved Products List. The list is periodically updated and should be checked by Contractor prior to start of construction.
9. New Manholes shall be precast manholes. Pre-cast manholes shall have an

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antimicrobial additive introduced to the concrete mix in order to provide protection against Microbial Induced Corrosion (MIC). Antimicrobial additive will not be required for doghouse manholes unless they are to remain permanently.

- a. The liquid antimicrobial additive shall be an EPA registered material and the registration number shall be submitted for approval prior to use in the project.
 - b. Manufacturer shall also provide a State of Texas registration for the antimicrobial additive.
 - c. Manufacturer shall be approved by SAWS Products Standard Committee and be on the APL.
 - d. The antibacterial additive shall be used to render the concrete uninhabitable for acid producing bacterial growth.
 - e. The antimicrobial shall only be used by precast producers that have been certified by the manufacturer of the antimicrobial additive.
 - f. Dosage of the antimicrobial shall be per manufacturer's recommendations.
 - g. A ferrous oxide tinting agent shall be used to identify all antimicrobial concrete precast, and shall be dosed per manufacturer's recommendations producing a terracotta tint to the cured concrete.
10. Shallow manholes have a depth of 4 feet or less measured from the top of cover to sewer invert.
 11. Each manhole joint shall be sealed with Infi-Shield® Gator Wrap external rubber sleeve as manufactured by Sealing Systems, Inc. The seal shall be made of Stretchable, Self-Shrinking, Intra-Curing Halogenated based rubber with a minimum thickness of 30 mils. The back side of each unit shall be coated with a cross-linked re-enforced butyl adhesive. The butyl adhesive shall be non-hardening sealant, with a minimum thickness of 30 mils. The seal shall stretch around the substrate then overlapped creating a cross-link and fused bond between the rubber and butyl adhesive.

852.5 CONSTRUCTION:

1. Manholes shall be constructed of materials and workmanship as described by these specifications, at such places shown in the contract documents or as designated by the Engineer, and in conformity with the typical details and sketches shown.
2. Unless otherwise shown in the contract documents or approved by the Engineer, standard sanitary sewer manholes shall be constructed with influent and effluent piping less than or equal to 24 inches in diameter with precast reinforced concrete manhole sections.
3. A standard sanitary sewer manhole shall be a single entrance cylindrical structure, having a minimum internal diameter of 4 feet between the cone and base sections.
4. The base of the structure shall include the load bearing portion beneath and exterior of the structure, invert channels and the fill or bench portions adjacent to the lower sewer pipes within the structure.
5. When the manhole depth is 4 feet or less, but not less than three (3) feet, provide a

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- shallow type manhole. Maximum pipe size for shallow type manholes is 12-inch diameter.
6. Special shallow cone sections, or flat cover slabs, shall be used for shallow manholes.
 7. The maximum vertical height of the diameter adjustment section or cone shall be 36 inches.
 - a. Adjustment of throat rings may be used for final elevation adjustment of the manhole ring and cover.
 - b. Concrete encasement of the manhole's ring shall be as shown in the DD-852 Standard Drawing Series.
 - c. Ring and cover shall be attached to the diameter adjustment flat top section or cone.
 - d. Manholes which differ from the above description shall be governed by Specification Item No. 850, "Polymer Concrete Sanitary Sewer Structures."
 - e. An External drop manhole shall be provided for a sewer entering a manhole more than 30 inches above the invert, as per TCEQ Rules and Regulations Chapter 217 Design Criteria for Domestic Wastewater Systems.
 8. Footings or bases of manholes shall be a minimum of 6 inches in depth below the bottom of the pipe.
 9. All invert channels shall be constructed and shaped accurately so as to be smooth, uniform and cause minimum resistance to flow.
 10. The bench shall be finished smooth with a slope of ½ inch per foot from the manhole walls to the edges of the invert.
 11. The top half of all sewer pipes within the invert channel or bench zone shall be removed flush to the inside manhole walls.
 12. Joints on sewer pipes shall not be cast or constructed within the wall sections of manholes.
 13. Concrete cradles shall be required for new pre-cast manholes.
 14. Concrete cradles shall extend beyond the outside walls of the manhole a minimum of 36 inches.
 15. Voids between exterior pipe walls and manhole walls at all pipe connections in manholes shall be filled with a non-shrink grout, as specified above, or as approved by the Engineer, or as shown in the contract documents and inspected prior to backfilling.
 16. Where connections to existing manholes are required, the adjacent pipe bedding shall be prepared to proper grade, the existing manhole neatly cored and the new pipe inserted so that the end is projecting 2 inches from the inside wall.
 17. The invert shall then be reshaped to properly channel new flows.
 18. Debris of any kind shall be kept out of new or existing manholes or mains.
 19. Joints between cones, risers, adjustment rings, flat tops, and between the ductile cast iron ring and the uppermost adjustment ring or flat top, as applicable, shall be thoroughly sealed in accordance with manufacturer's recommendations with adhesive bitumastic products as specified above.

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Where precast concrete risers are used, any gaps in the outer joint surfaces shall be additionally coated with non-shrink grout to a minimum thickness of ¼ inch.

20. All manhole rings shall be encased with 4,000 psi reinforced concrete as shown in the contract documents or as approved by the Engineer.
 - a. Concrete manhole ring encasement shall extend 6 inches below the top of the cone and have a minimum width when measured at the manhole ring of 1 foot. The surface of the encasement shall be flush with the top of the manhole ring.
21. All new manholes shall be encased with a minimum of 12 inches thickness of flowable fill to one foot above the top of the cone section to allow for the concrete ring encasement. See DD-852 drawing series.

852.6 TESTING: The Contractor shall notify Inspector and Engineer 48 hours prior to beginning of manhole testing and only after a successful pretest has been performed.

1. The Contractor shall perform the testing for all sanitary sewer manholes in accordance with the following:
2. All manholes must pass a leakage test.
3. The Contractor shall test each manhole (after assembly and backfilling) for leakage, separate and independent of all other sanitary sewer piping, by means of either a hydrostatic test, vacuum test, or other methods approved by the Engineer.
4. The Contractor is hereby instructed to conduct either of the two identified tests in the following manner:
 - a. Hydrostatic testing shall be conducted by utilizing approved plugs to seal all influent and effluent pipes in the manhole and filling the manhole to the top of the cone with water.
 - (1) Additional water may be added over a 24-hour period to compensate for absorption and evaporation losses.
 - (2) At the conclusion of the 24-hour saturation period, the manhole shall be filled to the top and observed.
 - (3) Any measurable loss within a 30 minute period shall be considered an unsuccessful test and thus require the Contractor to assess the needed repairs, perform such repairs (subject to the approval of the Engineer), and notify the Inspector when the retest will be performed.
 - (4) All effort, materials, or other costs shall be solely at the Contractor's expense.
 - b. Vacuum Testing: Manholes shall be tested after construction/installation and backfilling with all connections (existing and/or proposed) in place.
 - (1) Drop-connections and gas sealing connections shall be installed prior to testing.
 - (2) The lines entering the manhole shall be temporarily plugged with the plugs braced to prevent them from being drawn into the manhole.

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- (3) The plugs shall be installed in the lines beyond drop connections, gas sealing connections, etc.
 - (4) Prior to performing the test, the Contractor shall plug all lift holes and exterior joints with a non-shrink grout and plug all pipes entering the manhole.
 - (5) Only a cementitious coating may be applied.
 - (6) Contractor shall use a minimum 60 inch-lb. torque wrench to tighten the external clamps that secure the test cover to the top of the manhole.
 - (7) The test head shall be inflated in accordance with the manufacturer's recommendations.
 - (8) A vacuum of 10 inches of mercury shall be drawn, and the vacuum pump will be turned off.
 - (9) With the valve closed, the level vacuum shall be read after the required test time.
 - (10) If the drop in the level is less than 1 inch of mercury (final vacuum greater than 9 inches of mercury), the manhole will have passed the vacuum test.
 - (11) The required test time is 2 minutes.
 - c. Acceptance: Any manhole which fails the initial test must be repaired with a non-shrink grout or other suitable material based on the material of which the manhole is constructed.
 - d. The manhole shall be retested as described above until a successful test is attained.
 - e. After a successful test, the temporary plugs will be removed.
 - f. To ensure that the plugs have been removed, Contractor shall only do so in the presence of the Inspector.
 - (1) Repairs to Existing Manholes: Any existing manhole which fails to pass the hydrostatic/vacuum test shall be closely examined by the Inspector and the Contractor to determine if the manhole can be repaired.
 - g. Thereafter, the Contractor shall either repair or remove and replace the manhole as directed.
 - h. Any manhole excavated for repairs or excavated for tie in, shall be backfilled with a minimum of 12 inches thickness of flowable fill to one foot above the top of the cone section to allow for the concrete ring encasement.
 - i. After abrading and cleaning, additional protective coating material shall be applied to the repair area.
 - j. All touch-up repair procedures shall follow the protective coating manufacturer's recommendations
5. If a sanitary manhole fails to pass one of the above tests, it shall be repaired in accordance with the manufacturer's recommendations and re-tested. Should the test

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fail a second time, Contractor shall perform another leak test utilizing the other testing option in this specification. Should the test fail the third time, Contractor shall remove and replace the manhole and perform all the necessary test at no additional cost to SAWS. Manholes shall not be accepted until it passes all tests.

6. Engineer of Record must witness all tests over the EARZ.

852.7 MEASUREMENT: All manholes zero feet to 6 feet deep and designated in the contract documents will be measured as the total number of such manholes constructed, including those exceeding 6 feet in depth from the lowest invert elevation to the top of the ring.

1. Manholes deeper than 6 feet shall be measured by the number of vertical feet in excess of 6 feet.

852.8 PAYMENT:

1. All manholes shall be paid at the contract unit price bid for each such manhole, which price shall be full compensation for all precast sections or throat rings, UV stabilized polyethylene liner, cones, bases, rings and covers, manhole ring, anti-microbial agent, encasement, manhole rubber joint seal, flowable fill, mortar, drop pipes, saws cutting of surfaces, surface restoration, and fittings, labor, tools, equipment, testing, tees, wyes, and incidentals necessary to complete the work.
2. Extra depth manholes shall be paid for at the contract unit price bid per vertical foot as measured above.
3. Shallow manholes shall be paid at the contract unit price.
4. Concrete cradles for pipes shall be measured and paid for at the contract unit price bid as provided for in Specification Item No. 858, "Concrete Encasement, Cradles, Saddles and Collars."
5. Gravel subgrade filler for manholes shall not be measured separately for payment.

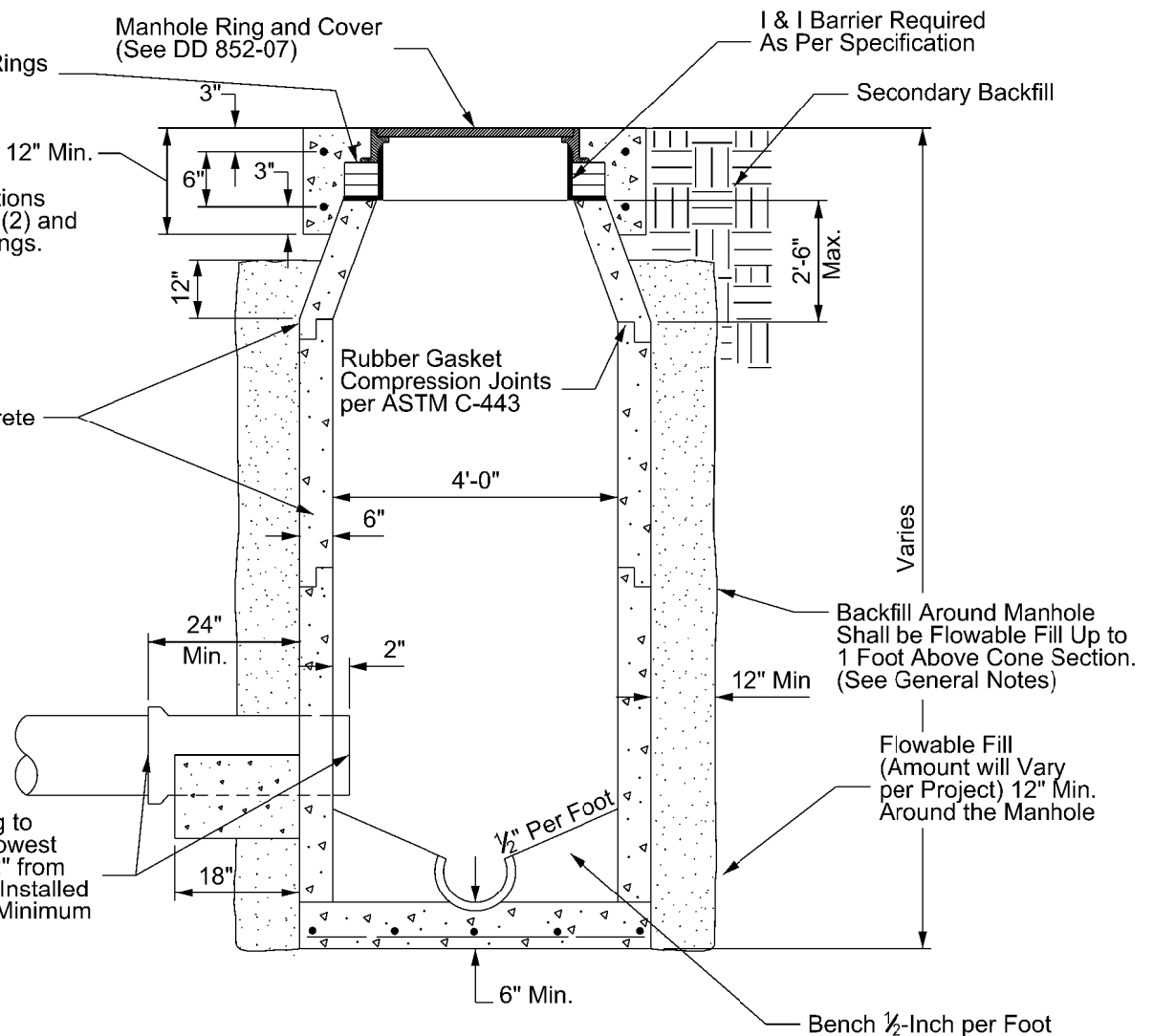
- End of Specification-

Adjusted:
A Minimum of (2) and a Maximum of (6) Throat Rings Shall be Used at Each Adjusted Manhole.

