

# FRESNO IRRIGATION DISTRICT ENGINEERING HANDBOOK OF

## SPECIFICATIONS AND DRAWINGS

REVISED 6-15-2018



"Your Most Valuable Resource – Water"

A blue ink signature of Laurence Kimura.

Laurence Kimura, Chief Engineer

## FID STANDARD DRAWINGS

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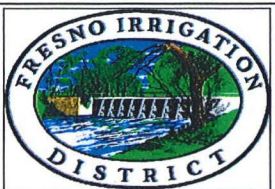
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# ABBREVIATIONS

AB	AGGREGATE BASE	GUY	GUY WIRE	REQD	REQUIRED
AC	ASPHALT CONCRETE	HD	HEAD	REV	REVISION
ACI	AMERICAN CONCRETE INSTITUTE	HDPE	HIGH DENSITY POLYETHYLENE	RGRCP	RUBBER GASKET REINFORCED CONCRETE PIPE
AGG	AGGREGATE	HGL	HYDRAULIC GRADE LINE	ROW,R/W	RIGHT-OF-WAY
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	HORIZ,H	HORIZONTAL	RP	RADIUS POINT
ALIGN	ALIGNMENT	HP	HINGE POINT	RR	RAILROAD
AP	ANGLE POINT	HWL	HIGH WATER LINE	RT	RIGHT
APPROX	APPROXIMATE	ID	INSIDE DIAMETER	RTU	REMOTE TERMINAL UNIT
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	IN	INCH	S	SLOPE
AV	AIR VENT	INV	INVERT	SCH	SCHEDULE
BC	BEGIN CURVE	IP	IRON PIPE	SEC	SECTION
BLDG	BUILDING	IRR	IRRIGATION	SF	SQUARE FEET/FOOT
BM	BENCHMARK	∠	ANGLE	SP	SERVICE POLE
BTM	BOTTOM	LB,LBS.	POUNDS	SQ	SQUARE
C	CHANNEL	LC	LENGTH OF CURVE	SS	STAINLESS STEEL
CA	CALIFORNIA	LCW	LONG CRESTED WEIR	ST	STRUCTURAL TUBING
CAL-OSHA	CALIFORNIA DIVISION OF OCCUPATIONAL SAFETY AND HEALTH	LF	LINEAR FEET	STA	STATION
C.F.S	CUBIC FEET PER SECOND	LT	LEFT	STD.	STANDARD
CIP	CAST-IN-PLACE	MAX.	MAXIMUM	SWL	SWALE
CL	CLASS	MH	MANHOLE	STWL	STILLING WELL
℄,C/L	CENTERLINE	MIL	THOUSANDTHS OF AN INCH	SYM	SYMMETRICAL
CLF	CHAIN LINK FENCE	MIN.	MINIMUM	T&B	TOP AND BOTTOM
CLR	CLEAR, CLEARANCE	MISC	MISCELLANEOUS	TB	TOP OF BANK
CIR.	CIRCUMFERENCE	N/A	NOT APPLICABLE	TBM	TEMPORARY BENCHMARK
CMLC	CEMENT MORTAR LINED & COATED	NAVD	NORTH AMERICAN VERTICAL DATUM	TC	TOP OF CURB
CMP	CORRUGATED METAL PIPE	NGVD	NATIONAL GEODETIC VERTICAL DATUM	TCE	TEMPORARY CONSTRUCTION EASEMENT
CONC	CONCRETE	NIC	NOT IN CONTRACT	TELE	TELEPHONE
CONT	CONTINUOUS	No.,#	NUMBER	TL	TOP OF LINING
CONST	CONSTRUCT/CONSTRUCTION	NTS	NOT TO SCALE	TOB	TOP OF BANK
CP	CONTROL POINT	O.A.	ON CENTER	TOE	TOE OF SLOPE
CY	CUBIC YARDS	OD	OUTSIDE DIAMETER	TOP	TOP OF SLOPE
Db	BAR DIAMETER	OH	OVERHEAD	TP	TELEPHONE POLE
DEG	DEGREE	OP	OPERATING	TR	TELEPHONE RISER
DEMO	DEMOLISH/DEMOLITION	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION	TRANS	TRANSFORMER
DIA.,D,∅	DIAMETER	O&M	OPERATIONS AND MAINTENANCE	TS	TOP OF STRUCTURE
DIM	DIMENSION	(P)	PROPOSED	CIR.D.	TYPICAL
DIP	DUCTILE IRON PIPE	PC	POINT OF CURVATURE	TWL	TOP OF WALL
D/S	DOWNSTREAM	PCC	POINT OF COMPOUND CURVATURE	UG	UNDERGROUND
DWG	DRAWING	PI	POINT OF INTERSECTION	UP	UTILITY POLE
(E)	EXISTING	PIP	PLASTIC IRRIGATION PIPE	U/S	UPSTREAM
EA	EACH	PLC	PROGRAMMABLE LOGIC CONTROLLER	VERT,V	VERTICAL
EC	END CURVE	PL	PROPERTY LINE	WL	WATER LEVEL
EF	EACH FACE	POC	POINT ON CURVE	W/	WITH
EG	EXISTING GRADE	POL	POINT ON LINE	W/O	WITHOUT
EL.,ELEV	ELEVATION	POT	POINT ON TANGENT	YD	YARD
ELEC	ELECTRIC	PP	POWER POLE	<	LESS THAN
ELL,ELB	ELBOW	PRC	POINT OF REVERSE CURVATURE	>	GREATER THAN
EP	EDGE OF PAVEMENT	PSF	POUNDS PER SQUARE FOOT	≅	LESS THAN OR EQUAL TO
ESMT	EASEMENT	PSI	POUNDS PER SQUARE INCH	≧	GREATER THAN OR EQUAL TO
EW	EACH WAY	PT	POINT OF TANGENCY	∨	EQUAL TO
F&I	FURNISH & INSTALL	PUE	PUBLIC UTILITY EASEMENT		
FB	FLAT BAR	PVC	POLYVINYL CHLORIDE		
FF	FINISHED FLOOR	PVMT	PAVEMENT		
FG	FINISHED GRADE	RAD,R	RADIUS		
FID	FRESNO IRRIGATION DISTRICT	ROC	RADIUS OF CURVE		
FL,F/L	FLOW LINE	RC	RELATIVE COMPACTION		
FNC	FENCE	RCP	REINFORCED CONCRETE PIPE		
FT	FEET/FOOT	RE	REFERENCE		
GA.	GAUGE				
GALV.	GALVANIZED				
GB	GRADE BREAK				
GPM	GALLONS PER MINUTE				



FRESNO IRRIGATION DISTRICT

ABBREVIATIONS

"Your Most Valuable Resource – Water"

SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

P-01

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**CALIFORNIA WATER CODE  
CHAPTER 3 EXCERPTS  
(Page 1 of 2)**

Chapter 3 - Bridges and Conduits On or Near Highways

7030 Conduit defined

As used in this chapter, "conduit" includes canal, ditch, culvert, pipeline, flume, or other appliance for conducting water. (Enacted by Stats 1961 Ch. 1786)

7031 Highway defined

As used in this chapter, except in Section 7034, "highway" includes both state and county highways as defined by or identified in the Streets and Highways Code. (Enacted by Stats 1961 Ch. 1786)

7031.5 Bridge defined

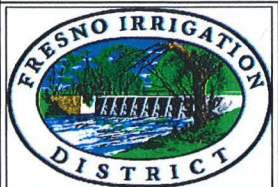
As used in this chapter, "bridge" means a structure constructed to allow the conducting of water underneath by canal, ditch, flume or other uncovered appliance for conducting water. (Enacted by Stats 1961 Ch. 998)

7032 Ban on obstruction of highway

No conduit shall be laid, constructed, or maintained so as to obstruct any highway. (Enacted by Stats 1961 Ch. 1786)

7033 Standards for conduit crossing or running along highway

Every person or public district or agency who or which initially constructs, or improves for his or its own benefit, any conduit crossing or running along any pre-existing highway, shall construct or improve such conduit in accordance with standards established by the county or State as the case may be, and at the expense of the person so constructing or improving such conduit. (Enacted by Stats 1961 Ch. 1786)



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CHAPTER 3 EXCERPTS

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**CALIFORNIA WATER CODE  
CHAPTER 3 EXCERPTS  
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7034 Bridges or conduits accepted by county; succession by state to responsibility

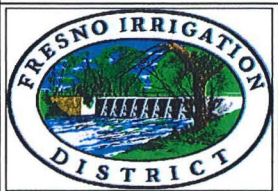
Bridges and conduits heretofore or hereafter constructed in a permanent manner, whether by encroachment permit or otherwise, which cross county highways and which have been constructed or brought up to county standards, and have been accepted, either formally or informally by appropriate action, shall, after such acceptance, and regardless of who constructed them, be the sole responsibility of the county, so far as maintenance, repair, improvement for the benefit of the county, reconstruction or replacement of such bridges and conduits are concerned. If any such county highways become state highways, the State shall succeed to the foregoing obligations of the County. The amendment of this section made at the 1963 Regular Session of the Legislature does not constitute a change in, but is declaratory of, the pre-existing law. (Amended by Stats 1963 Ch. 524)

7035 Responsibility for conduit presumed prior to highway

Whenever any conduit for conducting water crosses a highway and no written records exist showing that the highway rights-of-ways existed prior to the conduit rights-of-way, it shall be conclusively presumed that the conduit was in place and lawfully maintained prior to the highway and such conduit shall be repaired, improved for the benefit of the public agency having jurisdiction over such highway, and replaced, if necessary, by the public agency having jurisdiction over such highway, provided that usual acts of maintenance of the conduit, such as cleaning the conduit of dirt or silt, shall be performed by and at the expense of the person using the conduit. (Amended by Stats 1974 Ch. 36)

7036 Agreement between public district or private utility and county to apportion costs

Any public district or private utility and any county may enter into a contract agreeing to pay and apportion between them the costs of locating, removing, repairing, or relocating any facilities owned or to be owned by either party on the roads or other property of the other in such proportion and upon such terms as the governing boards of the parties shall determine to be equitable. This section shall not supersede the provisions of this chapter. (Enacted by Stats 1967 Ch. 998)



FRESNO IRRIGATION DISTRICT

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CALIFORNIA WATER CODE  
CHAPTER 3 EXCERPTS

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**STANDARD EASEMENT WIDTHS FOR  
OPEN CANALS AND PIPELINES**

**SOURCE:**

Board Policy No. 155

Rev. 5/29/02

Section 22438 of the California Water Code, attached as Exhibit "A" hereto, entitles the District to a secondary easement on each side of any open canal for which the District holds a prescriptive easement, with the width of the secondary easement to be whatever is reasonably required by the District for maintenance, repair, cleaning and operations of the secondary easement and open canal with equipment owned by or available to the District for that use at the time the rights are exercised. Exhibit "B" attached hereto, sets forth the dimensions of secondary easements for Fresno Irrigation District canals which are deemed to be reasonably required and which are claimed by the District under Section 22438.

Easements for pipelines or for open canals for which the District holds a written grant or judgement providing a legal description of the easement are not subject to the secondary easement provisions of Section 22438. District activities and the locations of canal facilities are therefore restricted to the limits established by the legal description of the easement.

For the purposes of acquiring easements for pipelines by grant or condemnation, the standard easement requirements are shown on Exhibit "C", attached hereto. Extraordinary conditions or circumstances may dictate modification of the standard easement, but such modification shall be subject to approval of the Board of Directors.



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STANDARD EASEMENT WIDTHS FOR  
OPEN CANALS AND PIPELINES

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**STANDARD EASEMENT WIDTHS FOR  
OPEN CANALS AND PIPELINES  
EXHIBIT "A"  
SENATE BILL No. 891**

An act to add Section 22438 to the Water Code, relating to irrigation districts.

Approved by the Governor on July 5, 1989.

Filed with the Secretary of State July 5, 1989.

LEGISLATIVE COUNSEL'S DIGEST

SB 891, Vuich. Irrigation Districts: canal easements.

Under existing law, an irrigation district may acquire by any means any property or interest in property to carry out its purposes.

This bill would declare that whenever any irrigation district is the owner of an easement for an open canal for the transportation of water across lands not owned by it, other than as specified, the district shall have a secondary easement on each side of the open canal for the maintenance, repair, cleaning, operation, and control of the open canal, as prescribed, and would specify related matters.

The people of the State of California do enact as follows:

SECTION 1. Section 22438 is added to the Water Code, to read:

22438. (a) Whenever any district is the owner of an easement for an open canal for the transportation of water across lands not owned by it, other than an easement evidenced by a written grant or judgement providing a legal description of the easement, the district shall have a secondary easement on each side of the open canal for the maintenance, repair, cleaning, operation, and control of the open canal and such other use thereof as may be reasonably be required by the district in exercising those rights and in the maintenance, repair, cleaning, and operation of that easement and open canal with equipment owned by or available to the district for that use at the time the rights are exercised. The duration of the secondary easement shall be for so long as the district, or its successors or assigns, continues to own the open canal easement regardless of what use has or has not been made of the secondary easement.

(b) The owner of the land upon which a secondary easement is located, or any lessee of the land, shall have the right to use the surface of the land upon which the secondary easement is located for his or her own purposes to the extent that the use does not unreasonably interfere with the district's ownership or use of the secondary easement, or upon the open canal easement. Any encroachment or obstruction placed or permitted upon the secondary easement by the owner of the land or any lessee of the land, which unreasonably interferes with the secondary easement or the open canal easement, may be removed by the district at the owner's or lessee's expense, or by legal action filed by the district.

This section shall not be construed to limit the right of a district or of any person to acquire any easement by prescriptive or condemnation or to enter into a written agreement concerning an easement or secondary easement upon such terms as are agreed upon the parties.



FRESNO IRRIGATION DISTRICT  "Your Most Valuable Resource – Water"	STANDARD EASEMENT WIDTHS FOR OPEN CANALS AND PIPELINES EXHIBIT A	
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	DATE: JANUARY 2018	SHEET 1 OF 1



**STANDARD EASEMENT WIDTHS FOR  
OPEN CANALS AND PIPELINES EXHIBIT "B"**  
(Page 1 of 2)

**GENERAL REQUIREMENTS**

The following requirements have been approved and adopted by the Board of Directors to provide a guideline for establishing adequate Right-of-Way widths for canals and ditches owned, operated, and maintained by the Fresno Irrigation District. Any extraordinary conditions, circumstances, misunderstandings, failure or refusal of a property owner to accept or comply with the general requirements described below should be brought to the immediate attention of the General Manager.

1. When establishing top of bank width required for operation and maintenance purposes, some existing top of bank widths may be more than required by the District, but in most cases, will be less. Therefore, the Right-of-Way line should be established in accordance with the requirements for future improvements, operations, and maintenance of the canal.
2. To determine the requirements for top of bank widths, canals and ditches shall be classified into two different categories. First, canals with banks which are not more than one foot (1.0') above the surrounding ground level will be classified in a "cut" category. Second, canals with banks which are more than one foot (1.0') above the adjacent ground level will be classified as "fill".
3. Required top of bank widths shall be measured on a level plane from the inside edge of the canal or ditch bank.
4. Canals with capacity of 50 C.F.S or more:
  - a). Canals which are in a "cut" or at grade shall require a top of bank width no less than twenty feet (20') wide.
  - b). Canals which are in a "fill" shall require a top of bank width of no less than fifteen feet (15') plus one and one-half feet (1.5') for each vertical foot outside of the bank slope plus an additional two feet (2') to establish the Right-of-Way line beyond the outside toe of the canal bank. Easement width will be as required or no less than twenty feet (20') from the top inside bank to Right-of-Way line.
5. Canals with a capacity of less than 50 C.F.S:
  - a). Canals which are in a "cut" shall require a top of bank width no less than fifteen feet (15') wide.
  - b). Canals which are in a "fill" shall require a top of bank width of no less than twelve feet (12') plus one and one-half feet (1.5') for each vertical foot outside of the bank slope. "Fill" canals also require an additional two feet (2.0') to establish the Right-of-Way line beyond the outside toe of the canal.



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STANDARD EASEMENT WIDTHS FOR OPEN  
CANALS AND PIPELINES EXHIBIT B

SCALE: NOT TO SCALE

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STANDARD DETAIL

P-05

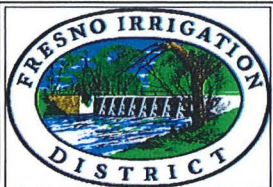
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**STANDARD EASEMENT WIDTH FOR  
OPEN CANALS AND PIPELINES EXHIBIT "B"**

(Page 2 of 2)

6. Canals with a capacity less than 50 C.F.S: (Alternate)

- a). Canals which are in a "cut" shall require a top of bank width no less than fifteen feet (15') wide.
- b). Canals which are in a "fill" shall require a top of bank width of no less than four feet (4') plus four feet (4.0') for each vertical foot outside of the bank slope.
- c). On smaller sloper type ditches, it may be necessary to resort to access along and outside the ditch, but in all cases the requirements should be established to prevent encroachments on the Right-of-Way.
- d). The alternate section cannot be used if the overall width exceeds the standard width and is permitted only when the District operations and maintenance functions do not require a standard road Right-of-Way.



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CANALS AND PIPELINES EXHIBIT B

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**STANDARD EASEMENT WIDTHS FOR  
OPEN CANALS AND PIPELINES EXHIBIT "C"  
PIPELINE EASEMENT WIDTHS**

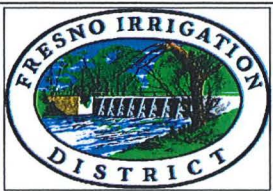
The following shall be used by staff in the determination and acquisition of new pipeline easement widths:

Type of Pipe	Easement Width for Dia. ≤ 24" I.D.	Easement Width for 24" > Dia. ≤ 36" I.D.	Easement Width for Dia. > 36" I.D.
PVC (SDR41, PIP)	20 feet	N/A	N/A
RGRCP (C-361)	20 feet	30 feet	40 feet
CIP (ACI 346)	N/A	30 feet	40 feet
Min. Width Adjacent to Right-of-Way	15 feet	15 feet	20 feet

Where the pipeline easement will be contiguous and parallel to a Joint Use Right-of-Way such as a "local" public street Right-of-Way or a "rural" road with a Right-of-Way sixty feet (60') or less, the required easement may be reduced if the street maintaining agency allows the District to perform maintenance using a portion of the road Right-of-Way. On any street or rural road where curbside parking will be permitted by the street maintaining agency, the easement width may be reduced.

The easement width may not be reduced for controlled access streets designed as freeways, expressways, super arterials, arterials, collectors, or landscaped drives. No easement reduction will be permitted adjacent to turn lanes or bus stops or other locations posted to prohibit stopping or parking without special provision for maintenance access. Written evidence may be required from the street maintaining agency showing that the predetermined easement width reduction can be satisfied.

Where public utility easements or landscape easements will overlap the District's pipeline easement, regardless of pipeline diameter, the required pipeline easement width shall be increased as necessary so that fifty percent (50%) of the required easement width is free from overlapping utilities. The District may waive this easement requirement for landscape easements if the District can be assured the landscaping will not impact the pipeline.



FRESNO IRRIGATION DISTRICT

STANDARD EASEMENT WIDTHS FOR OPEN  
CANALS AND PIPELINES EXHIBIT C

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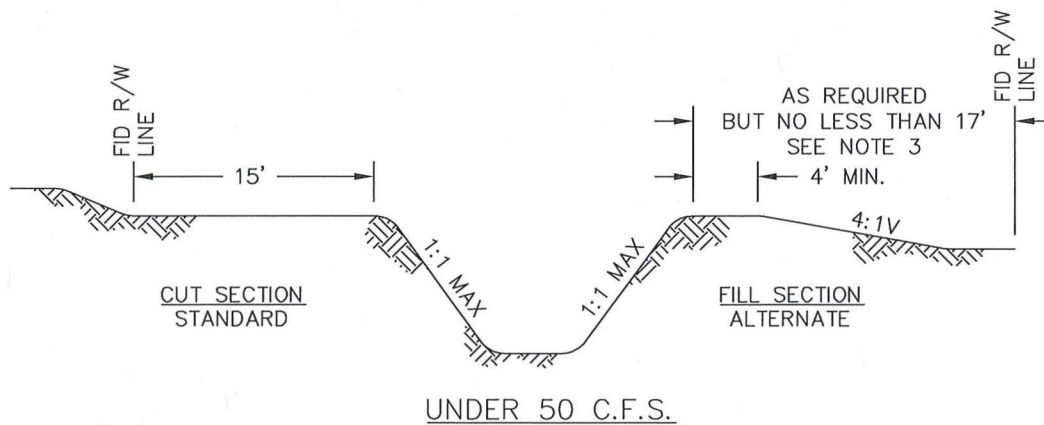
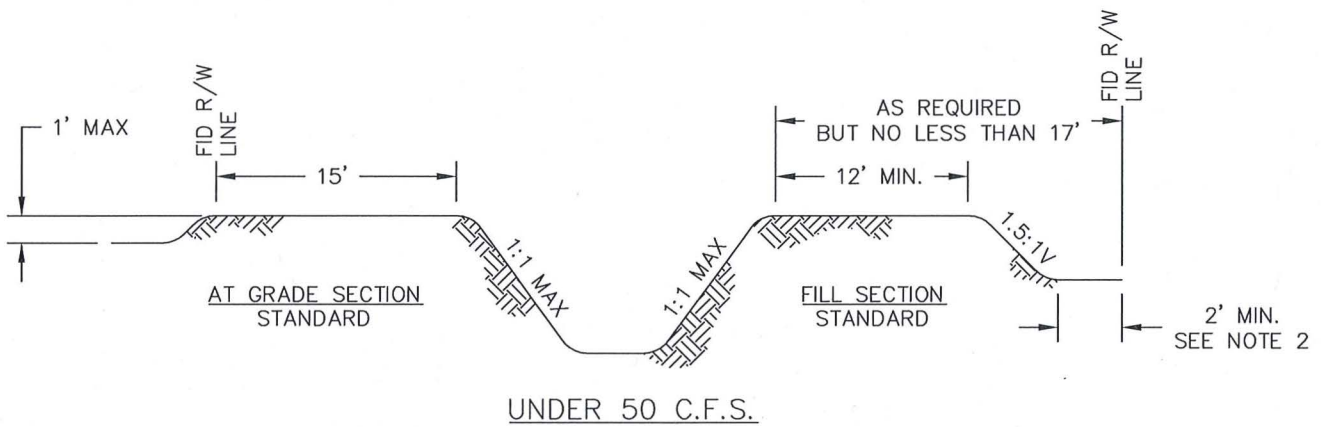
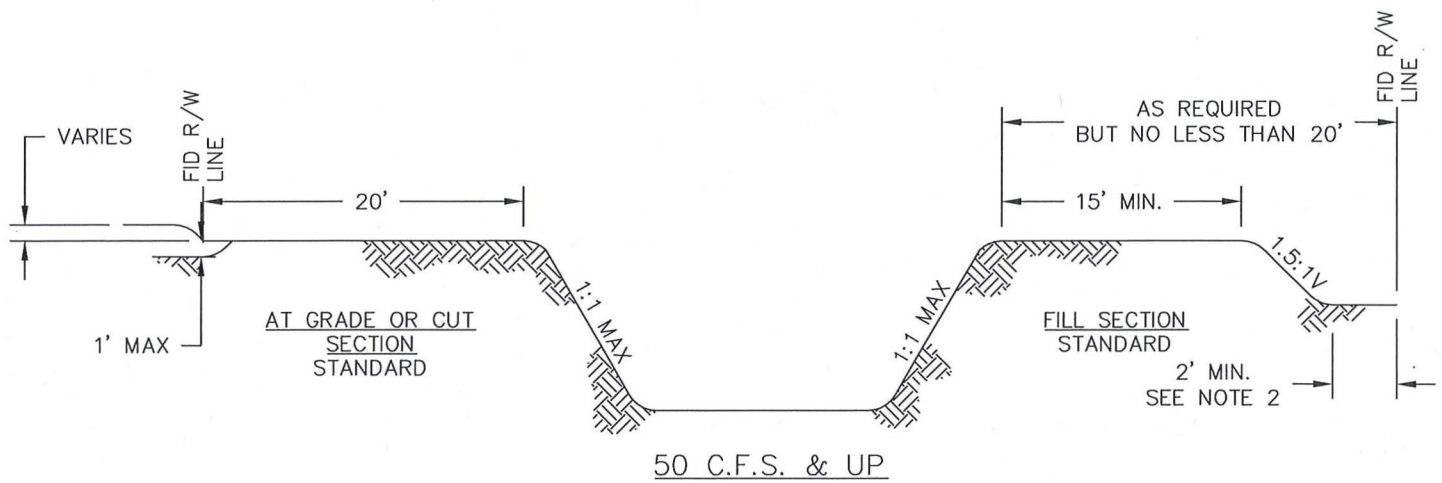
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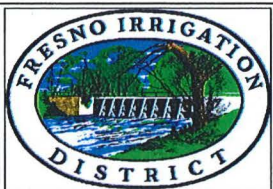
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**NOTES:**

1. ALL PRIVATE FACILITIES TO BE LOCATED OUTSIDE FID RIGHT-OF-WAY.
2. ADD 2 FEET TO EMBANKMENT WIDTH TO ESTABLISH OVERALL RIGHT-OF-WAY WIDTH TO ACCOMMODATE GRADER BLADE CLEARANCE.
3. THE ALTERNATE SECTION CANNOT BE USED IF THE OVERALL WIDTH EXCEEDS THE STANDARD WIDTH AND IS PERMITTED ONLY WHEN DISTRICT OPERATIONS AND MAINTENANCE FUNCTIONS DO NOT REQUIRE A STANDARD ROADWAY.



FRESNO IRRIGATION DISTRICT

CANAL RIGHT-OF-WAY

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SCALE: NOT TO SCALE

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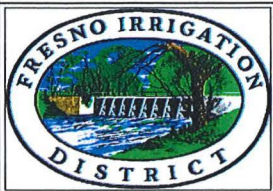
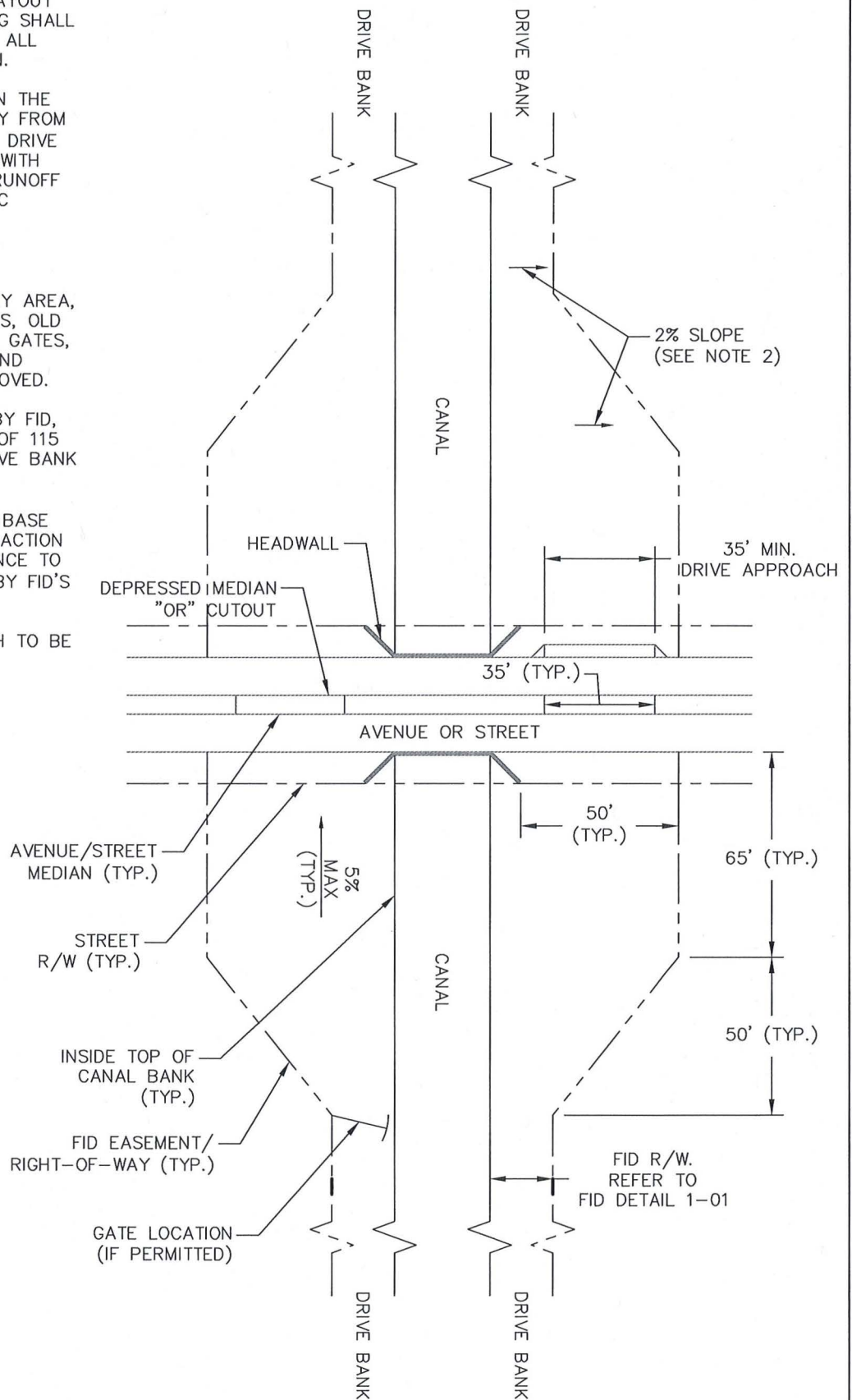
DATE: JANUARY 2018

1-01

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**NOTES:**

1. DIMENSIONS AND NOTES ARE FOR LAYOUT PURPOSES ONLY. A SCALED DRAWING SHALL BE PREPARED AND SUBMITTED WITH ALL PLAN SETS PRIOR TO CONSTRUCTION.
2. DRAINAGE WILL NOT BE ACCEPTED IN THE CANAL AND SHALL BE ROUTED AWAY FROM FID PROPERTY/DRIVE BANKS. SLOPE DRIVE BANKS 2% AWAY FROM THE CANAL WITH PROVISIONS MADE FOR RAINFALL. RUNOFF TO BE CONVEYED TO NEARBY PUBLIC STREETS OR DRAINAGE SYSTEM BY DRAINAGE SWALES OR OTHER FID ACCEPTABLE ALTERNATIVES.
3. WITHIN FID EASEMENT/RIGHT-OF-WAY AREA, ALL EXISTING TREES, BUSHES, DEBRIS, OLD CANAL STRUCTURES, PUMPS, CANAL GATES, AND OTHER NON OR INACTIVE FID AND PRIVATE STRUCTURES MUST BE REMOVED.
4. IF AN ACCESS GATE IS PERMITTED BY FID, GATE MUST BE PLACED A MINIMUM OF 115 FEET AWAY FROM ROAD, WHERE DRIVE BANK NARROWS TO 20 FEET.
5. THREE INCH (3") THICK AGGREGATE BASE COMPACTED TO 93% RELATIVE COMPACTION SHALL BE REQUIRED AT THE ENTRANCE TO EACH DRIVE BANK AS DETERMINED BY FID'S ENGINEER. NO REGRIND ASPHALT.
6. DRIVEWAY APPROACH MINIMUM WIDTH TO BE 35 FEET.



