

San Antonio Water System Standard Specifications for Construction

ITEM NO. 808 Reinforced Concrete Vaults

808.1 DESCRIPTION: This item shall govern the construction of reinforced concrete vaults, cast-in-place or pre-cast, in accordance with these specifications and as directed by the Engineer. Reinforced concrete vaults shall be cast-in-place with reinforcing steel and shall include all work required to provide a complete and functional structure.

808.2 REFERENCED STANDARDS: Reference standards cited in this Specification Item No. 808 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 Specifications for Construction
3. American Concrete Institute
 - a. ACI 117 – Standard Tolerances for Concrete Construction and Materials.
 - b. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
 - d. ACI 304R – Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - e. ACI 308 – Standard Practice for Curing Concrete.
 - f. ACI 309R – Guide for Consolidation of Concrete.
 - g. ACI 311 – Guide for Concrete Plant Inspection and Field Testing of Ready Mix Concrete.
 - h. ACI 315 – Details and Detailing of Concrete Reinforcement
 - i. ACI 318 – Building Code Requirements for Reinforced Concrete and Commentary.
 - j. ACI 544 – Guide for Specifying, Mixing, Placing, and Finishing Steel Fiber Reinforced Concrete.
4. American Society for Testing and Materials (ASTM) International:
 - a. ASTM A 82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
 - b. ASTM A 185 – Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - c. ASTM A 615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - d. ASTM A 767 – Standard Specifications for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - e. ASTM A 775 – Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - f. ASTM A 820 – Standard Specification for Steel Fibers for Fiber-Reinforced Concrete.
 - g. ASTM A 884 – Specification for Epoxy-Coated Steel Wire and Welding Wire Fabric for Reinforcement.

San Antonio Water System Standard Specifications for Construction

- h. ASTM C 31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - i. ASTM C 33 – Standard Specification for Concrete Aggregates.
 - j. ASTM C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - k. ASTM C 42 – Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - l. ASTM C 94 – Standard Specification for Ready-Mixed Concrete.
 - m. ASTM C 138 – Standard Test Method for Unit Weight Yield and Air Content (Gravimetric)
 - n. ASTM C 143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
 - o. ASTM C 150 – Standard Specification for Portland Cement.
 - p. ASTM C 172 – Standard Practice for Sampling Freshly Mixed Concrete.
 - q. ASTM C 173 – Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.
 - r. ASTM C 231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - s. ASTM C 260 – Standard Specification for Air-Entraining Admixtures for Concrete. . ASTM C 309 – Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.
 - t. ASTM C 494 – Standard Specification for Chemical Admixtures for Concrete.
 - u. ASTM C 595 – Standard Specification for Blended Hydraulic Cements.
 - v. ASTM C 685 – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
 - w. ASTM C 1064 – Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
 - x. ASTM C 1077 – Standard Practice for Laboratory Testing of Concrete and Concrete
5. American Association of State Highway and Transportation Official (AASHTO)
- a. AASHTO M306 Standard Specification for Drainage, Sewer Utility and Related Castings
 - b. AASHTO M105: Gray Iron Castings Aggregate for Use in Construction and Criteria for Laboratory Evaluation.

808.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions, recommendations, signed and sealed shop drawings and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved prior to delivery. Submit the following 30 days prior to performing any work.

- 1. Certifications:
 - a. Per General Conditions section 5.12.2 all Contractor submittals for all materials furnished under this specification shall be marked as reviewed and approved by Contractor for compliance with Contract Documents and the referenced standards.

San Antonio Water System Standard Specifications for Construction

2. Submit proposed mix design and test date for each type and strength of concrete in Work.
3. Submit laboratory reports prepared by independent testing laboratory stating that materials used comply with requirements of this Section.
4. Submit manufacturer's mill certificates for reinforcing steel. Provide specimens for testing when required by Engineer.
5. Submit certification from concrete supplier that materials and equipment used to produce and deliver concrete comply with this Specification.
6. When required on Drawings, submit shop drawings showing reinforcement type, quantity, size, length, location, spacing, bending, splicing, support, fabrication details, and pertinent information.
7. For waterstops, submit product information sufficient to indicate compliance with this Section, including manufacturer's descriptive literature and specifications.

808.4 MATERIALS: All precast concrete vaults shall be accurately formed and finished as shown in the contract documents.

1. Precast vaults conforming to the Standard Drawings and Specifications shall be acceptable as a substitute to the cast-in-place vaults or as approved by the Engineer.
2. Concrete used shall be transit mix and shall have a 28 day compressive strength of 3,000 psi with a maximum slump of 6 inches and a minimum slump of 3 inches.
3. The use of admixtures shall not be permitted unless approved by the Engineer.
4. Cement shall be Type I or Type III and shall conform to the general requirements contained in the Materials Specifications Item 100-10 and the latest provision of ASTM Specifications C150 and C156 or most applicable approved equal provision.
5. Vault Covers Casting shall meet AASHTO M306 proof load criterion.

808.5 CONSTRUCTION:

1. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions shown in the contract documents.
 - a. Surfaces which will be exposed to view when construction is completed shall be prefabricated plywood panel forms, job-built plywood forms, or forms that are lined with plywood or fiberboard.
 - b. The forms shall produce finished surfaces that are free from off-sets, ridges, waves, and concave or convex areas.
 - c. Plywood or lined forms will not be required for surfaces which are normally submerged or not ordinarily exposed to view.
 - d. Other types of forms, such as steel or unlined wooden forms, may be used for surfaces which are not restricted to plywood or lined forms and may be used as backing for form linings.
 - e. Before concrete is placed, a film of light form oil shall be applied to the forms.
 - f. Forms shall be substantial and sufficiently tight to prevent leakage of mortar.
 - g. Forms shall be thoroughly cleaned, braced, or tied to maintain the desired position, shape, and alignment during and after concrete placement.

San Antonio Water System Standard Specifications for Construction

- h. Form ties shall be corrosion resistant and shall have sufficient strength and rigidity to support and maintain the form in proper position and alignment.
 - i. Reinforced concrete vaults shall be cast-in-place and shall include reinforcing steel, forms, finishing, curing, and all other appurtenant work required to provide a complete and functional structure.
 - j. All cast-in-place concrete shall be accurately formed and properly placed and finished as shown in the contract documents.
 - k. The Contractor shall inform the Engineer at least 24 hours in advance, of time and location at which he/she intends to place concrete in order for inspection of forms, reinforcing steel placement, and other preparatory work.
 - l. Precast vaults conforming to the Standard Drawings and Specifications shall be acceptable as a substitute to the cast-in-place vaults or as approved by the Engineer.
- 2. Forms shall be removed after 24 hours, provided that the exposed surfaces can be immediately and effectively sealed to prevent loss of moisture. Otherwise, the forms shall remain in place for 48 hours.
 - 3. Precautions shall be taken in form removal to avoid surface gouging, corner or edge breaking, and other damage to the concrete.
 - 4. Reinforcing steel shall be accurately formed and shall be free from loose rust, scale, and contaminants which reduce bond. Unless otherwise shown in the contract documents, bar reinforcement shall be deformed and conform to the general requirements contained in Specification Item No. 301, Reinforcing Steel.
 - 5. Reinforcing steel shall be accurately positioned on supports, spaces, hangers, or other reinforcements and shall be secured in place with wire ties or suitable clips.
 - 6. All bars shall be shop fabricated and bent cold.
 - 7. Concrete shall be placed as nearly as practicable in its final position to avoid segregation due to re-handling.
 - a. When the concrete pour has commenced, it shall be carried on as a continuous operation until the placing of the panel or section is completed as a whole.
 - b. All concrete shall be thoroughly compacted by suitable means during pouring operations and shall be thoroughly worked around reinforcement bars and into the corners of the forms.
 - c. Mechanical vibration or other acceptable means shall be used to completely embed the reinforcement and eliminate honeycomb. A backup vibrator shall be provided for large concrete pours.
 - d. Finished surfaces shall be brought to proper grade, struck off, and completed in a workmanlike manner.
 - e. No honeycombing, rough spots or protruding stones shall be left exposed.
 - 8. Concrete shall be protected from loss of moisture for at least 7 days after placement.
 - 9. Curing of concrete shall be by methods which will keep the concrete surfaces adequately wet during the specified curing period.
 - a. Water saturation of concrete surfaces shall begin as quickly as possible after the initial set of the concrete.