New:
All New Manhole Installations Shall have a Minimum of (2) and Not Exceed (4) Throat Rings.

Precast Reinforced Concrete Manhole Sections ASTM Designation C-478
4000 psi min. Strength in 28 Days

Note "A"
Sewer Pipe Connecting to Manholes Above the Lowest Sewer Shall Protrude 2" from the Inside Wall and be Installed with a Joint Located a Minimum 24 Inches



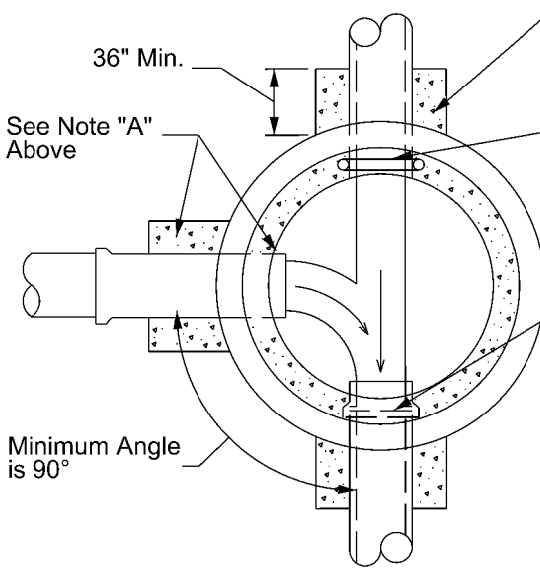
PRECAST MANHOLE

Concrete Cradle to Nearest Point of all Lines Leaving or Entering Manholes
All Pipe is Used, Provide Rubber Gasket One Size Smaller than Pipe at Each Wall Crossing of Manhole, If HDPE Pipe is Used a Non-Shrink Grout to be Applied within the Wall Sections, Gasket is also, Required.

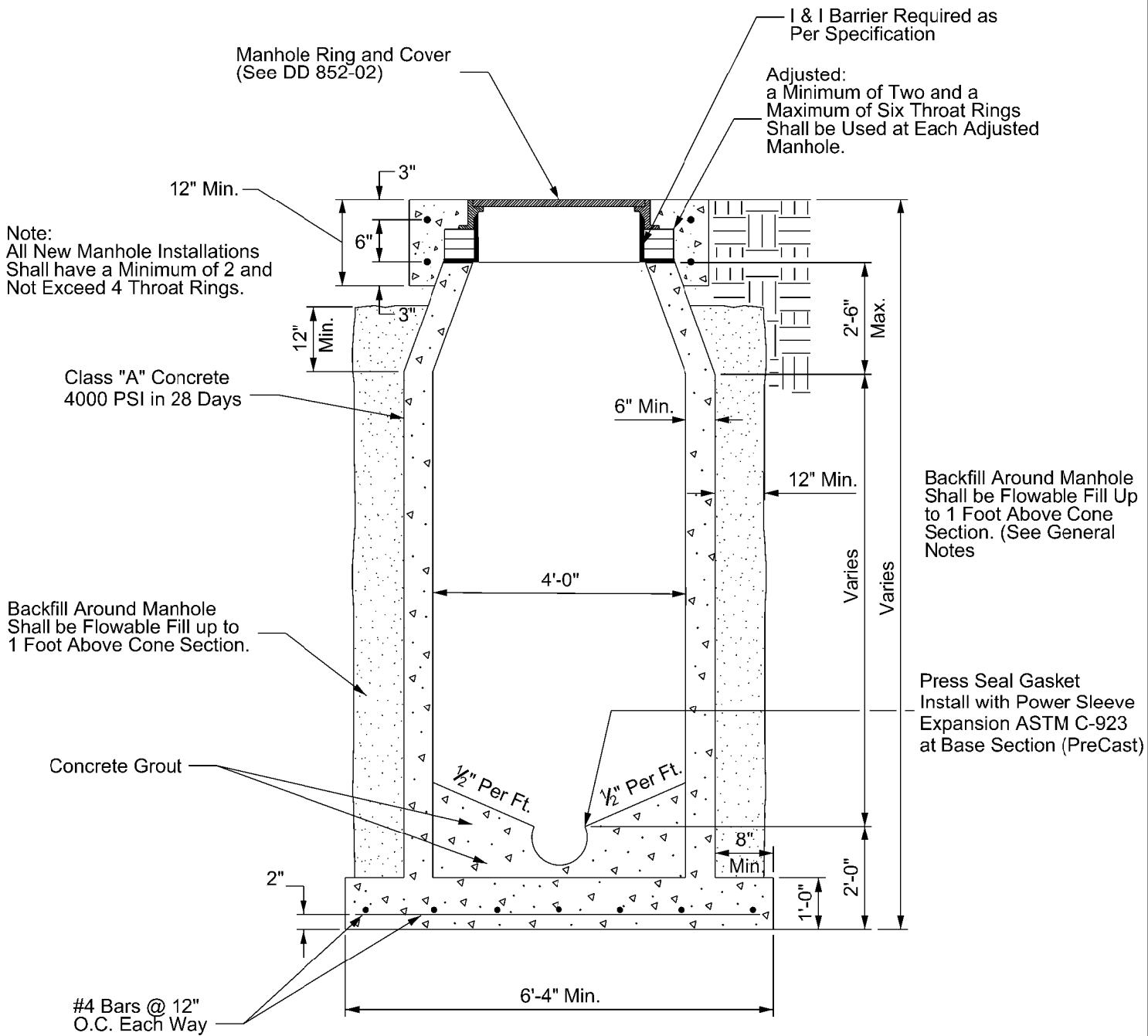
No Joints for Pipe will be Allowed within Wall Section

General Notes:

1. Material for Sanitary Sewer Pipe must be the Same from Manhole to Manhole. Changes in Type of Pipe may be Made Only at Manholes, or Special Structures, except as Approved by the SAWS Inspector.
2. Adapters and Concrete Collars shall be Used as Directed and Approved by the SAWS Inspector.
3. Watertight Manhole Rings and Covers shall be Trans-Tex A77 "O" Ring or Approved Equal.
4. The Minimum Angle of Flow for a Connecting Sewer to the Direction of Flow Defined by a Collection System is 90 Degrees, unless Approved by the Engineer.



PRECAST MANHOLE



MONOLITHIC MANHOLE

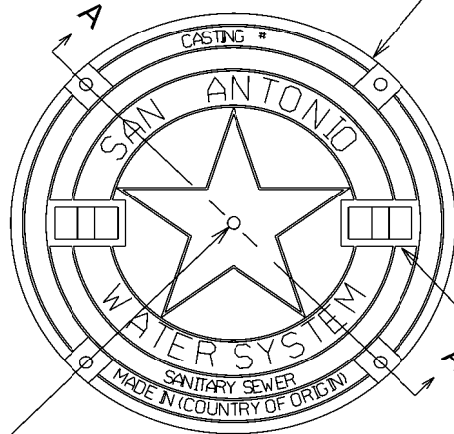
General Notes:

1. Material for Sanitary Sewer Pipe Must be the Same from Manhole to Manhole. Changes in Type of Pipe May be Made only at Manholes, or Special Structures, Except as Approved by the Project Engineer.
2. Adaptors and Concrete Collars shall be used as approved by the SAWS Project Engineer.
3. Watertight Manhole Rings and Covers shall be Trans-Tex A77 "O" Ring or Approved Equal.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	STANDARD MONOLITHIC MANHOLE	APPROVED	REVISED
		March 2008	AUG 2019
		DD 852-01	

Note:
Standard Manhole Ring and Cover:
All applicable dimensions shall
conform to the dimensions shown
here

Vented Manhole
Ring and Cover



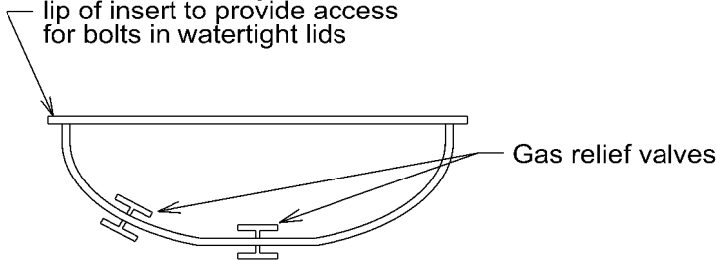
Lift Slot for Lifting Bar

Note:
The bearing surfaces and
O-Ring groove shall be
Machine ground

1" Dia. Cast Hole

VENTED MANHOLE RING AND COVER

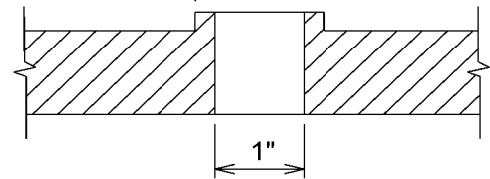
Slots or holes may be cut in
lip of insert to provide access
for bolts in watertight lids



Gas relief valves

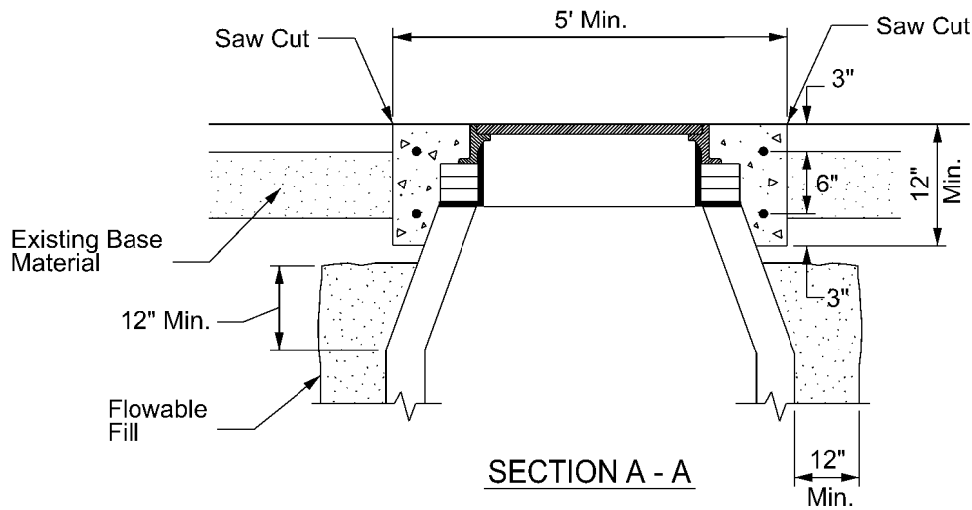
**WATERTIGHT MANHOLE
INSERT DETAIL**

Top of vent hole to be same
height as adjacent ribs

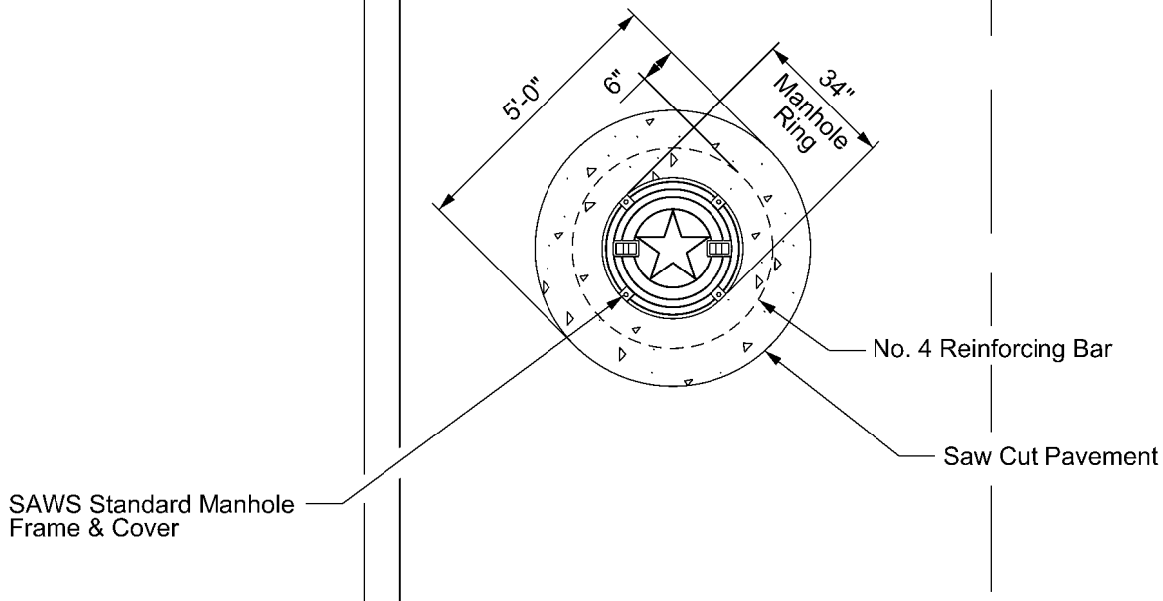


**VENT HOLE DETAIL
SECTION A-A**

Manhole cover inserts shall be installed in strict accordance with the manufacturer's recommendations. The contractor shall be responsible for making the necessary field measurements for the manufacturer prior to production.