FRESNO IRRIGATION DISTRICT

DRIVE APPROACH - URBAN AREAS

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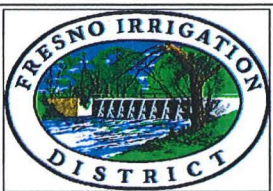
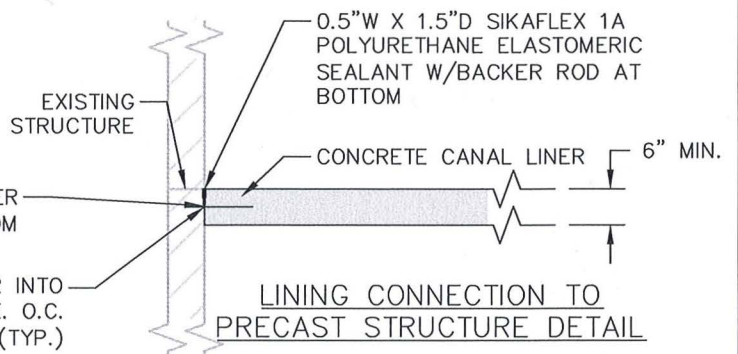
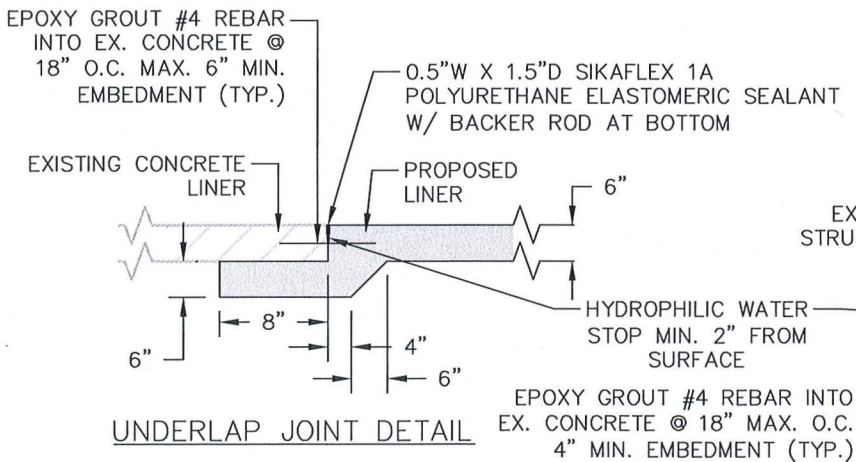
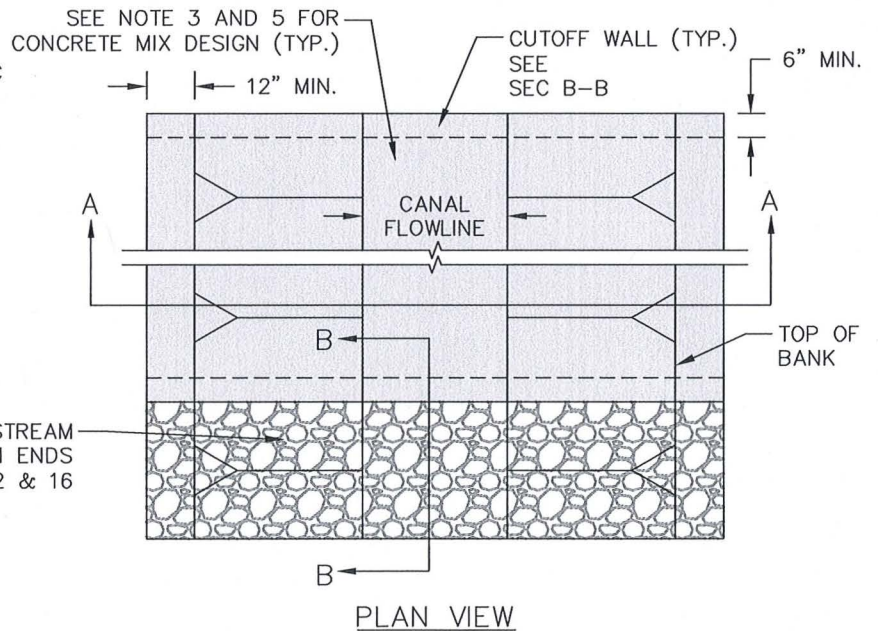
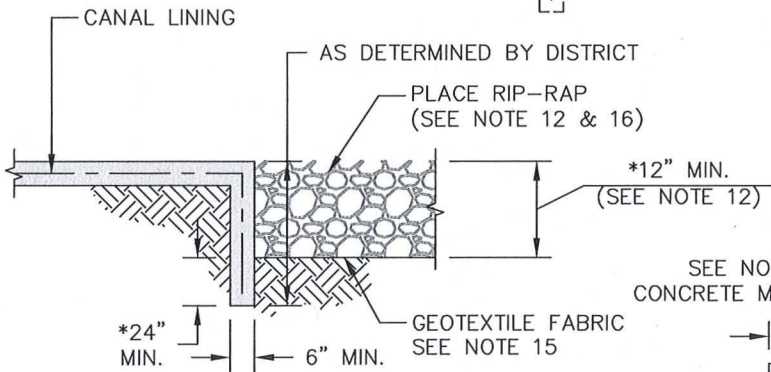
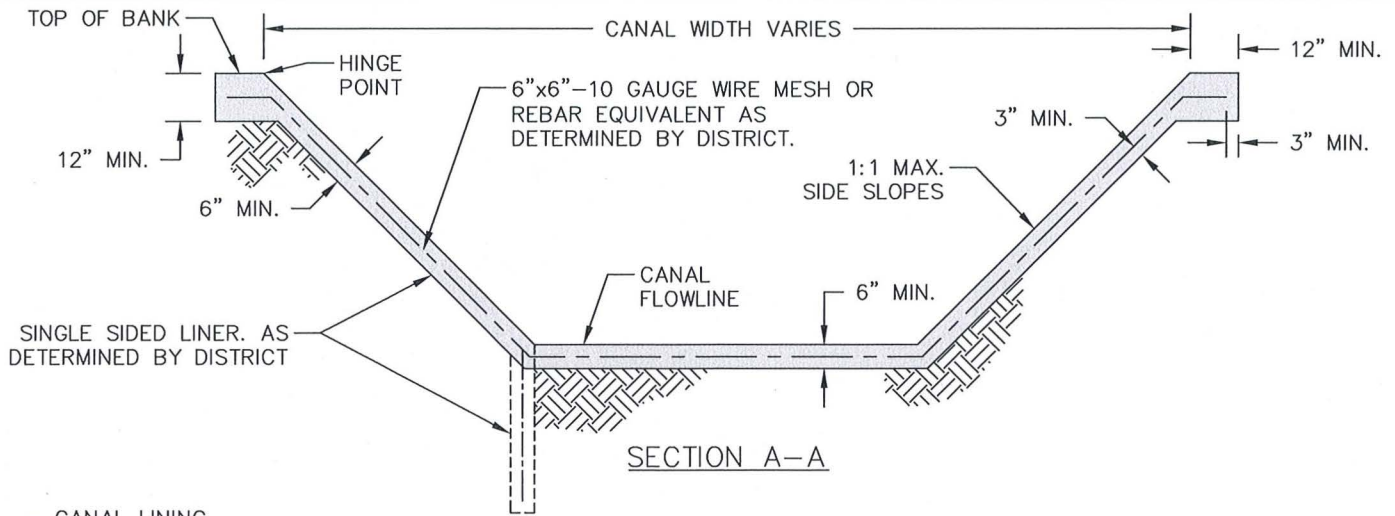
SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

1-02

SHEET 1 OF 1



FRESNO IRRIGATION DISTRICT

CANAL LINING

"Your Most Valuable Resource - Water"

SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

2-01

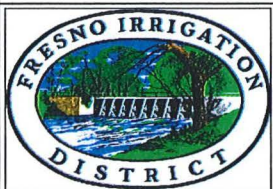
SHEET 1 OF 2

CANAL LINING NOTES:

1. LINING SHALL BE PLACED ON FIRM COMPETENT MATERIAL. IF THE UNDERLYING SOILS ARE NOT SUITABLE FOR CONCRETE PLACEMENT, CONTRACTOR SHALL OVER-EXCAVATE AND REPLACE WITH COMPACTED ENGINEERED FILL.
2. ALL DISTURBED SOILS TO HAVE MINIMUM OF 93% RELATIVE COMPACTION PER ASTM D-1557 IN FILL AREAS FOR A DISTANCE 5 FEET MINIMUM AROUND CONCRETE LINER.
3. CONCRETE LINING SHALL BE A MINIMUM OF 6-1/2 SACK WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI.
4. CONTRACTOR SHALL SUBMIT CONCRETE MIX DESIGN TO FID FOR APPROVAL PRIOR TO CONSTRUCTION.
5. FIBERCAST 500 OR EQUIVALENT CONCRETE FIBER REINFORCEMENT WITH FIBER LENGTHS BETWEEN 1.5 INCH TO 2 INCH. APPLICATION RATE SHALL BE AT A MINIMUM OF 1.5 POUNDS. PER CUBIC YARD AND BE INCLUDED IN THE CONCRETE MIX.
6. 6" X 6" - 10" X 10" GAUGE WIRE MESH MAY BE UNCOATED OR GALVANIZED.
7. INSTALL ACCESS/SAFETY LADDERS ON ALTERNATE SIDES OF CANAL 18 INCH ON CENTER AT 100 FEET INTERVALS PER CAL OSHA STANDARDS OR AS DETERMINED BY DISTRICT.
8. LINING CUTOFF WALLS TO BE CONSTRUCTED UPSTREAM AND DOWNSTREAM OF CONCRETE LINING. LINING CUTOFF DEPTH TO BE DETERMINED BY DISTRICT.
9. AS DIRECTED BY FID'S INSPECTOR OR ENGINEER, CONTRACTOR SHALL MAKE AVAILABLE 7 DAY AND 28 DAY COMPRESSIVE STRENGTH TEST RESULTS.
10. CONTROL JOINTS REQUIRED EVERY 10 FEET IN TRANSVERSE DIRECTIONS WITH CONCRETE JOINT SEAL AND BACKER ROD.
11. CONCRETE LINER REQUIRED FOR A MINIMUM OF 5 FEET IN LENGTH OR LIMITS OF DISTURBED SOIL, WHICHEVER IS GREATER.

RIP-RAP NOTES:

12. RIP-RAP REQUIREMENT AS DETERMINED BY FID ENGINEER AND/OR INSPECTOR.
13. CLASS 2 RIP-RAP WITH METHOD B PLACEMENT FOR A MINIMUM OF 5 FEET PER 2010 CALTRANS STANDARDS AROUND CHANNEL FLOOR AND SIDE SLOPES OR AS DETERMINED BY FID'S ENGINEER. PLACE WOVEN GEOTEXTILE FABRIC BENEATH RIP-RAP.
14. CUTOFF WALLS SHALL BE EXCAVATED TO A MINIMUM OF 3 FEET BELOW NATIVE GRADE AND 24 INCHES BELOW RIP-RAP SUBGRADE UNLESS OTHERWISE DETERMINED BY FID'S ENGINEER.
15. WOVEN GEOTEXTILE FABRIC SHALL BE MIRAFI FW500 OR APPROVED EQUIVALENT.
16. RIP-RAP REQUIRED FOR A MINIMUM OF 5 FEET ON UPSTREAM AND DOWNSTREAM ENDS OF CONCRETE LINING.



FRESNO IRRIGATION DISTRICT

CANAL LINING NOTES

"Your Most Valuable Resource - Water"

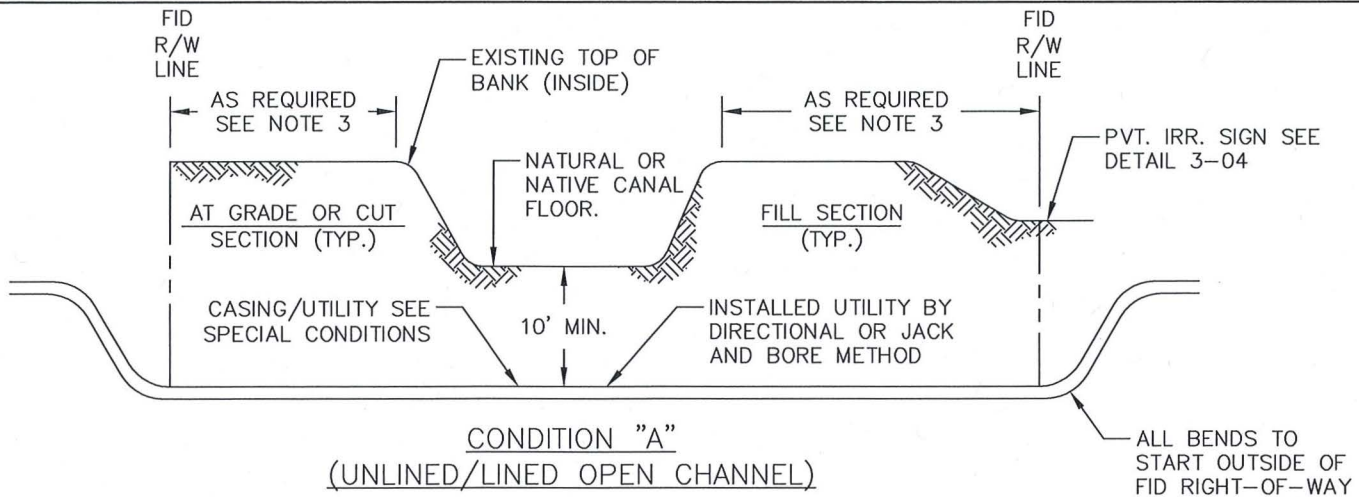
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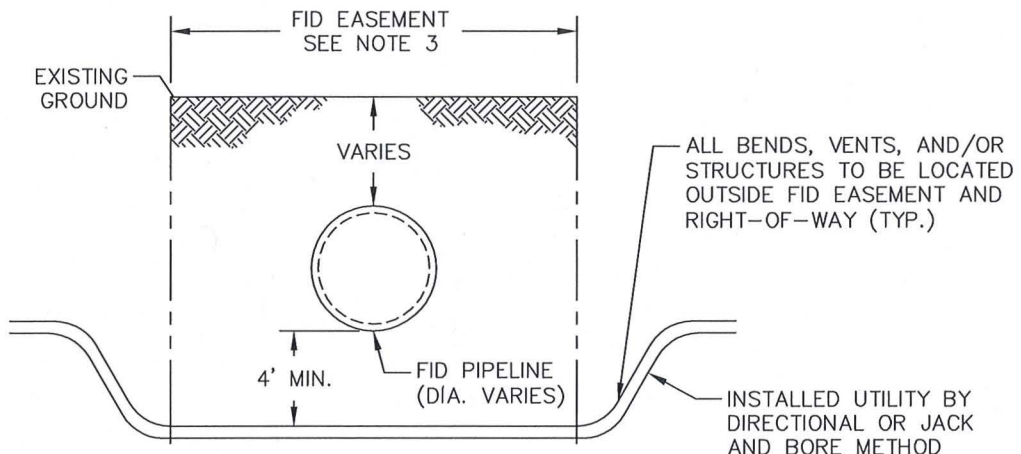
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2-01

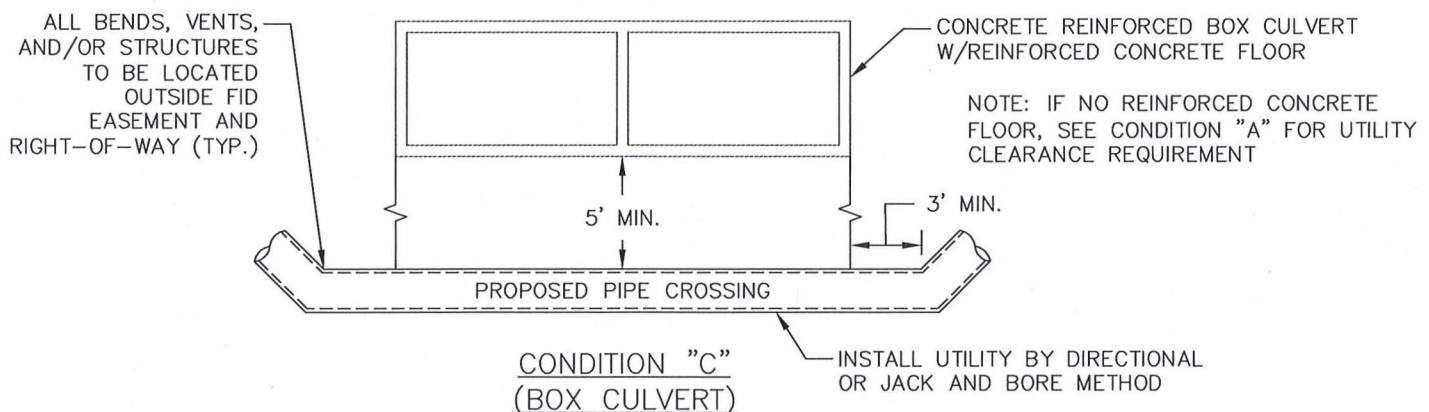
SHEET 2 OF 2



**CONDITION "A"**  
(UNLINED/LINED OPEN CHANNEL)



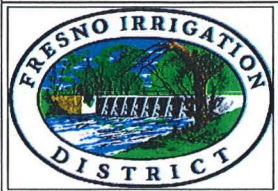
**CONDITION "B"**  
(UNDERGROUND PIPELINE/PIPE CULVERT)



**CONDITION "C"**  
(BOX CULVERT)

**NOTES:**

1. ALL BORING OPERATIONS ARE NOT ALLOWED DURING FID'S IRRIGATION SEASON (TYPICALLY MARCH 1 THROUGH AUGUST 30).
2. FID'S INSPECTOR SHALL BE ON-SITE DURING THE BORE. UTILITY CLEARANCE MUST BE VERIFIED BY FID'S INSPECTOR.
3. REFER TO DETAIL 1-01 FOR RIGHT-OF-WAY REQUIREMENTS, P-06 FOR PIPELINE EASEMENT REQUIREMENTS.
4. FOR SITE SPECIFIC REQUIREMENTS, SEE SPECIAL CONDITIONS ISSUED WITH PERMIT.
5. ALL BORE PITS MUST BE SITUATED OUTSIDE OF FID'S RIGHT-OF-WAY.
6. WET UTILITY CROSSINGS MAY REQUIRE STEEL CASING AS DETERMINED BY FID ENGINEER.



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource - Water"

PIPE CROSSING - BORING CLEARANCE

SCALE:	NOT TO SCALE	STANDARD DETAIL 3-01
DATE:	JANUARY 2018	

SHEET 1 OF 2



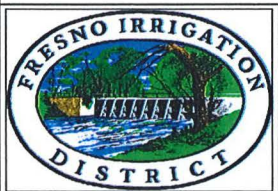
FRESNO IRRIGATION DISTRICT  
SPECIAL CONDITIONS  
FOR  
JACK & BORE / DIRECTIONAL BORE UTILITY INSTALLATIONS  
(REVISED MARCH 29, 2018)

THE CONTRACTOR IS SUBJECT TO THE CONDITIONS STATED BELOW:

1. FRESNO IRRIGATION DISTRICT'S (FID) ENGINEERING DEPARTMENT, (559) 233-7161, SHALL BE NOTIFIED 48 HOURS PRIOR TO CONSTRUCTION. NO WORK SHALL BEGIN WITHOUT A 'PERMIT TO WORK WITHIN EASEMENT AND RIGHT-OF-WAY' ISSUED BY FID (INSPECTION FEES ARE ASSESSED AS FOLLOWS: MINIMUM OF \$125.00 PER WEEK (2 ½ HOURS) OR \$50 PER DAY (1 HOUR). IF ADDITIONAL INSPECTION HOURS ARE NECESSARY, THE COST INCURRED WILL BE WITHHELD FROM THE DEPOSIT OR INVOICED TO THE PERMITTEE AT \$50.00 PER HOUR). ALL WORK SHALL BE COMPLETED BY THE DATE SPECIFIED ON THE FID PERMIT, AND THE AREA RESTORED TO ITS ORIGINAL CONDITION. ANY WORK REQUIRED AFTER THE COMPLETION DATE, SHALL BE APPROVED BY FID'S ENGINEER AND ASSESSED A LATE COMPLETION FEE AS SPECIFIED ON THE PERMIT.
2. ALL UTILITY CROSSINGS SHALL BE INSTALLED UNDER FID'S PIPELINE/PIPE CULVERT/CANAL/BOX CULVERT AND MINIMUM CLEARANCE SHALL BE MAINTAINED FOR ENTIRE LENGTH OF RIGHT-OF-WAY.
3. AT LOCATIONS WHERE FID APPROVES UTILITY CROSSINGS OVER FID'S PIPELINE, THE UTILITY SHALL BE BACKFILLED WITH A RED CONCRETE SLURRY MIXTURE. THE SLURRY BACKFILL SHALL CONSIST OF A FLUID, WORKABLE MIXTURE OF AGGREGATE, CEMENT AND WATER. AGGREGATE MATERIAL SHALL BE A DIAMETER OF 1/4-INCH (.25") OR LESS WITH A 2-SACK CEMENT MIX AND 4 POUNDS OF RED DYE PER CUBIC YARD.
4. CONSTRUCTION SHALL NOT INTERFERE WITH THE MAINTENANCE AND/OR OPERATION OF FID'S FACILITY. BORE PITS SHALL BE SITUATED SUCH THAT THEY ARE OUTSIDE FID'S RIGHT-OF-WAY LIMITS. LOCATION OF BORE PITS ARE TO BE CONFIRMED WITH FID'S FIELD INSPECTOR.
5. IF THE FID CANAL IS A MAJOR CONVEYOR OF STORM WATERS, THE ANTICIPATED STORM FLOWS THROUGH THE CANAL MAY REQUIRE CONSTRUCTION TO BE TEMPORARILY SHUT DOWN UNTIL PEAK FLOWS HAVE PASSED. JACK AND BORE AND DIRECTIONAL BORE WILL NOT BE ALLOWED DURING FID'S IRRIGATION SEASON, WHICH USUALLY RUNS MARCH 1 THROUGH AUGUST 31.
6. FID SHALL NOT BE RESPONSIBLE FOR ANY WATER THAT MAY FLOW IN THE IRRIGATION FACILITY OR AREA OF CONSTRUCTION DURING THE TIME OF THE UTILITY INSTALLATION, INCLUDING ANY DAMAGE RESULTING FROM SUCH WATER..
7. CONTRACTOR AND/OR AGENCY SHALL HAVE EQUIPMENT MOBILIZED TO REPAIR DAMAGE IN THE EVENT OF A CANAL BREACH.
8. ALL EXCESS MATERIAL AND/OR DEBRIS SHALL BE REMOVED FROM FID'S EASEMENT AND RIGHT-OF-WAY UPON COMPLETION OF ALL UTILITY INSTALLATION.
9. ALL WORK WITHIN FID'S EASEMENT AND RIGHT-OF-WAY SHALL BE INSPECTED AND APPROVED BY FID'S FIELD INSPECTOR OR ENGINEER BEFORE BACKFILLING CAN OCCUR.
10. ALL WORK SHALL BE COMPLETED BY THE DATE SPECIFIED ON THE FID CONSTRUCTION PERMIT AND THE AREA RESTORED TO ITS ORIGINAL CONDITION. ANY WORK REQUIRED AFTER THE COMPLETION DATE SHALL BE APPROVED BY FID'S ENGINEER AND LIQUATED DAMAGES IN THE AMOUNT OF \$2,500.00 PER DAY WILL BE ASSESSED.
11. IN SITUATIONS WHERE A CASING IS REQUIRED, VOIDS SHALL BE FILLED WITH SUITABLE MATERIAL THROUGH INJECTION POINTS AT A MINIMUM 3 FEET (3') ON CENTER (I.E. SAND, GROUT, ETC.) AND SEALED IN ORDER TO MINIMIZE FLOW THROUGH CASING/VOID SHOULD THE INTEGRITY BE COMPROMISED AS DETERMINED BY FID'S FIELD INSPECTOR. AT A MINIMUM, CASING ENDS SHALL BE SEALED. CASING/VOID GROUT ENDS SHALL BE TERMINATED AT THE EDGE OF FID'S RIGHT-OF-WAY UNLESS APPROVED OTHERWISE.

BORE AND JACK SPECIFIC NOTES:

1. TOP OF BORE PITS SHALL BE A MINIMUM OF ONE-FOOT (1') HIGHER THAN EXISTING HIGH WATER MARK OF THE CANAL. IN ADDITION, BORE PITS SHALL BE DESIGNED TO CONTAIN WATER SHOULD THE CANAL BREACH. ALL BORE PIT BERMS SHALL BE COMPACTED TO 93% RELATIVE COMPACTION.
2. BORE PITS SHALL BE BACKFILLED IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED AND ALL DISTURBED SOIL SHALL BE COMPACTED TO A MINIMUM 93% RELATIVE COMPACTION.
3. COMPACTION TESTS SHALL BE PROVIDED TO FID UPON REQUEST BY FID'S ENGINEER.
4. CASING PIPE SHALL BE PROVIDED WITH END SEALS APPROVED BY FID ENGINEER.