San Antonio Water System Standard Specifications for Construction

- b. The rate of water application shall be regulated to provide complete surface coverage with a minimum of runoff.
 - c. Chlorinated, rubber-type, membrane curing compound may be used in lieu of water curing on concrete which will not be covered later with mortar or additional concrete.
 - d. Membrane curing compound shall be spray applied at coverage of not more than 300 square feet per gallon.
 - e. If forms are removed before the end of the specified curing period, curing compound shall be immediately applied to the formed surfaces before they dry out.
 - f. Curing compound shall be suitably protected against abrasion during the curing period.
- 10. Fins and other surface projections shall be removed from all formed surfaces.
- 11. All exposed exterior surfaces shall have a rubbed finish.
- 12. The floor surface shall be brush finished, unless otherwise specified.
- 13. Defects in formed concrete surfaces shall be repaired to the satisfaction of the Engineer within 24 hours, and defective concrete shall be replaced within 48 hours after the forms have been removed.
 - a. All concrete which is honeycombed or otherwise defective shall be cut out and removed to sound concrete with edges square cut to avoid feathering.
 - b. Concrete repair work shall be performed in a manner that will not interfere with thorough curing of surrounding concrete.
 - c. Repair work shall be adequately cured.
- 14. All exposed metallic surfaces such as the cover plate, hinges, handles, and other exposed hardware, shall be primed and painted with one coat of primer and one coat of aluminum paint of approved and compatible quality.
- 15. The Contractor shall cover the openings at each end of the vault with ¼ inch plywood placed outside the vault.
 - a. Selected backfill (consisting of job excavated materials, finely divided and free from debris, organic material and stones larger than two inches in greatest dimension) shall be placed in uniform layers not exceeding eight inches in un-compacted thickness and shall be carefully compacted around the sides of the vault until level with the surrounding ground.

808.5 MEASUREMENT: Reinforced concrete vaults, cast-in-place or pre-cast, shall be measured by the unit of the various sizes.

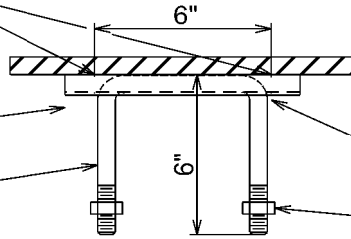
808.6 PAYMENT: Payment for reinforced concrete vault, cast-in-place or pre-cast, will be made at the unit price for each size vault installed.

-End of Specification-

Cut groove in Lid for
Drop Handle to fit
down into C Channel

Weld C Channel to
bottom of Lid (8" Long)

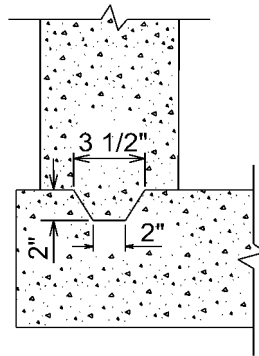
Form 5/8" Rod, Threaded
on each end



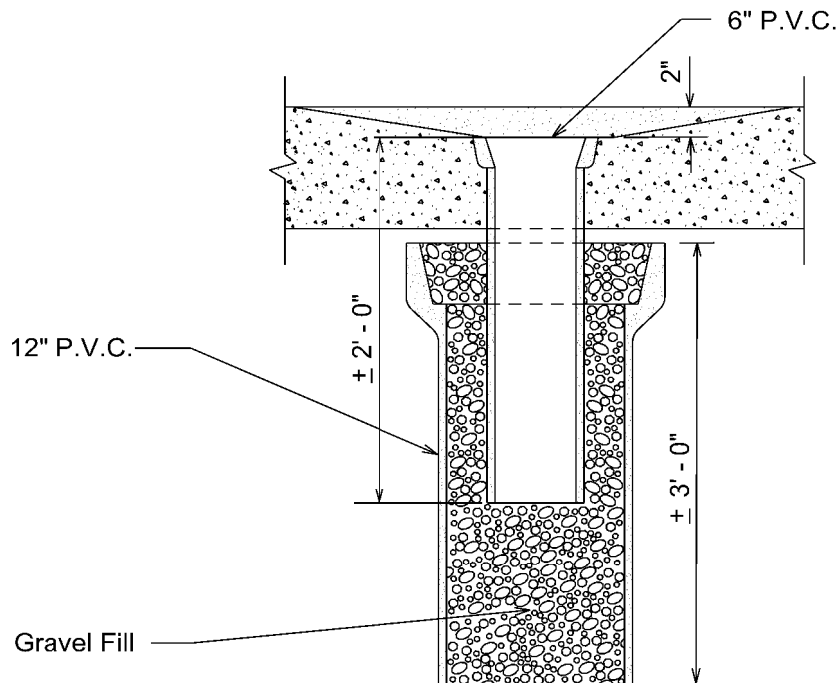
3/4" Diameter Hole

5/8" Heavy Hex Nut

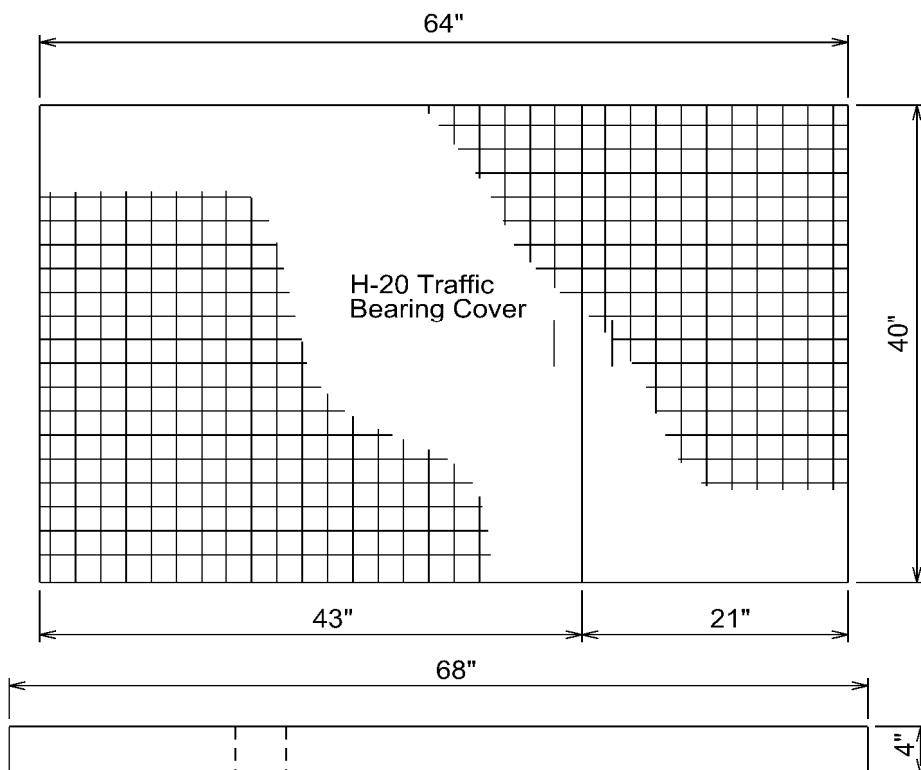
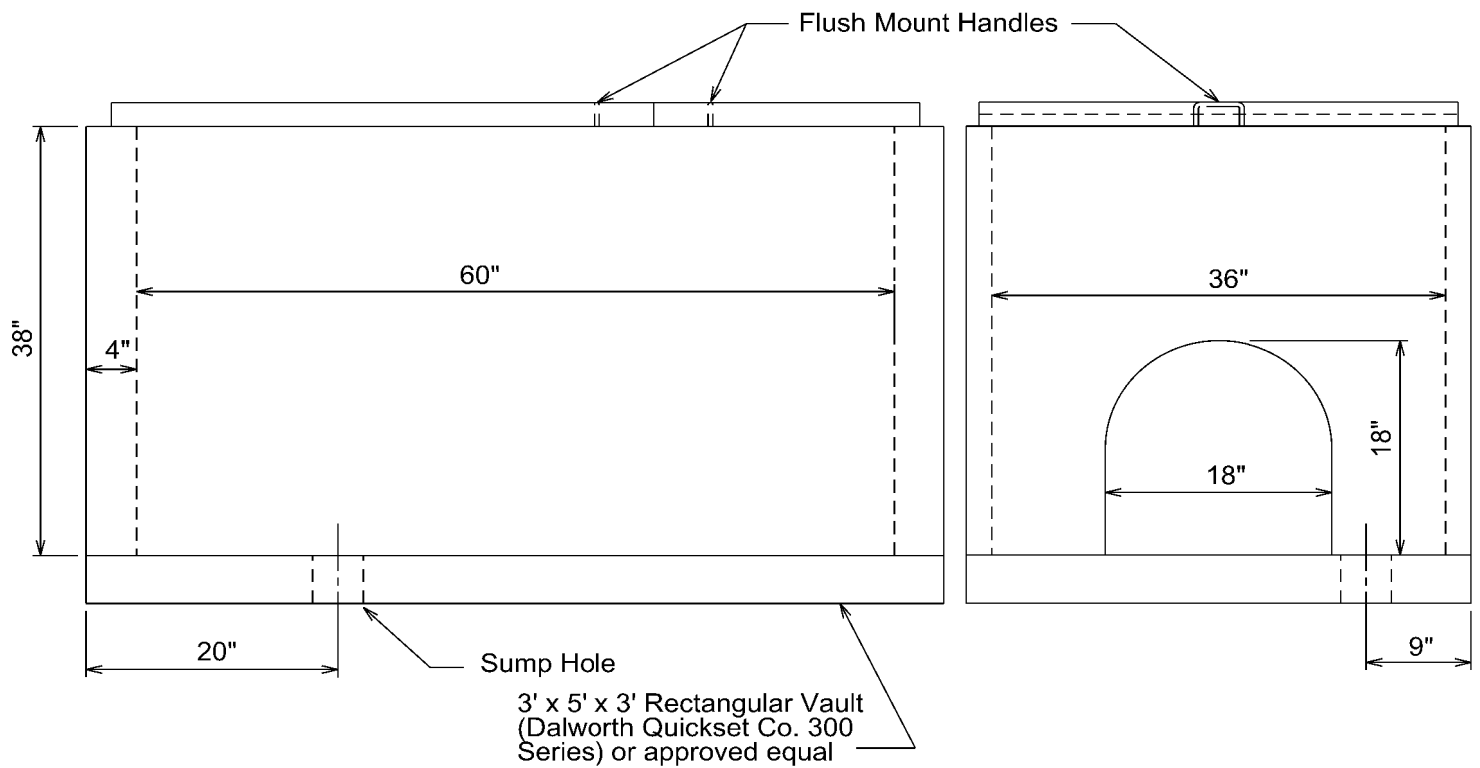
DROP HANDLE DETAIL