↑
FLOW DIRECTION
OF TRAFFIC



NOTE:

1. The Concrete Shall be 4000 PSI Minimum and Reinforced with No. 4 Bars as Shown.
2. The Concrete Shall Extend to Edge of Saw Cut Pavement.
3. Manhole Ring Encasement is Required on all Manholes.
4. Manhole Lid shall Open in the Direction of Traffic or Downstream in Parkway

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SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

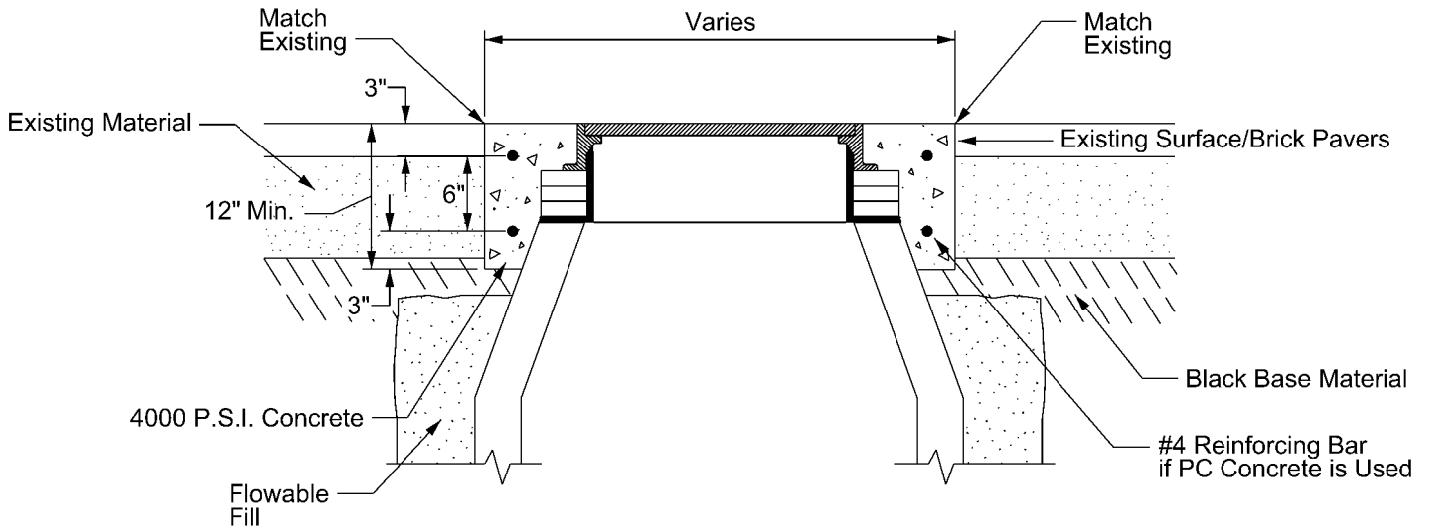
MANHOLE RING
ENCASEMENT DETAIL

APPROVED
AUGUST 2009

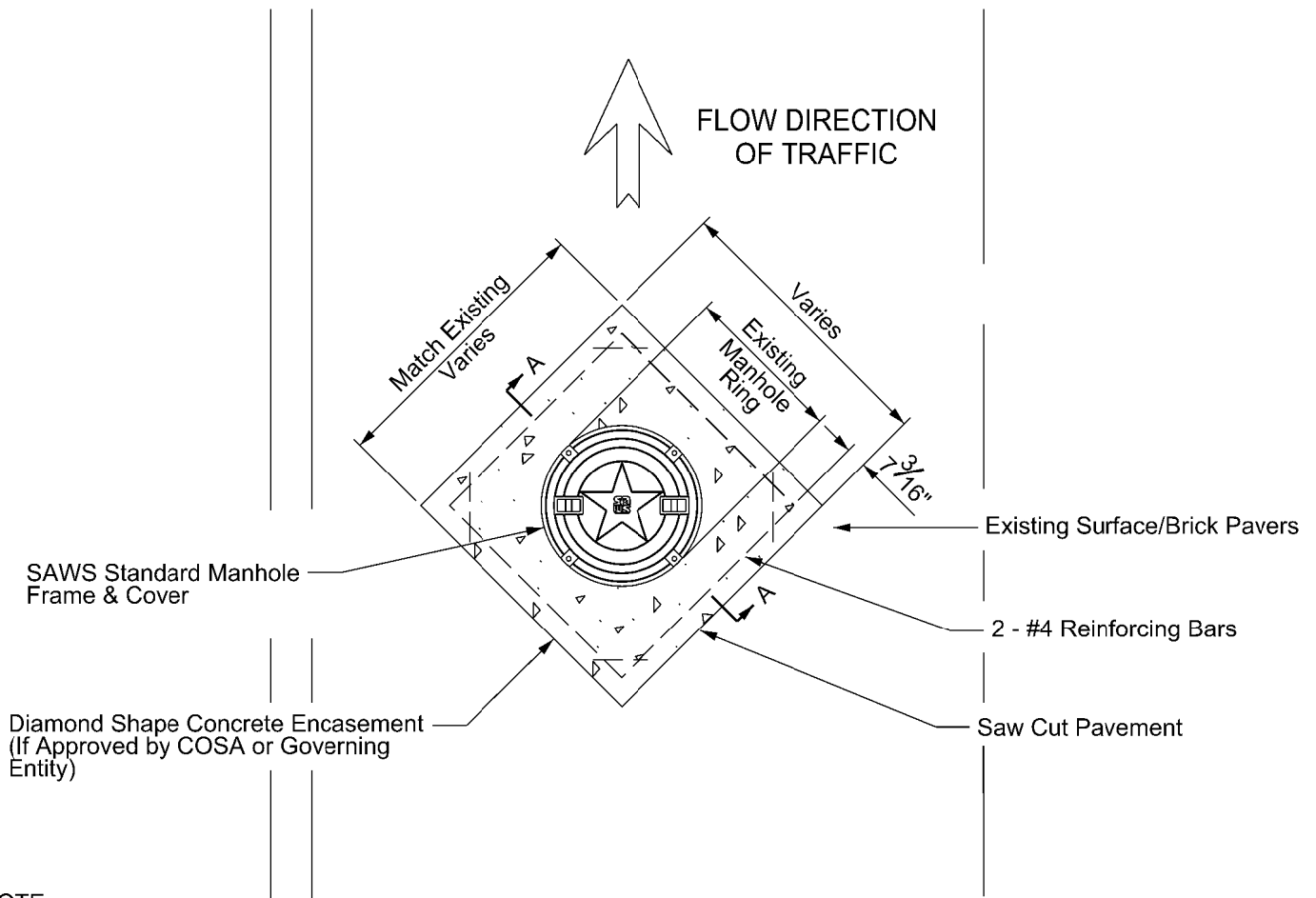
REVISED
AUG 2019

DD 852-03

SHEET
1 OF 2

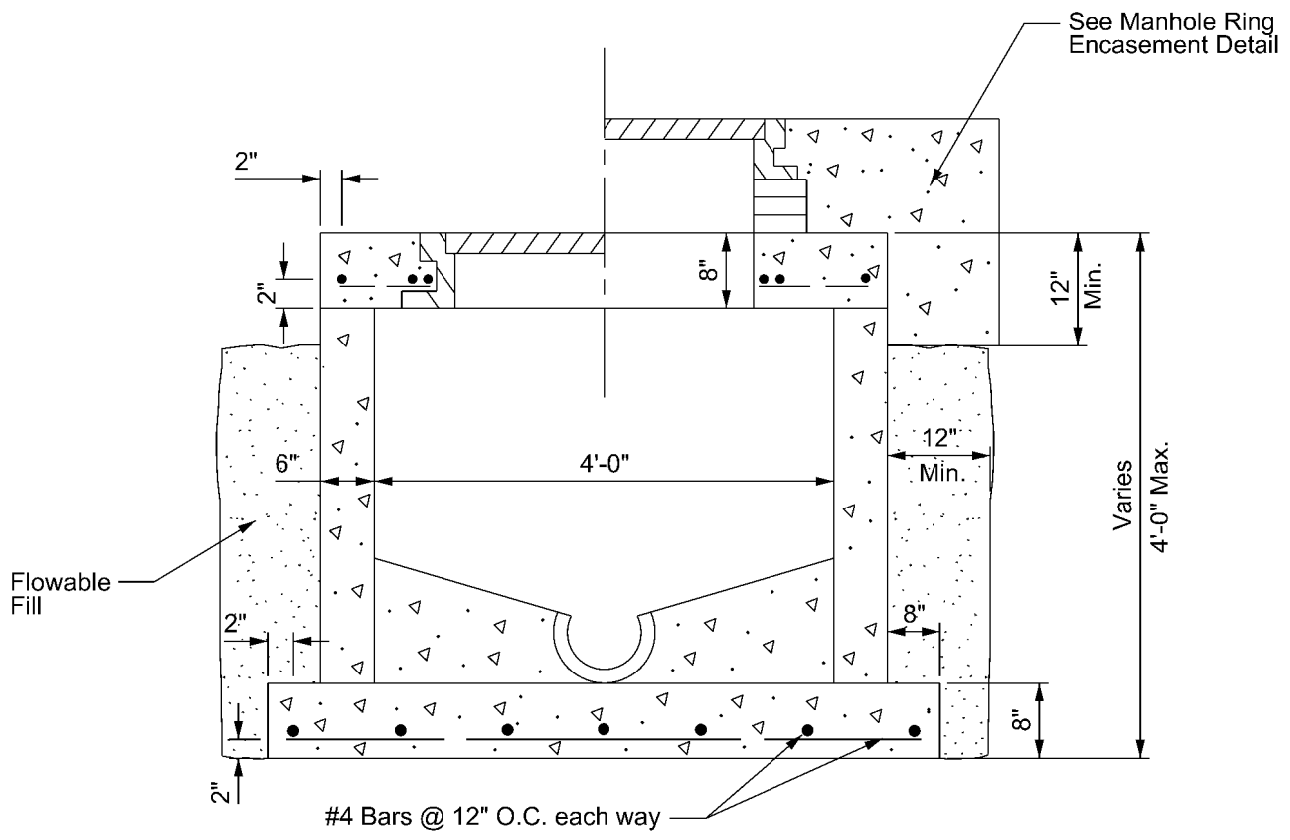
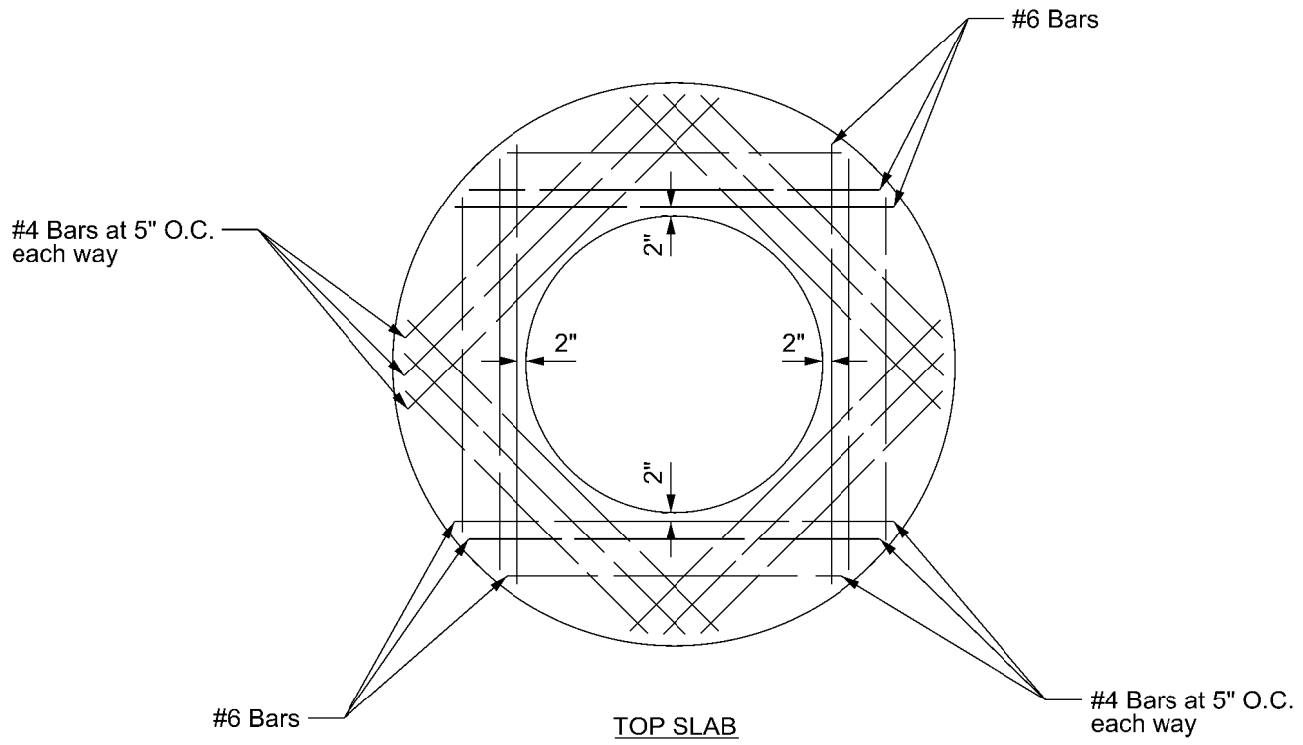