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource – Water"

PIPE CROSSING  
BORE CLEARANCE NOTES

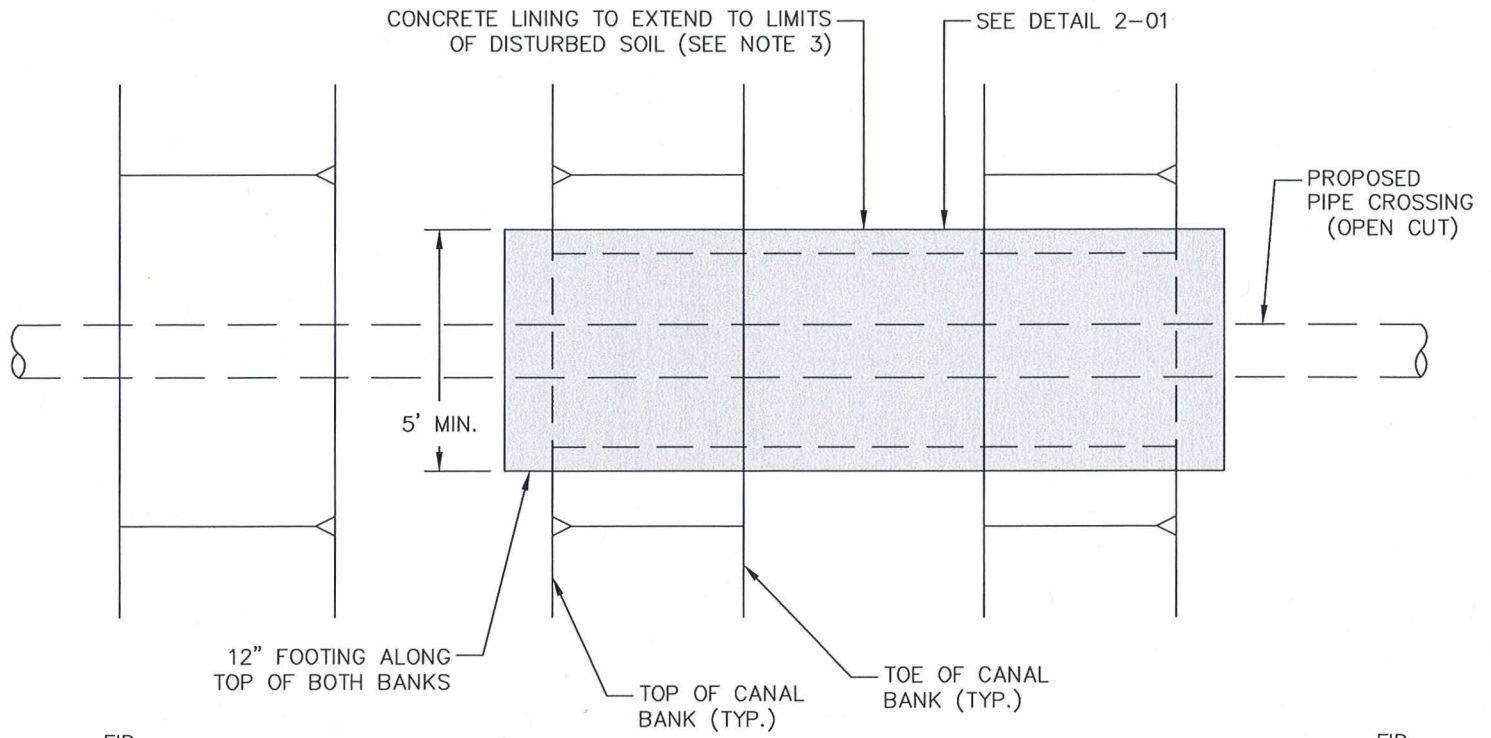
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STANDARD DETAIL

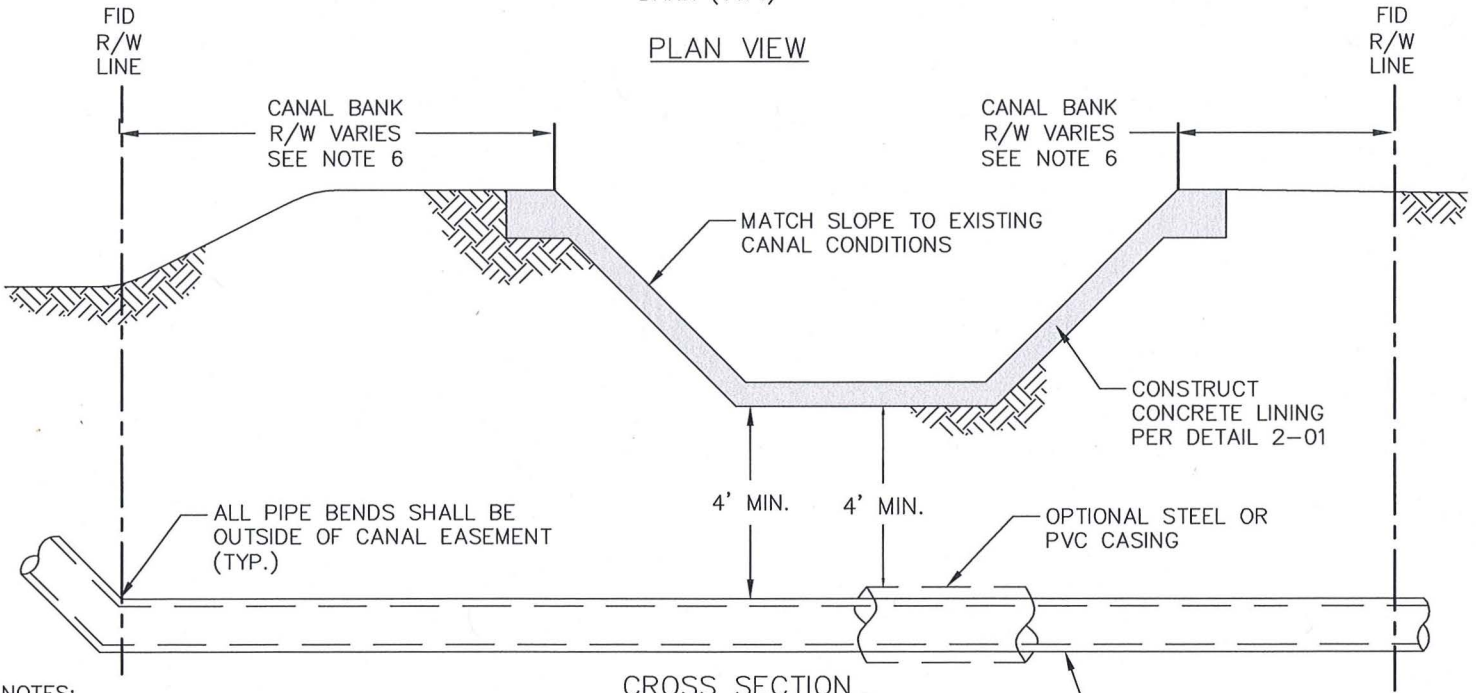
DATE: JANUARY 2018

3-01

SHEET 2 OF 2



PLAN VIEW



CROSS SECTION

NOTES:

1. REFER TO FID SPECIAL CONDITIONS FOR OPEN-EXCAVATION UTILITY INSTALLATION.
2. ALL DISTURBED SOIL TO HAVE 93% RELATIVE COMPACTION.
3. FID'S INSPECTOR TO DETERMINE LIMITS OF DISTURBED SOIL.
4. NO BENDS, VENTS OR STRUCTURES TO BE LOCATED WITHIN CANAL RIGHT-OF-WAY.
5. CONCRETE LINING REQUIRED FOR OPEN CUT INSTALLATIONS ONLY.
6. WIDTH OF CANAL BANK RIGHT-OF-WAY SHALL CONFORM TO DETAIL 1-01.
7. THE CONCRETE LINER SHALL NOT BE CONSTRUCTED HIGHER THAN THE FLOOR ELEVATION OF AN EXISTING CULVERT OR CHECK STRUCTURE UPSTREAM OF THE PROPOSED CROSSING AS REQUIRED BY FID ENGINEER.



FRESNO IRRIGATION DISTRICT

CANAL CROSSING - OPEN CUT

"Your Most Valuable Resource - Water"

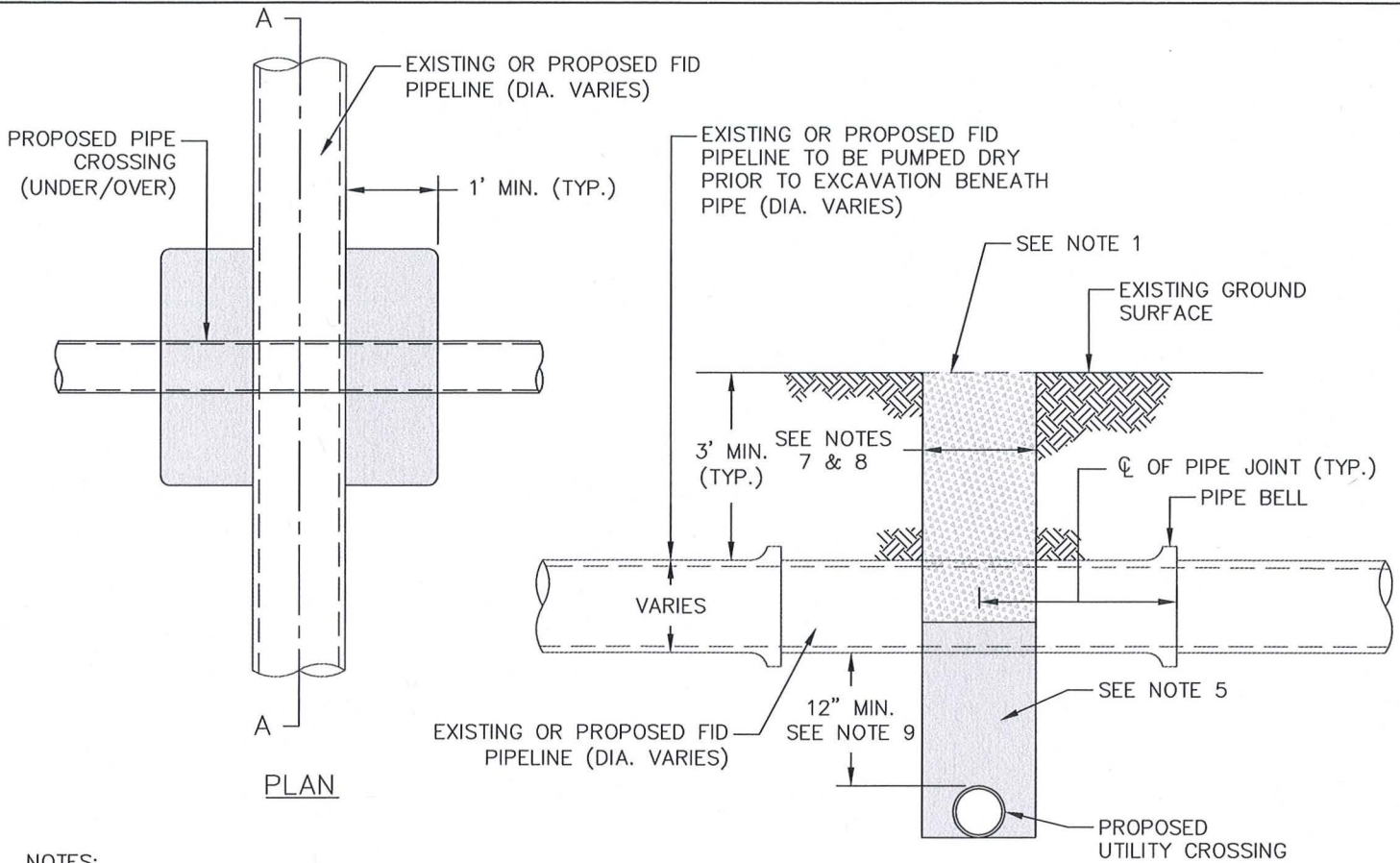
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DATE: JANUARY 2018

STANDARD DETAIL

3-02

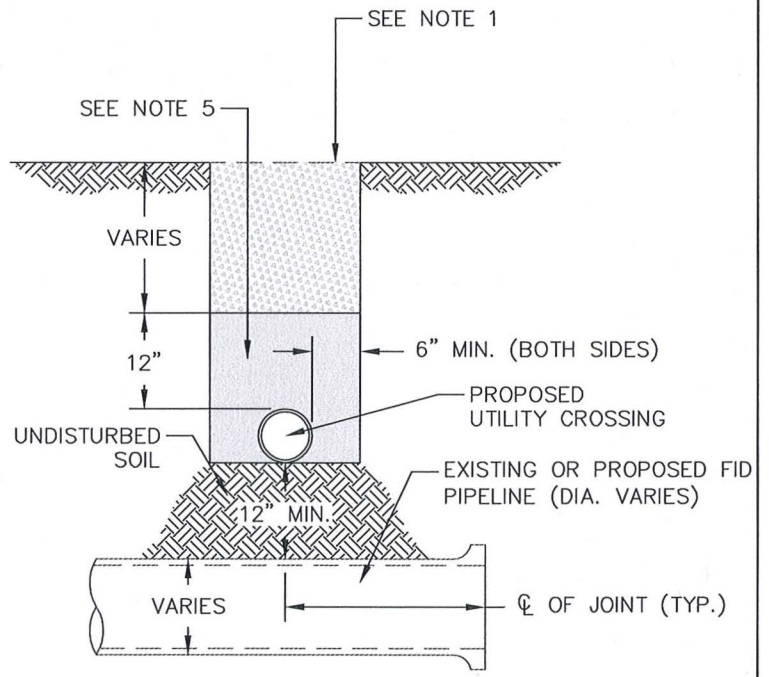
SHEET 1 OF 1



SECTION A-A  
PIPE CROSSING UNDER FID

NOTES:

1. ALL COMPACTED BACKFILL TO HAVE A MINIMUM OF 93% RELATIVE COMPACTION. SEE DETAIL 4-02.
2. CONTRACTOR SHALL POT-HOLE AND VERIFY THE HORIZONTAL ALIGNMENT AND VERTICAL DEPTH OF FID'S LINE PRIOR TO COMMENCEMENT OF WORK.
3. NO VIBRATORY COMPACTION WITHIN 10 FEET OF FID FACILITY UNLESS APPROVED OTHERWISE.
4. NO VENTS OR STRUCTURES TO BE LOCATED WITHIN PIPELINE EASEMENT AND/OR RIGHT-OF-WAY.
5. ALL CROSSINGS REQUIRE 2-SACK RED CONCRETE SLURRY WITH 1/4-INCH (.25") MINUS AGGREGATE AND 4 POUNDS OF RED DYE PER CUBIC YARD.
6. AT LOCATIONS WHERE A CASING IS REQUIRED BY UTILITY OWNER, CASING PIPE NEEDS TO MAINTAIN CLEARANCES NOTED.
7. TRENCH WIDTH SHALL NOT EXPOSE PIPE JOINTS WITHOUT BEING SUPPORTED. CONTRACTOR SHALL SUBMIT WORK PLAN CERTIFIED BY A LICENSED ENGINEER TO FID PRIOR TO PERMIT ISSUANCE IF TRENCH WIDTH IS GREATER THAN 48 INCHES WIDE OR 48 INCHES IN LENGTH.
8. ANY JOINT ON FID'S PIPELINE THAT IS EXPOSED ALL AROUND SHALL BE SUPPORTED UNLESS APPROVED BY FID INSPECTOR.
9. ALL UTILITY CROSSINGS MUST BE PLACED A MINIMUM 12 INCHES BELOW EXISTING FID PIPELINES OR 12 INCHES BELOW FID MASTER PLANNED PIPE DIAMETER AND DEPTH, WHICHEVER IS DEEPER.

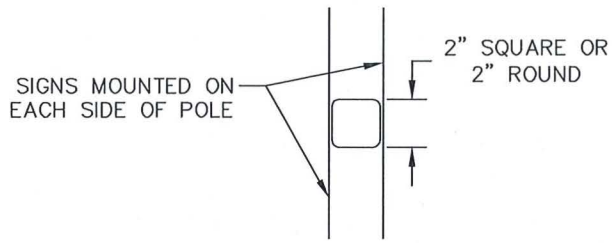


SECTION A-A  
PIPE CROSSING OVER FID

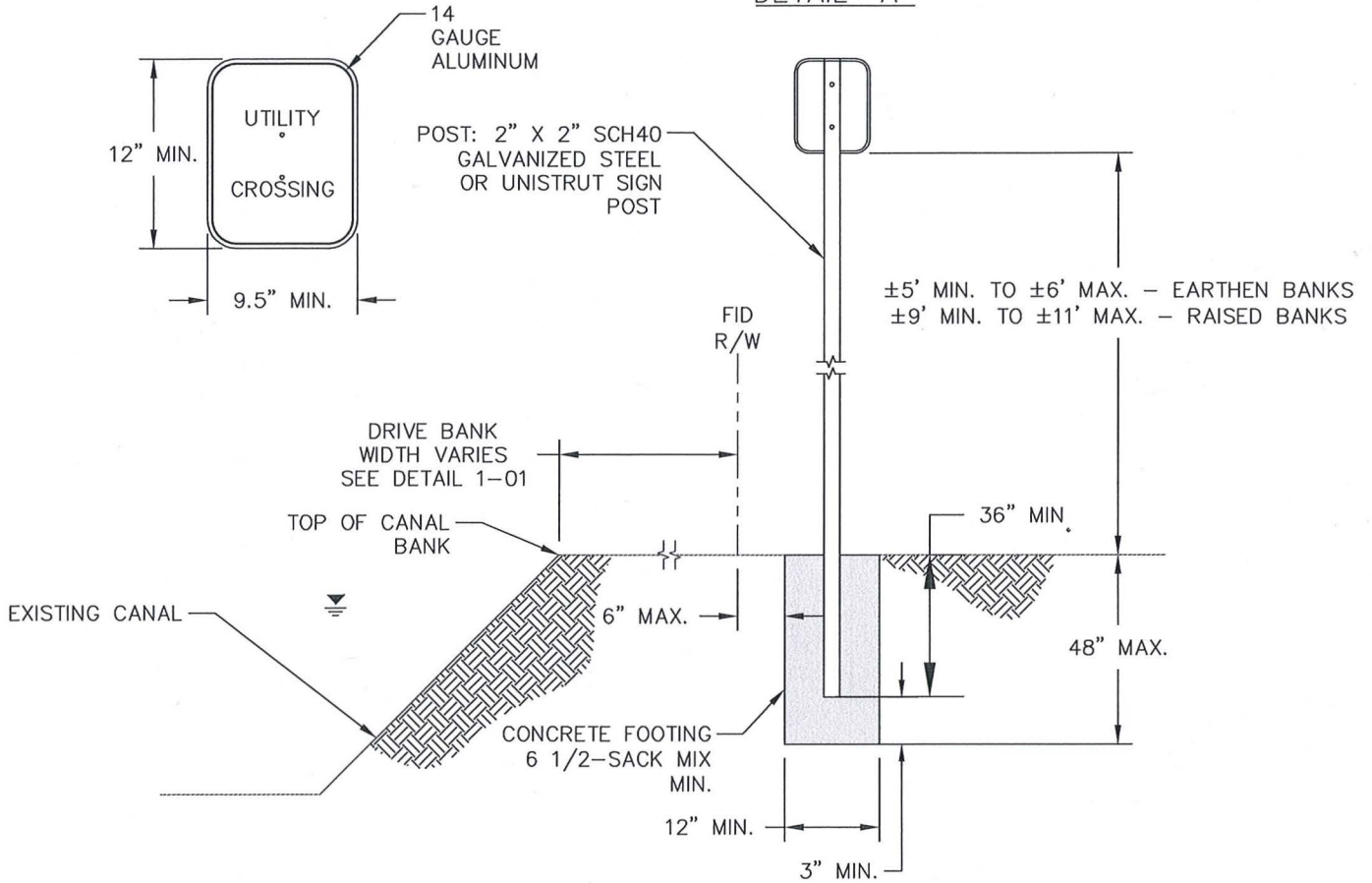


FRESNO IRRIGATION DISTRICT  
"Your Most Valuable Resource - Water"

CONDUIT/PIPELINE CROSSING - OPEN CUT	
SCALE: NOT TO SCALE	STANDARD DETAIL
DATE: JANUARY 2018	3-03
	SHEET 1 OF 1



DETAIL "A"



**NOTES:**

1. OWNER RESPONSIBLE FOR THE FURNISHING, INSTALLATION, AND MAINTENANCE OF PRIVATE UTILITY CROSSING SIGNS.
2. SIGNS SHALL BE VISIBLE FROM EACH DIRECTION.
3. SIGNS SHALL BE MOUNTED ON EACH SIDE OF POLE. SEE DETAIL "A".
4. SIGNS SHALL BE PLACED ON OUTSIDE EDGE OF EACH CANAL BANK, OUT OF THE WAY OF VEHICULAR TRAFFIC.
5. SEE DETAIL 1-01 OF THE FRESNO IRRIGATION DISTRICT ENGINEERING HANDBOOK FOR DISTRICT RIGHT-OF-WAY REQUIREMENTS.
6. DIRECTIONAL BORE INSTALLATIONS ONLY.
7. SIGN LOCATION TO BE DETERMINED BY FID ENGINEER.



FRESNO IRRIGATION DISTRICT

UTILITY CROSSING SIGN

"Your Most Valuable Resource - Water"

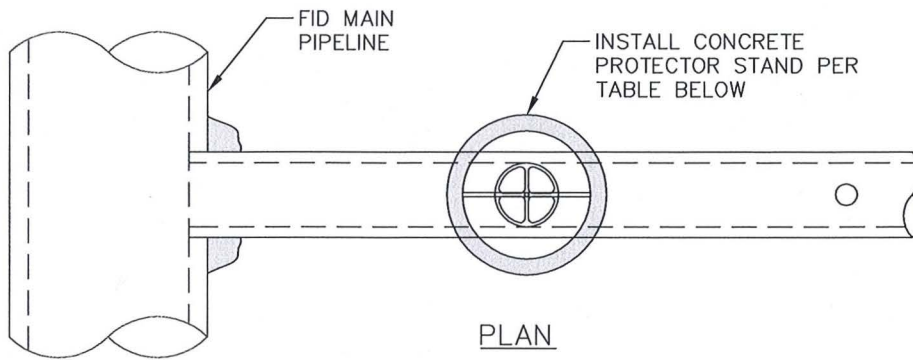
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STANDARD DETAIL

DATE: JANUARY 2018

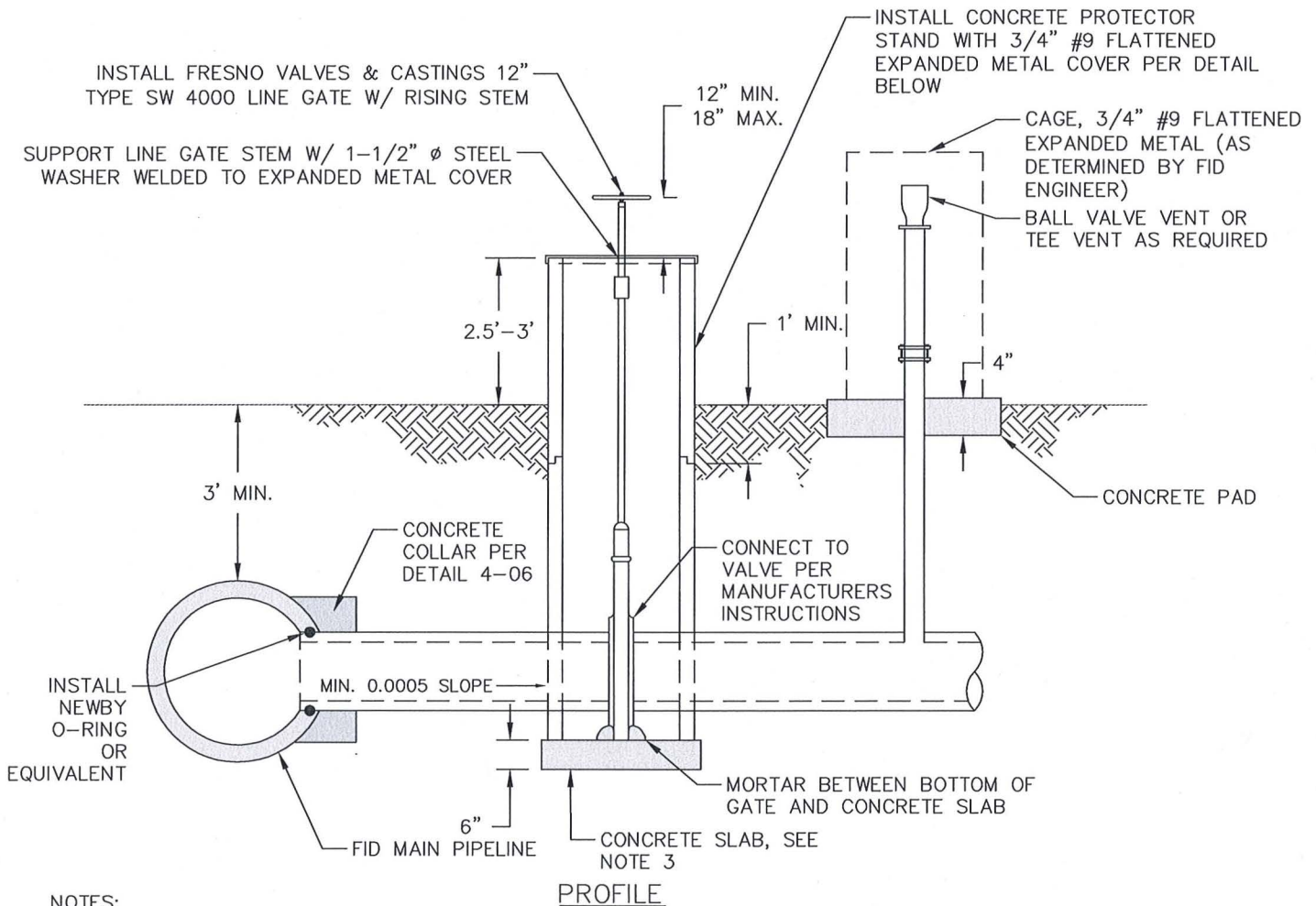
3-04

SHEET 1 OF 1



PROTECTOR STAND	
GATE	STAND
≤15"	48"
>15"	60"

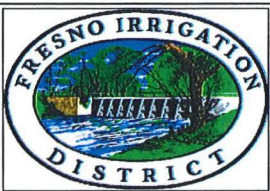
PLAN



PROFILE

NOTES:

1. DETAIL SHOWS CONNECTION TO CONCRETE FID MAIN PIPELINE. IF FID PIPELINE IS PVC, USE A PVC TEE FITTING INSTEAD OF MORTAR/COLLAR CONNECTION.
2. ALL CONNECTIONS SHALL BE WATERTIGHT.
3. PRESSURE TESTING IS REQUIRED FOR ACCEPTANCE.
4. STRUCTURAL CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI, WATER-CEMENT RATIO OF .045 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1% AND 4 INCH (4") SLUMP AT PLACEMENT.



FRESNO IRRIGATION DISTRICT

TURNOUT END LINE GATE  
W/ PROTECTOR STAND

"Your Most Valuable Resource – Water"

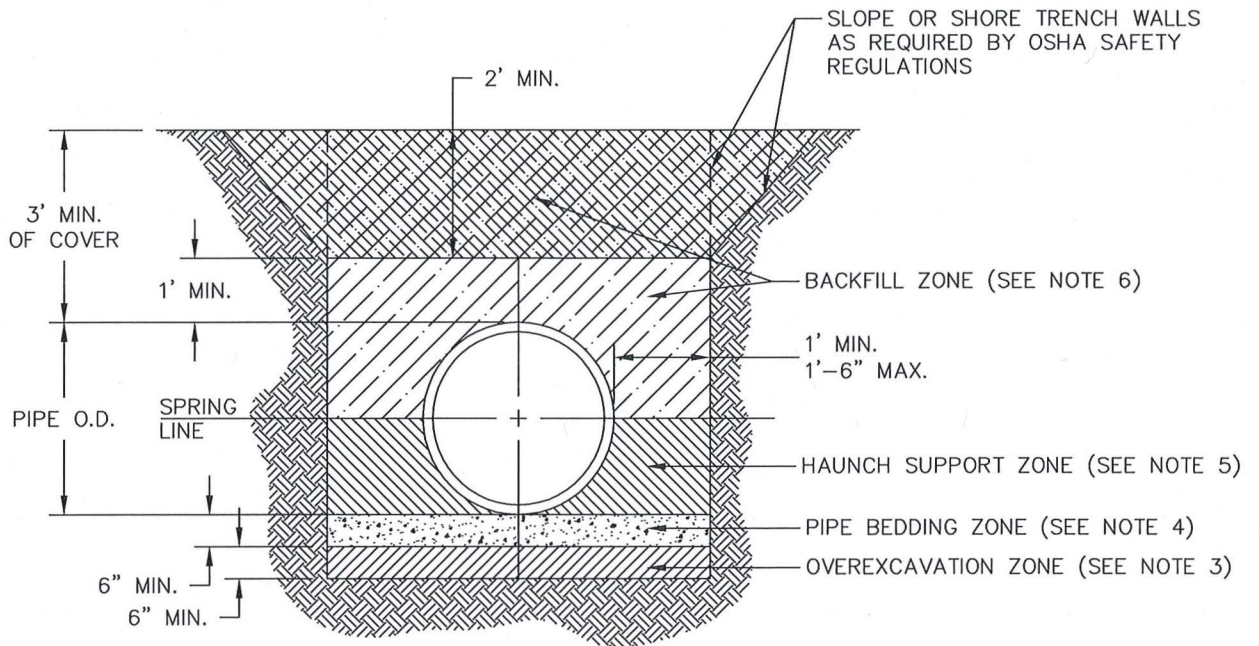
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STANDARD DETAIL

DATE: JANUARY 2018

4-01

SHEET 1 OF 1



**TRENCH EXCAVATION AND BACKFILL NOTES:**

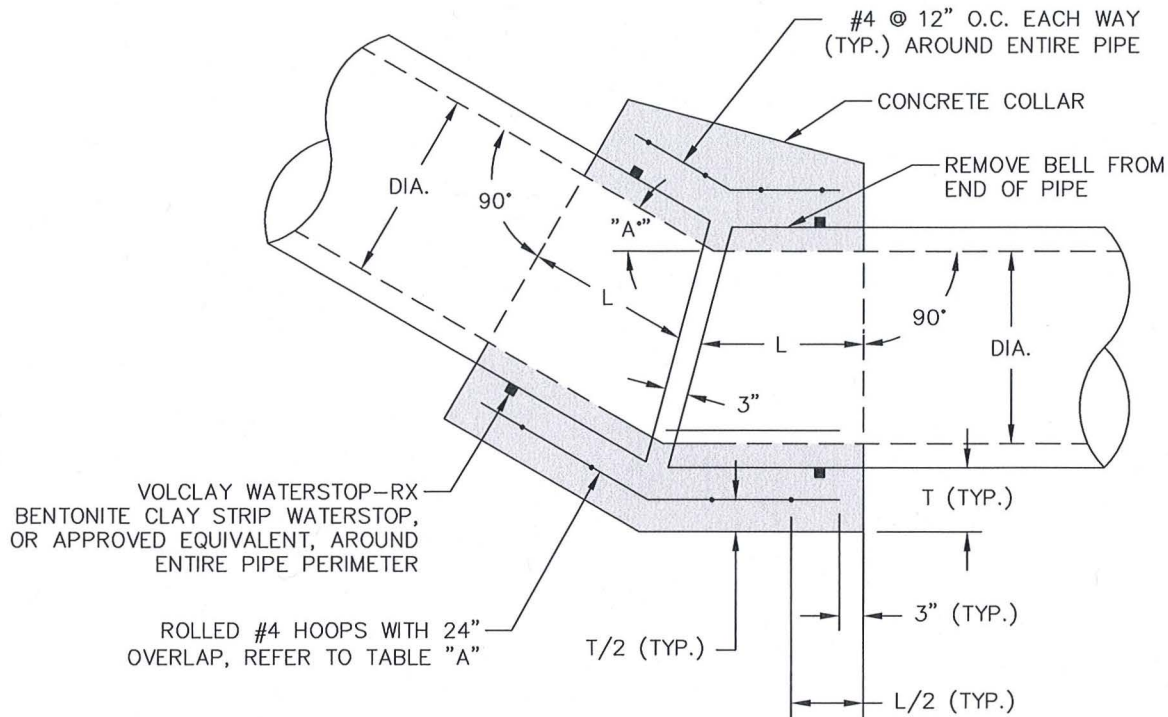
1. SHORING OR SLOPING SHALL BE IN COMPLIANCE WITH CALIFORNIA LABOR CODE AND CAL/OSHA REQUIREMENTS.
2. COMPACTION OF ALL MATERIALS SHALL COMPLY WITH ASTM D-1557. COMPACTION TESTING SHALL BE PERFORMED BY THE OWNER/AGENCY AS DIRECTED BY THE DISTRICT ENGINEER OR DISTRICT INSPECTOR.
3. OVEREXCAVATION ZONE:  
BOTTOM OF TRENCH SHALL BE IN FIRM, UNIFORM-BEARING SOIL SURFACES. WHEN UNSUITABLE OR DISTURBED THE CONTRACTOR SHALL REMOVE, REPLACE AND COMPACT MATERIAL TO 95% RELATIVE COMPACTION OR AS DIRECTED BY THE DISTRICT ENGINEER.
4. PIPE BEDDING ZONE:  
PIPE BEDDING SHALL BE UNCOMPACTED GRANULAR SOIL OR APPROVED EQUIVALENT CONTAINING NO MORE THAN 5% MATERIAL PASSING THE NUMBER 200 SIEVE, AND SHALL HAVE A MAXIMUM PARTICLE SIZE OF 3/4 INCH (.75"). HOLES SHALL BE EXCAVATED FOR PIPE BELLS SUCH THAT PIPE IS SUPPORTED ENTIRELY ALONG THE SHAFT AND BELLS AND NOT TO JUST THE BELLS.
5. HAUNCH SUPPORT ZONE:  
HAUNCH SUPPORT BACKFILL SHALL BE GRANULAR MATERIAL CONTAINING MORE THAN 5% MATERIAL PASSING THE NUMBER 200 SIEVE. HAUNCH SUPPORT ZONE SHALL BE SOUND EARTHEN MATERIAL FREE OF ROCKS, HARDPAN, ORGANICS, AND DELETERIOUS MATERIAL, AND HAVE A MAXIMUM PARTICLE SIZE OF 3/4 INCH, PLACED IN LOOSE LIFTS NOT TO EXCEED 6 INCHES (6") IN DEPTH, AND COMPACTED TO A MINIMUM OF 95% RELATIVE COMPACTION, OR 2-SACK CEMENT-SAND SLURRY MIX MAY BE USED. TRENCH WIDTH MAY BE REDUCED BY 6 INCHES (6") ON EACH SIDE OF PIPE IF CEMENT-SAND SLURRY IS USED.
6. BACKFILL ZONE:  
BACKFILL SHALL BE SOUND EARTHEN MATERIAL FREE OF ROCKS, HARDPAN, ORGANICS, AND DELETERIOUS MATERIAL, HAVE A MAXIMUM PARTICLE SIZE OF 3/4 INCH (.75"), PLACED IN LOOSE LIFTS NOT TO EXCEED 8 INCHES (8") IN DEPTH, AND COMPACTED TO 93% RELATIVE COMPACTION (95% WITHIN CITY OR COUNTY RIGHT-OF-WAY FOR TOP 24 INCHES) OR AS SPECIFIED ON THE PLANS.
7. MAC-WRAP:  
ALL URBAN AND LANDSCAPED AREAS REQUIRE MAC-WRAP EXTERNAL JOINT WRAP BAND.