KEYWAY DETAIL



DRAIN DETAIL



**3' x 5' x 3' RECTANGULAR CONCRETE VAULT
(TRAFFIC BEARING LOCATION)**

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

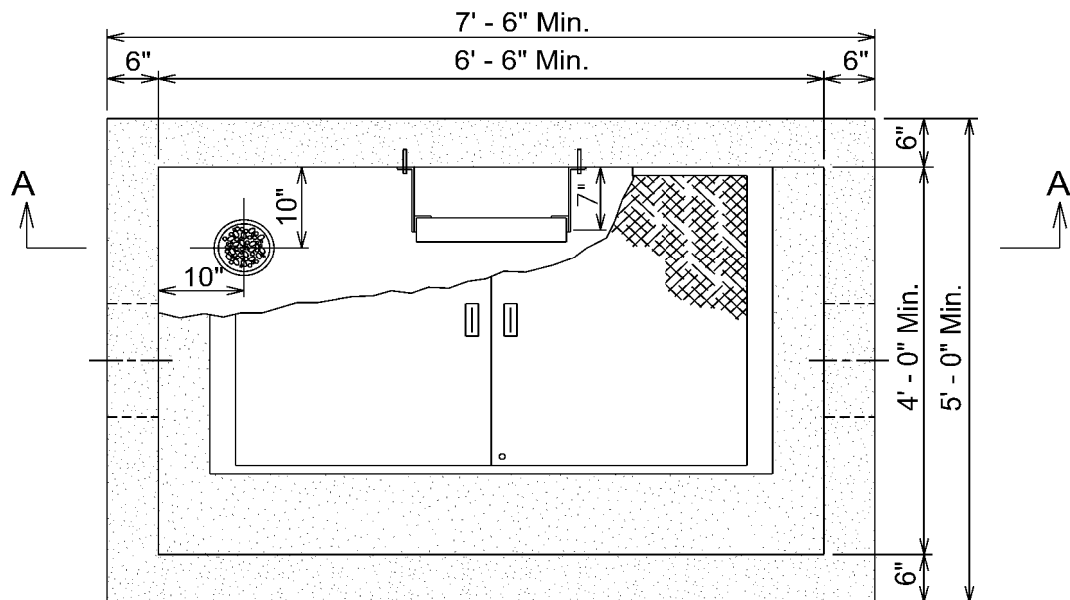
**VAULT FOR 3", 4", 6" & 8"
TURBINE METER
INSTALLATION
TRAFFIC BEARING LOCATION**

APPROVED
MARCH 2008

REVISED
AUG 2019

DD-808-02

SHEET
1 OF **1**



PLAN

Recessed Bolt Down Mechanism
See DD-808-09 Sheet 1 of 1

Cover Latch is to be located on the opposite side of where the ladder is positioned

3' x 5' H-20 Traffic bearing frame and cover cast in flush with top of Concrete Lid. Lid is to be Spring-assisted for easy opening and painted aluminum

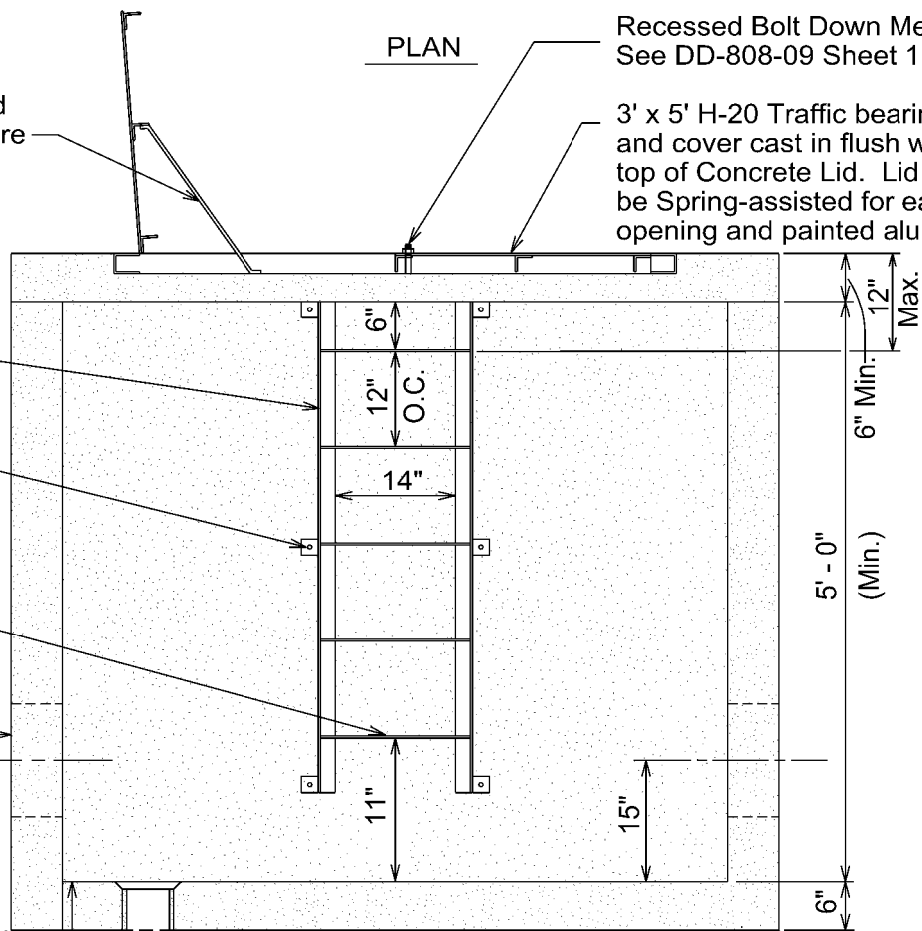
Ladder made of 2" x 2" x 1/4" Angle Steel

2" x 1/4" Steel ladder supported with 3/8" wedge anchor bolts

3" x 1/4" Steel Steps welded to ladder coated with skid resistant material

14" x 14" Side Openings

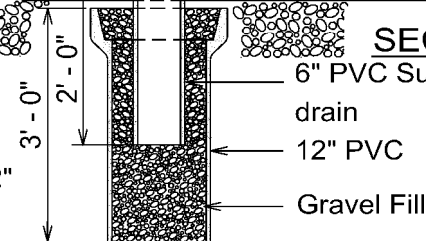
6" of 3/4" to 1-1/2" Gravel



SECTION A-A

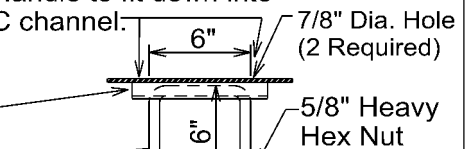
OPTION FOR DRAIN

- 1) Install 6" of 3/4" to 1-1/2" gravel under vault
- 2) Provide 6" PVC Sleeve through vault floor



Cut groove in Lid for Drop Handle to fit down into C channel:

C Channel 8" Long
Form 5/8" Rods, Threaded on each end (2 Required)