SECTION A - A



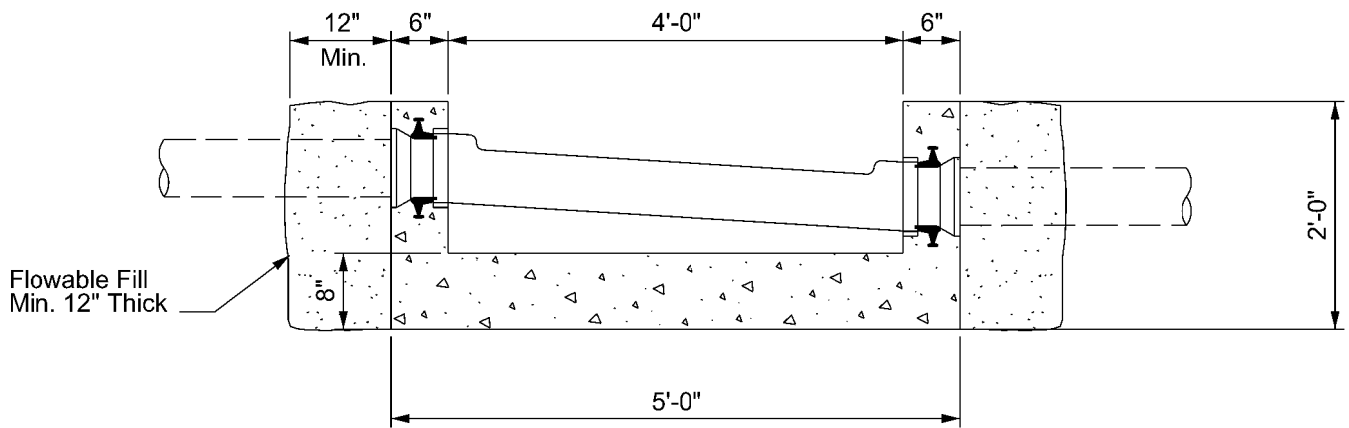
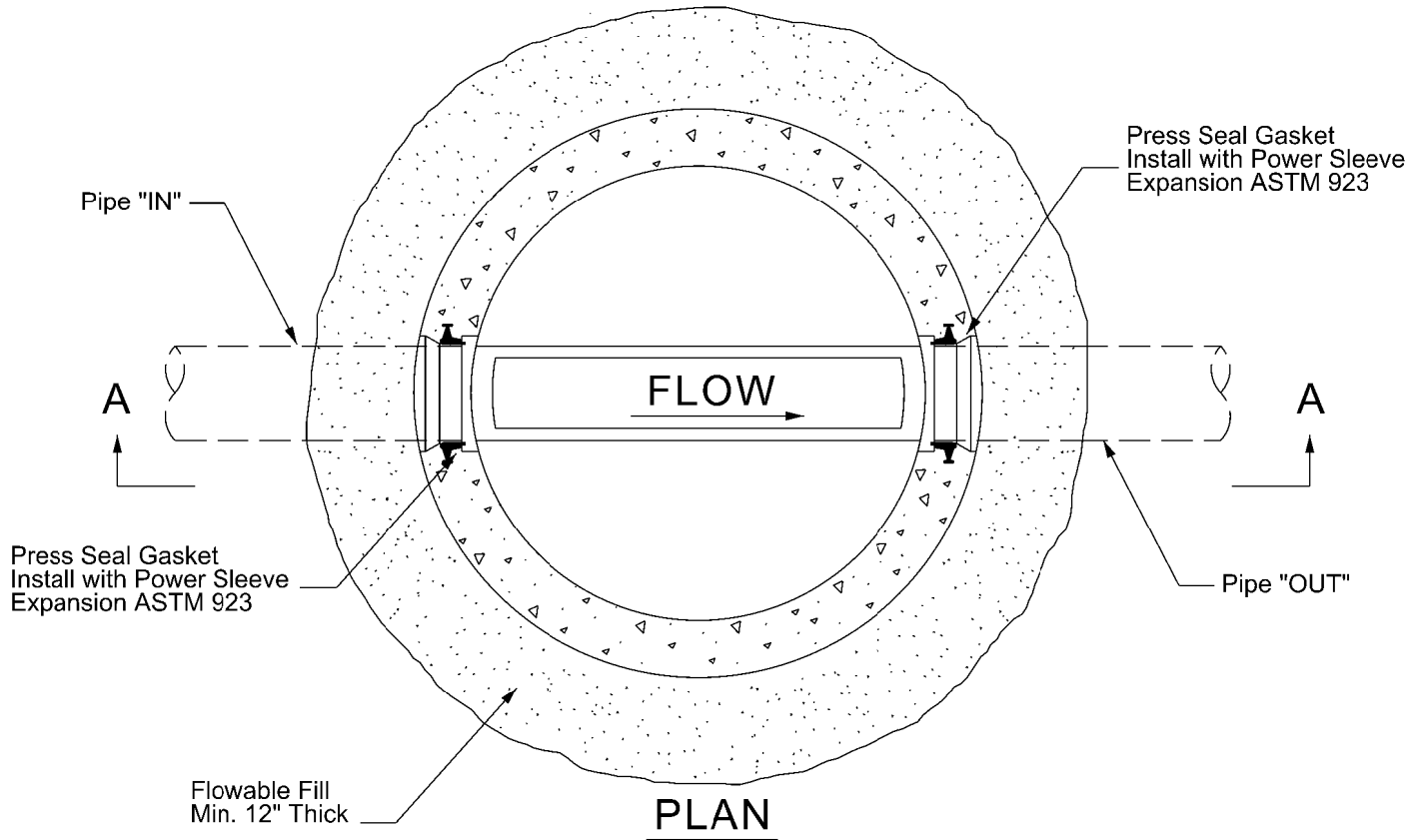
NOTE:

1. The Concrete Shall be 4000 PSI, Minimum and Reinforced with 2 - #4 Bars as Shown.
2. The Concrete Shall Extend to Edge of Saw Cut Pavement.
3. Manhole Ring Encasement is Required on all Manholes.
4. Manhole Lid Shall Open in the Direction of Traffic or Downstream in Parkway.



SHALLOW MANHOLE
PRECAST OR MONOLITHIC

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	SHALLOW MANHOLE DETAIL	APPROVED	REVISED
		MARCH 2008	AUG 2019
		DD 852-04	
			SHEET 1 OF 1



PROPERTY OF
SAN ANTONIO WATER SYSTEM
 SAN ANTONIO, TEXAS

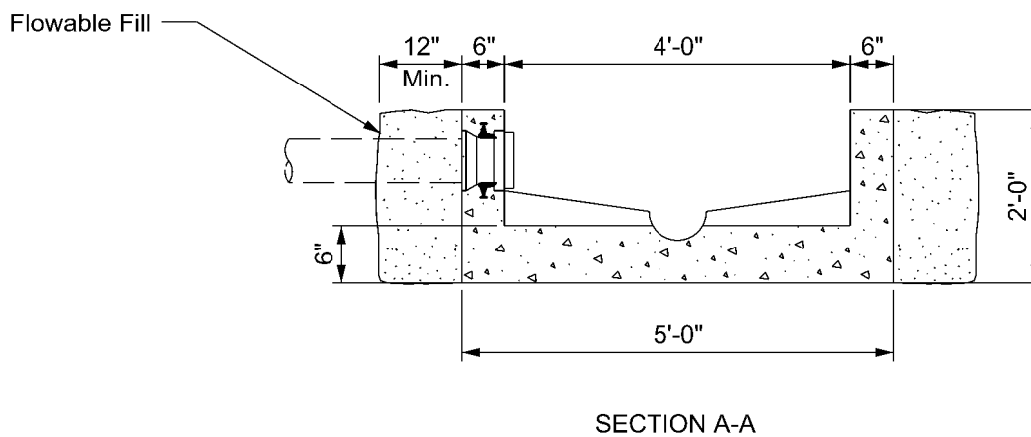
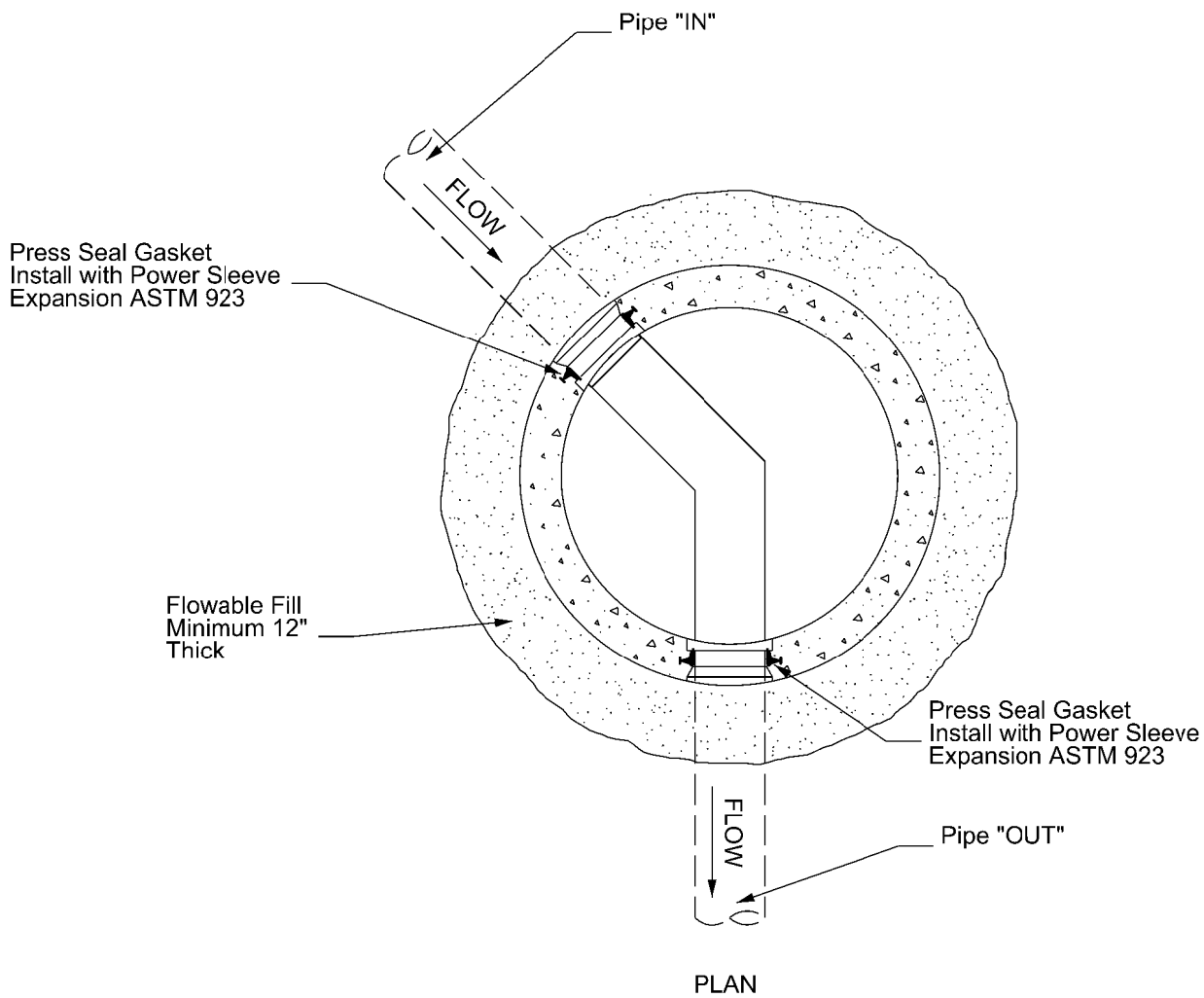
PRECAST MANHOLE BASE
 STRAIGHT THROUGH