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource - Water"

PIPELINE BACKFILL	
SCALE: NOT TO SCALE	STANDARD DETAIL
DATE: JANUARY 2018	4-02
SHEET 1 OF 1	



MAX. PIPE SIZE	L (MIN.)	T	MIN. HOOP QTY.
24"	18"	8"	4
48"	24"	10"	4
72"	30"	12"	6
> 72"	BY DESIGN		

**NOTES:**

1. ANGLE "A" SHALL BE DETERMINED IN THE FIELD AND REBAR PLACEMENT APPROVED BY FID'S ENGINEER PRIOR TO CONCRETE PLACEMENT. ANGLE "A" SHALL NOT EXCEED 45°.
2. INSIDE JOINT TO HAVE A BRUSHED FINISH AND SHALL BE FLUSH WITH ADJOINING PIPES.
3. JOINT SHALL BE WATERTIGHT.
4. PREPARE SURFACE OF EXISTING PIPES BY WIRE BRUSHING, WATER BLASTING, OR SAND BLASTING AS DIRECTED BY FID ENGINEER OR INSPECTOR.
5. CONCRETE PIPE SHALL BE CLEANED AND TREATED WITH PRE-APPROVED CONCRETE BONDING AGENT PRIOR TO CONCRETE PLACEMENT.
6. DIAMETER OF ROLLED HOOPS SHALL BE INSIDE PIPE DIAMETER + (2 X WALL THICKNESS) + T.
7. FORMS USED TO POUR CONCRETE COLLAR SHALL BE REMOVED PRIOR TO BACKFILL.
8. CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1%, AND FOUR INCH (4") SLUMP AT PLACEMENT.
9. CONCRETE SHALL BE VIBRATED AROUND PIPE JOINT DURING PLACEMENT.



FRESNO IRRIGATION DISTRICT

FIELD BEND

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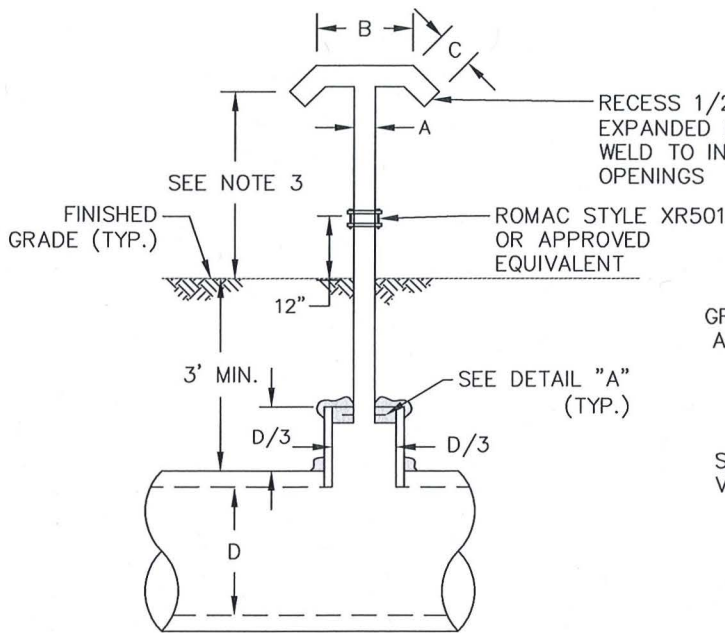
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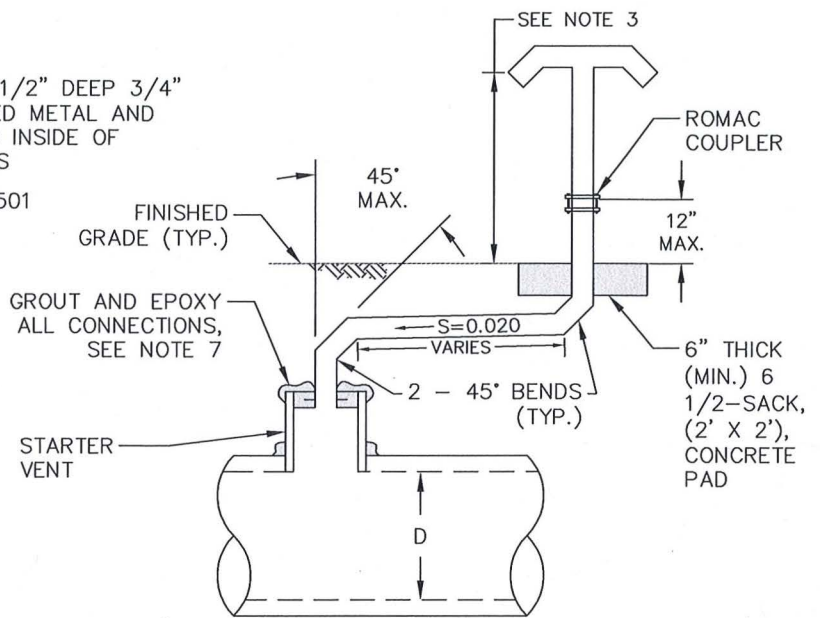
DATE: JANUARY 2018

4-03

SHEET 1 OF 1

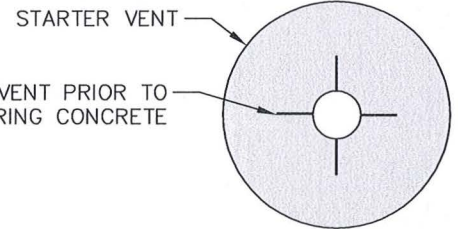


STANDARD VENT



OPTIONAL OFFSET VENT  
(4" VENT ONLY AND TO BE DETERMINED BY FID)

DETAIL "A"



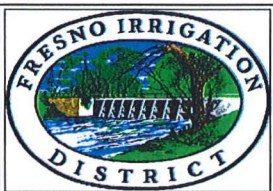
RUBBER GASKET REINFORCED CONCRETE PIPE (RGRCP):

FOR PIPE DIA. $\leq 36"$	USE 4" DIA. GALVANIZED T-VENT WITH STARTER VENT.
FOR $36" < \text{PIPE DIA.} \leq 42"$	USE 6" DIA. GALVANIZED T-VENT WITH STARTER VENT.
FOR $42" > \text{PIPE DIA.} \leq 60"$	FOR $42" > \text{PIPE DIA.} \leq 60"$ USE 8" DIA. GALVANIZED T-VENT WITH STARTER VENT.
FOR PIPE DIA. $> 60"$	USE 12" DIA. GALVANIZED T-VENT WITH STARTER VENT OR SEE 4-05 FOR CONCRETE VENT.

VENT DESIGN CRITERIA		
"A"	"B"	"C"
4"	18"	7"
6"	22"	8"
8"	22"	8"
12"	22"	8"

NOTES:

- VENTS SHALL BE INSTALLED AT NO MORE THAN 700 FOOT INTERVALS, IMMEDIATELY UPSTREAM OF PIPELINE GRADE CHANGES, AT HIGH POINTS, IMMEDIATELY DOWNSTREAM OF ANY INLET STRUCTURE, AND IMMEDIATELY UPSTREAM OF ANY BENDS.
- ALL VENTS SHALL BE WELDED HOT DIPPED GALVANIZED STEEL PIPE WITH EXPANDED METAL COVER.
- TOP OF VENT SHALL BE A MINIMUM OF 1.5 FEET (1.5') ABOVE HYDRAULIC GRADIENT OR A MINIMUM OF 3 FEET (3') ABOVE SURROUNDING GROUND, WHICHEVER IS GREATER.
- 90° ELBOW FITTINGS FOR OFFSET VENTS ARE NOT ALLOWED.
- ALL GALVANIZED PIPE SHALL BE MINIMUM SCHEDULE 40.
- DEPENDING ON DEPTH OF COVER OVER FID PIPELINE AND VENT DIAMETER, OFFSET VENTS MAY NOT BE ALLOWED.
- CONSTRUCTION GROUT TO BE NON SHRINK, CONSTRUCTION GRADE OR 5,000 PSI MINIMUM.



FRESNO IRRIGATION DISTRICT

VENT - METAL T

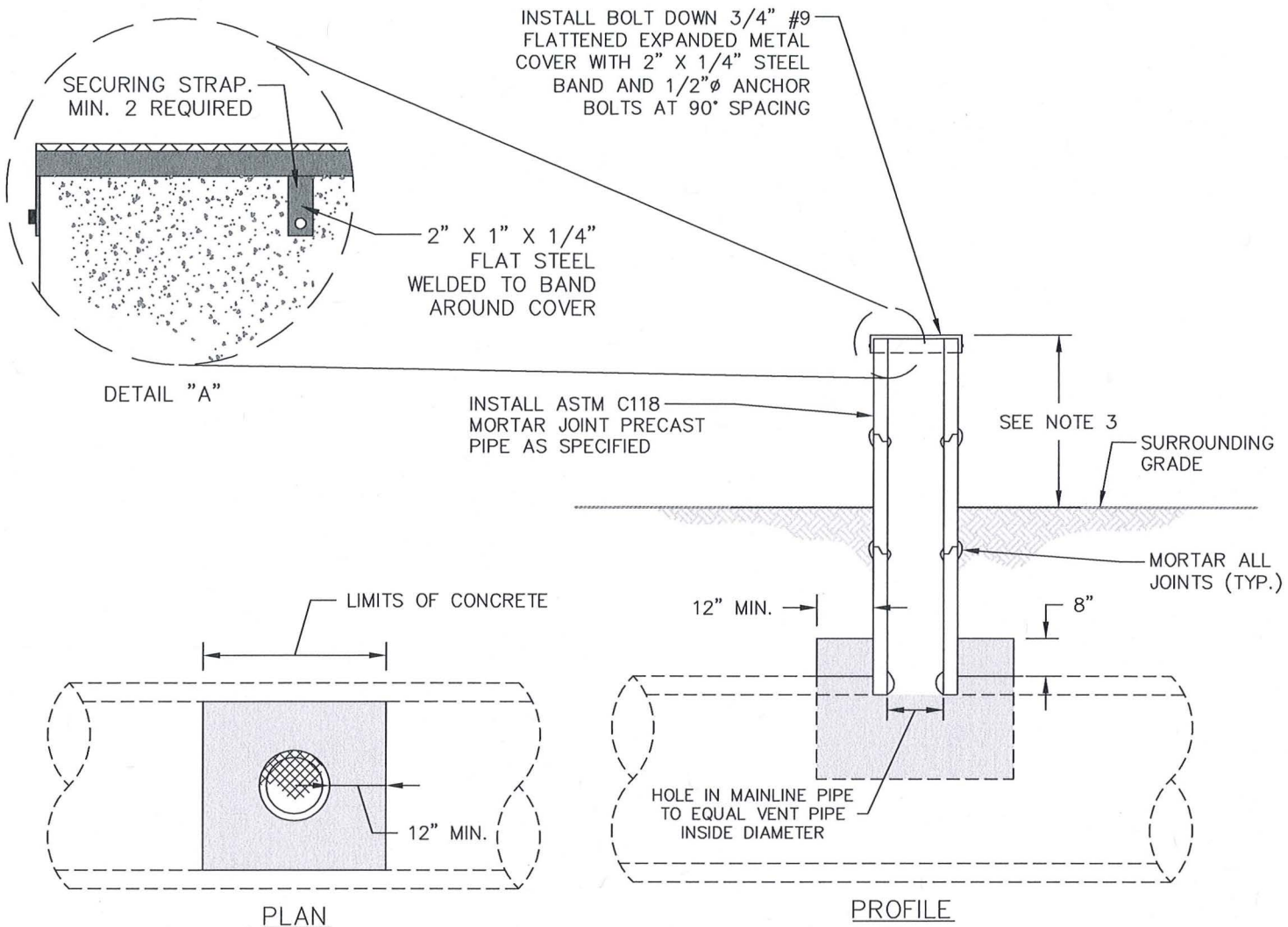
"Your Most Valuable Resource - Water"

SCALE: NOT TO SCALE  
DATE: JANUARY 2018

STANDARD DETAIL  
4-04

SHEET 1 OF 1





A.S.T.M. C118 CONCRETE PIPE	
PIPE DIA. ≤ 36"	SEE DETAIL 4-04
36" < PIPE DIA. ≤ 42"	USE 6" DIA. CONCRETE VENT WITH EXPANDED METAL COVER.
PIPE DIA. > 42"	USE 8" DIA. CONCRETE VENT STAND WITH EXPANDED METAL COVER.

**NOTES:**

- VENTS SHALL BE INSTALLED AT NO MORE THAN 700 FEET (700') INTERVALS, IMMEDIATELY UPSTREAM OF PIPELINE GRADE CHANGES, AT HIGH POINTS, IMMEDIATELY DOWNSTREAM OF ANY INLET STRUCTURE, AND IMMEDIATELY UPSTREAM OF ANY BENDS.
- ALL 3/4 INCH (.75") EXPANDED METAL TO BE PRIMED AND PAINTED WITH RED OXIDE PAINT.
- TOP OF VENT SHALL BE 1.5 FEET (1.5') ABOVE HYDRAULIC GRADIENT OR 3 FEET (3') ABOVE SURROUNDING GROUND, WHICHEVER IS GREATER.



FRESNO IRRIGATION DISTRICT

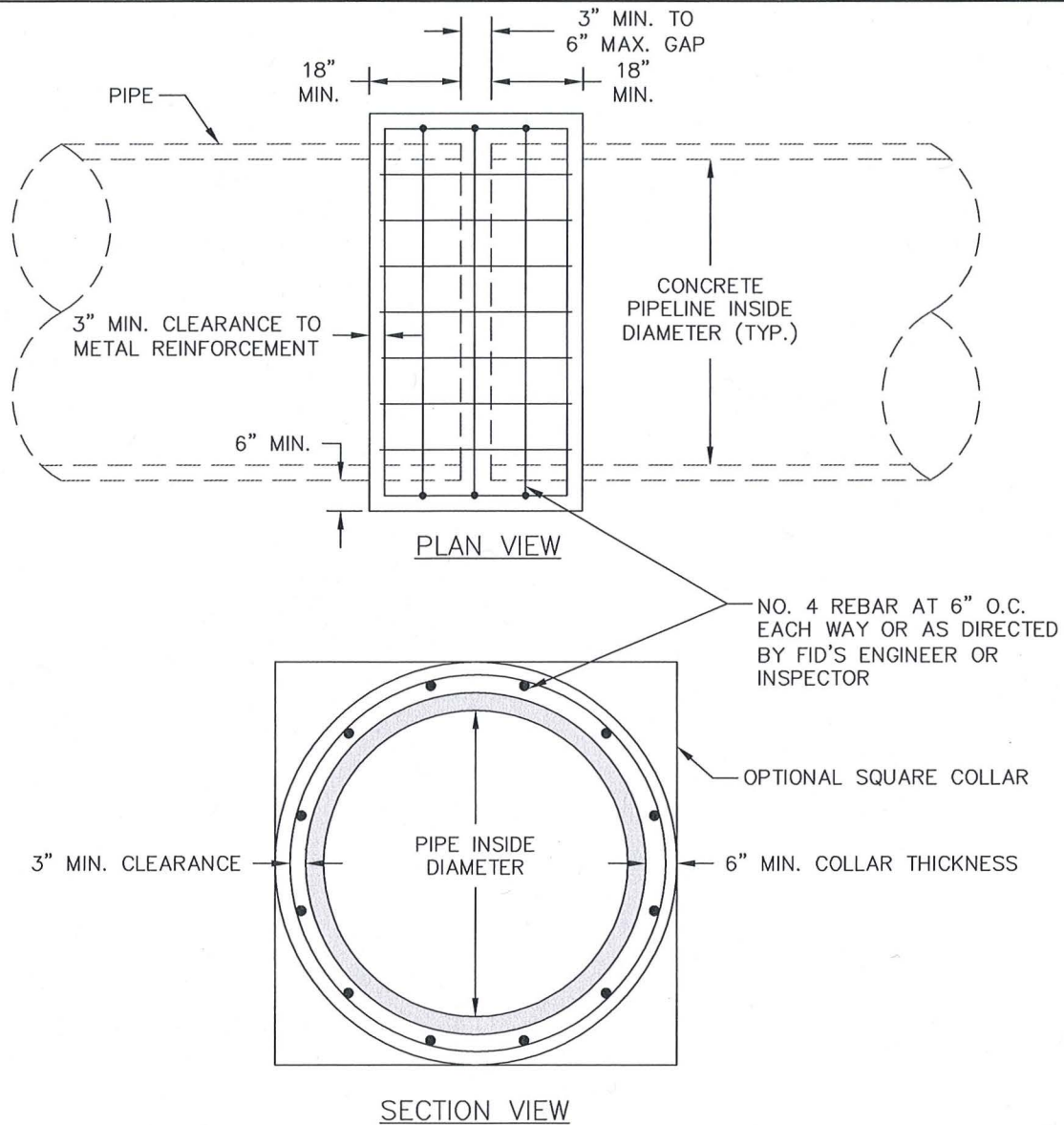
"Your Most Valuable Resource – Water"

VENT – CONCRETE

SCALE: NOT TO SCALE

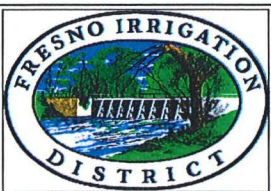
DATE: JANUARY 2018

STANDARD DETAIL  
4-05  
SHEET 1 OF 1



**NOTES:**

1. JOINT GAP SEAM TO BE GROUTED ON THE INSIDE PRIOR TO PLACING OF COLLAR (HAND HOLE IN EXISTING PIPE IS ALLOWED TO MAKE INSIDE BAND). TO BE INSPECTED PRIOR TO CONCRETE COLLAR BEING POURED.
2. TWENTY-FOUR HOURS AFTER INSIDE BAND IS MADE, COAT WITH EPOXY OVER BANDED AREA.
3. IF REQUIRED, HAND HOLE PLUG TO BE EPOXIED AT MATCHING SURFACES WITH PIPE AND THEN MORTAR AND PLUG HOLE.
4. THE ENTIRE SURFACE OF THE PIPE IN THE COLLAR AREA IS TO BE COATED WITH EPOXY JUST PRIOR TO POURING THE COLLAR. EPOXY TYPE TO BE REZI WELD 1000 OR APPROVED EQUIVALENT.
5. EXTERNAL COLLAR, WHEN IN PLACE AND SET, MUST BE WATERED DOWN TO A POINT OF SATURATION THEN COVERED WITH WET BURLAP AND SHADED WITH 6 INCHES (6") OF SOIL OVER ENTIRE AREA. SAID SOIL MUST BE KEPT MOIST FOR A PERIOD OF FIVE CONTINUOUS DAYS.
6. COLLAR MUST BE APPROVED BY FID'S ENGINEER OR INSPECTOR PRIOR TO BACKFILLING PIPELINE TRENCH.
7. JOINT SHALL BE WATERTIGHT.
5. CONCRETE SHALL BE A MINIMUM OF 6 1/2-SACK WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI. FIBERCAST 500 OR EQUIVALENT CONCRETE FIBER REINFORCEMENT WITH FIBER LENGTHS BETWEEN 1.5 INCHES (1.5") TO 2 INCHES (2").
6. APPLICATION RATE AT A MINIMUM OF 1.5 POUNDS PER CUBIC YARD AND SHALL BE INCLUDED IN THE CONCRETE MIX.



FRESNO IRRIGATION DISTRICT

CONCRETE COLLAR

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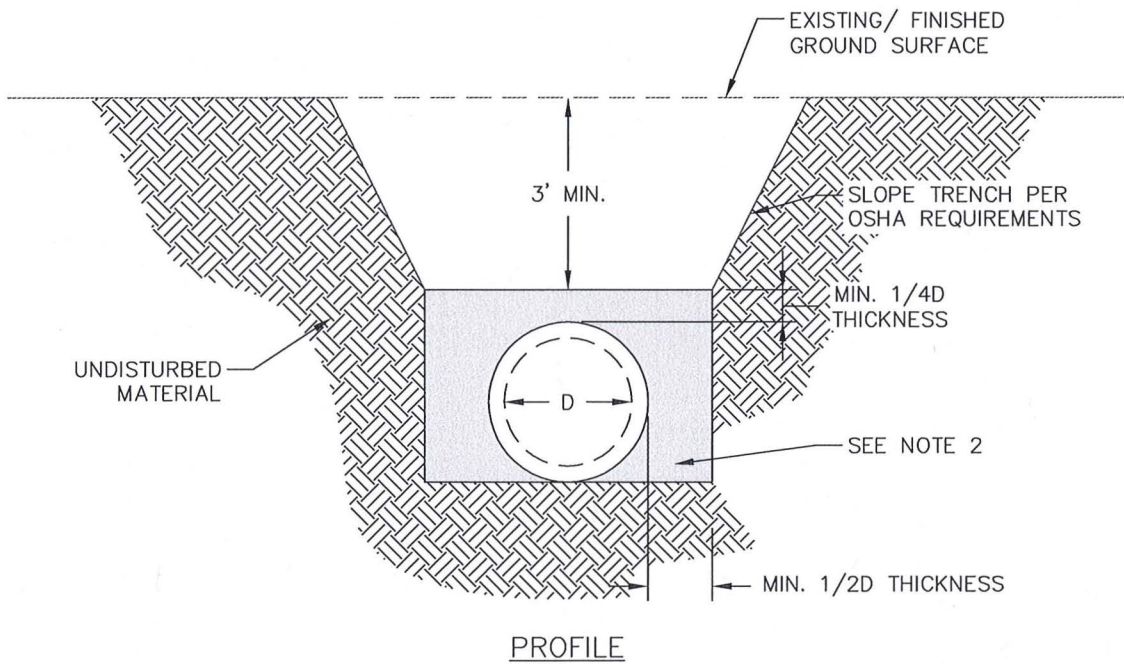
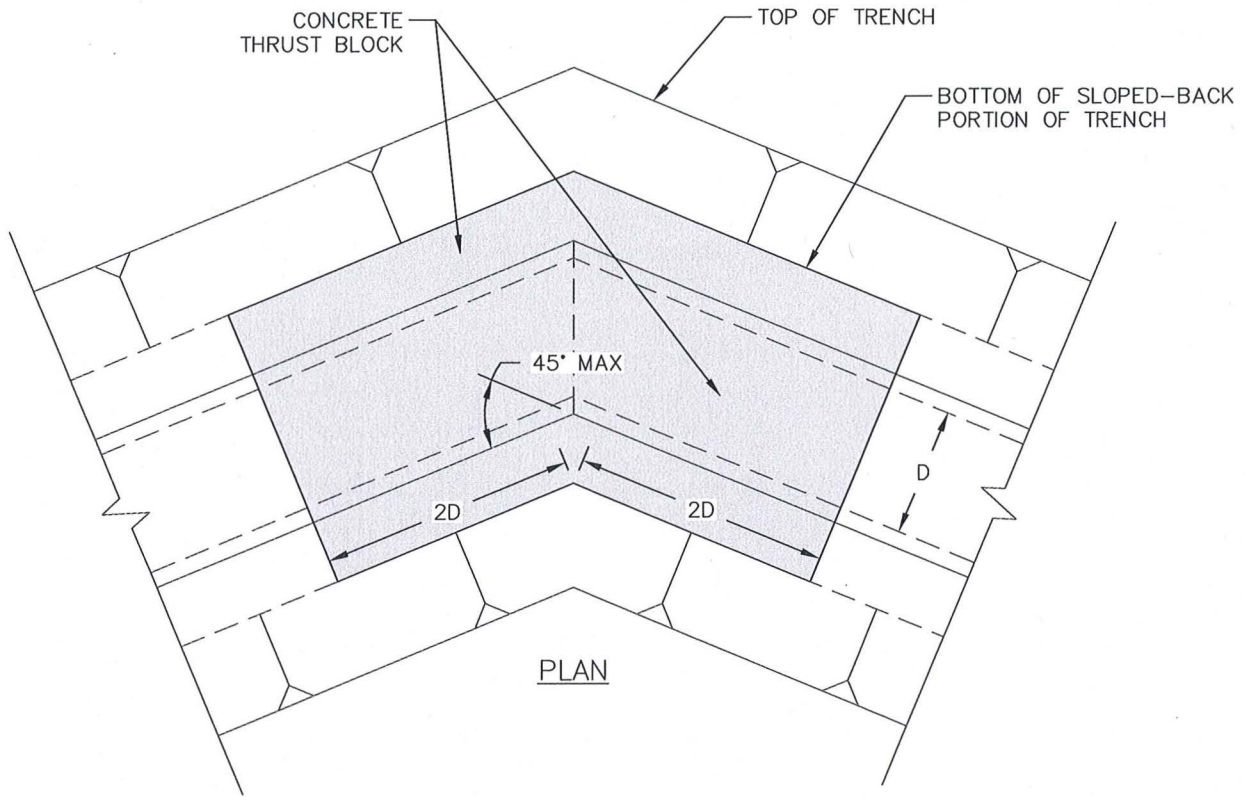
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STANDARD DETAIL

DATE: JANUARY 2018

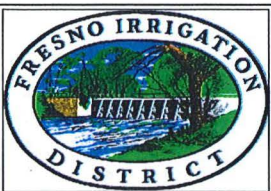
4-06

SHEET 1 OF 1



**NOTES:**

1. THRUST BLOCKS REQUIRED AT EACH PIPELINE BEND.
2. THRUST BLOCK CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1%, AND 3 INCH (3") ± 1 INCH (1") SLUMP AT PLACEMENT.
3. SEE DETAIL 4-02 FOR PIPELINE TRENCH AND BACKFILL REQUIREMENTS.



FRESNO IRRIGATION DISTRICT

THRUST BLOCK

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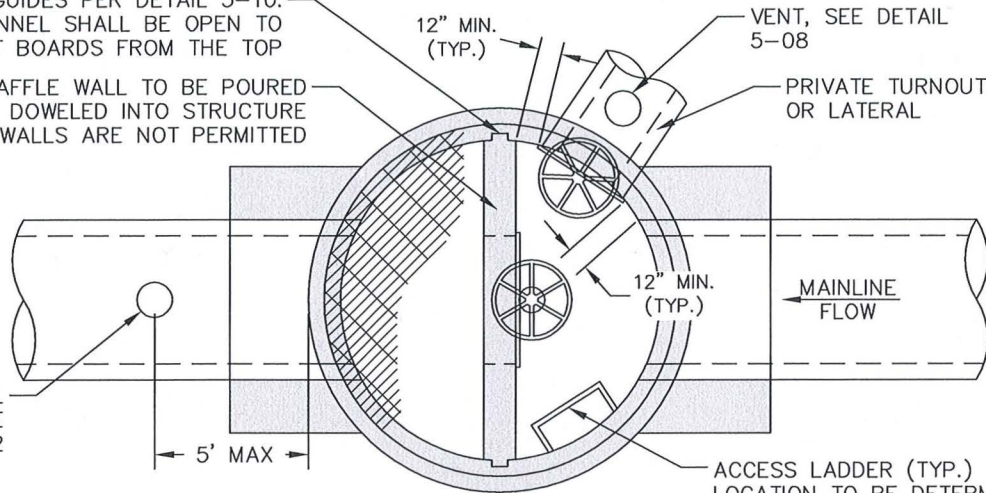
SCALE: NOT TO SCALE  
DATE: JANUARY 2018

STANDARD DETAIL  
4-07  
SHEET 1 OF 1

CONSTRUCT BOARD GUIDES PER DETAIL 5-10.  
TOP OF BOARD CHANNEL SHALL BE OPEN TO  
ACCEPT BOARDS FROM THE TOP

AS REQUIRED: BAFFLE WALL TO BE POURED  
IN PLACE AND DOWELED INTO STRUCTURE  
PRECAST WALLS ARE NOT PERMITTED

VENT, SEE DETAIL  
4-05 AND NOTE  
10 ON SHEET 2



PLAN VIEW

SEE NOTE 6 ON SHEET  
2 OF THIS DETAIL

INSTALL METAL COVER  
PER DETAIL 6-03

INSTALL LANE POLYPROPYLENE P-14938  
RUNG IF STAND IS > 3' ABOVE GRADE

HWL TO BE FIELD  
VERIFIED BY DESIGNER

SILL ELEVATION DETERMINED BY FID

PRECAST STANDPIPE - SEE  
NOTE 3 ON SHEET 2

6" MIN.

3' MIN.  
COVER

INSTALL LANE  
POLYPROPYLENE P-14938  
RUNG AND SEE NOTE 8 ON  
SHEET 2

CONCRETE COLLAR AROUND  
INLET AND OUTLET PIPES. (TYP.)