DROP HANDLE DETAIL

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

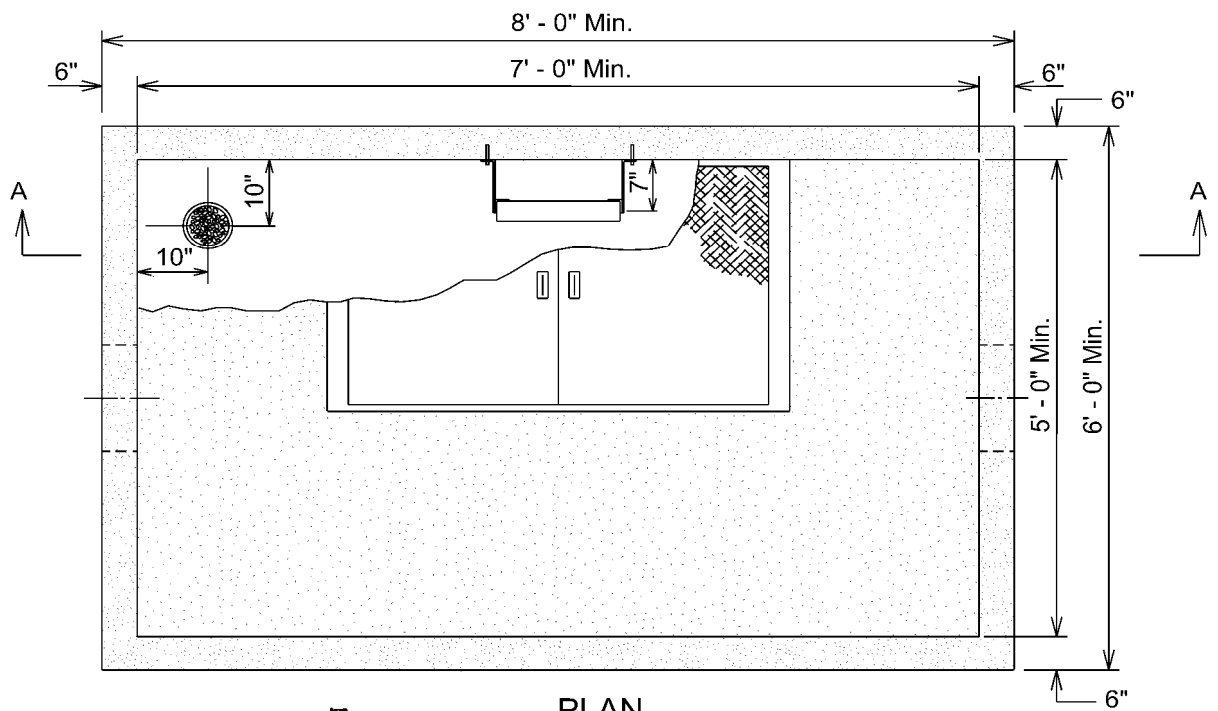
CONCRETE VAULT FOR
6" & 8" DOUBLE DETECTOR
CHECK INSTALLATION

APPROVED
MARCH 2008

REVISED
AUG 2019

DD-808-03

SHEET
1 OF 1



Cover latch is to be located on the opposite side of where the ladder is positioned.

PLAN

Recessed Bolt Down Mechanism
See DD-808-09 Sheet 1 of 1

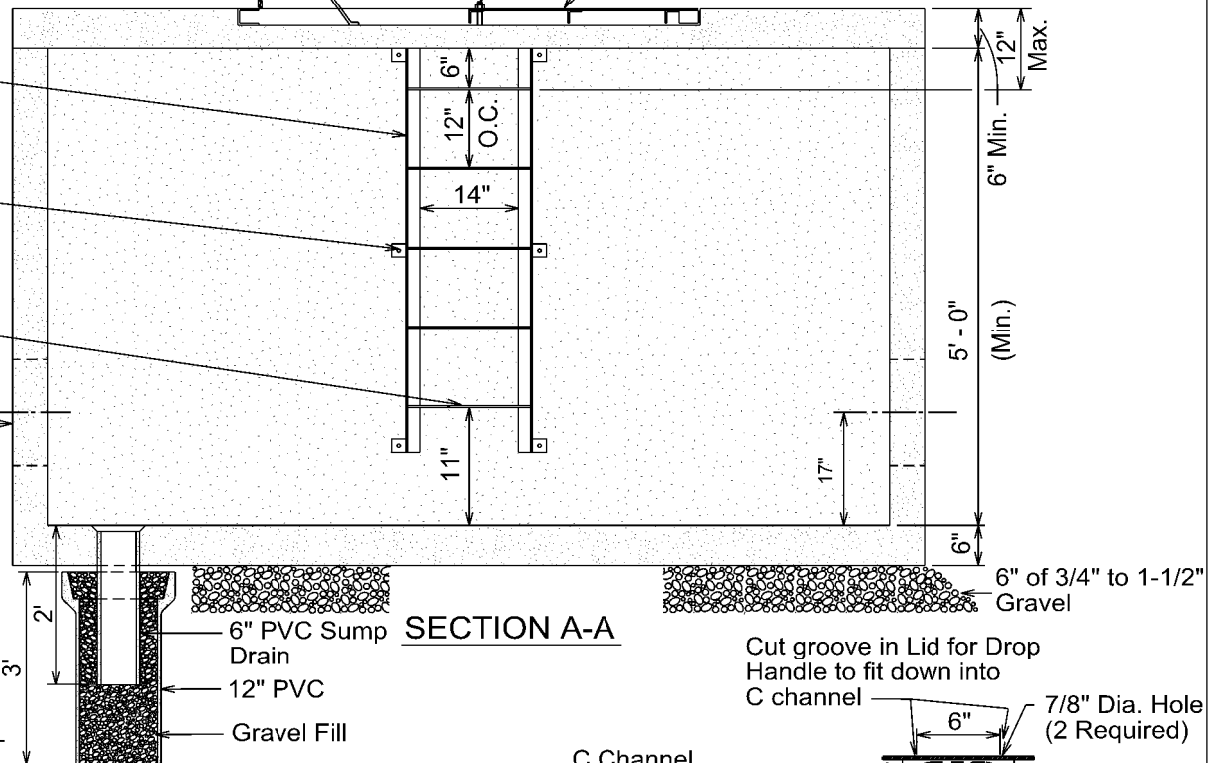
3' x 5' H-20 Traffic bearing frame and cover cast in flush with top of Concrete Lid. Lid is to be spring-assisted for easy opening and painted aluminum.

Ladder made of
2"x 2" x 1/4" Angle
Steel

2" x 1/4" Steel ladder
supports with 3/8"
wedge anchor bolts

3" x 1/4" Steel Steps
welded to ladder
coated with skid
resistant material

16" x 16" Side
Opening



OPTION FOR DRAIN

- 1) Install 6" of 3/4" to 1-1/2" gravel under vault
- 2) Provide 6" PVC Sleeve through vault floor

Cut groove in Lid for Drop
Handle to fit down into
C channel

C Channel
8" Long

Form 5/8" Rods,
Threaded on each
end (2 Required)

7/8" Dia. Hole
(2 Required)