APPROVED
 MARCH 2008

REVISED
 AUG 2019

DD-852-05

SHEET
1 OF 1



PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

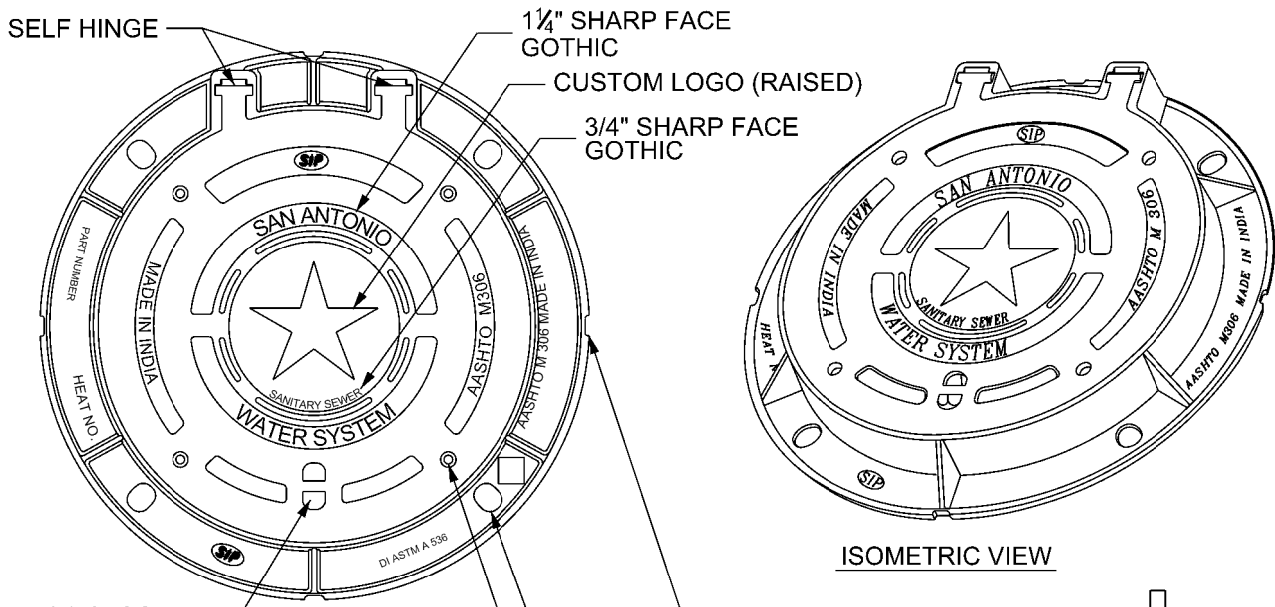
PRECAST MANHOLE BASE
45° ANGLE

APPROVED
MARCH 2008

REVISED
AUG 2019

DD-852-06

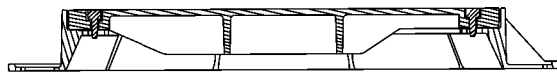
SHEET
1 OF 1



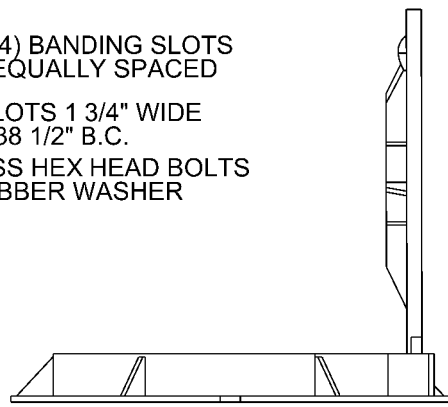
(1) CLOSED PICKHOLE

(4) BANDING SLOTS EQUALLY SPACED

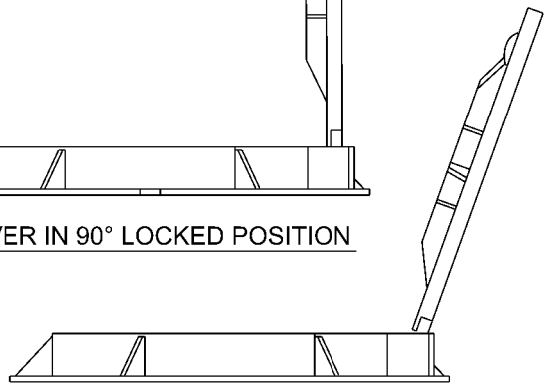
(4) BOLT SLOTS 1 3/4" WIDE ON 36" TO 38 1/2" B.C.
 (4) 1/2" - 13 SS HEX HEAD BOLTS W/ SS & RUBBER WASHER



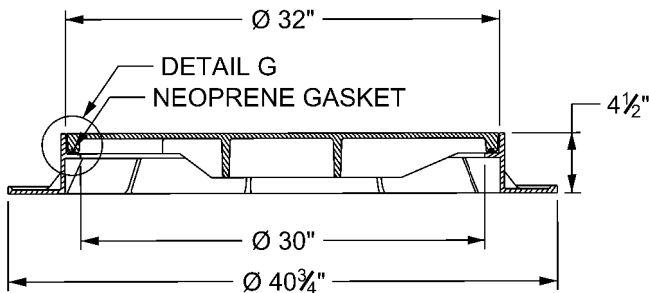
SECTION B-B (BOLTING DETAIL)



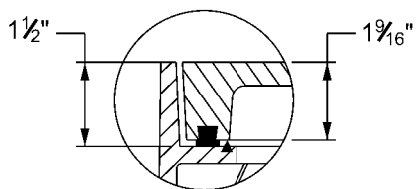
COVER IN 90° LOCKED POSITION



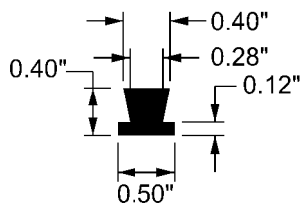
COVER IN 120° RESTING POSITION



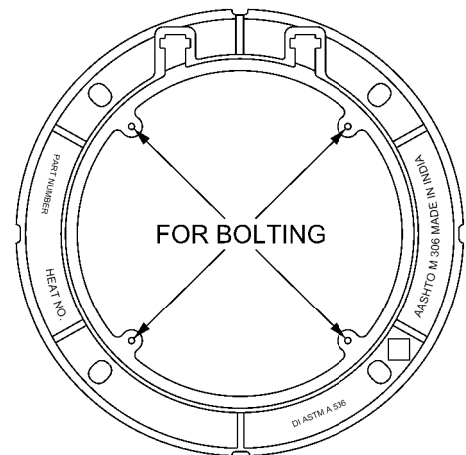
SECTION A-A



DETAIL G



NEOPRENE GASKET DETAIL



FRAME TOP VIEW

SIP Industries

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 SAN ANTONIO WATER SYSTEM
 SAN ANTONIO, TEXAS

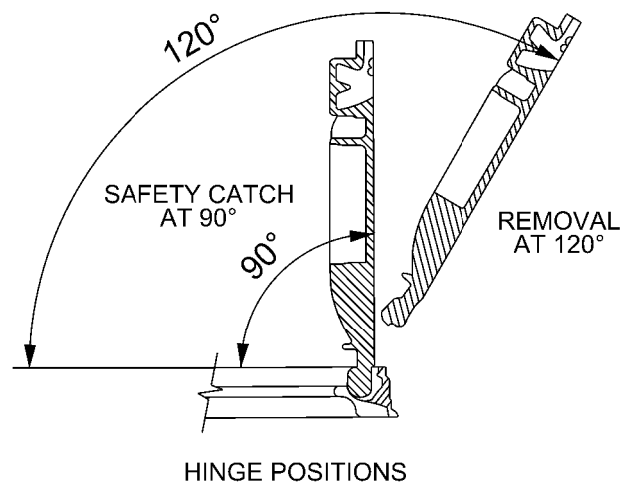
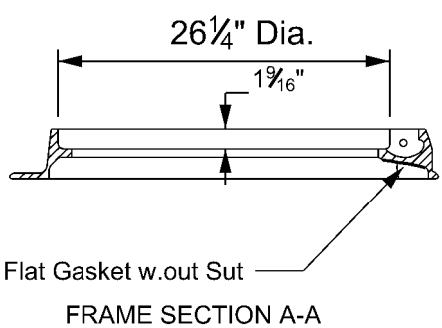
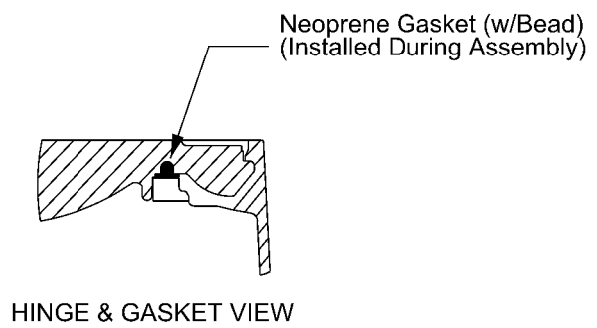
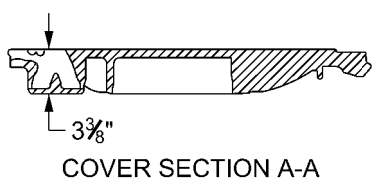
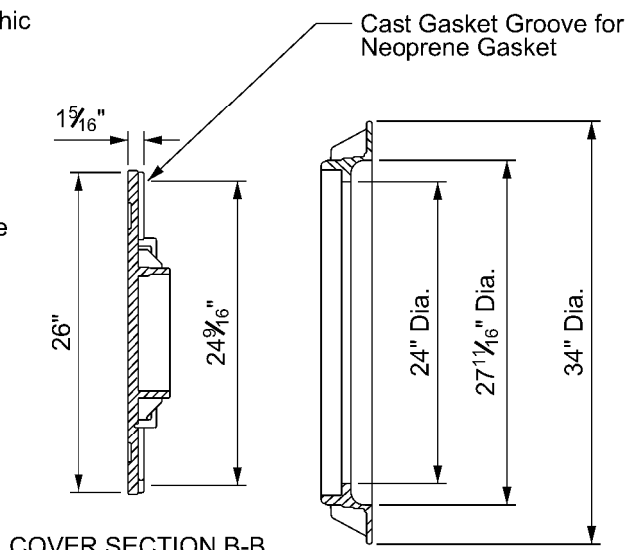
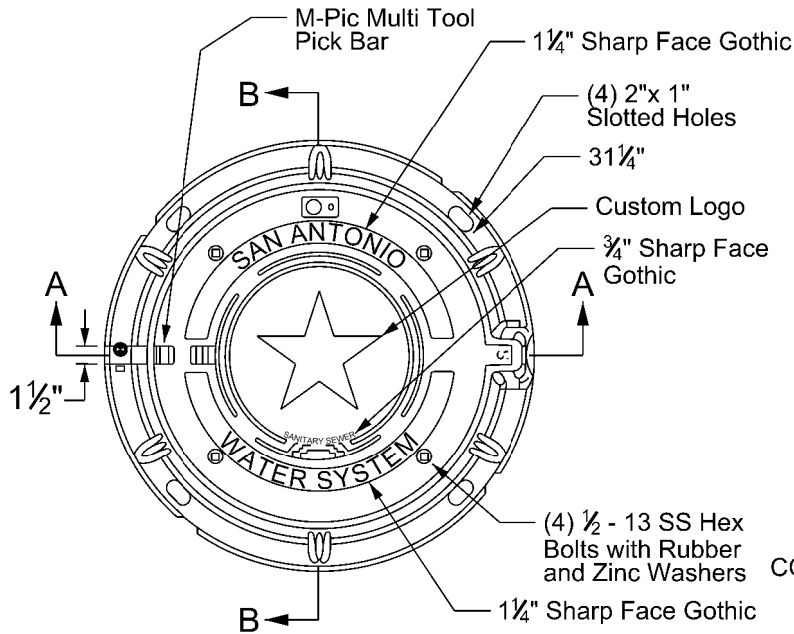
30" MANHOLE RING
 AND COVER DETAIL