MATCH DOWNSTREAM  
FLOWLINE

SCARIFY AND RECOMPACT BENEATH  
STRUCTURE TO MINIMUM 95% RELATIVE  
COMPACTION PER ASTM D-1557 (12" MIN.)

PROFILE VIEW

SEE NOTE 5 ON SHEET 2  
OF THIS DETAIL

GATE TO INCLUDE CLAMP AND  
STEM SUPPORT NO LESS THAN  
12" BELOW TOP OF STRUCTURE

3' MIN. OR 1.5' ABOVE HGL,  
WHICHEVER IS GREATER

FINISHED  
GRADE

ALL STEEL REINFORCEMENT SHALL  
CONFORM TO APPLICABLE  
PROVISIONS OF ACI 318

LIMIT OF CAST-IN-PLACE  
(SLIP FORM) SEE NOTE 4 &  
7 ON SHEET 2 OF THIS  
DETAIL

GATE TO MATCH OUTLET PIPE DIAMETER  
OR AS SPECIFIED BY FID ENGINEER

EPOXY GROUT  
PIPE/STRUCTURE  
INTERFACE  
(TYP.)

MAINLINE  
FLOW

FOR PRECAST STRUCTURE  
CONNECTIONS, SEE DETAIL  
5-03

SLIP FORM BASE - SEE  
NOTE 4 ON SHEET 2 OF  
THIS DETAIL

#4 REBAR 12" O.C.  
BOTH WAYS

FRESNO IRRIGATION DISTRICT

STANDPIPE



"Your Most Valuable Resource - Water"

SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

5-01

SHEET 1 OF 2

STRUCTURE NOTES:

1. STRUCTURAL CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1%, AND 4 INCH (4") SLUMP AT PLACEMENT.
2. ALL CAST-IN-PLACE (SLIP FORM) STRUCTURES SHALL INCLUDE FIBERCAST 500 OR EQUIVALENT CONCRETE FIBER REINFORCEMENT WITH FIBER LENGTHS BETWEEN 1.5 INCH (1.5") TO 2 INCH (2"). APPLICATION RATE AT A MINIMUM OF 1.5 POUNDS PER CUBIC YARD.
3. IF PRECAST STANDPIPE IS USED, SET STAND ON PAD BEFORE CONCRETE HAS COMPLETELY SET. USE RAMNEC BUTYL RUBBER JOINT COMPOUND AROUND JOINT OR APPROVED EQUIVALENT WATERSTOP. STANDPIPE SHALL MEET ASTM C-478. ALL JOINTS SHALL BE WATERTIGHT.
4. IF CAST-IN-PLACE (SLIP FORM) IS USED FOR STANDPIPE, BASE SHALL MEET ACI 318 AND ASTM C-150 SPECIFICATIONS. WALLS SHALL BE MIN. 8 INCH (8") THICK. POUR PAD AND WALLS AT THE SAME TIME. ALL JOINTS SHALL BE WATERTIGHT.
5. INSTALL FRESNO VALVES AND CASTINGS GATE PER SPECIFICATIONS ON PLAN SHEET. RISING STEM REQUIRED FOR ALL GATES. FOR DIA. ≤ 24 INCH (24") USE TYPE W PRESSURE GATES. FOR DIA. > 24 INCH (24") USE MODEL 20-10C.
6. INSTALL 101C FRESNO VALVES AND CASTINGS GATE PER SPECIFICATIONS ON PLAN SHEET. RISING STEM REQUIRED FOR ALL GATES. CONTRACTOR SHALL SUBMIT SHOP DRAWING FOR FID APPROVAL PRIOR TO ORDERING THE GATE.
7. TOP OF SLIP FORM SHALL BE CAST WITH APPROPRIATE IMPRESSION RINGS.
8. SEE CAL/OSHA STANDARDS FOR FIXED LADDER REQUIREMENTS.
9. FID'S INSPECTOR MUST APPROVE ANY CHANGES THAT MAY OCCUR DUE TO FIELD CONDITIONS.
10. DOWNSTREAM AIR VENT MAY BE REQUIRED BY FID ENGINEER.



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource - Water"

STANDPIPE NOTES

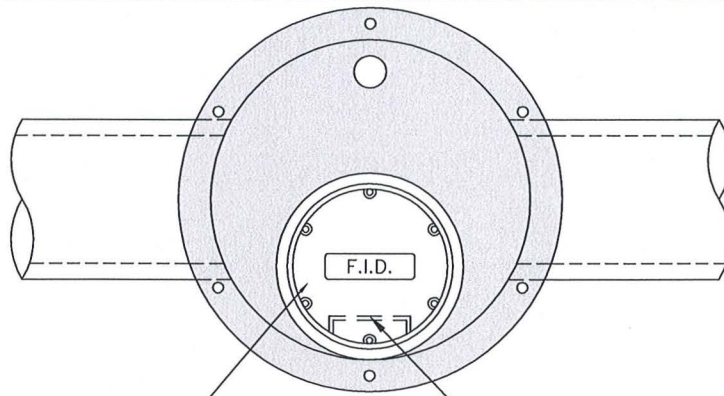
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DATE: JANUARY 2018

STANDARD DETAIL

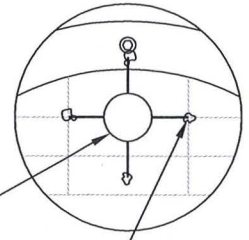
5-01

SHEET 2 OF 2



PLAN VIEW

DETAIL "A"



INSTALL 30" DIA. PRESSURE TYPE (10 PSI) D&L A-1366 SERIES W/6-BOLT AND GASKET OR APPROVED EQUIVALENT. CAST MANHOLE IN LID, FLUSH WITH TOP OF LID, OFFSET FOR VENT CLEARANCE, AND TO BE ABOVE LADDER.

INSTALL STANDARD VENT. SEE DETAIL 4-04

TIE IN VENT TO REBAR PRIOR TO POURING CONCRETE FOR LID

LID TO BE MIN. OF 12" THICK WITH #6 REBAR @ 12" O.C. BOTH WAYS  
RECESS BOLTS OR GRIND EXCESS THREADS TO A SMOOTH FINISH

SEE NOTE 6 ON SHEET 2

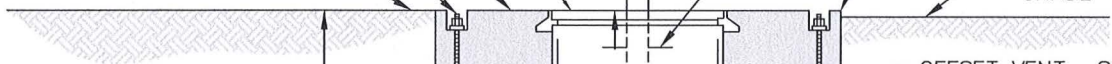
12" MIN.

ROMAC COUPLER

SEE DETAIL "A"

SEE NOTE 6 ON SHEET 2

FINISHED GRADE



OFFSET VENT. SEE SHEET 2 OF DETAIL

SEE NOTE 3 ON SHEET 2

ALL STEEL REINFORCEMENT SHALL CONFORM TO APPLICABLE PROVISIONS OF ACI 318

SECURE LID WITH EIGHT GALVANIZED GRADE 5 ALL-THREAD 3/4"Ø BOLTS @ 45° SPACING THAT EXTEND A MIN. OF 12" INTO CHAMBER WALLS. EPOXY COAT ALL EXPOSED FASTENERS

3' MIN. (TYP.)

LIMIT OF CIP (SLIP FORM). SEE NOTE 5 ON SHEET 2 OF THIS DETAIL

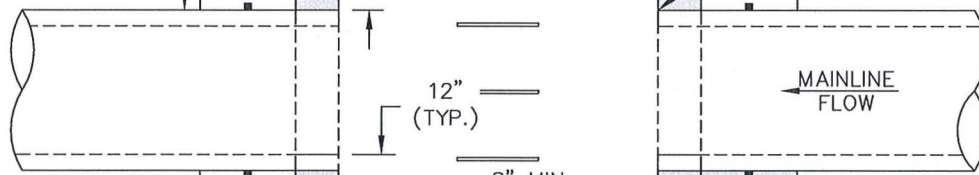
48" MIN.

PRECAST STANDPIPE - SEE NOTE 3 ON SHEET 2

INSTALL LANE POLYPROPYLENE P-14938 RUNGS AND SEE NOTE 8 ON SHEET 2

12"

EPOXY GROUT PIPE/STRUCTURE INTERFACE (TYP.) SEE NOTE 12



12" (TYP.)

MAINLINE FLOW

8" MIN.

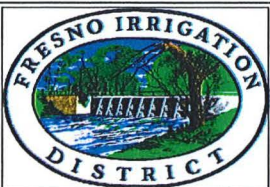
CONCRETE COLLAR AROUND

FOR PRECAST STRUCTURE CONNECTIONS, SEE DETAIL 5-03

PROFILE VIEW

SCARIFY AND RECOMPACT BENEATH STRUCTURE TO MIN. 95% RC PER ASTM D-1557 (12" MIN.)

SLIP FORM BASE - SEE NOTE 4 ON SHEET 2 OF THIS DETAIL



FRESNO IRRIGATION DISTRICT

SURGE CHAMBER

"Your Most Valuable Resource - Water"

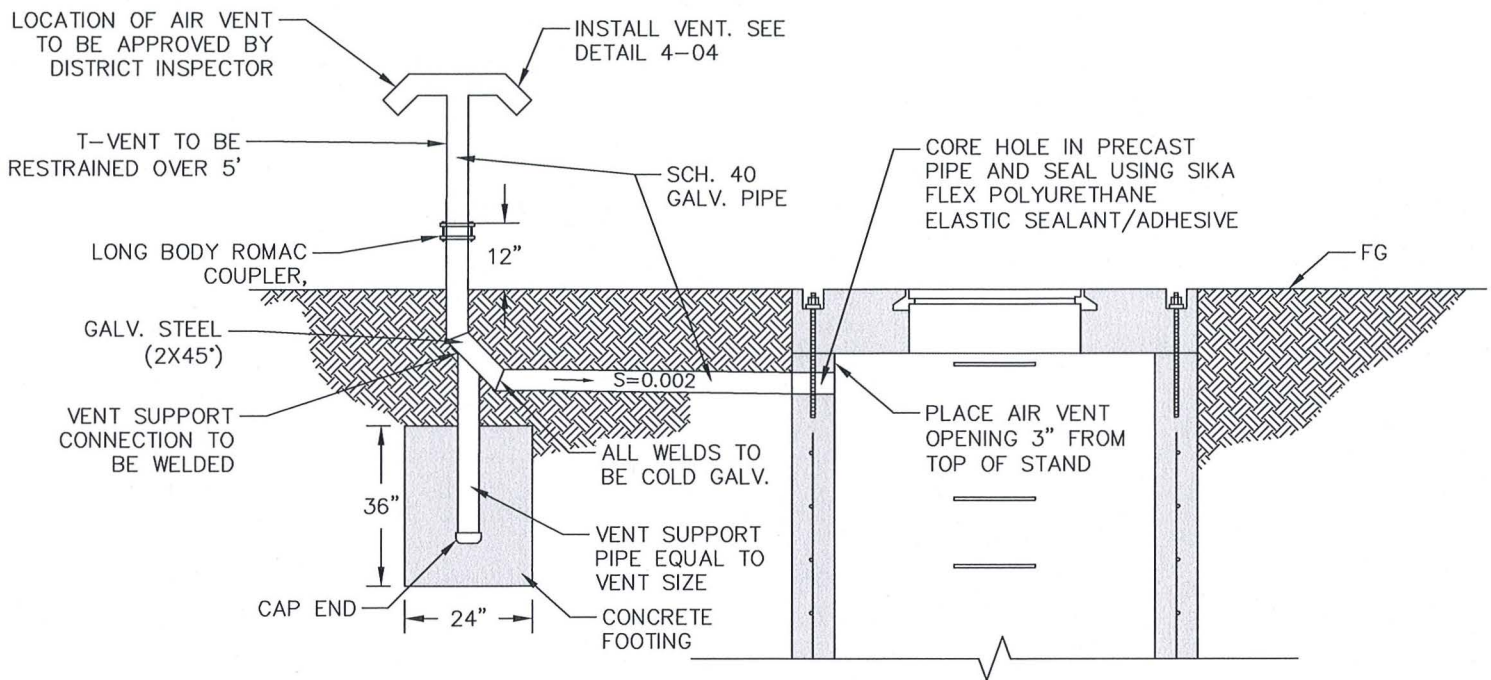
SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

5-02

SHEET 1 OF 2



OFFSET VENT DETAIL  
(AS DETERMINED BY DISTRICT)

STRUCTURE NOTES:

1. STRUCTURAL CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1%, AND 4 INCH SLUMP AT PLACEMENT.
2. ALL CAST-IN-PLACE (SLIP FORM) STRUCTURES SHALL INCLUDE FIBERCAST 500 OR EQUIVALENT CONCRETE FIBER REINFORCEMENT WITH FIBER LENGTHS BETWEEN 1.5 INCH TO 2 INCH. APPLICATION RATE AT A MINIMUM OF 1.5 POUNDS PER CUBIC YARD.
3. USE BUTYL RUBBER JOINT COMPOUND OR SIMILAR WATERSTOP AROUND JOINTS. STANDPIPE SHALL MEET ASTM C-478. ALL JOINTS SHALL BE WATERTIGHT AND GROUTED BOTH INSIDE AND OUTSIDE.
4. IF CAST-IN-PLACE (SLIP FORM) IS USED FOR STANDPIPE, BASE SHALL MEET ACI 318 AND ASTM C-150 SPECIFICATIONS. WALLS SHALL BE MIN. 8 INCH THICK. POUR PAD AND WALLS AT THE SAME TIME. ALL JOINTS SHALL BE WATERTIGHT.
5. TOP OF SLIP FORM SHALL BE CAST WITH APPROPRIATE IMPRESSION RINGS BEFORE CONCRETE HAS COMPLETELY SET.
6. TOP OF LID SHALL BE FLUSH WITH ADJACENT CONCRETE OR 0.10 FEET HIGHER THAN SOIL SURFACE FINISHED GRADE.
7. A MINIMUM OF 12 INCHES OF CONCRETE IS REQUIRED BETWEEN THE TOP THE MAINLINE OF PIPE & THE BOTTOM OF THE LID.
8. SEE CAL/OSHA STANDARDS FOR FIXED LADDER REQUIREMENTS.
9. FID'S INSPECTOR MUST APPROVE ANY DESIGN CHANGES THAT MAY OCCUR DUE TO UNEXPECTED FIELD CONDITIONS.
10. 93% MINIMUM COMPACTION REQUIRED AROUND STAND FOR A MINIMUM OF 5 FEET OR LIMITS OF DISTURBED SOIL, WHICHEVER IS GREATER.
11. DIMENSIONS, REINFORCEMENT, AND NOTES ARE FOR DETAIL PURPOSES ONLY. A SCALED DRAWING SHALL BE PREPARED & SUBMITTED WITH ALL PLAN SETS PRIOR TO CONSTRUCTION.
12. CONSTRUCTION GROUT TO BE NON SHRINK, CONSTRUCTION GRADE OR 5,000 PSI MINIMUM.



FRESNO IRRIGATION DISTRICT

SURGE CHAMBER NOTES

"Your Most Valuable Resource - Water"

SCALE: NOT TO SCALE

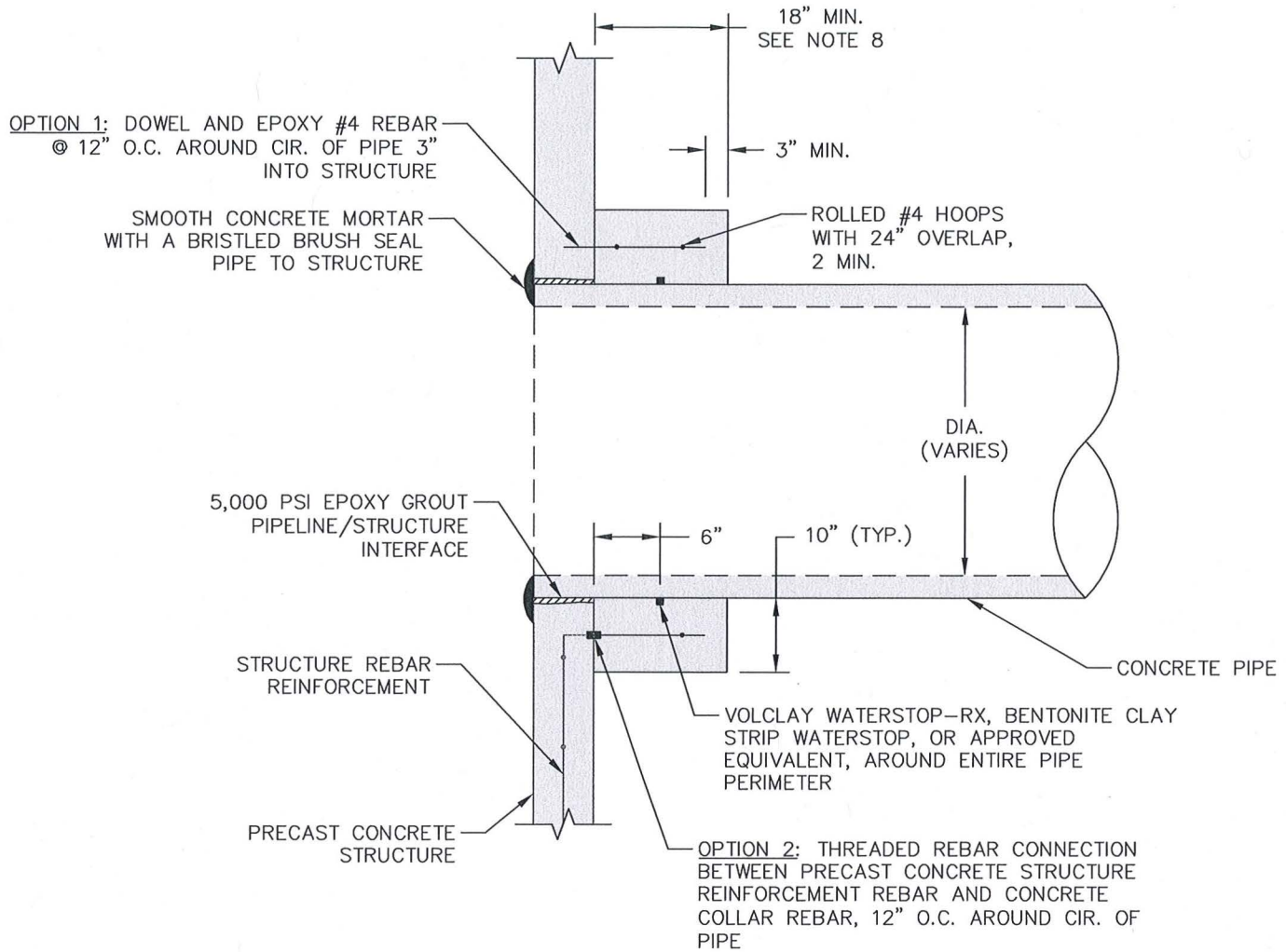
STANDARD DETAIL

DATE: JANUARY 2018

5-02

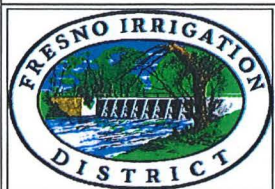
SHEET 2 OF 2

\*FOR CONCRETE WALLS 4 INCHES OR GREATER



NOTES:

1. CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1%, AND 4 INCH SLUMP AT PLACEMENT.
2. REMOVE FORMS USED TO POUR CONCRETE COLLAR PRIOR TO BACKFILL.
3. DIAMETER OF ROLLED HOOPS SHALL BE PIPE INSIDE DIAMETER + (2 X WALL THICKNESS) + 10 INCHES.
4. CONCRETE SHALL BE VIBRATED AROUND PIPE JOINT DURING PLACEMENT.
5. CONCRETE PIPE SHALL BE CLEANED AND TREATED WITH CONCRETE BONDING AGENT PRIOR TO CONCRETE PLACEMENT.
6. PREPARE SURFACE OF STRUCTURE BY WIRE BRUSHING, WATER BLASTING, OR SAND BLASTING AS REQUIRED AND TREATED WITH CONCRETE BONDING AGENT PRIOR TO CONCRETE PLACEMENT.
7. IF A VENT IS REQUIRED, VENT SHALL BE INCORPORATED INTO CONCRETE COLLAR. LENGTHEN COLLAR AS NECESSARY. COLLAR TO EXTEND 12 INCH MINIMUM BEYOND VENT.
8. OPTION 1 OR OPTION 2 SHALL BE USED FOR THE STRUCTURE TO COLLAR REBAR CONNECTION.
9. JOINT SHALL BE WATERTIGHT.



FRESNO IRRIGATION DISTRICT

STANDPIPE CONNECTION

"Your Most Valuable Resource - Water"

SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

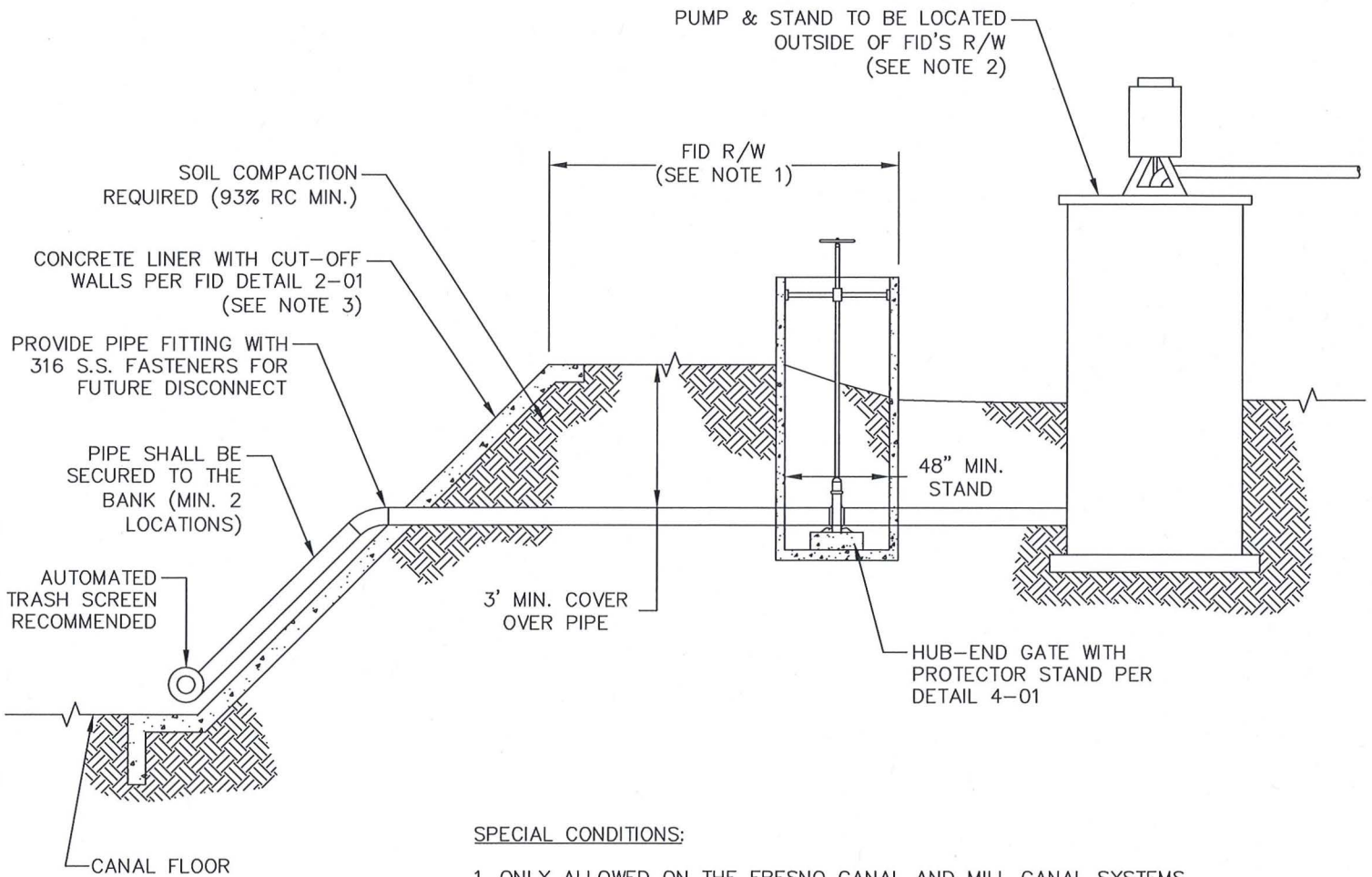
5-03

SHEET 1 OF 1



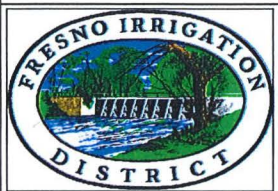
**NOTES:**

1. FID R/W:  
CANALS 50 C.F.S. & UP AS REQUIRED NOT LESS THAN 20 FEET.  
CANALS UNDER 50 C.F.S. AS REQUIRED BUT NOT LESS THAN 17 FEET.
2. FLOW METER SHALL BE FURNISHED & INSTALLED PER FID REQUIREMENTS.
3. IF CONCRETE OR RIP-RAP LINER IS NOT INSTALLED, LANDOWNER ASSUMES ALL RESPONSIBILITY FOR THE REPAIR OR REPLACEMENT OF ANY PRIVATE PIPELINE AND PIPELINE APPURTENANCES DAMAGED DUE TO ANY POTENTIAL BANK EROSION.



**SPECIAL CONDITIONS:**

1. ONLY ALLOWED ON THE FRESNO CANAL AND MILL CANAL SYSTEMS, SUBJECT TO DETERMINATION BY FID ENGINEER.



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource – Water"

OFFSET PUMP STAND  
ROTATING SCREEN INTAKE

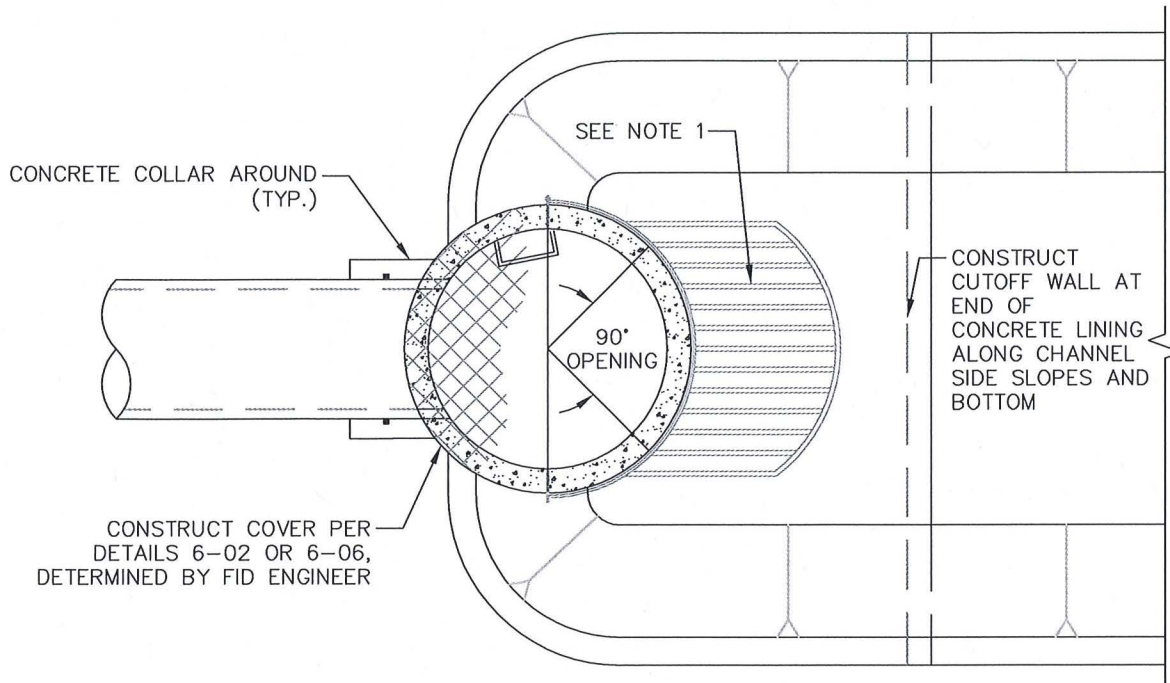
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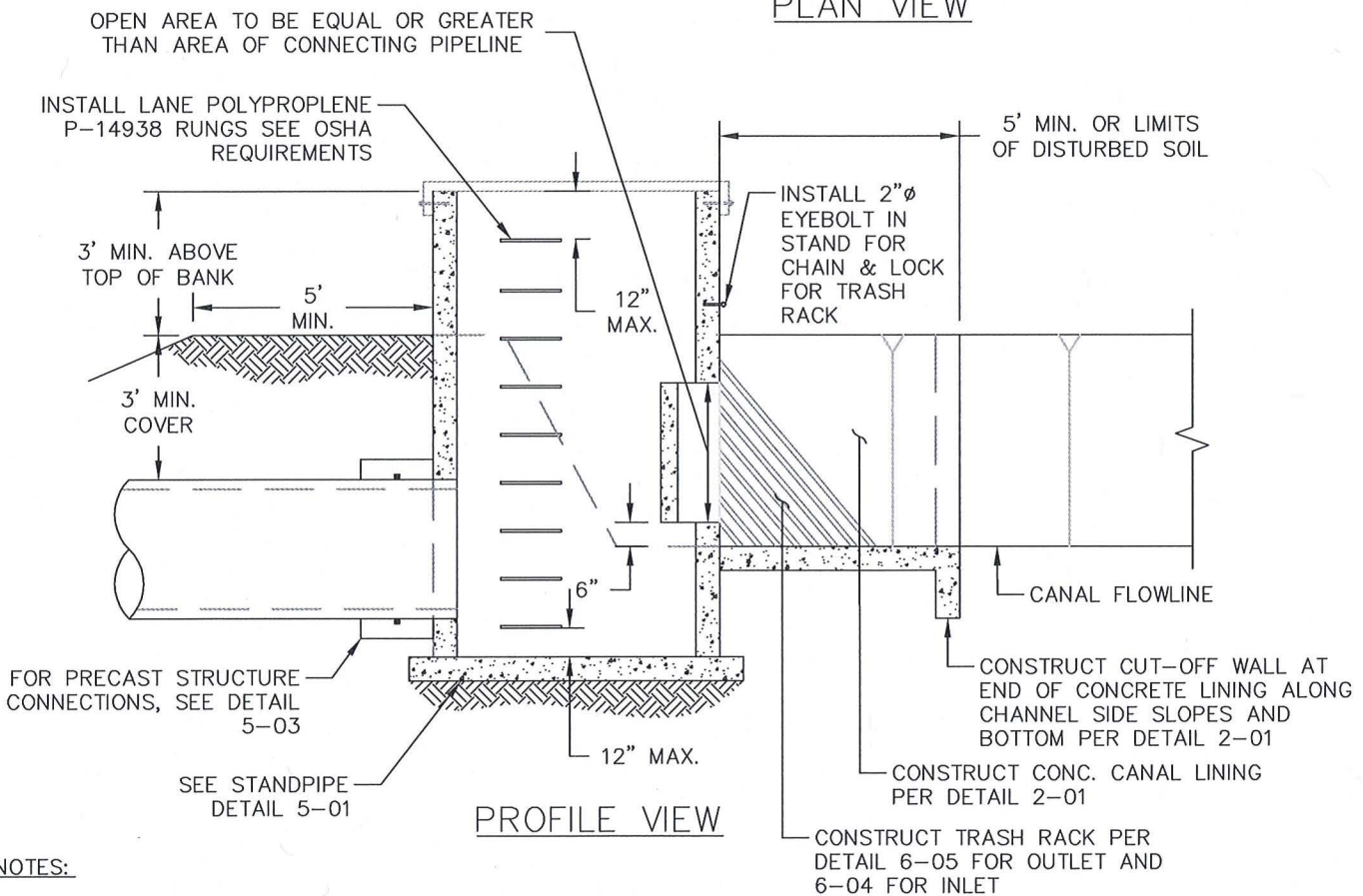
STANDARD DETAIL

5-04

SHEET 1 OF 1



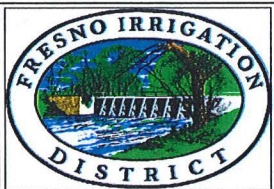
PLAN VIEW



PROFILE VIEW

NOTES:

1. BOTTOM MUST REMAIN FLAT AND LEVEL WITH FLOW LINE TO A POINT BEHIND TRASH RACK PLACEMENT.
2. BACKFILL AROUND STRUCTURE TO HAVE 93% RELATIVE COMPACTION.
3. STANDS GREATER THAN 3 FEET SEE DETAIL 6-10.