5/8" Heavy
Hex Nut

DROP HANDLE DETAIL

PROPERTY OF
SAN ANTONIO WATER SYSTEM
SAN ANTONIO, TEXAS

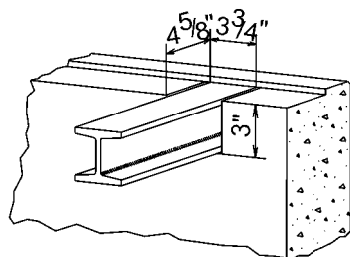
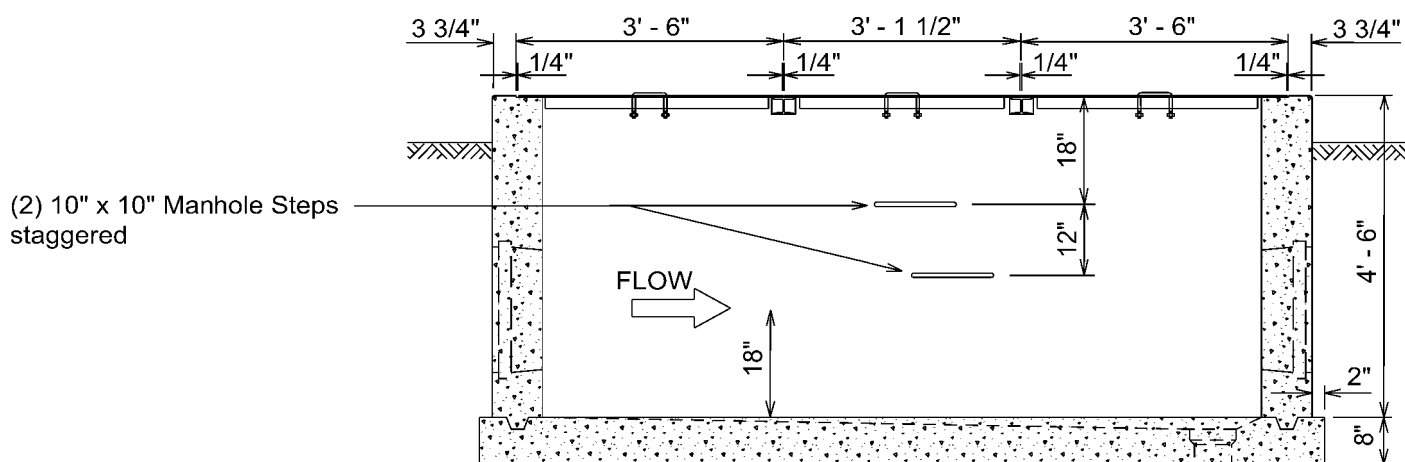
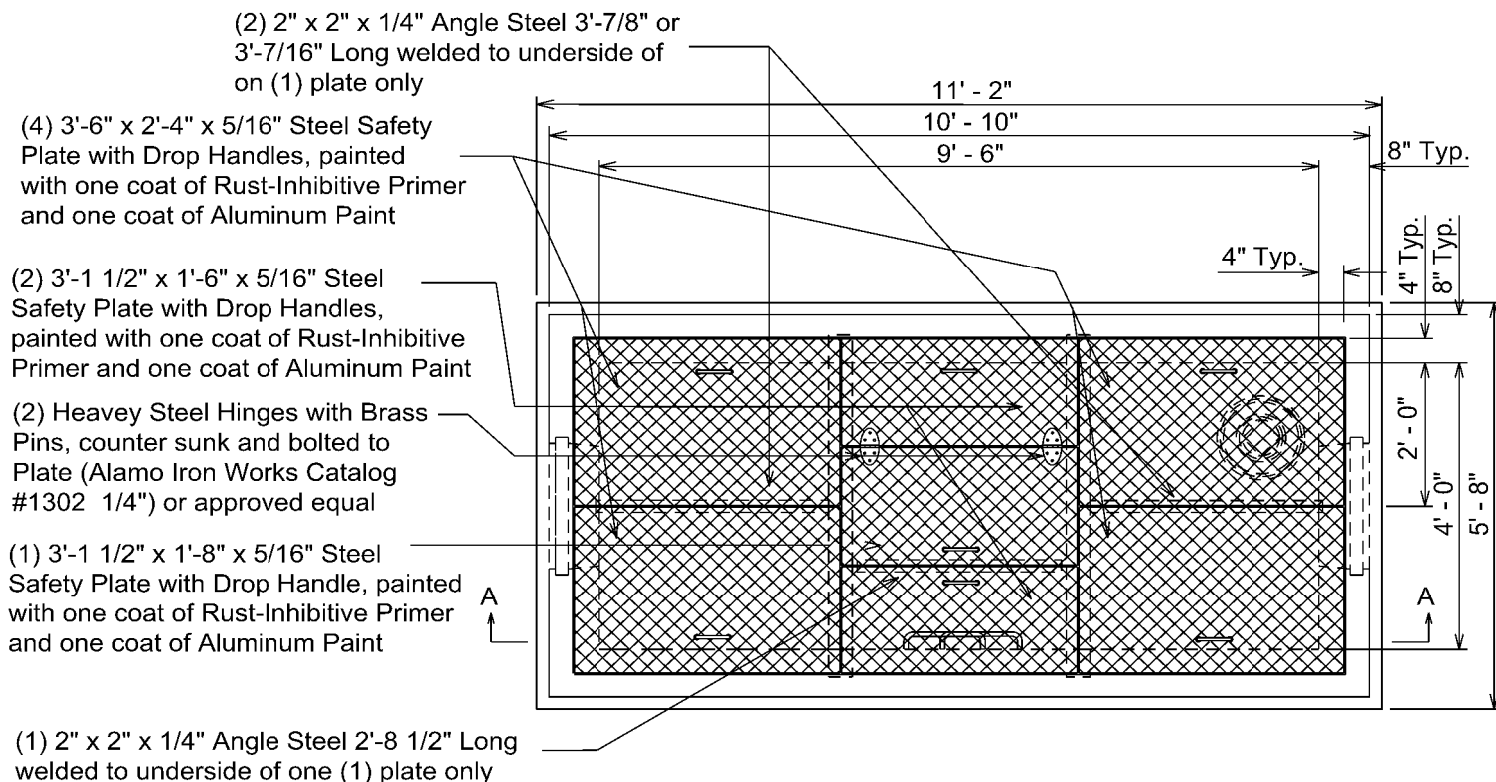
**CONCRETE VAULT FOR
10" DOUBLE DETECTOR
CHECK INSTALLATION**

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MARCH 2008

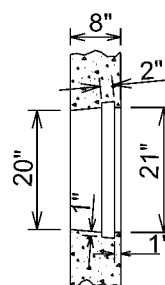
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DD-808-04