APPROVED

REVISED
 AUG 2019

DD 852-07

SHEET
 1 OF 5



ERGO Assembly

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

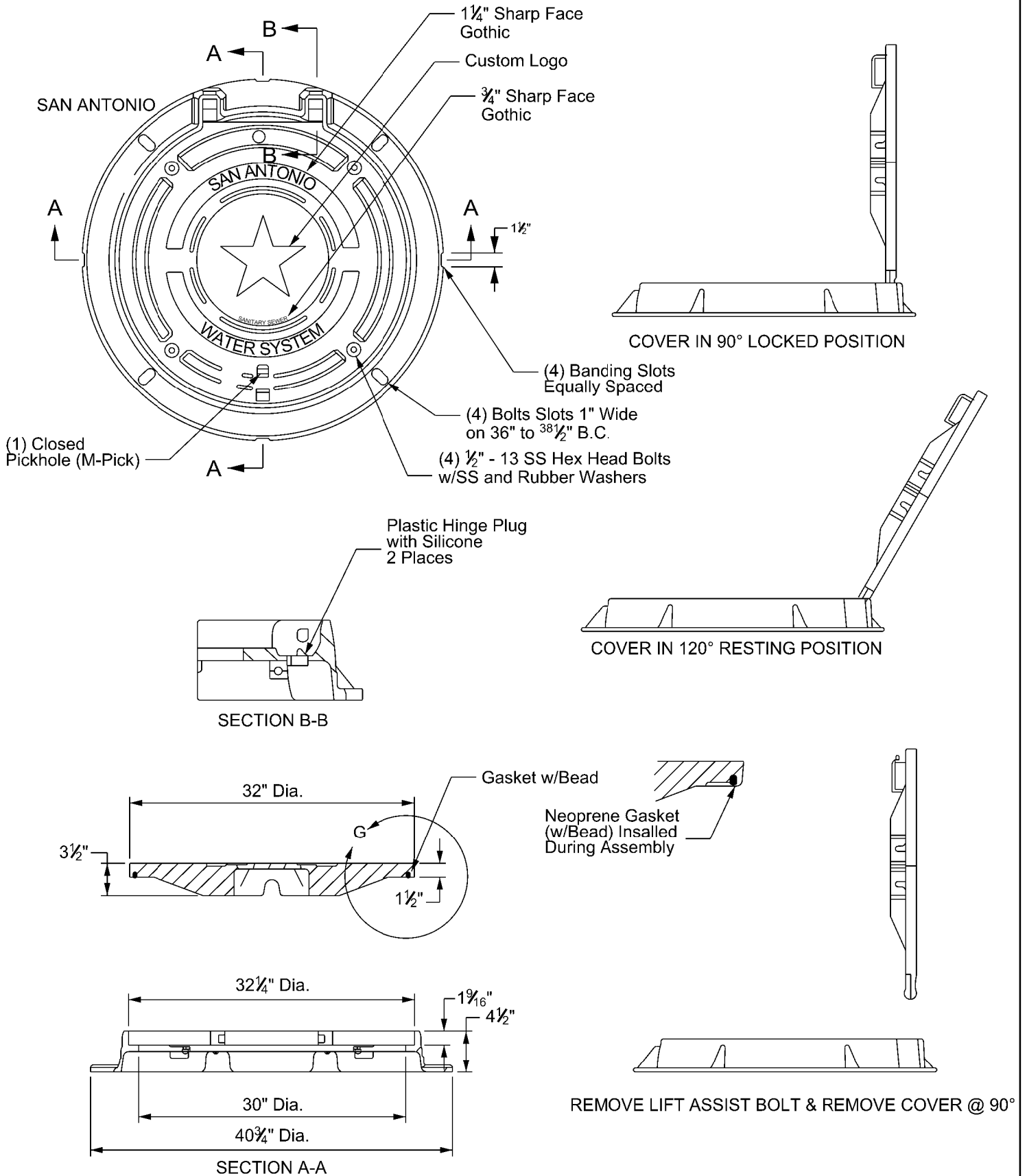
MANHOLE RING
AND COVER DETAIL

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AUG 2019

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SHEET
2 OF 5



ERGO XL Assembly

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

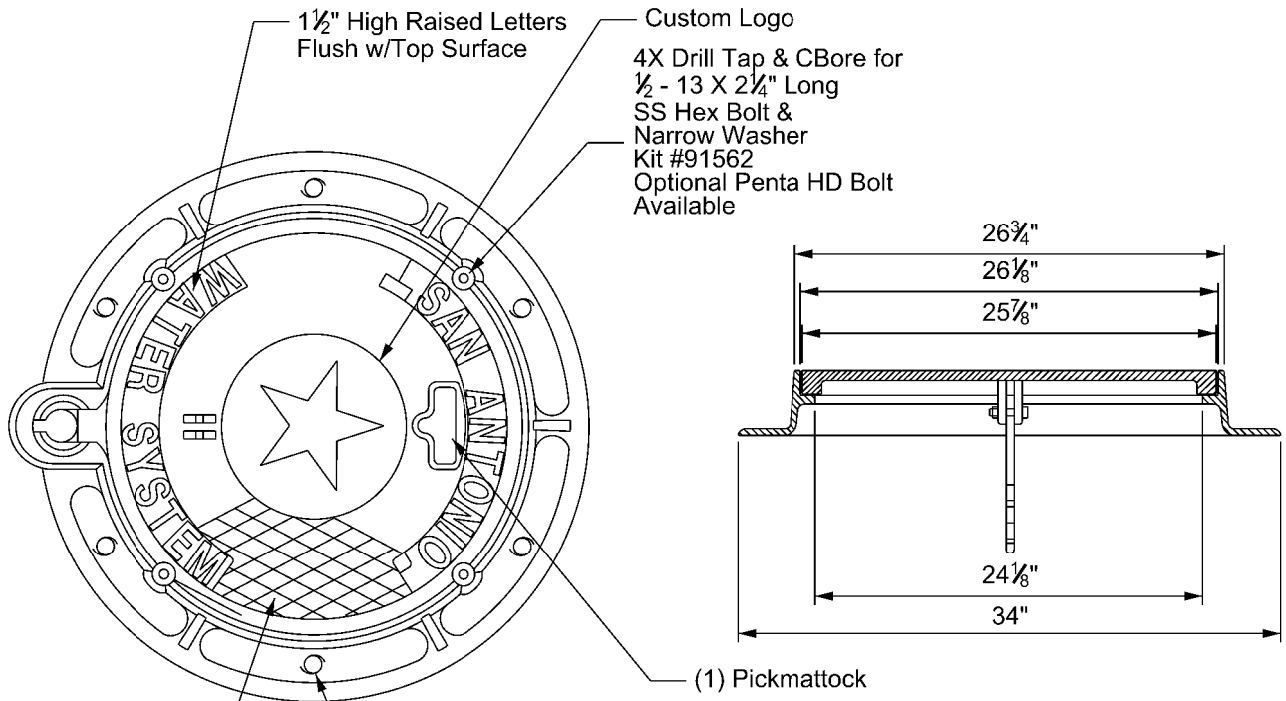
MANHOLE RING
AND COVER DETAIL

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MARCH 2008

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AUG 2019

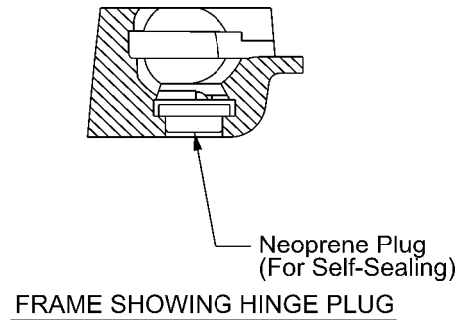
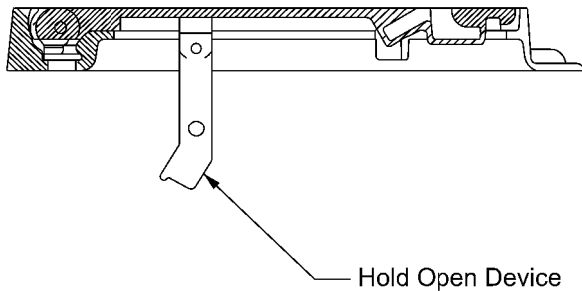
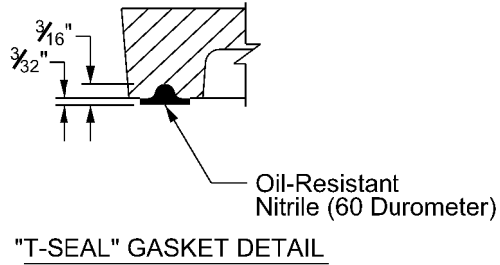
DD 852-07

SHEET
3 OF 5



Type "C" Lid Design
w/Permagrip Texture

(6) 1 1/8" Dia. Anchor Bolt
Holes on a 29 1/16" Dia. B.C.



NEENAH FOUNDRY

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SAN ANTONIO, TEXAS

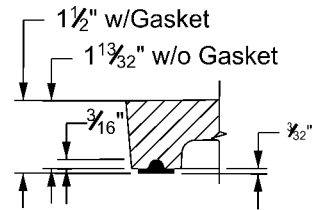
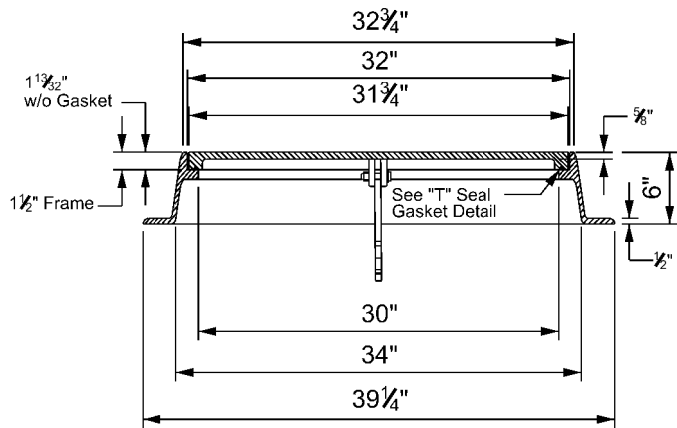
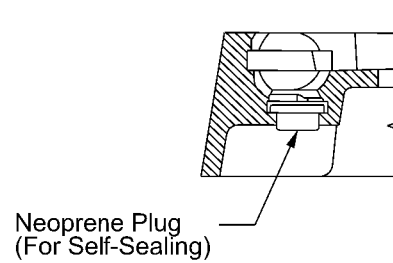
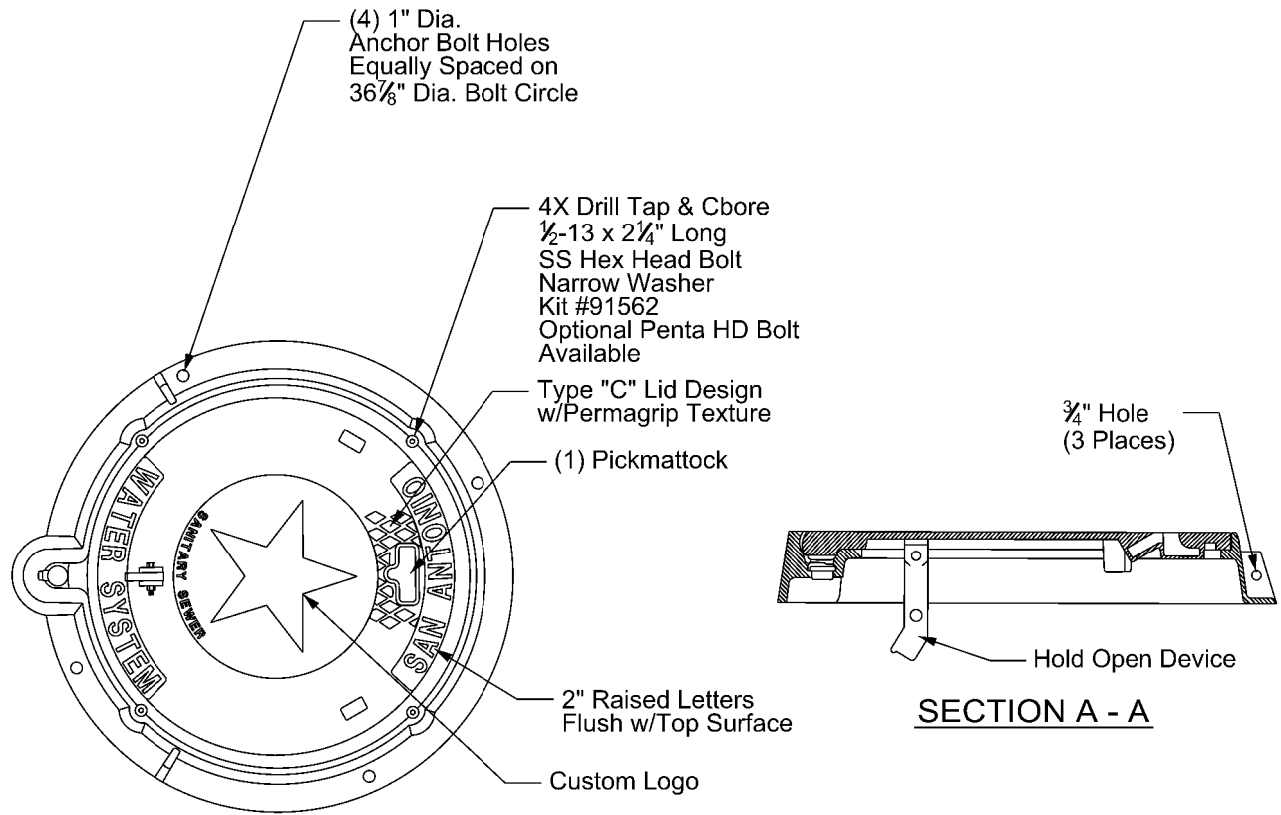
MANHOLE RING
AND COVER DETAIL