FRESNO IRRIGATION DISTRICT

INLET/OUTLET STAND

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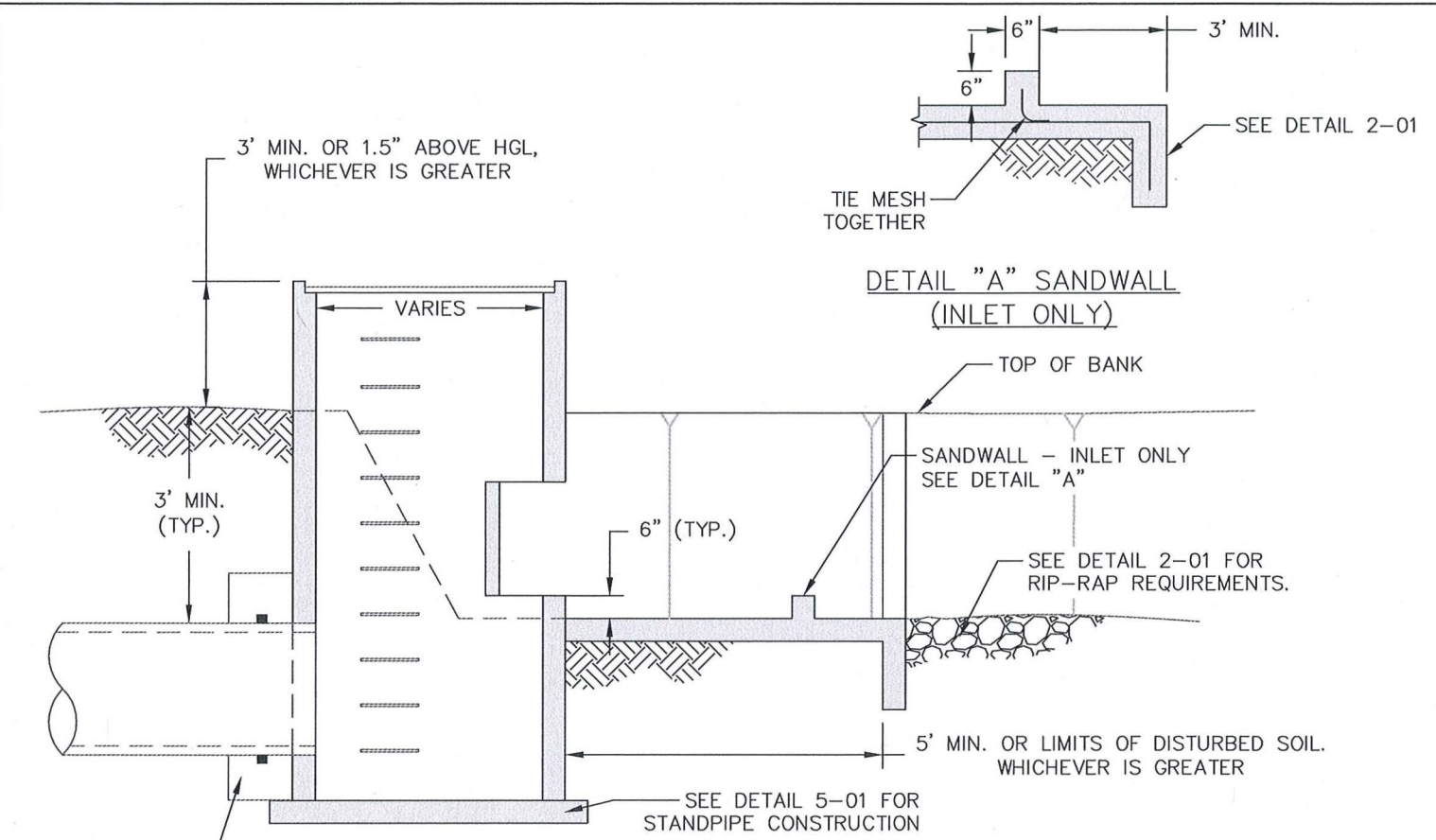
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STANDARD DETAIL

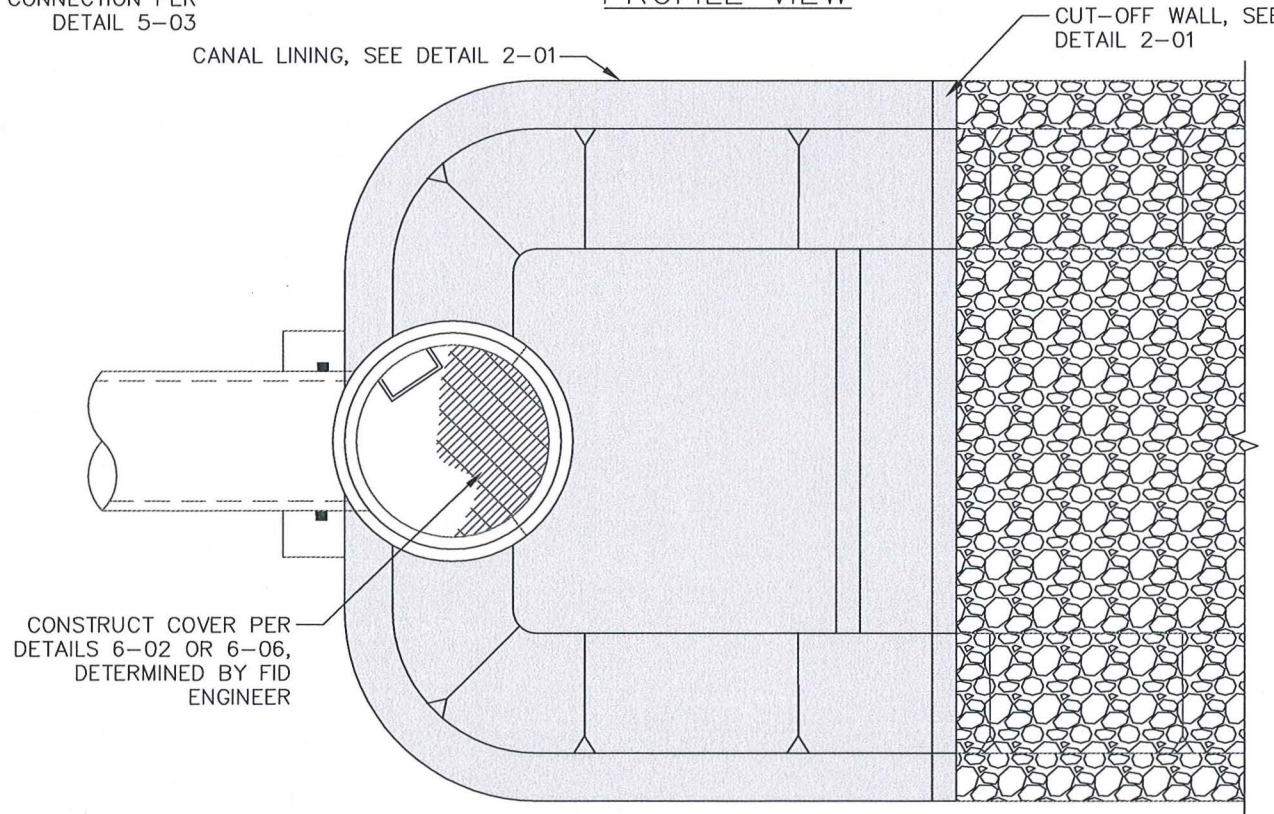
DATE: JANUARY 2018

5-05

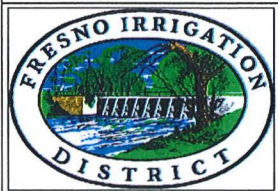
SHEET 1 OF 2



PROFILE VIEW



PLAN VIEW



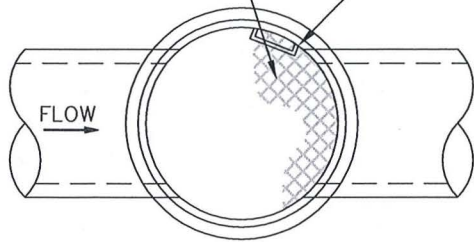
FRESNO IRRIGATION DISTRICT

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BATH TUB INSTALLATION		STANDARD DETAIL 5-05 SHEET 2 OF 2
SCALE:	NOT TO SCALE	
DATE:	JANUARY 2018	

INSTALL METAL COVER, SEE DETAIL 6-02 OR 6-06 AS DETERMINED BY FID ENGINEER

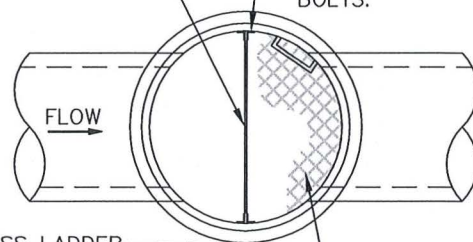
ACCESS LADDER



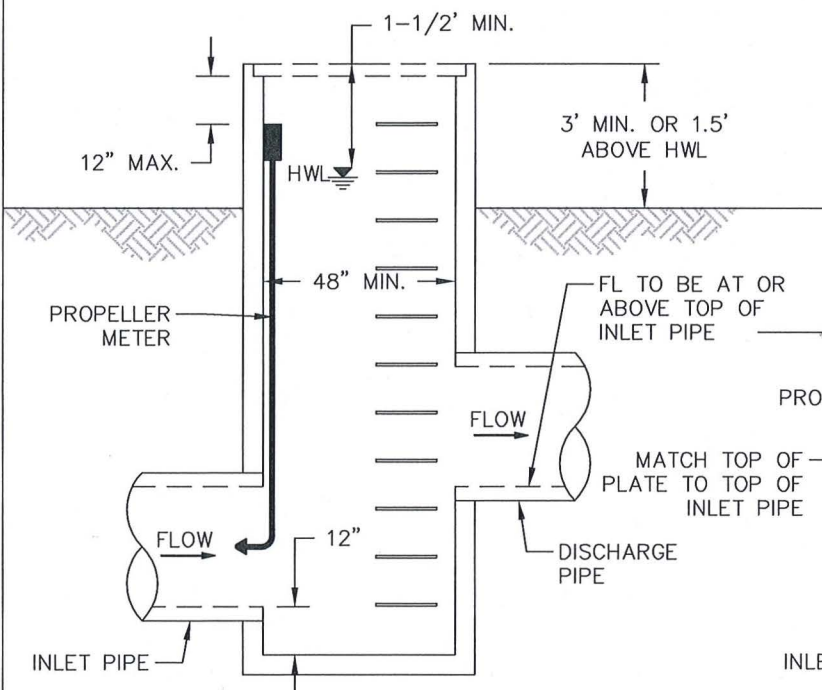
INSTALL 1/2" GALVANIZED STEEL PLATE

INSTALL 1/4" X 2" X 2" ANGLE IRON BRACKETS. BOLT TO WALL @ 12" INTERVALS WITH STAINLESS STEEL BOLTS.

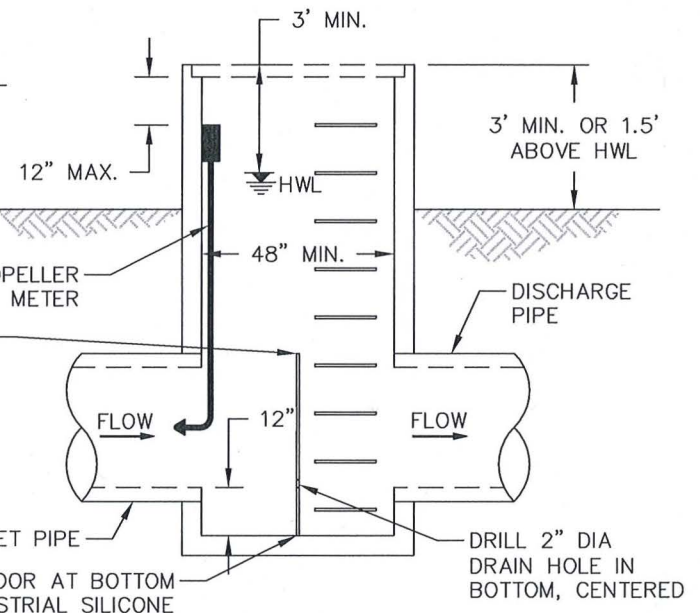
ACCESS LADDER



INSTALL METAL COVER, SEE DETAIL 6-02 OR 6-06 AS DETERMINED BY FID ENGINEER



TYPE "A" METER STAND  
OFFSET CONNECTING PIPES



TYPE "B" METER STAND

NOTES:

1. SEE DETAIL 5-01 FOR STANDPIPE CONSTRUCTION.
2. ALL METER STANDS MUST BE INSTALLED A MINIMUM OF 10 PIPELINE DIAMETERS DOWNSTREAM FROM GATE OR BEND.



FRESNO IRRIGATION DISTRICT

METER STAND

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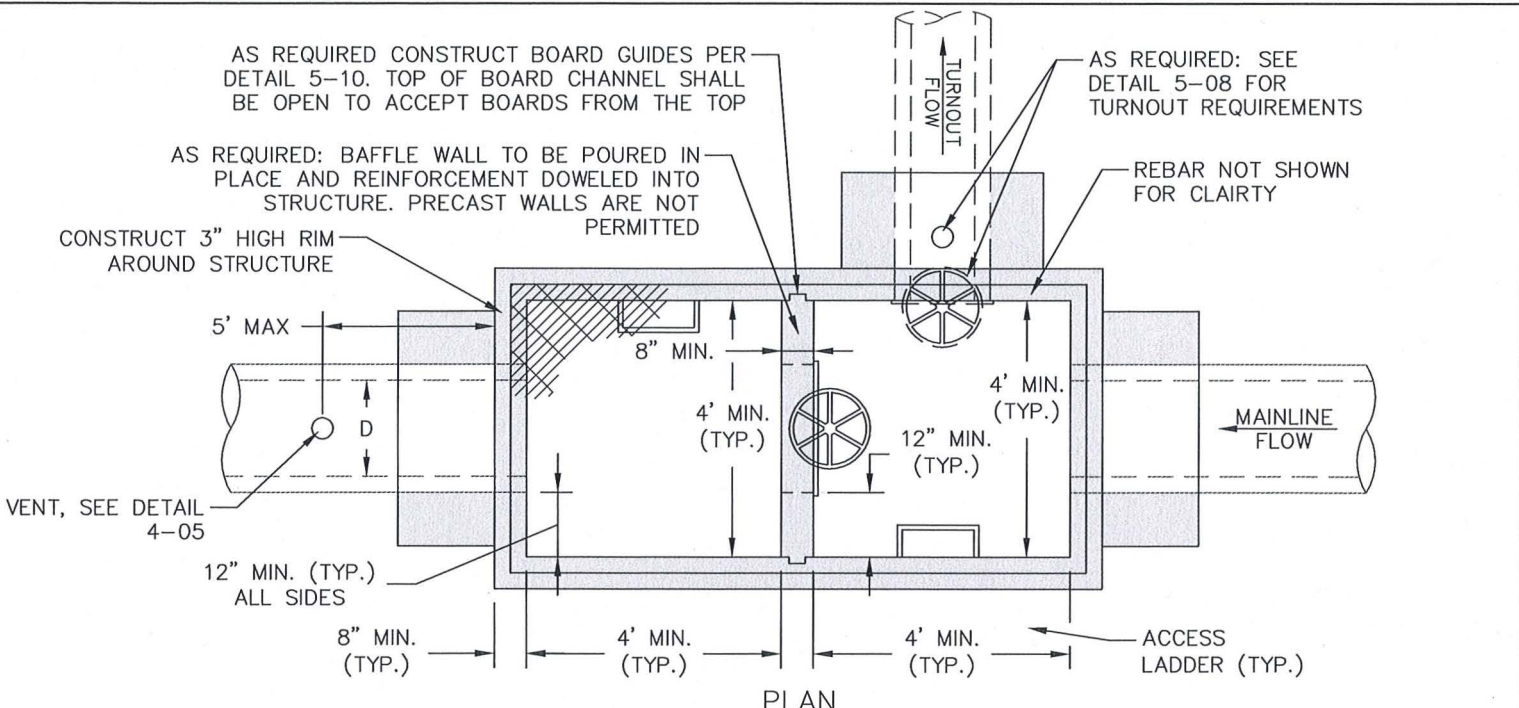
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STANDARD DETAIL

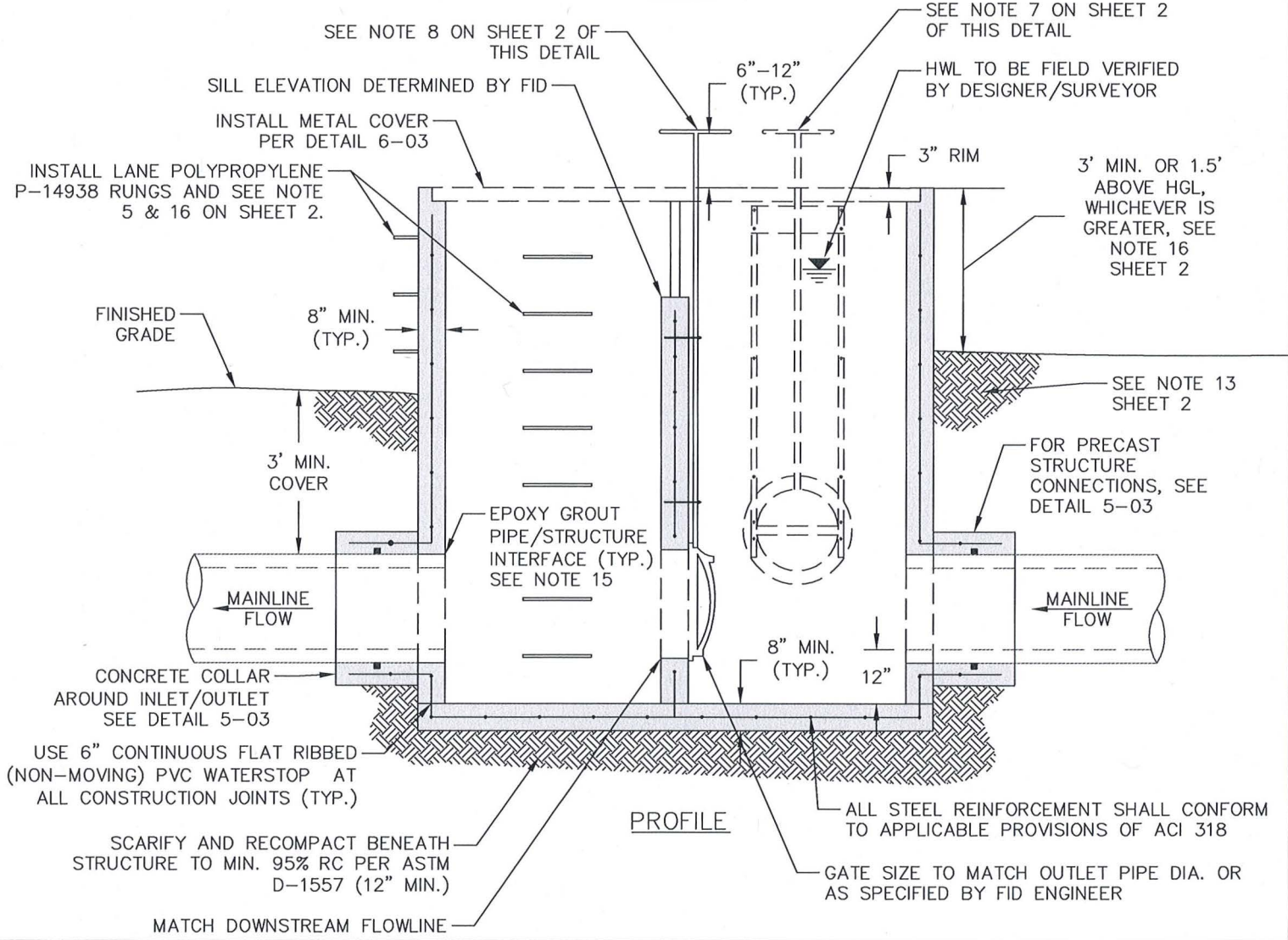
DATE: JANUARY 2018

5-06

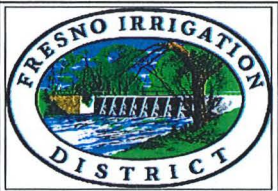
SHEET 1 OF 1



PLAN



PROFILE



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource - Water"

BACKUP STRUCTURE - BOX

SCALE: NOT TO SCALE

DATE: JANUARY 2018

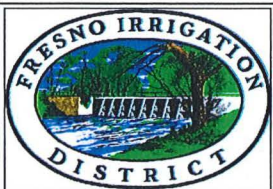
STANDARD DETAIL

5-07

SHEET 1 OF 2

STRUCTURE NOTES:

1. IF CAST-IN-PLACE STRUCTURE IS USED, THEN STRUCTURE SHALL MEET ACI 318 REQUIREMENTS. THE CONTRACTOR SHALL SUBMIT PROPOSED CONCRETE AND STEEL REINFORCEMENT SPECIFICATIONS TO FID FOR APPROVAL PRIOR TO CONSTRUCTION. ALL CAST-IN-PLACE JOINTS SHALL BE WATERTIGHT.
2. IF PRECAST STRUCTURE IS USED, THEN STRUCTURE SHALL MEET ACI 318 REQUIREMENTS. USE BUTYL OR SIMILAR WATERSTOP AROUND JOINT. JOINTS SHALL BE GROUTED ON THE INSIDE AND OUTSIDE. ALL JOINTS SHALL BE WATERTIGHT.
3. STRUCTURAL CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1%, AND 4 INCH SLUMP AT PLACEMENT.
4. ALL CAST-IN-PLACE STRUCTURES SHALL INCLUDE FIBERCAST 500 OR EQUIVALENT CONCRETE FIBER REINFORCEMENT WITH FIBER LENGTHS BETWEEN 1.5 INCH TO 2 INCH. APPLICATION RATE TO BE A MINIMUM OF 1.5 POUNDS PER CUBIC YARD.
5. SEE CAL/OSHA STANDARDS FOR FIXED LADDER REQUIREMENTS.
6. FID'S INSPECTOR MUST APPROVE ALL DESIGN CHANGES THAT OCCUR DUE TO UNEXPECTED FIELD CONDITIONS.
7. AS REQUIRED: INSTALL FRESNO VALVES AND CASTINGS GATE PER SPECIFICATIONS ON PLAN SHEET. RISING STEM REQUIRED FOR ALL GATES. FOR DIAMETER. ≤ 24 INCH USE TYPE W PRESSURE GATES. FOR DIAMETER. > 24 INCH USE MODEL 20-10C. CONTRACTOR SHALL SUBMIT SHOP DRAWING FOR FID APPROVAL PRIOR TO ORDERING THE GATE.
8. AS REQUIRED: INSTALL 101C FRESNO VALVES AND CASTINGS GATE PER SPECIFICATIONS ON PLAN SHEET. RISING STEM REQUIRED FOR ALL GATES. CONTRACTOR SHALL SUBMIT SHOP DRAWING FOR FID APPROVAL PRIOR TO ORDERING THE GATE. GATE SHALL BE GREATER THAN OR EQUAL TO DOWN STREAM PIPE SIZE OR AS DETERMINED BY FID ENGINEER.
9. INSTALL FRESNO VALVES AND CASTINGS 101-C GATE PER SPECIFICATIONS ON PLAN SHEET. RISING STEM REQUIRED FOR ALL GATES.
10. ACCESS LADDERS TO BE PROVIDED AT UPSTREAM/DOWNSTREAM OF THE BAFFLE WALL.
11. GATES GREATER THAN OR EQUAL TO 48 INCH, ADD 3:1 GEAR REDUCER.
12. DIMENSIONS, REINFORCEMENT, AND NOTES ARE FOR DETAIL PURPOSES ONLY. A SCALED DRAWING SHALL BE PREPARED AND SUBMITTED WITH ALL PLAN SETS PRIOR TO CONSTRUCTION.
13. 93% MINIMUM COMPACTION REQUIRED AROUND STAND FOR A MINIMUM OF 5 FEET OR LIMITS OF DISTURBED SOIL, WHICHEVER IS GREATER.
14. DOWN STREAM AIR VENT MAY BE REQUIRED BY FID ENGINEER.
15. CONSTRUCTION GROUT TO BE NON-SHRINK, CONSTRUCTION GRADE OR 5,000 PSI MINIMUM.
16. EXTERNAL LADDER COVER REQUIRED PER DETAIL 6-10 IF STRUCTURE IS MORE THAN 3 FEET ABOVE GRADE.