SHEET
1 OF **1**

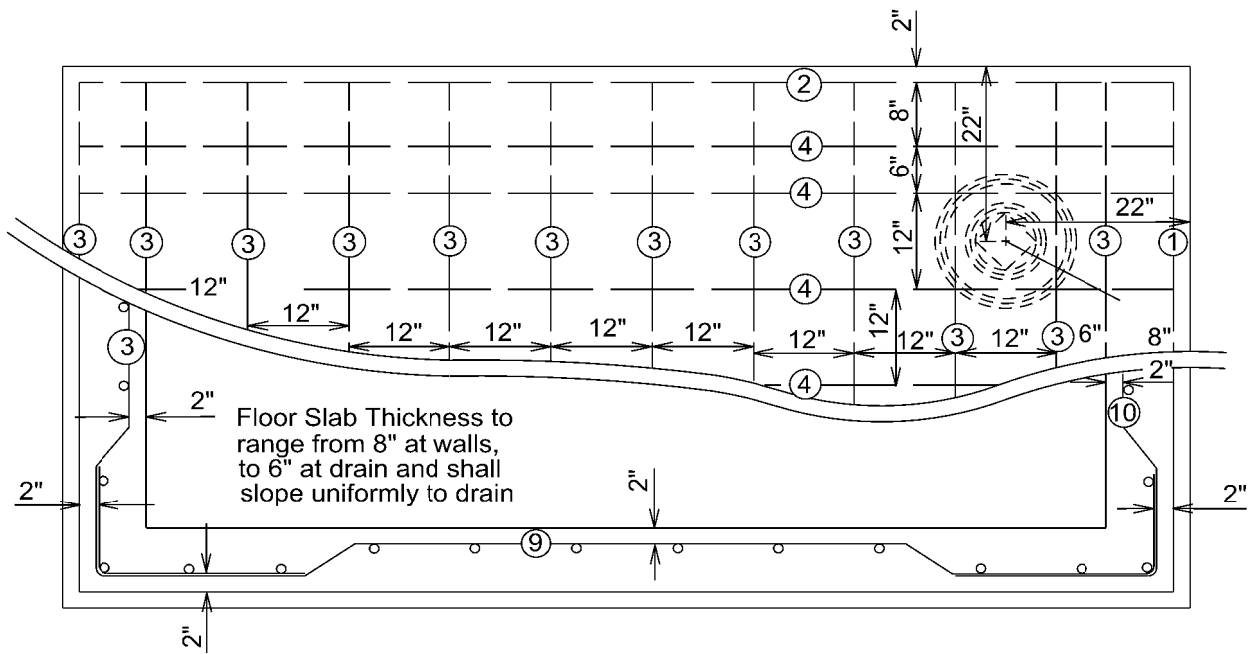


Block-Out Detail
For I Beams

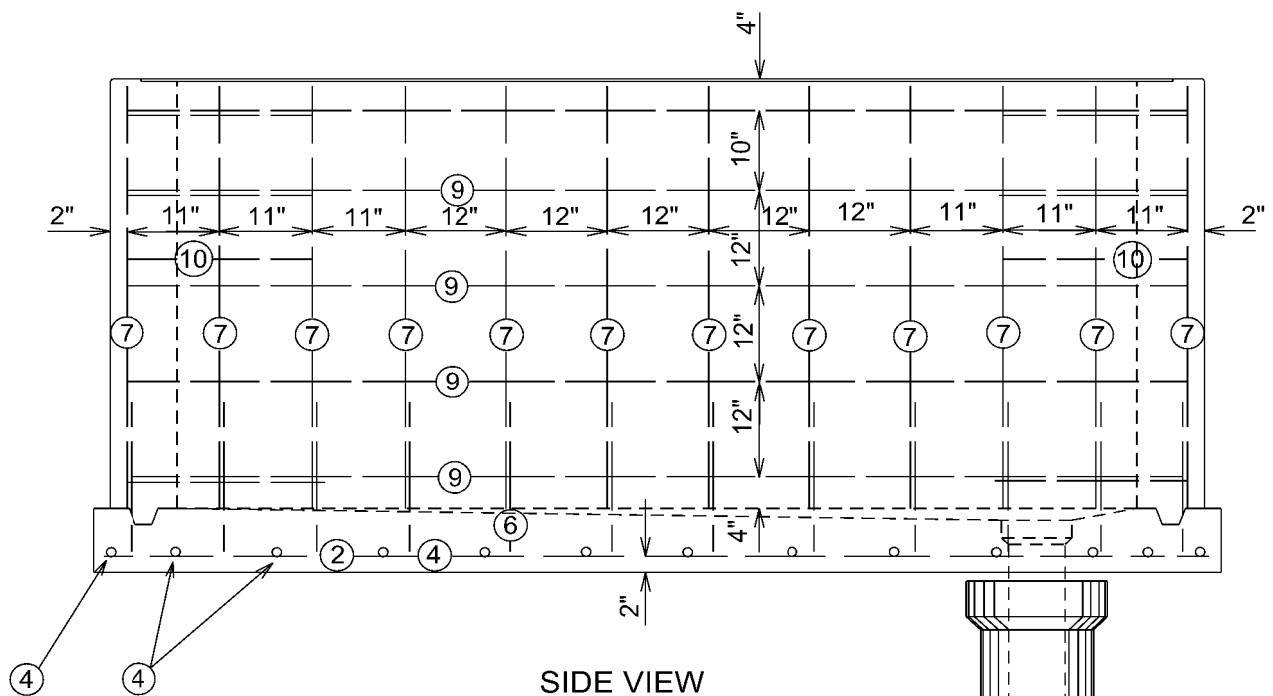


Opening Detail
For Service Pipe

Refer to DD-808-01
For Drain Detail



PLAN VIEW



SIDE VIEW

STEEL DETAIL FOR CONCRETE VAULT

Refer to DD-808-01
For Drain Detail

Note:
See DD-808-05 Sheet 3 of 3 for Steel Schedule

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SAN ANTONIO, TEXAS

CONCRETE VAULT FOR
12" SERVICE WITH
10" TURBINE METER
STEEL DETAIL FOR CONCRETE VAULT

APPROVED
MARCH 2008

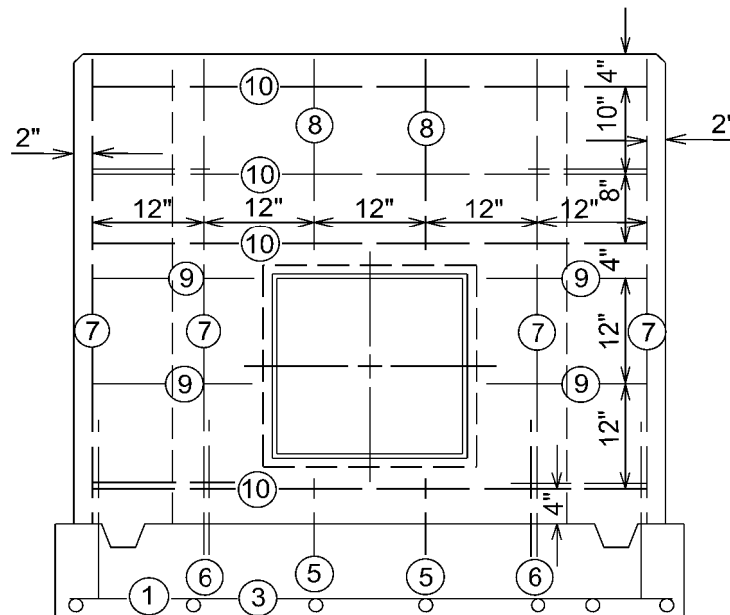
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DD-808-05

SHEET
2 OF 3

STEEL SCHEDULE				
Mark	Req'd	Size	Bending Detail	Placement
1	2	5	20" 5'-4" 20"	Floor Slab
2	2	5	20" 10'-10" 20"	Floor Slab
3	11	5	5'-4"	Floor Slab
4	6	5	10'-10"	Floor Slab
5	4	4	10" 12"	Tie Bar - Floor Slab To Vertical Walls
6	28	4	18" 12"	Tie Bar - Floor Slab To Vertical Walls
7	28	4	4'-4"	Vertical In Walls
8	4	4	20"	Vertical In Walls (Above Openings)
9	10	4	16" 24" 4" 5'-10" 4" 24" 16"	Horizontal In Walls
10	8	4	15" 4" 1'-10" 4" 15"	Horizontal In Walls

STEEL SCHEDULE FOR CONCRETE VAULT



END VIEW

STEEL DETAIL FOR CONCRETE VAULT

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SAN ANTONIO, TEXAS

CONCRETE VAULT FOR
12" SERVICE WITH
10" TURBINE METER
STEEL SCHEDULE AND
STEEL DETAIL FOR CONCRETE VAULT

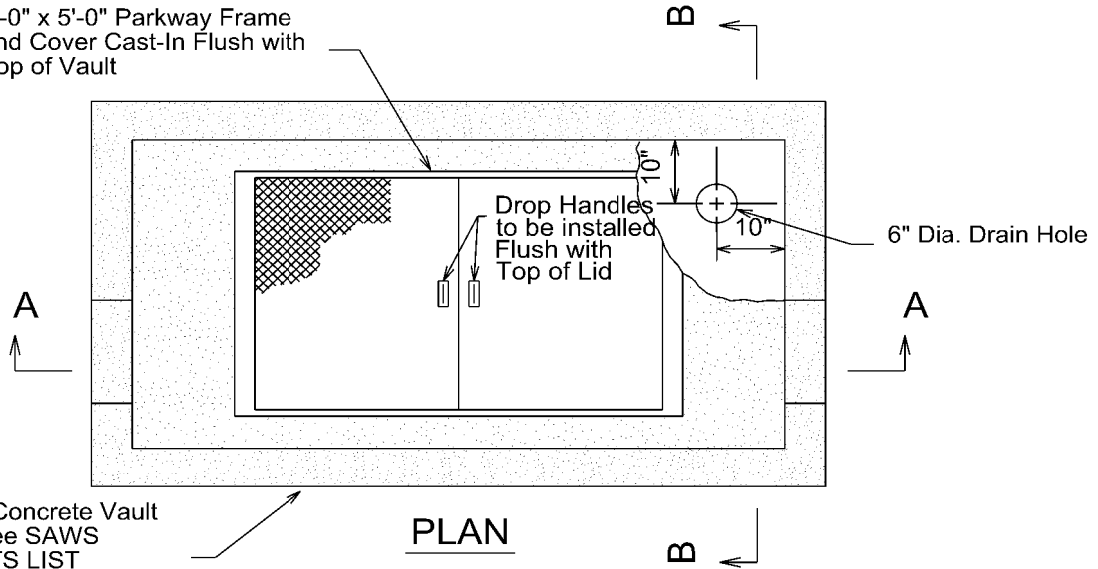
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DD-808-05

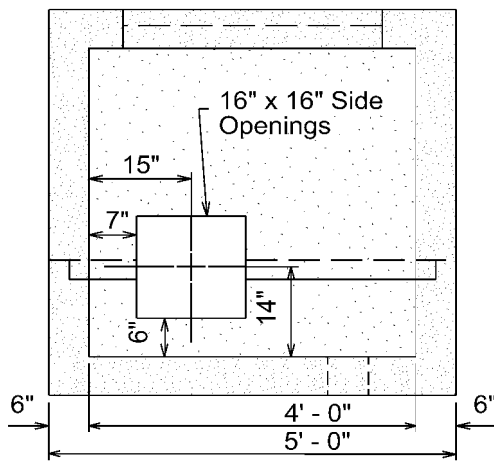
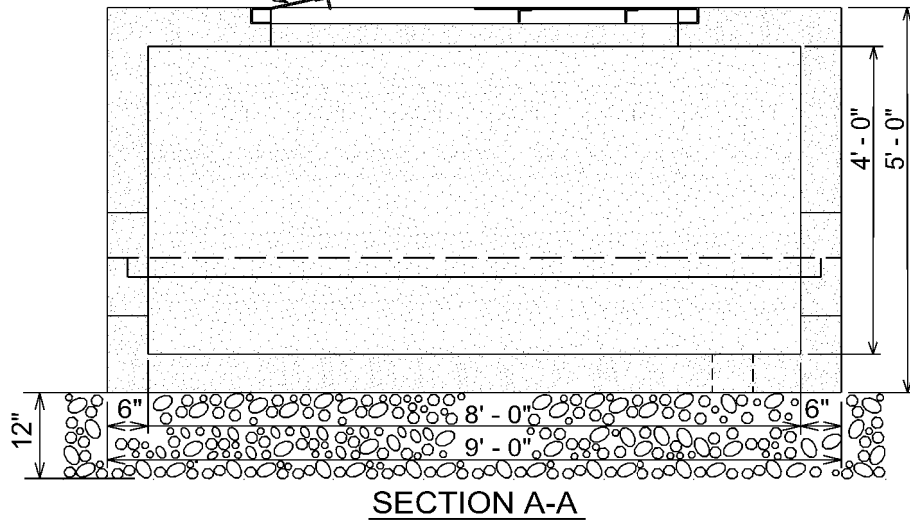
SHEET
3 OF **3**