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4 OF 5



NEENAH FOUNDRY

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

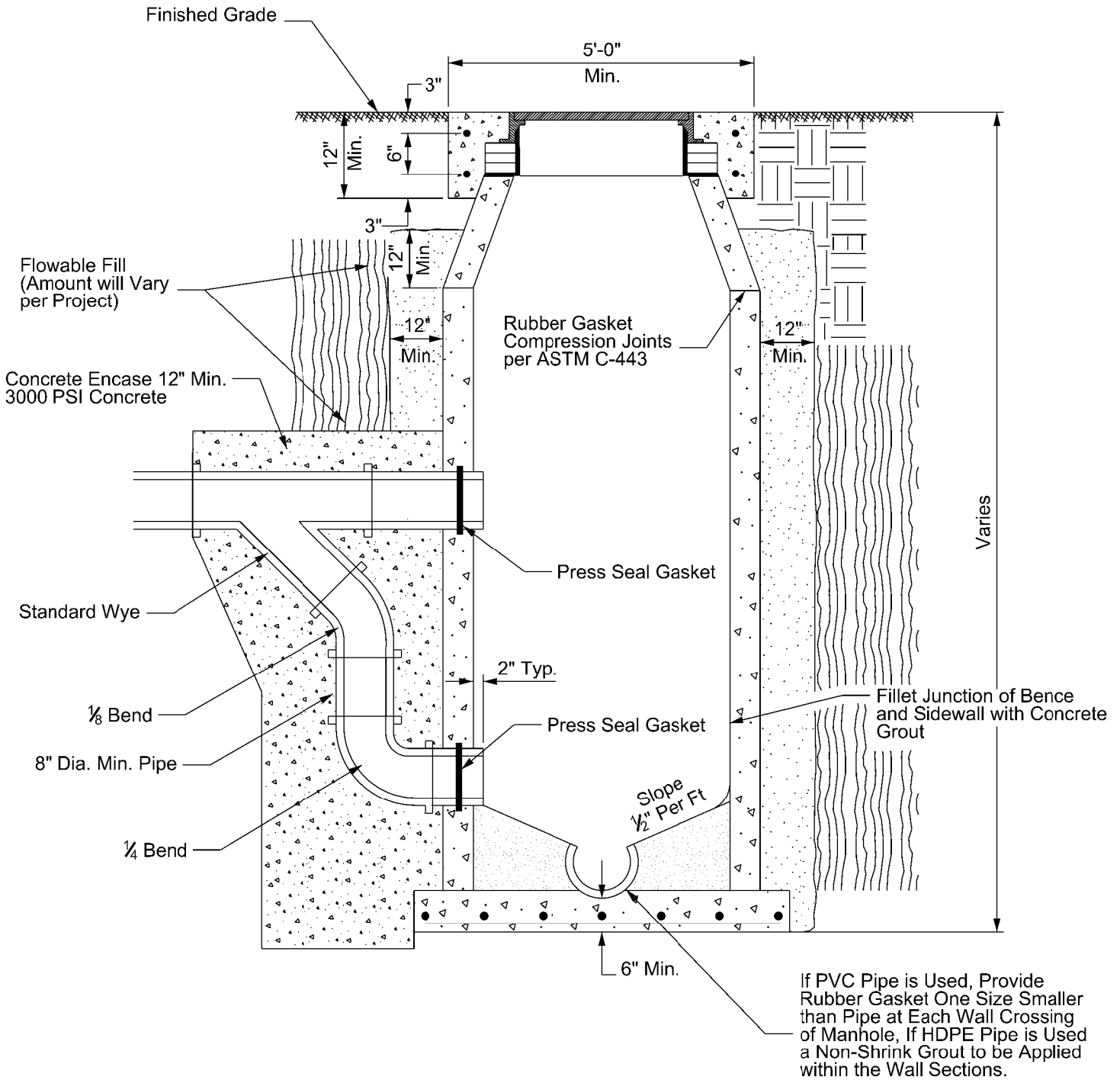
MANHOLE RING
AND COVER DETAIL

APPROVED
MARCH 2008

REVISED
AUG 2019

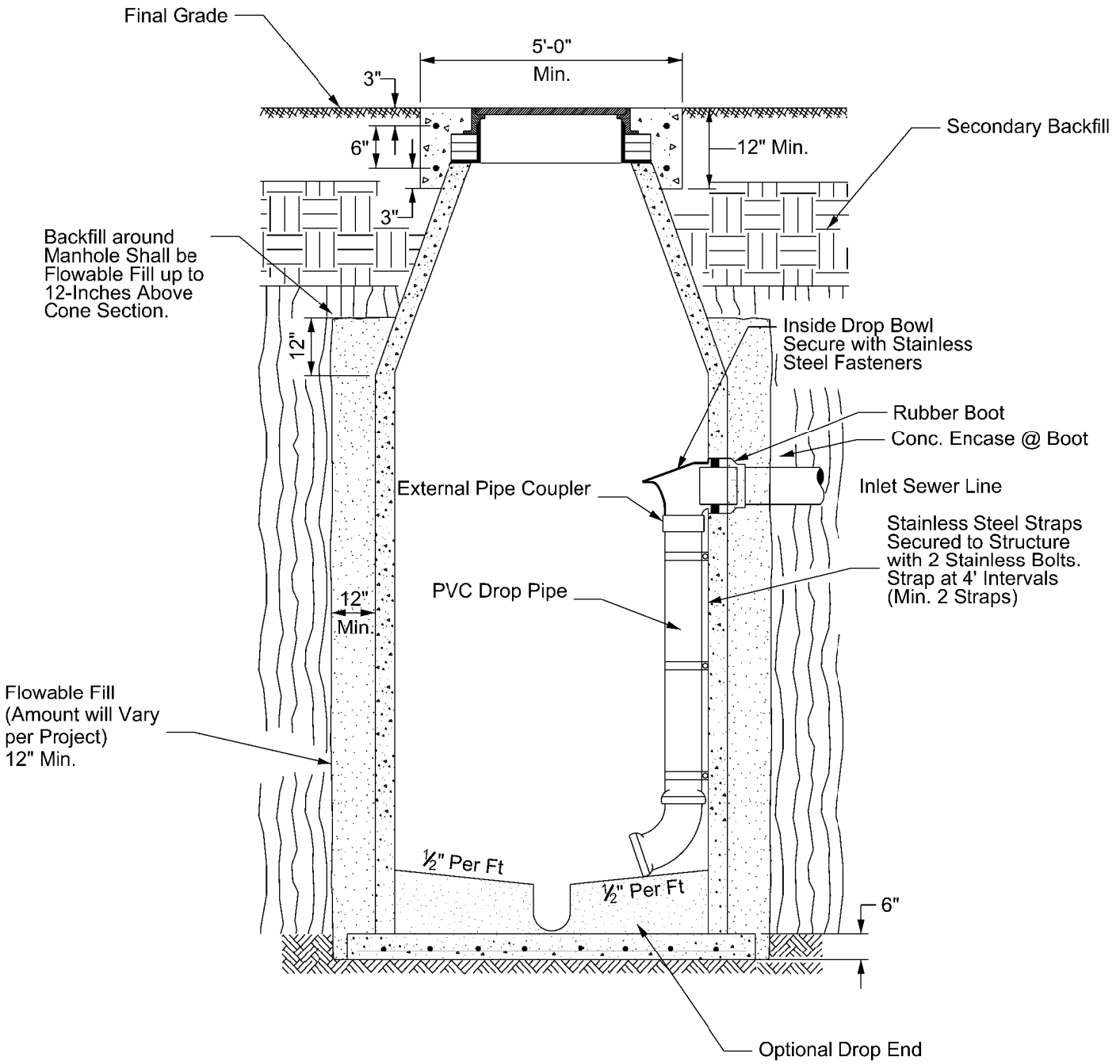
DD 852-07

SHEET
5 OF 5



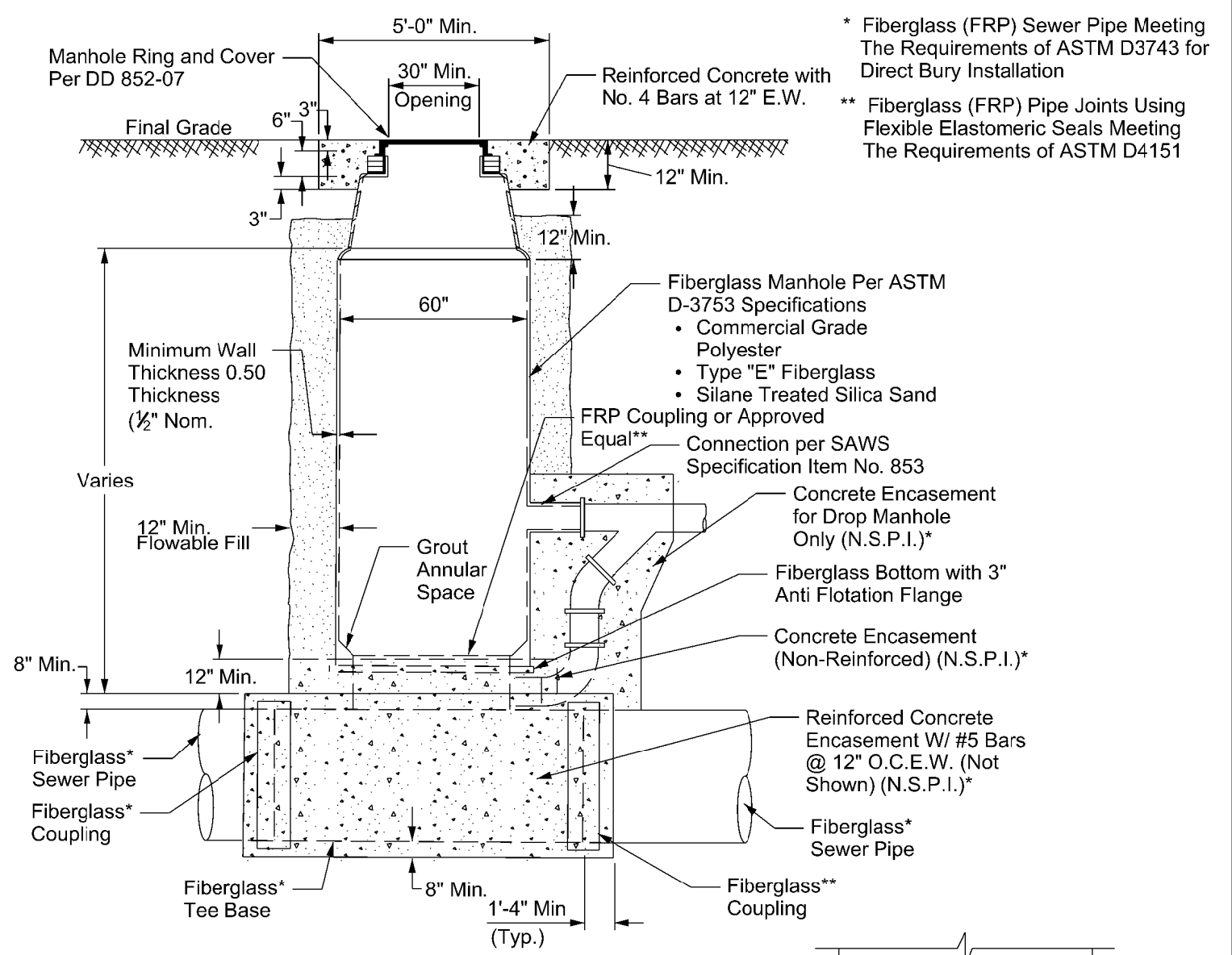
NOTE: Price for Drop Fittings and Encasement to be Included with the Price of Manhole.

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	DROP MANHOLE DETAIL	APPROVED	REVISED
		MARCH 2008	AUG 2019
DD-852-08			SHEET 1 OF 1



NOTE:
THIS MANHOLE IS TO BE APPROVED BY SAWS DIRECTOR OF ENGINEERING PRIOR TO CONSTRUCTION.