FRESNO IRRIGATION DISTRICT

BACKUP STRUCTURE – BOX NOTES

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SCALE: NOT TO SCALE

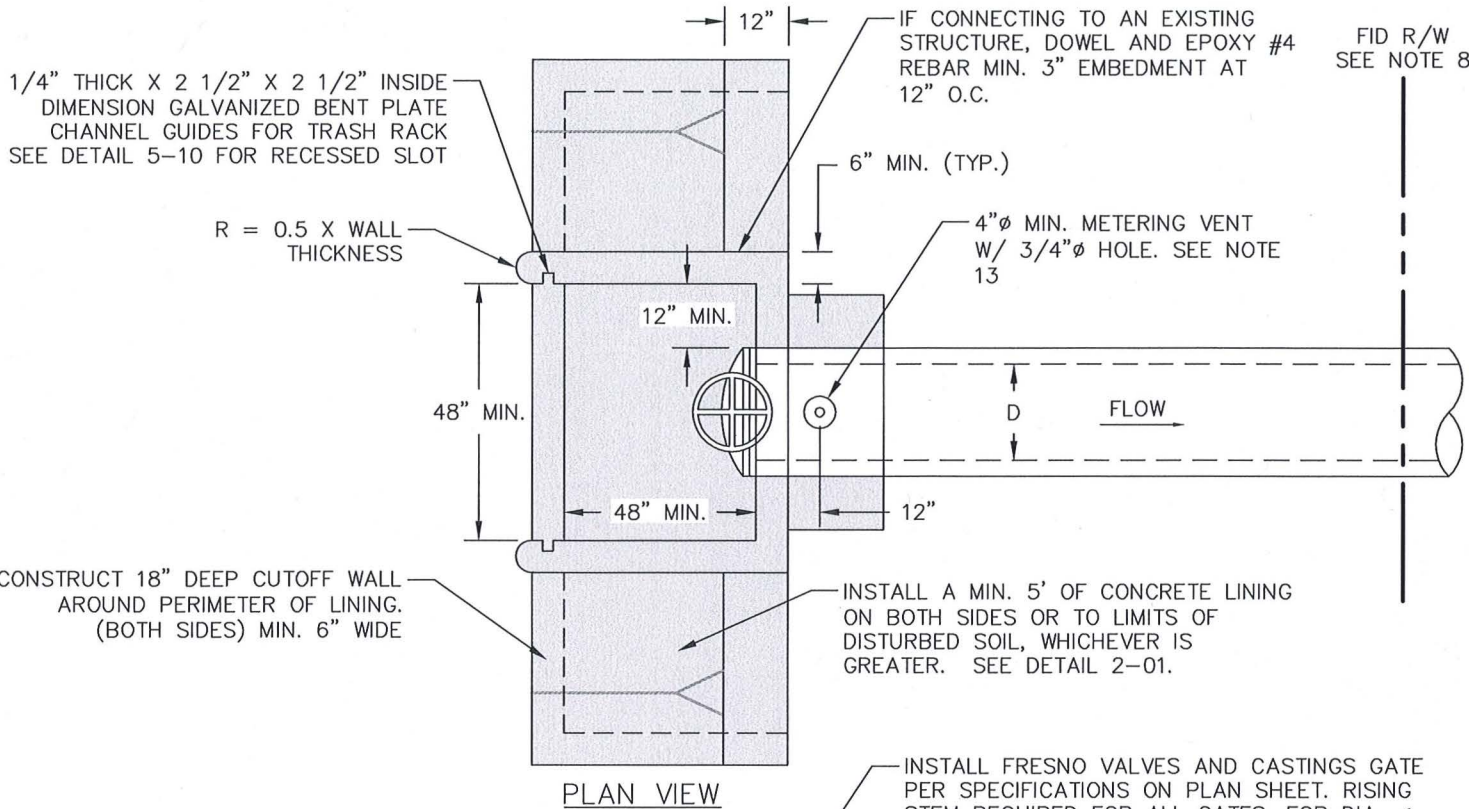
STANDARD DETAIL

DATE: JANUARY 2018

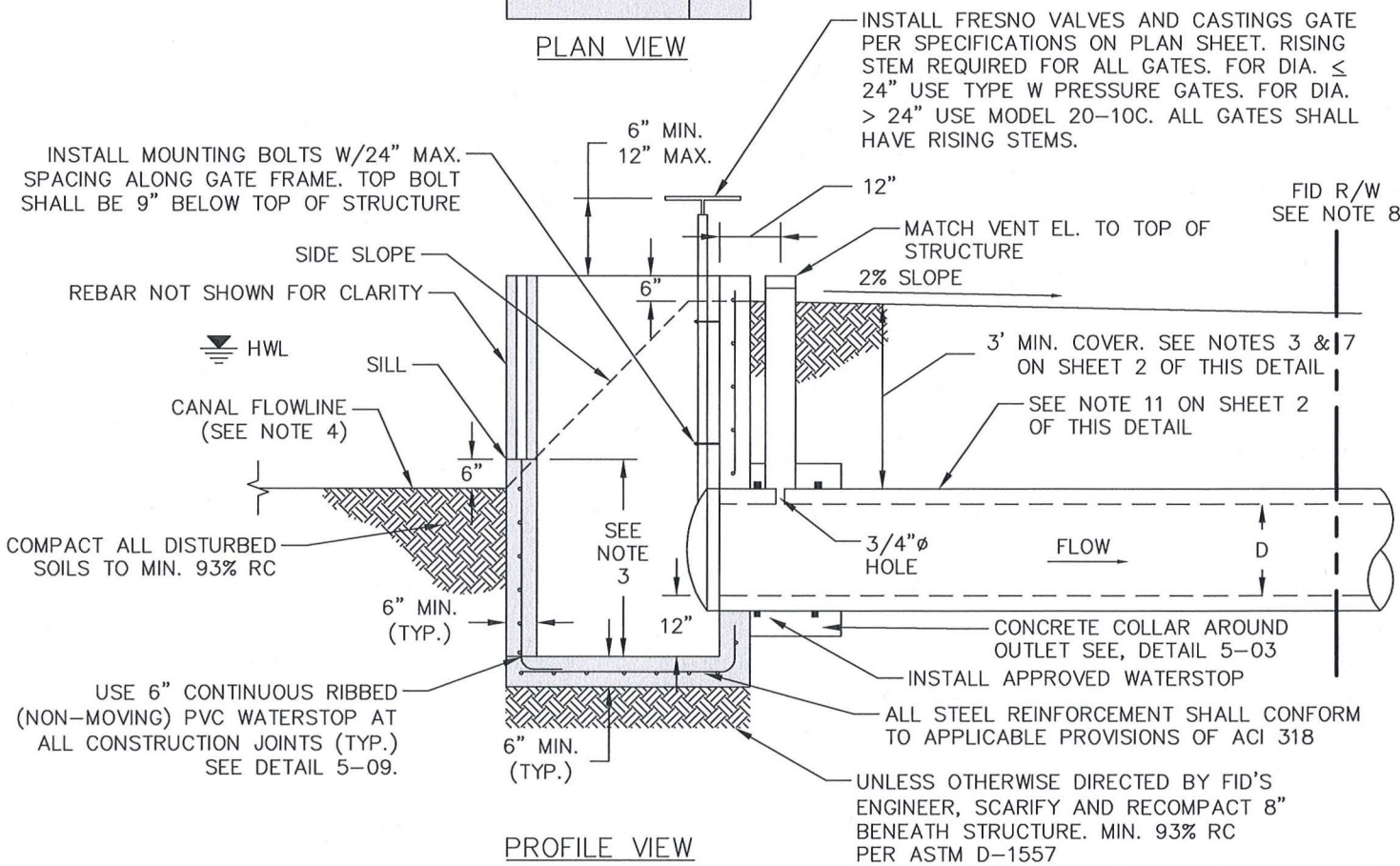
5-07

SHEET 2 OF 2

NOTE: ALL DESIGNS SUBMITTED TO FID FOR APPROVAL SHALL BE DRAWN TO SCALE AND INCLUDE ELEVATIONS



FID R/W  
SEE NOTE 8



FID R/W  
SEE NOTE 8



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource - Water"

TURNOUT

SCALE: NOT TO SCALE

DATE: JANUARY 2018

STANDARD DETAIL

5-08

SHEET 1 OF 2

STRUCTURE NOTES:

1. STRUCTURAL CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1%, AND 4 INCH SLUMP AT PLACEMENT.
2. ALL CAST-IN-PLACE STRUCTURES SHALL INCLUDE FIBERCAST 500 OR EQUIVALENT CONCRETE FIBER REINFORCEMENT WITH FIBER LENGTHS BETWEEN 1.5 INCH TO 2 INCH. APPLICATION RATE TO BE A MINIMUM OF 1.5 POUNDS PER CUBIC YARD.
3. VARIES BASED ON MINIMUM 3 FEET COVER OVER PIPE AND SIZE OF CANAL.
4. REMOVE DEPOSITS/SEDIMENT TO THE NATIVE FLOWLINE OF THE CANAL. CANAL FLOWLINE TO BE FIELD VERIFIED.
5. SUBMITTALS FOR CONCRETE MIX AND GATE VALVES REQUIRED PRIOR TO INSTALLATION.
6. COMPACTION TESTING SHALL BE PERFORMED BY THE OWNER/AGENCY AS DIRECTED BY FID'S ENGINEER OR INSPECTOR.
7. SEE DETAIL 4-02 FOR PIPELINE BACKFILL REQUIREMENTS.
8. SEE DETAIL 1-01 FOR RIGHT-OF-WAY REQUIREMENTS.
9. METER/METER STAND MAY BE REQUIRED PER FID DIRECTION.
10. REFER TO LOW FLOW AGREEMENT REQUIREMENT FOR DRIP INSTALLATION.
11. ALL PIPE SHALL CONFORM TO ASTM C-361 FOR CONCRETE PIPE OR PIP 100 PSI PVC FOR PLASTIC PIPE AND SHALL EXTEND BEYOND FID'S EASEMENT. PIPE SHALL BE INSTALLED PER FID SPECIFICATIONS AND FID INSPECTOR INSTRUCTIONS.
12. ADD GEAR BOX REDUCER (3:1) FOR GATES GREATER THAN OR EQUAL TO 48 INCHES.
13. VENT SIZE SHALL BE 4 INCH MINIMUM, VENT SHALL BE CONCRETE FOR CONCRETE PIPE AND PVC FOR PVC PIPE.



FRESNO IRRIGATION DISTRICT

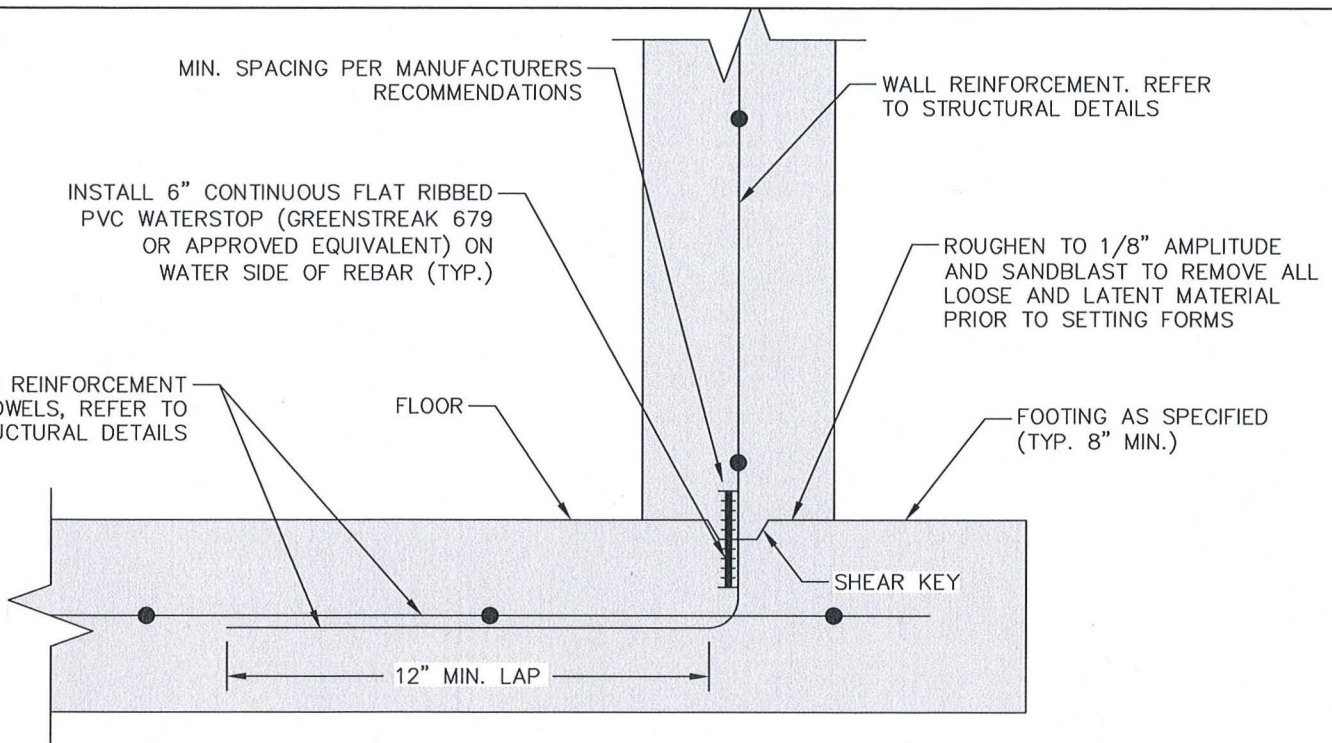
"Your Most Valuable Resource – Water"

TURNOUT NOTES

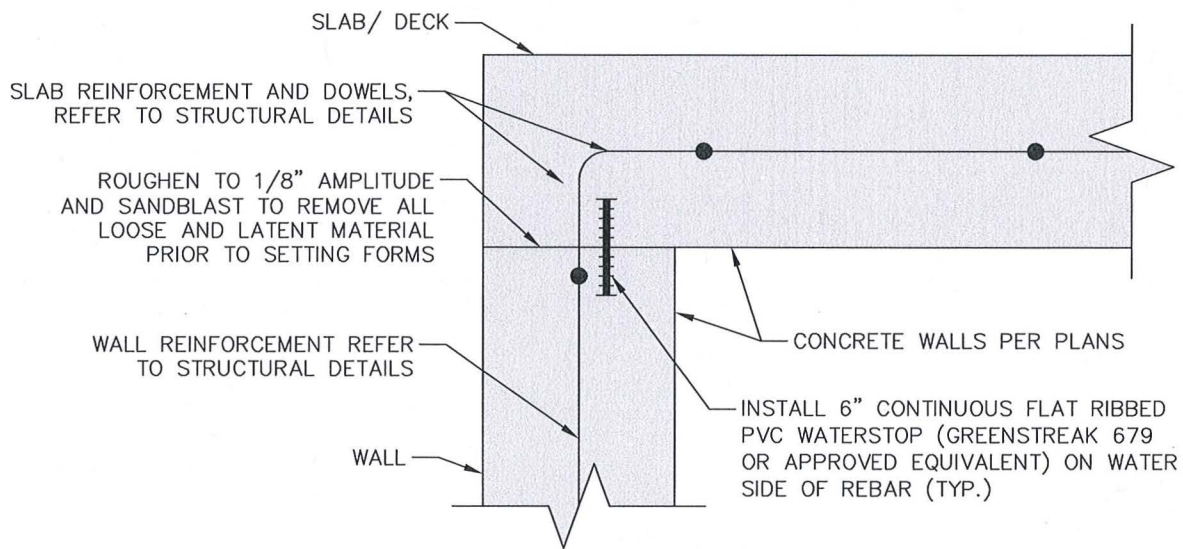
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DATE: JANUARY 2018

STANDARD DETAIL  
5-08





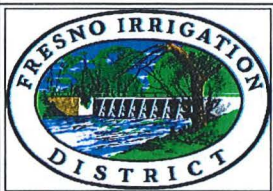
FLOOR TO WALL



WALL TO SLAB

NOTES:

1. ALL JOINTS BETWEEN CONCRETE POURS CONFORM TO THIS STANDARD.
2. CONSTRUCTION JOINTS ARE REQUIRED FOR ALL FLOOR/SLAB TO WALL TRANSITIONS.
3. CONSTRUCTION JOINTS SHALL BE PLACED AS SHOWN ON THE PLANS OR AS PRE-APPROVED BY FID ENGINEER. JOINTS SHALL BE THOROUGHLY CLEANED AND LAITANCE REMOVED BEFORE A NEW POUR IS MADE. EACH JOINT SHALL BE WETTED IMMEDIATELY BEFORE THE PLACING OF NEW CONCRETE.
4. REINFORCING STEEL SHALL JOIN THE CONCRETE BETWEEN POURS WITH A MINIMUM OVERLAP CONFORMING TO ACI 318 OR TO BE DETERMINED BY FID'S ENGINEER.
5. THIS DETAIL INTENTIONALLY DOES NOT SPECIFY CONCRETE THICKNESS OR REINFORCEMENT SIZE, WHICH SHOULD BE DESIGNED SEPARATELY.



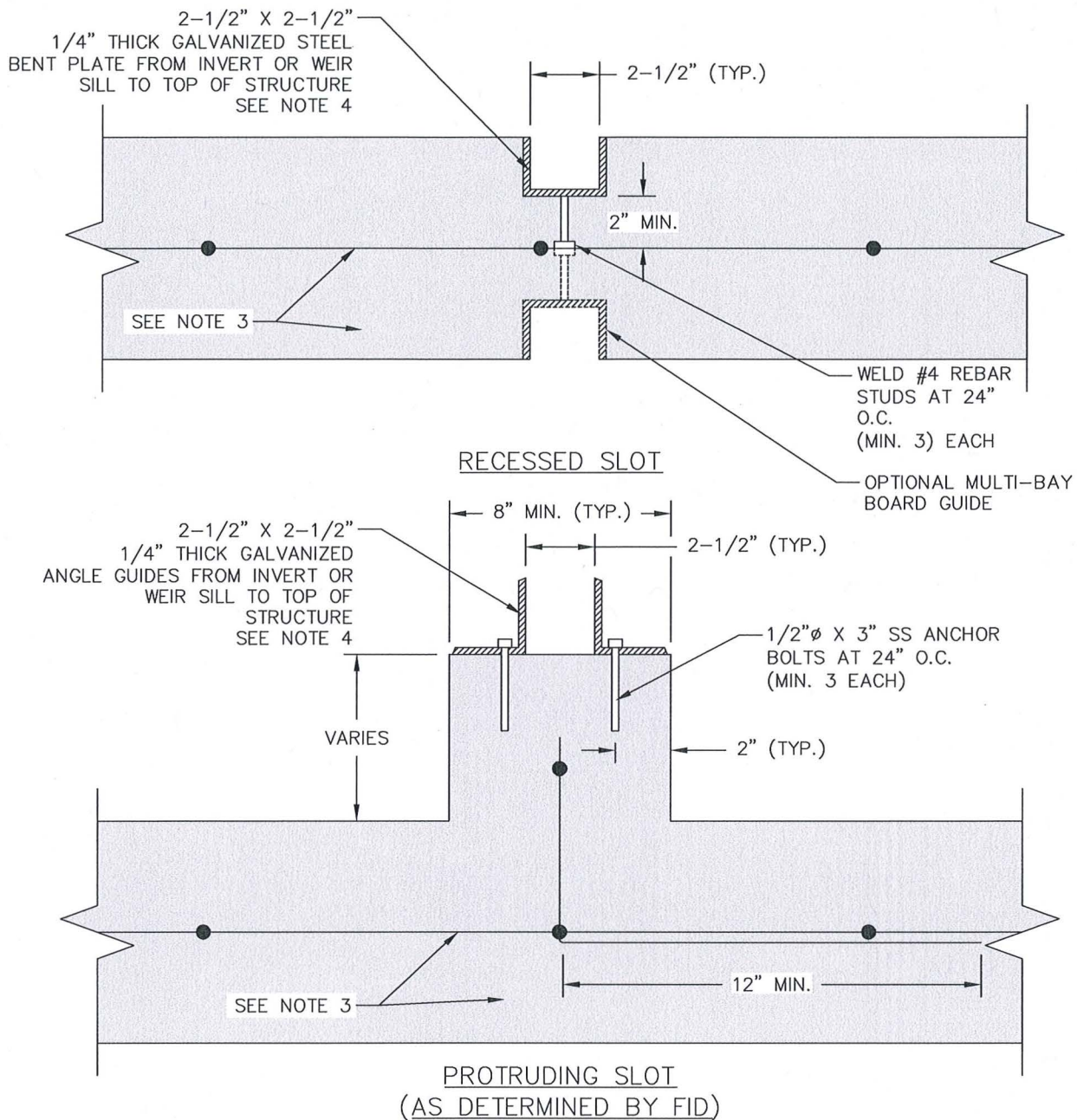
FRESNO IRRIGATION DISTRICT

CONSTRUCTION JOINT

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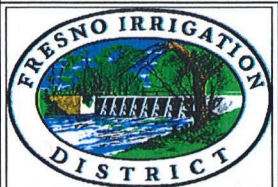
SCALE: NOT TO SCALE  
DATE: JANUARY 2018

STANDARD DETAIL  
5-09  
SHEET 1 OF 1



NOTES:

1. ALL BOARD GUIDES SHALL BE 1/4 INCH THICK, 2-1/2 INCH X 2-1/2 INCH GALVANIZED STEEL. ALL DIMENSIONS SHALL BE FROM THE INSIDE OF THE SLOT, USE 1/4 INCH THICK, 3-1/2 INCH X 3-1/2 INCH FOR LARGER CANALS, UNLESS OTHERWISE SPECIFIED, SEE NOTE 4.
2. BOARD GUIDES SHALL BE RECESSED AND PLACED FLUSH WITH CONCRETE WALL FACES, AS SHOWN ON THE PLANS OR AS DIRECTED BY FID'S ENGINEER.
3. THIS DETAIL INTENTIONALLY DOES NOT SPECIFY CONCRETE THICKNESS OR REINFORCEMENT SIZE, WHICH SHALL BE DESIGNED SEPARATELY.
4. LARGER CANAL/PIPELINE SYSTEMS MAY REQUIRE LARGER SIZE BOARD GUIDES AS DETERMINED BY FID'S ENGINEER.



FRESNO IRRIGATION DISTRICT

BOARD GUIDES

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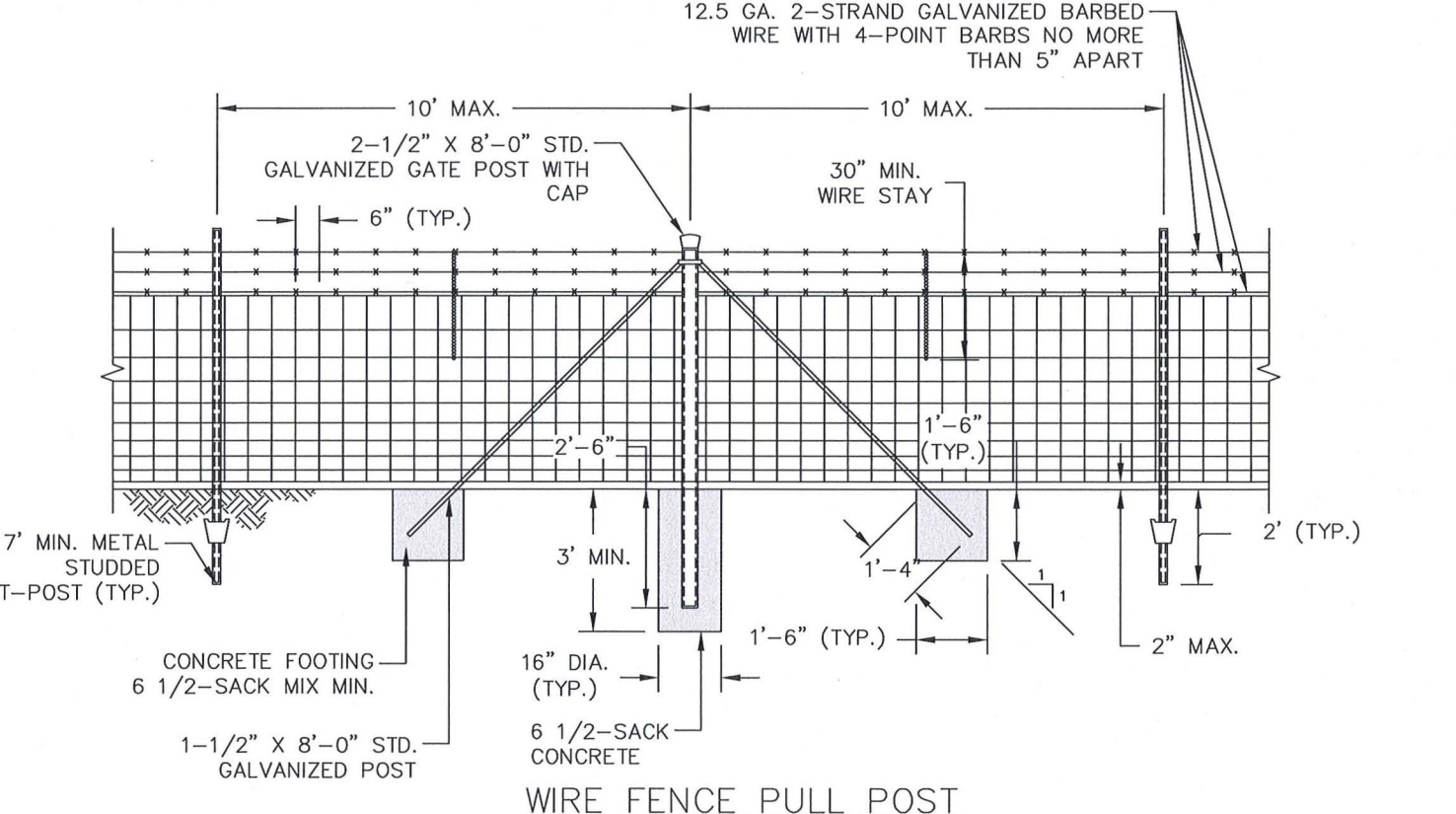
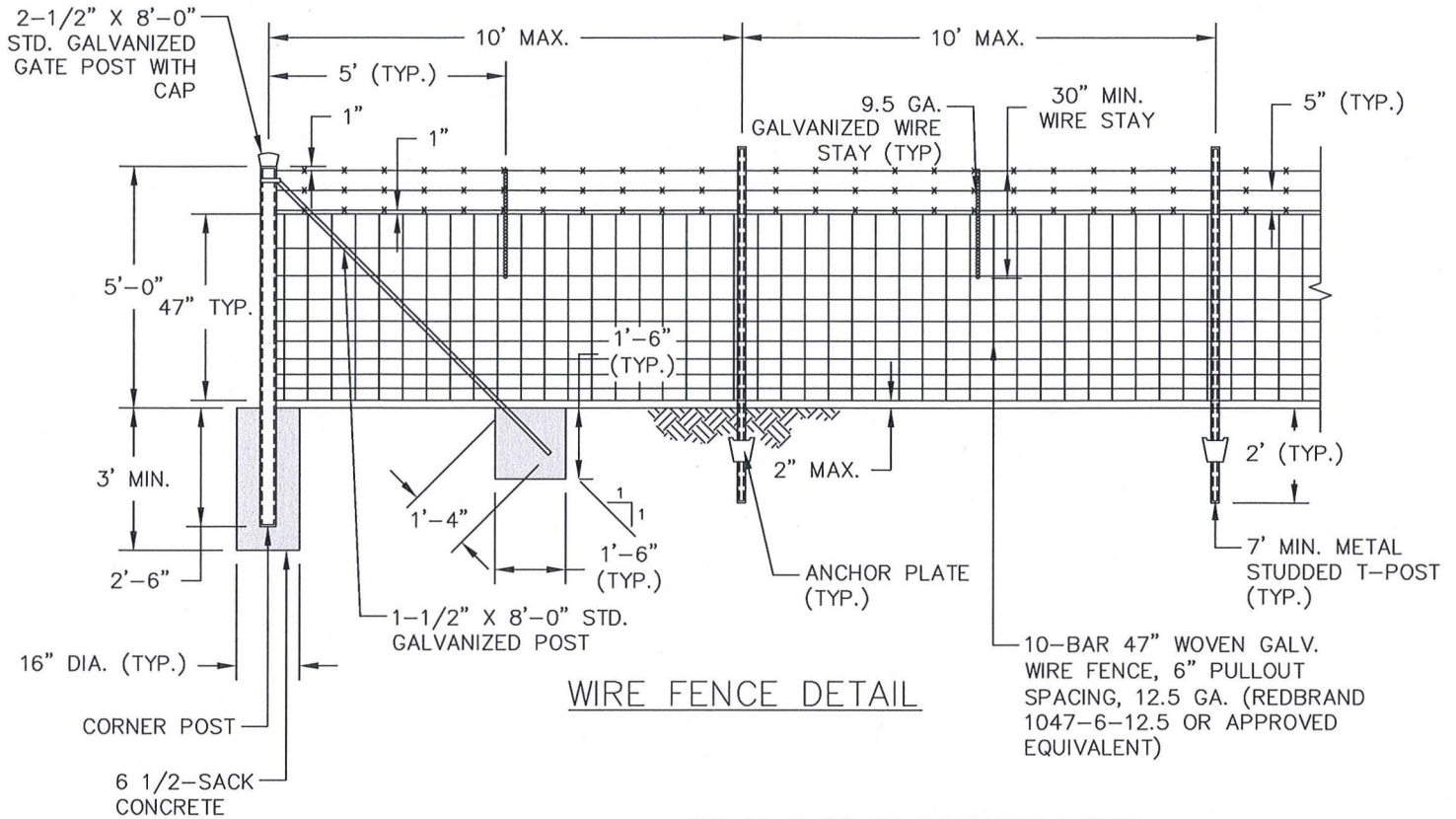
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STANDARD DETAIL

DATE: JANUARY 2018

5-10

SHEET 1 OF 1



FRESNO IRRIGATION DISTRICT

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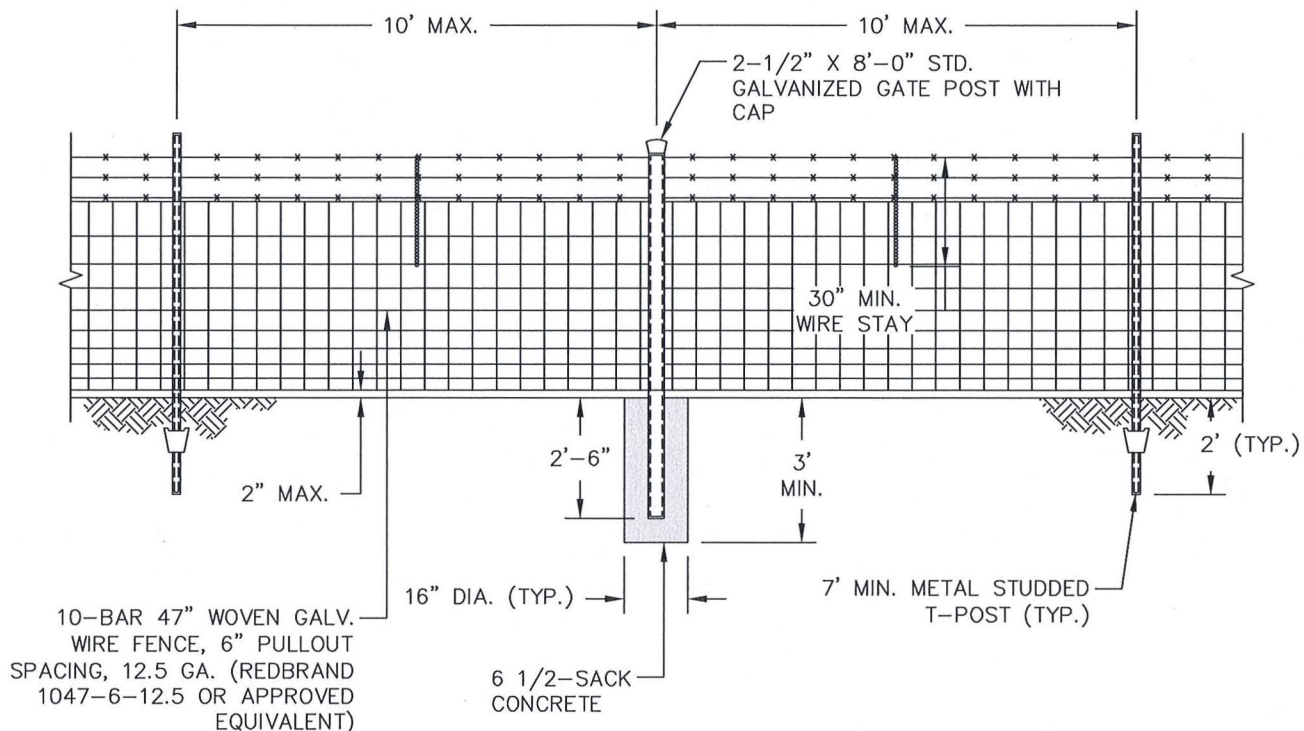
FENCE - RURAL

SCALE: NOT TO SCALE

DATE: JANUARY 2018

STANDARD DETAIL 6-01

SHEET 1 OF 2



INTERMEDIATE SUPPORT POST

NOTES:

1. FIELD FENCING TO BE PLACED ALONG ALL EXTERIOR PROPERTY LINES.
2. PLACE ALL FENCING AS SPECIFIED IN PLANS.
3. PULL POSTS SHALL BE PLACED AT 500 FEET MAX SPACING.
4. INTERMEDIATE SUPPORT POSTS SHALL BE PLACED AT 100 FEET MAX SPACING.
5. ALL PIPE DIAMETERS SHOWN ARE IRON PIPE SIZES-STANDARD WEIGHT.
6. FENCE POSTS ON CURVES SHALL BE BRACED AS RECOMMENDED BY THE MANUFACTURER.
7. ALL SINGLE DRIVE GATES SHALL BE EQUIPPED WITH GATE FASTENERS SUITABLE FOR LOCKING WITH PADLOCK.
8. CORNER AND END POSTS SHALL BE BRACED IN THE DIRECTION OF PULL.
9. ALTERNATE DETAILS MAY BE SUBMITTED FOR APPROVAL.
10. INCLUDE GATE STOPS ON ALL GATE INSTALLATIONS.
11. FENCE LINES TO BE LOCATED 6 INCHES WITHIN FID PROPERTY LINES.
12. CONCRETE SHALL BE A MINIMUM OF 6-1/2 SACK (611 POUNDS OF PORTLAND CEMENT PER CUBIC YARD) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500 PSI, WATER-CEMENT RATIO OF 0.45 (BY WEIGHT), AIR ENTRAINMENT OF 4% ± 1% AND 4 INCH SLUMP AT PLACEMENT.
13. T-POST FASTENERS AND POST TIES AS REQUIRED ON ALL FENCING.