3'-0" x 5'-0" Parkway Frame
and Cover Cast-In Flush with
Top of Vault



4' x 8' x 4' Rectangular Concrete Vault
(Non-Traffic Bearing) See SAWS
APPROVED PRODUCTS LIST

Bolt Down Spring-assisted Lid
See DD-808-03, sheet 1 of 1



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SAN ANTONIO, TEXAS

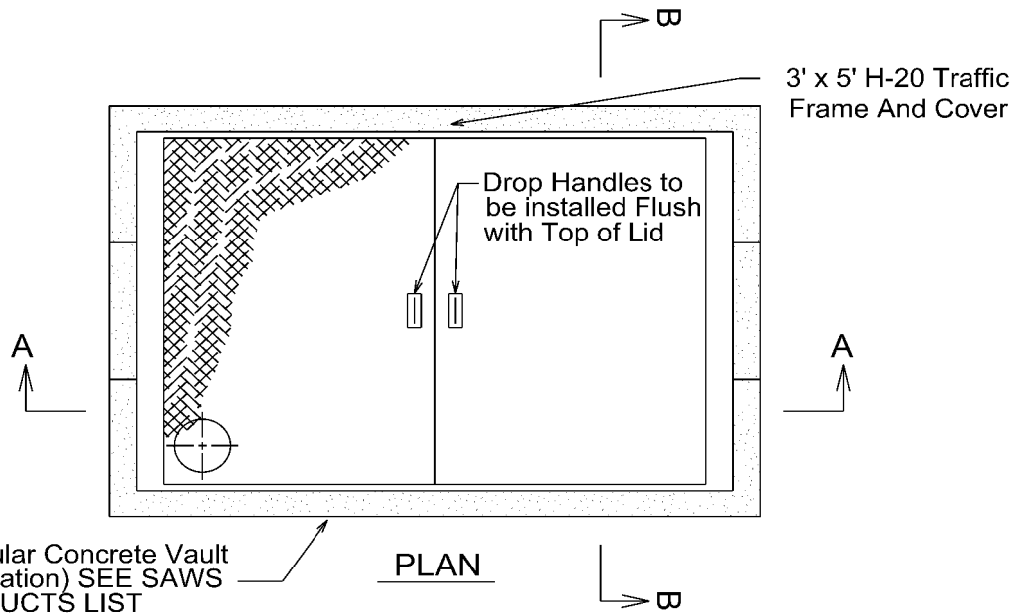
**CONCRETE VAULT FOR
6" & 8" FIRE FLOW METER
INSTALLATION**

APPROVED
MARCH 2008

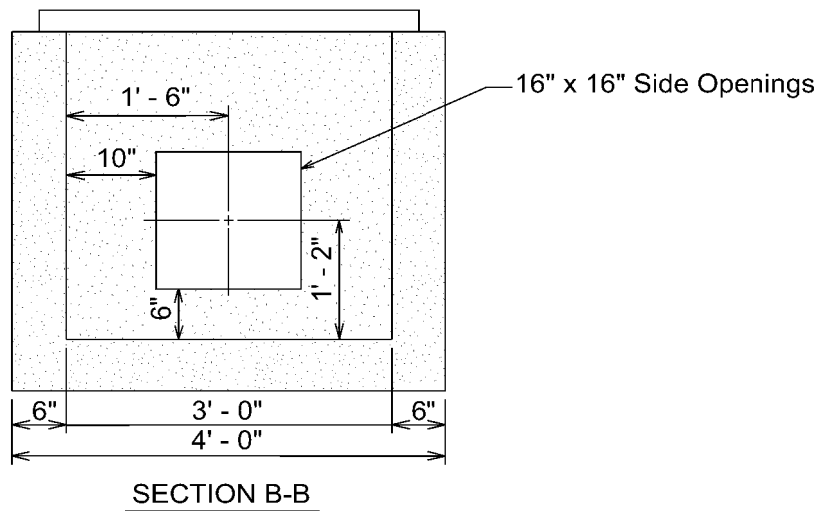
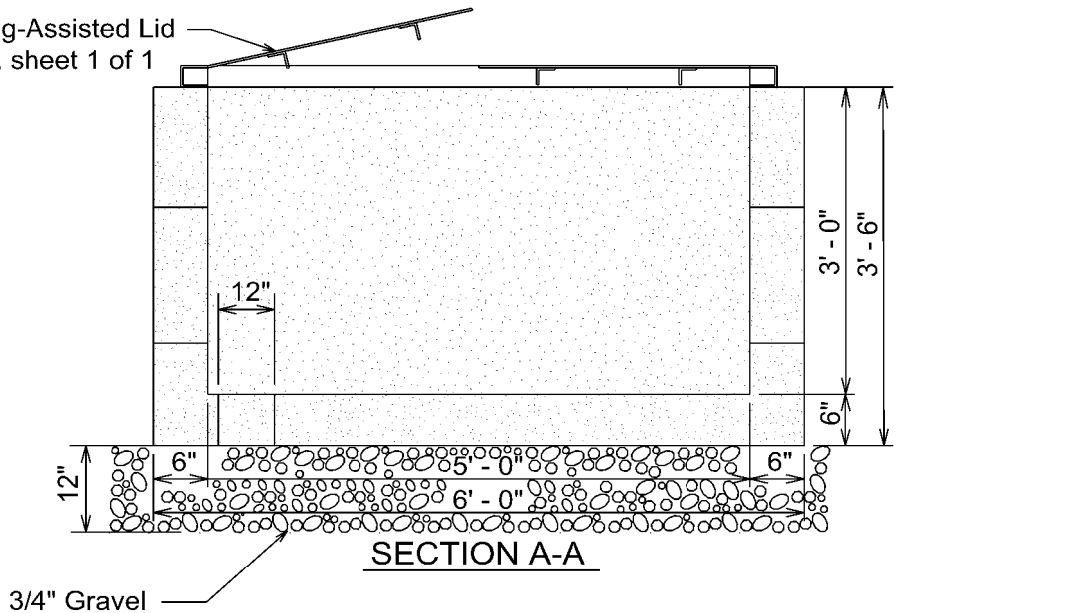
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DD-808-06

SHEET
1 OF **1**



Bolt Down Spring-Assisted Lid
See DD-808-03, sheet 1 of 1



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SAN ANTONIO, TEXAS

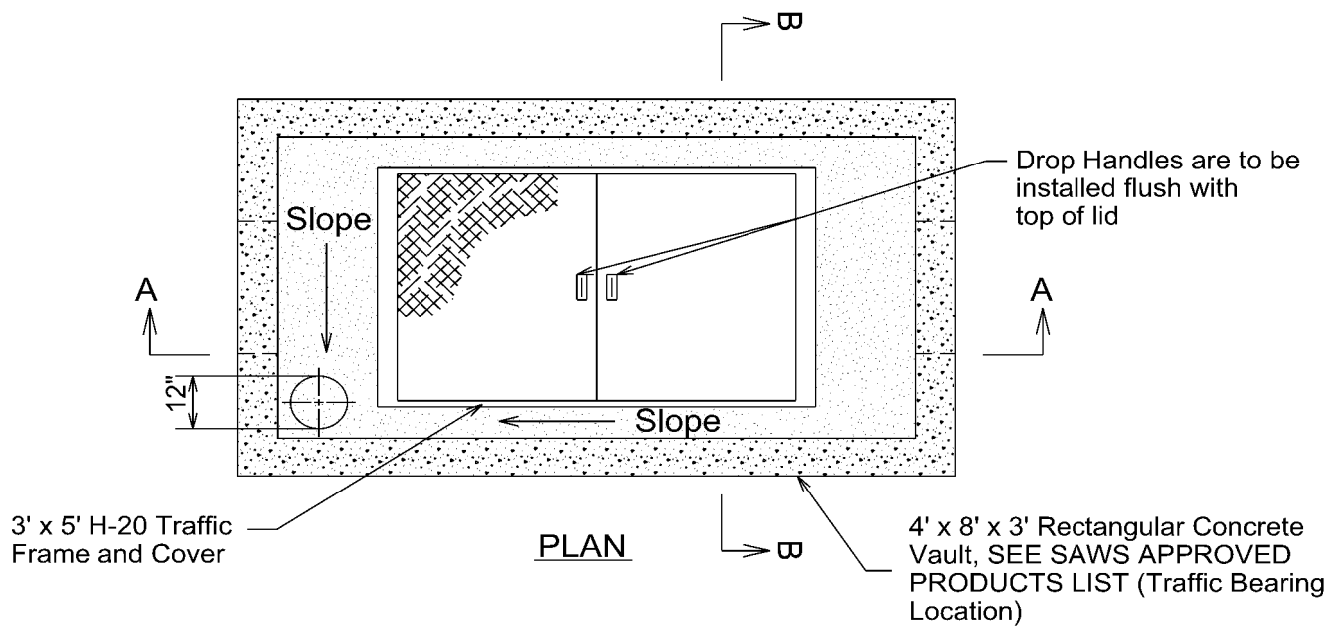
CONCRETE VAULT FOR
6" & 8" DETECTOR CHECK
INSTALLATION