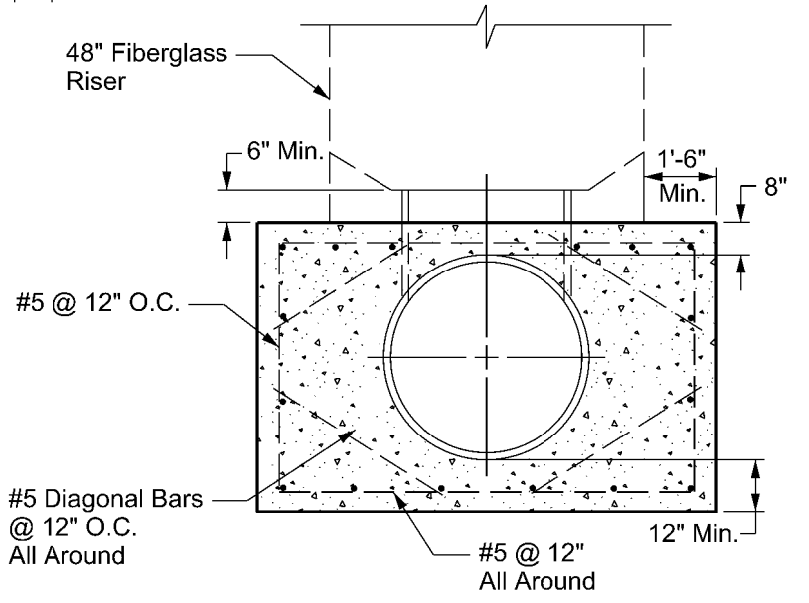
PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	MANHOLE INSIDE DROP SYSTEM	APPROVED	REVISED
		SEPT 2018	AUG 2019
		DD-852-09	SHEET <u>1</u> OF <u>1</u>



* Fiberglass (FRP) Sewer Pipe Meeting The Requirements of ASTM D3743 for Direct Bury Installation

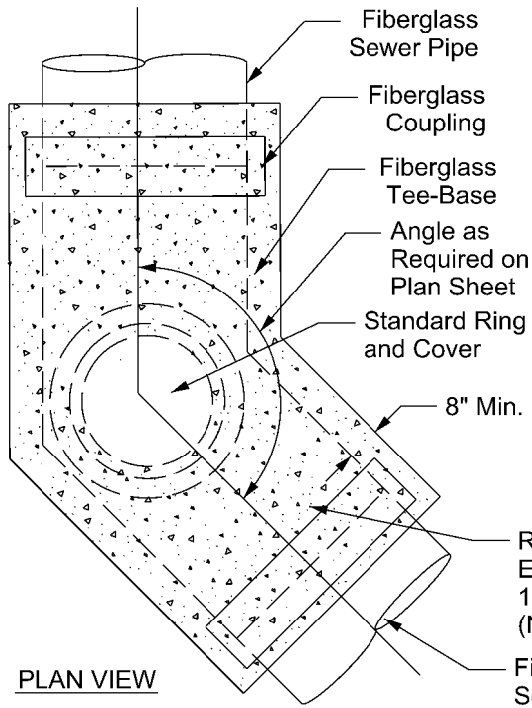
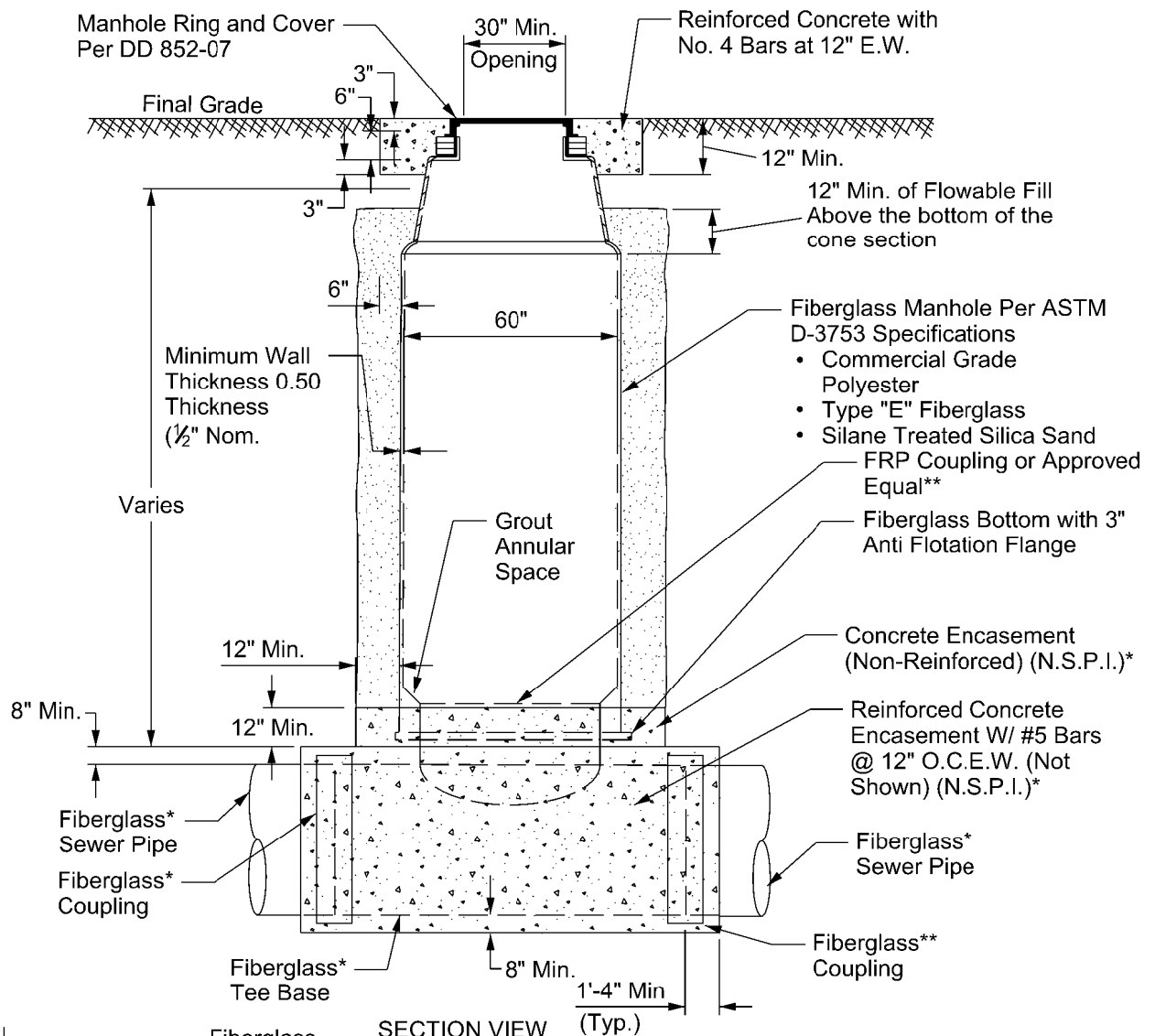
** Fiberglass (FRP) Pipe Joints Using Flexible Elastomeric Seals Meeting The Requirements of ASTM D4151

- Notes:
1. Encasement to be Designed to Resist all Tee Base Deformations and is to Extend Past the First Joint on Either Side of the Tee Base by 1' to 3'
 2. All Concrete Encasement Required for Tee Base Manholes Shall be Considered Incidental to the Cost of the Manholes.
 3. Backfill Around Manhole Shall be Flowable (low Strength) with a Min. Thickness of 12-Inches and Fill Shall be Placed to within 12-Inches of Final Grade. This Cost Shall be Incidental to the Cost of the Manhole.
 4. Over Excavation within Areas for Placement of Sanitary Sewer Manholes and Structures Shall be Backfilled Per Detail This Sheet with Regards to Flowable Fill and ASTM D448 Aggregate. This Cost Shall be Incidental to the Cost of the Manhole or Structure.



TEE BASE CONCRETE REINFORCEMENT SECTION THROUGH PIPE

PROPERTY OF SAN ANTONIO WATER SYSTEM SAN ANTONIO, TEXAS	TEE-BASE FIBERGLASS DROP MANHOLE	APPROVED	REVISED
		AUG 2019	
		DD-852-10	SHEET 1 OF 1



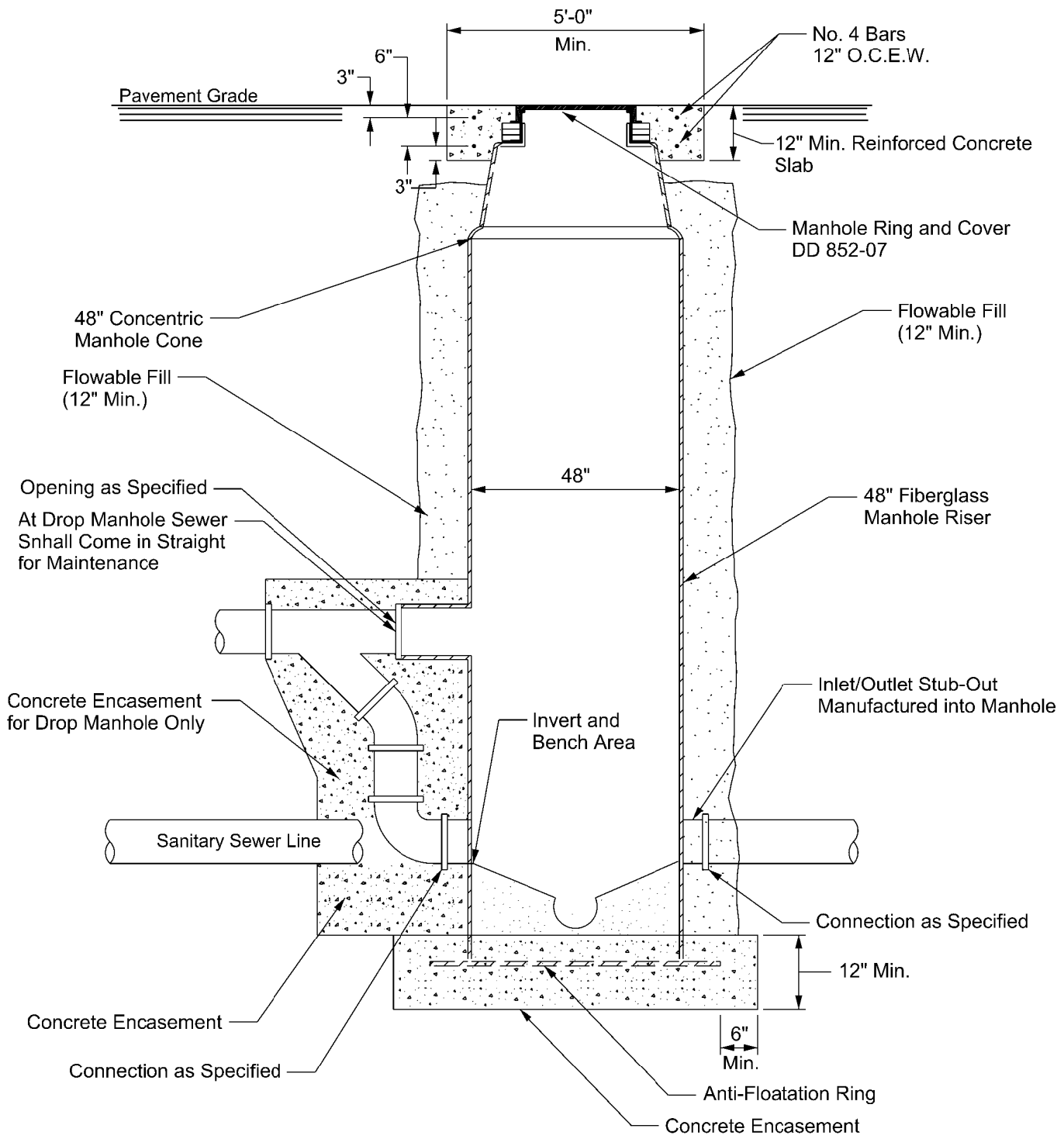
SECTION VIEW

Notes:

1. Encasement to be Designed to Resist all Tee Base Deformations and is to Extend Past the First Joint on Either Side of the Tee Base by 1' to 3'
2. All Concrete Encasement Required for Tee Base Manholes Shall be Considered Incidental to the Cost of the Manholes.
3. Backfill Around Manhole Shall be Flowable with a Min. Thickness of 12-Inches and Fill Shall be Placed to within 12-Inches of Final Grade. This Cost Shall be Incidental to the Cost of the Manhole.
4. Over Excavation within Areas for Placement of Sanitary Sewer Manholes and Structures Shall be Back filled Per Detail This Sheet with Regards to Flowable Fill and ASTM D448 Aggregate. This Cost Shall be Subsidiary to the Cost of the Manhole or Structure.

* Fiberglass (FRP) Sewer Pipe Meeting The Requirements of ASTM D3743 for Direct Bury Installation

** Fiberglass (FRP) Pipe Joints Using Flexible Elastomeric Seals Meeting The Requirements of ASTM D4151



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 SAN ANTONIO, TEXAS

**TYPICAL FIBERGLASS
 MANHOLE DETAIL**

APPROVED
 AUG 2019

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DD-852-12

SHEET
1 OF 1