APPROVED
MARCH 2008

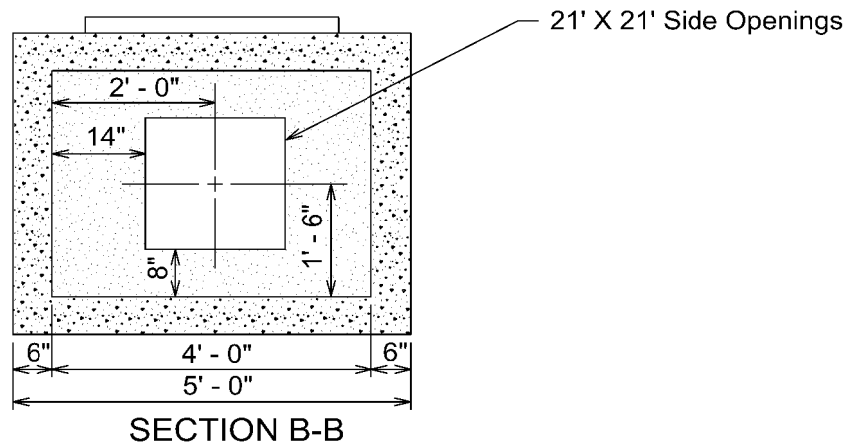
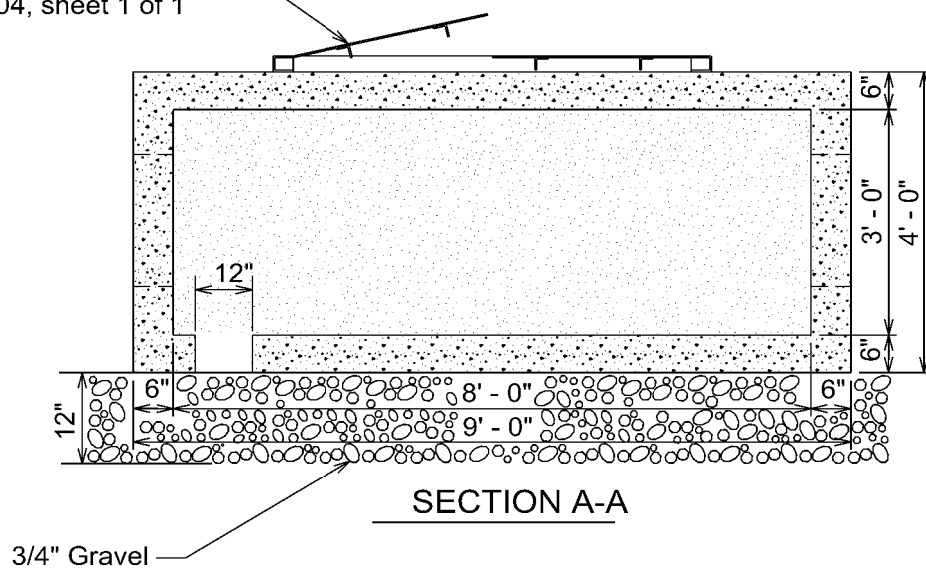
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DD-808-07

SHEET
1 OF 1



Bolt Down Spring-Assisted Lid
See DD-808-04, sheet 1 of 1



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SAN ANTONIO, TEXAS

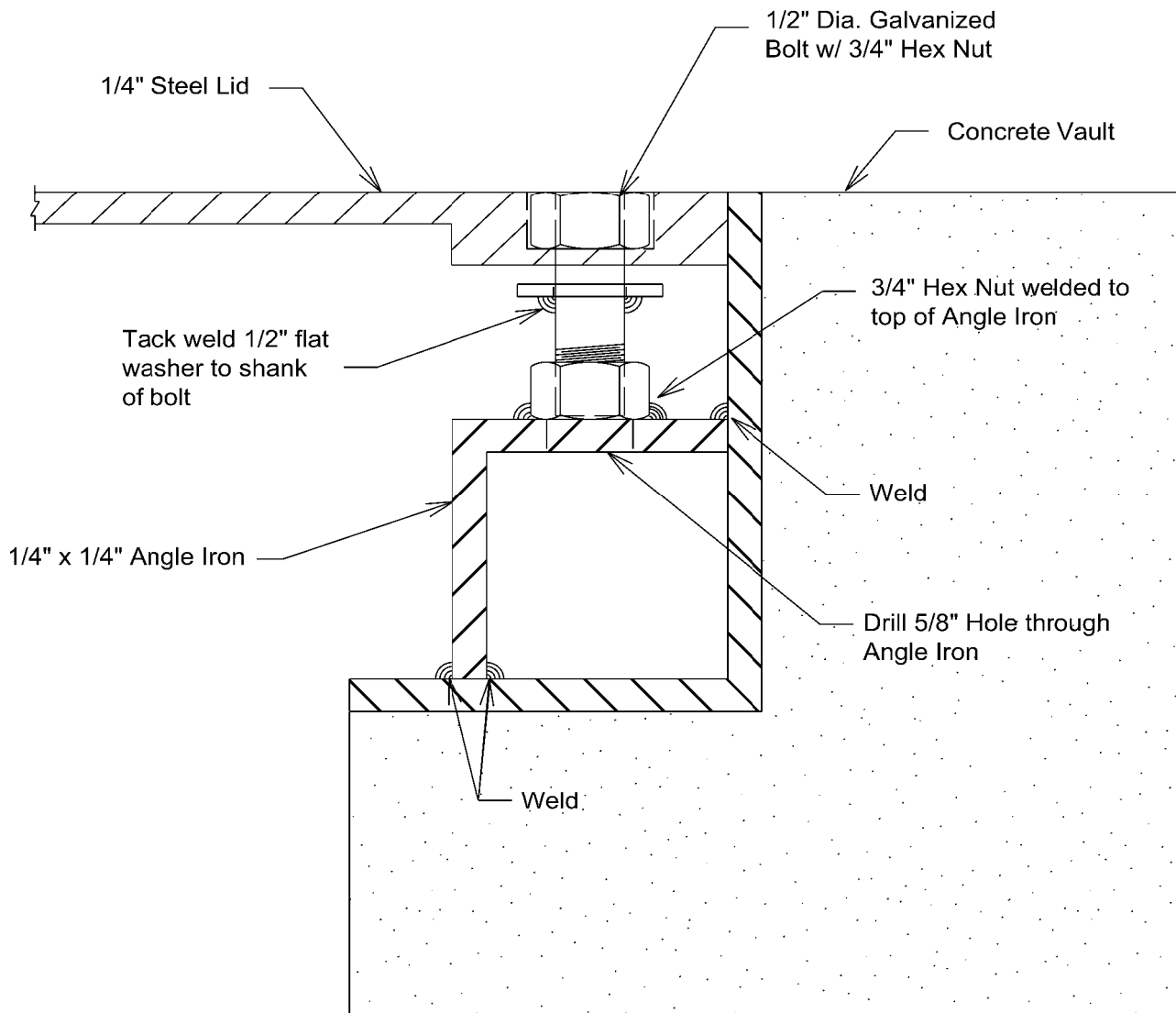
**CONCRETE VAULT FOR
10" x 12" DETECTOR CHECK
INSTALLATION**

APPROVED
MARCH 2008

REVISED
AUG 2019

DD-808-08

SHEET
1 OF **1**



DETAIL