FRESNO IRRIGATION DISTRICT

FENCE - RURAL NOTES

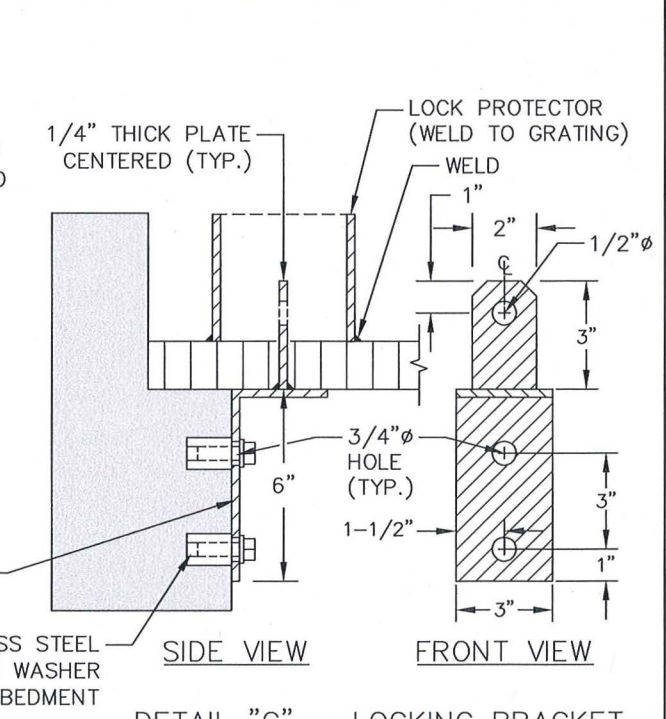
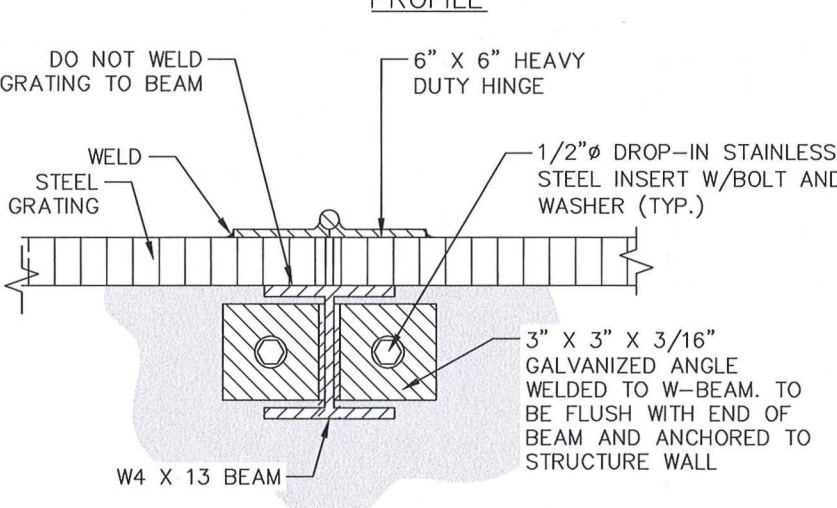
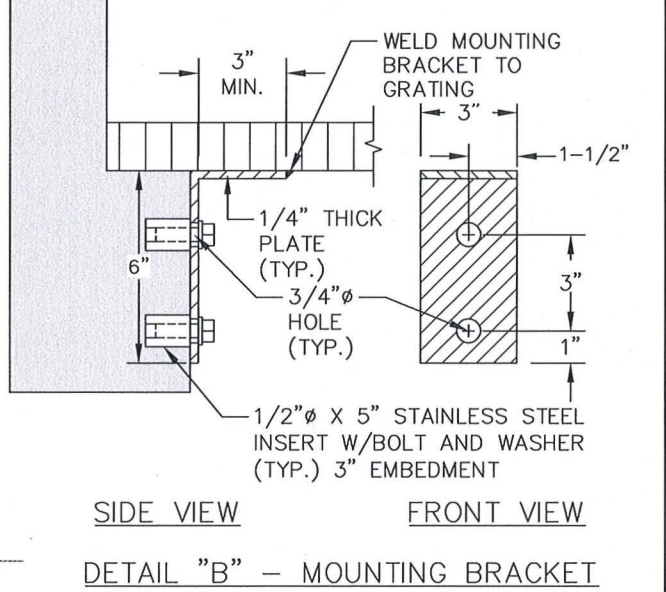
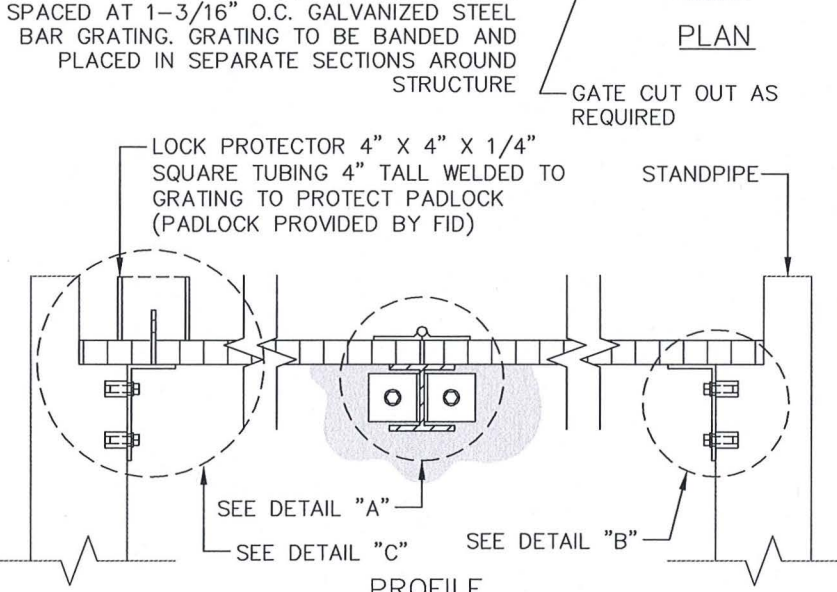
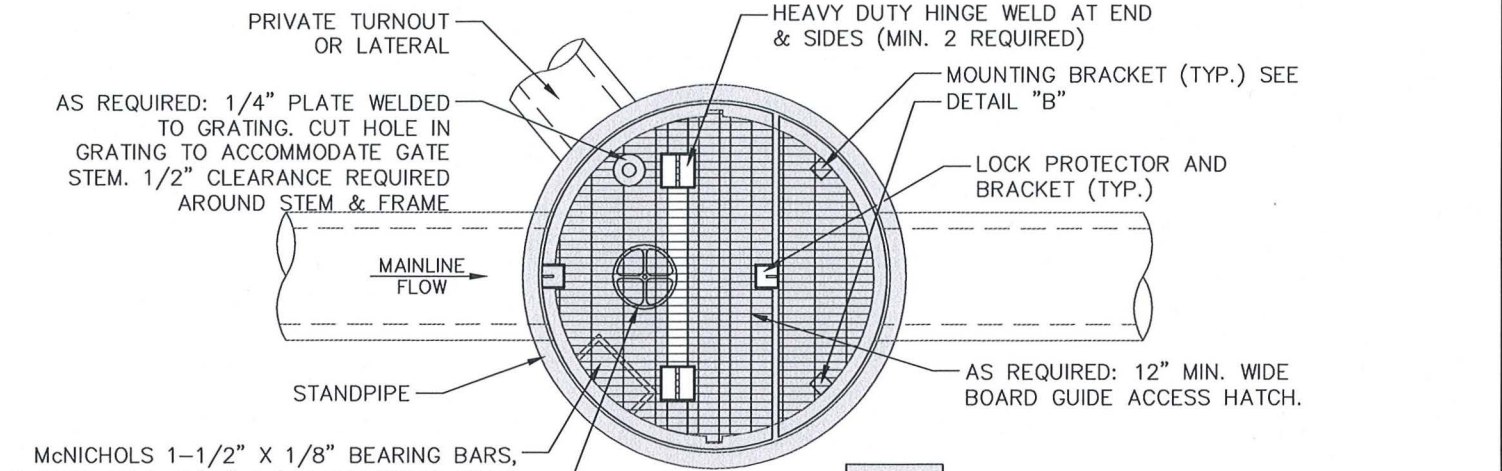
"Your Most Valuable Resource - Water"

SCALE: NOT TO SCALE  
DATE: JANUARY 2018

STANDARD DETAIL

6-01

SHEET 2 OF 2



- NOTES:
1. ALL STEEL SHALL BE GALVANIZED UNLESS OTHERWISE DIRECTED.
  2. DETAIL PROVIDED IS FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR SHALL FABRICATE METAL COVER BASED ON FIELD DIMENSIONS.



FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource - Water"

HEAVY DUTY COVER - STANDPIPE

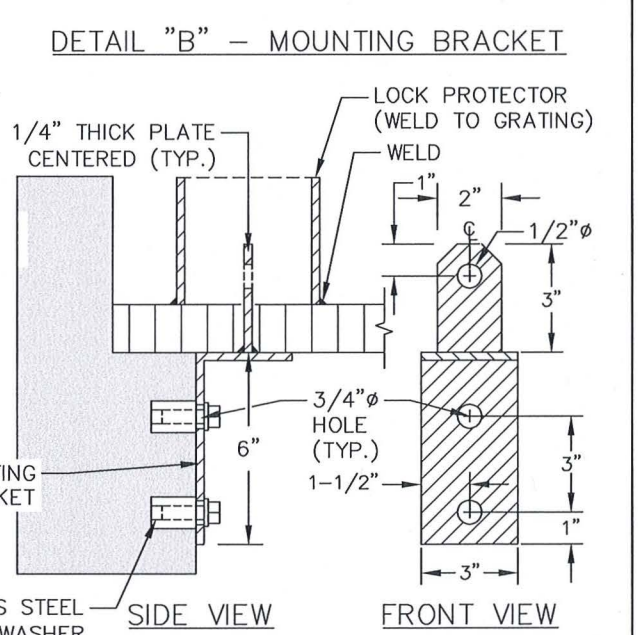
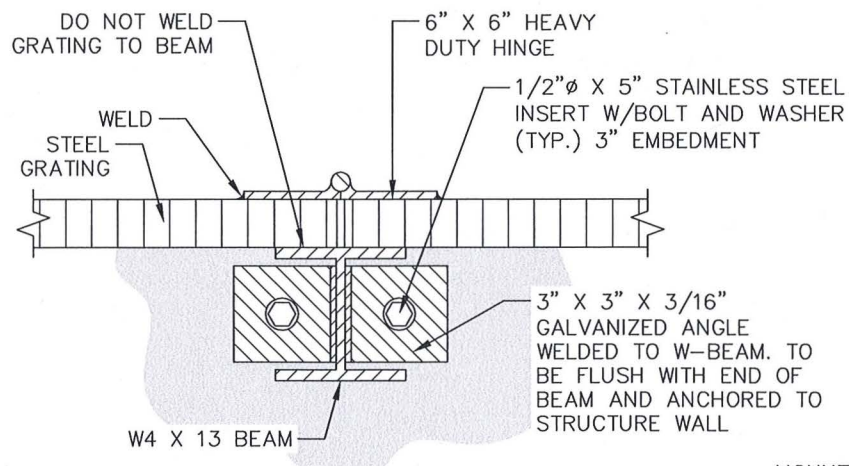
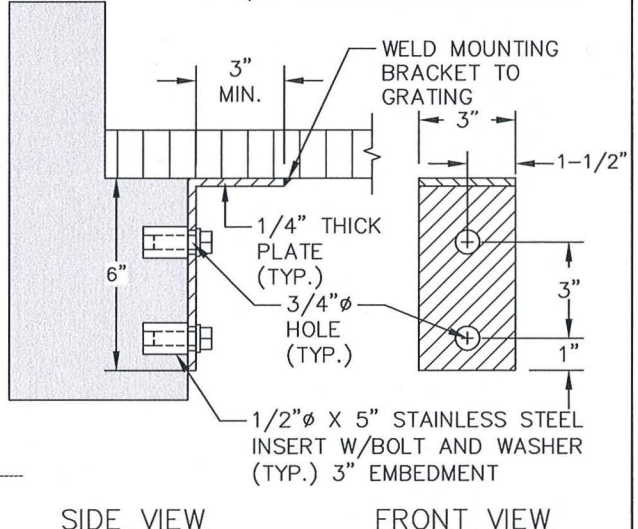
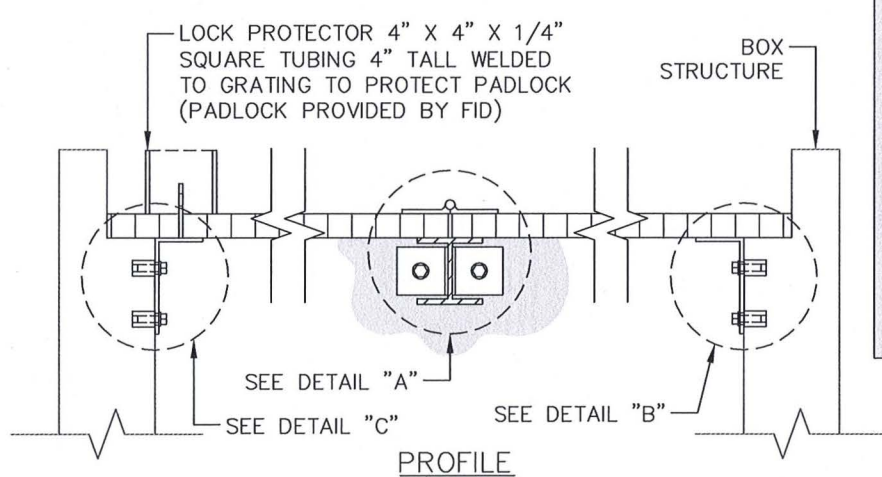
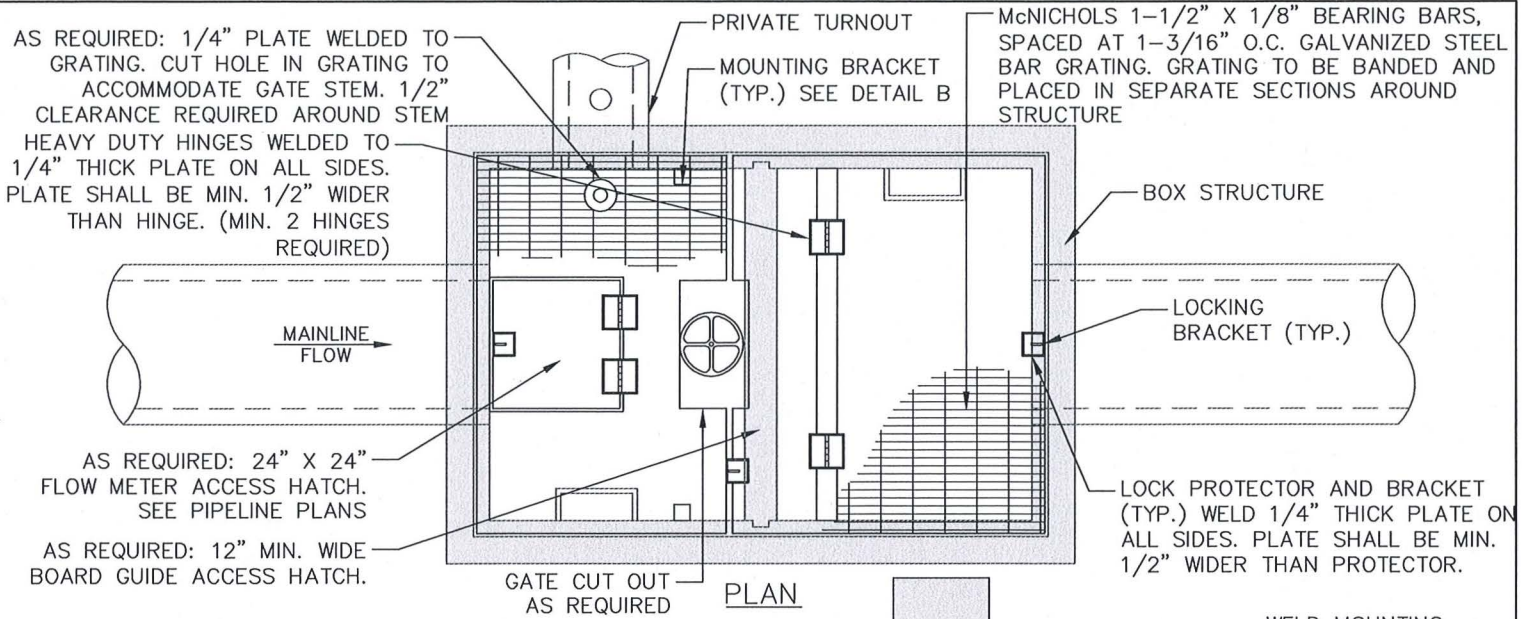
SCALE: NOT TO SCALE

DATE: JANUARY 2018

STANDARD DETAIL

6-02

SHEET 1 OF 1

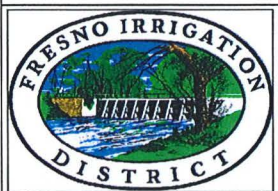


NOTES: DETAIL "A" - SUPPORT BEAM

1. ALL STEEL SHALL BE HOT DIPPED GALVANIZED UNLESS OTHERWISE DIRECTED.
2. DETAIL PROVIDED IS FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR SHALL FABRICATE COVER BASED ON FIELD CONDITIONS.

1/2"  $\phi$  X 5" STAINLESS STEEL INSERT W/BOLT AND WASHER (TYP.) 3" EMBEDMENT

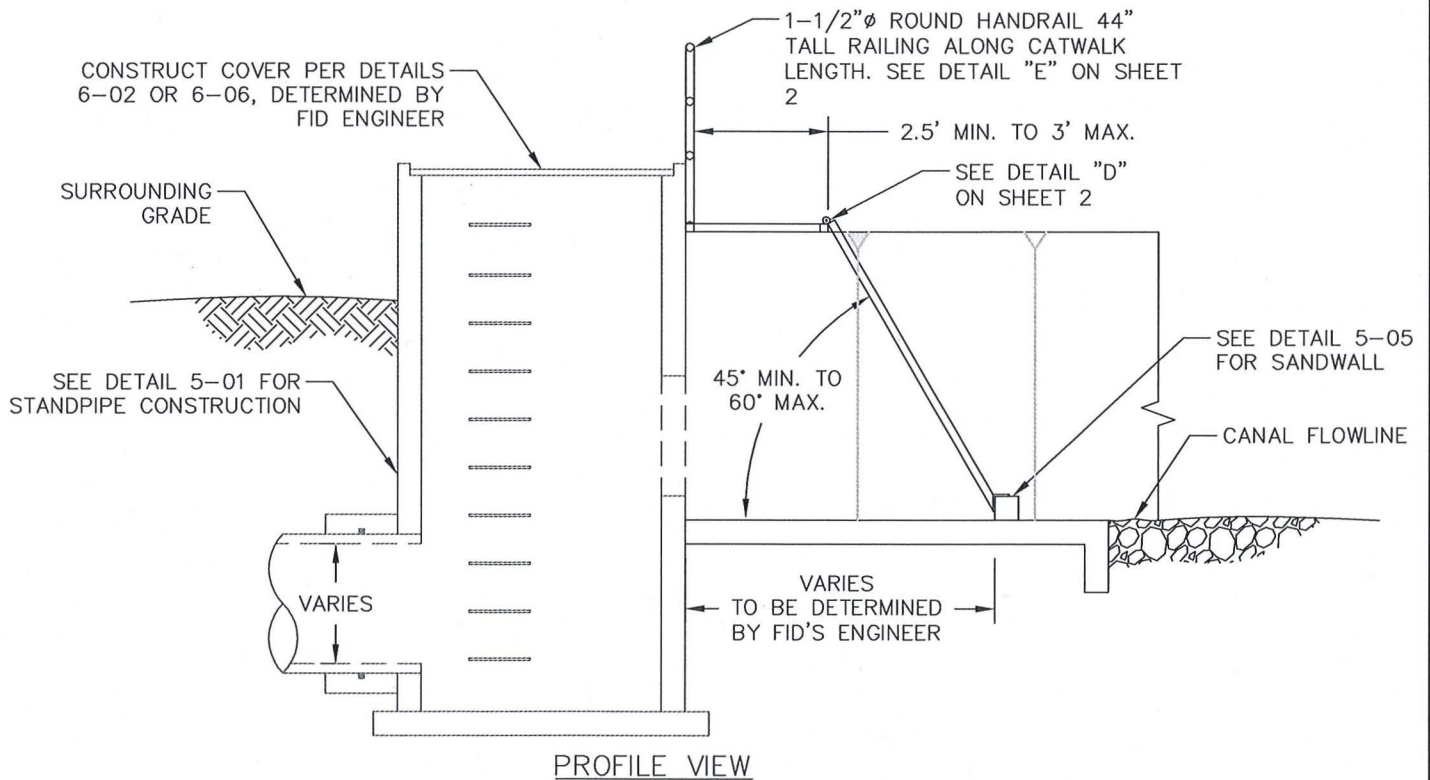
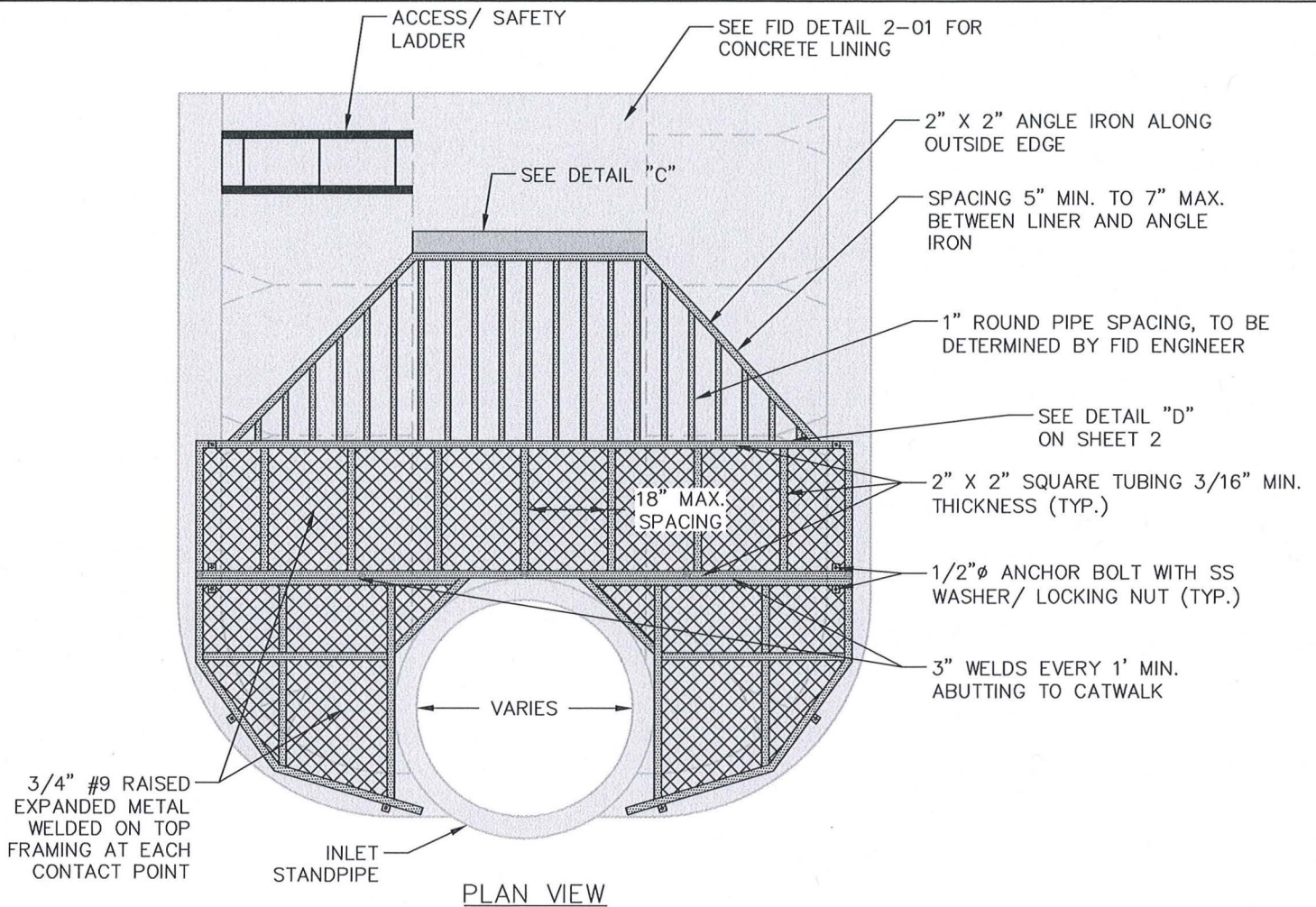
DETAIL "C" - LOCKING BRACKET



FRESNO IRRIGATION DISTRICT

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HEAVY DUTY COVER - BOX STRUCTURE	
SCALE: NOT TO SCALE	STANDARD DETAIL
DATE: JANUARY 2018	6-03
SHEET 1 OF 1	



FRESNO IRRIGATION DISTRICT

TRASH RACK - INLET

"Your Most Valuable Resource - Water"

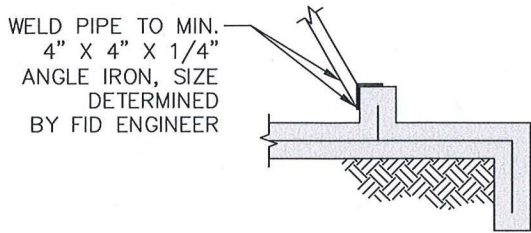
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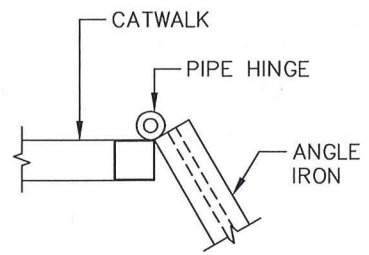
DATE: JANUARY 2018

6-04

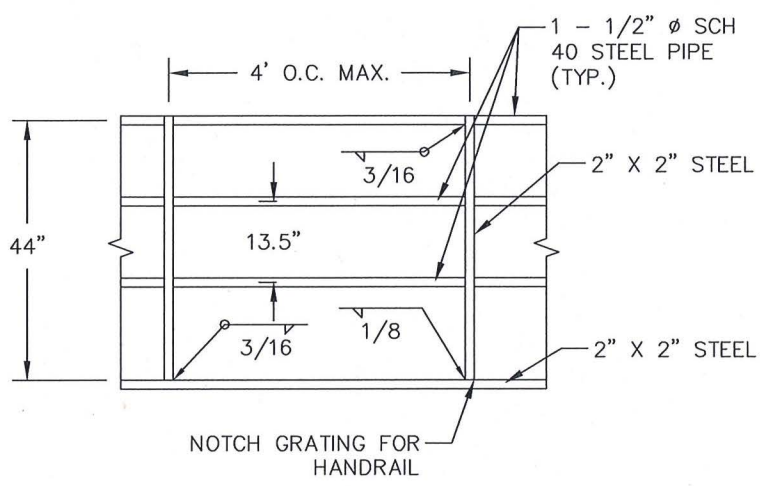
SHEET 1 OF 2



DETAIL "C"  
SANDWALL (INLET ONLY)



DETAIL "D"  
(PIPE HINGE FOR RACK & CATWALK CONNECTION)



DETAIL "E" HANDRAIL

TRASH RACK NOTES:

1. FOR REFERENCE ONLY. CONTRACTOR SHALL SUBMIT TRASH RACK DESIGN OR SHOP DESIGN TO FID FOR APPROVAL PRIOR TO CONSTRUCTION.
2. ENGINEERING MAY BE REQUIRED BASED ON CANAL SIZE.
3. SPRAY RED OXIDE PRIMER ON ENTIRE CATWALK, TRASH RACK, AND HANDRAIL PRIOR TO INSTALLATION.



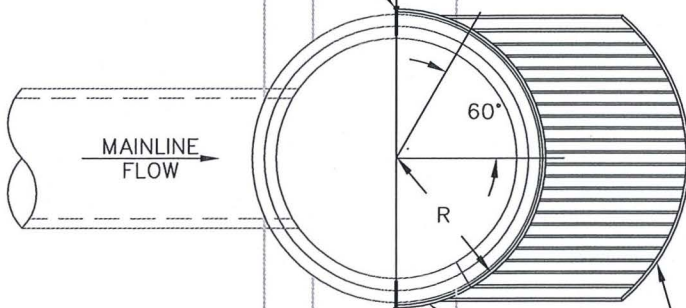
FRESNO IRRIGATION DISTRICT

"Your Most Valuable Resource – Water"

TRASH RACK INLET – NOTES	
SCALE: NOT TO SCALE	STANDARD DETAIL
DATE: JANUARY 2018	6-04
	SHEET 2 OF 2



DRILL  $\frac{5}{8}$ "  $\phi$  X 2" DEEP HOLE IN STAND & INSTALL DROP-IN ANCHOR. SECURE W/ 3" LONG BOLT & WASHER. 2 REQUIRED.



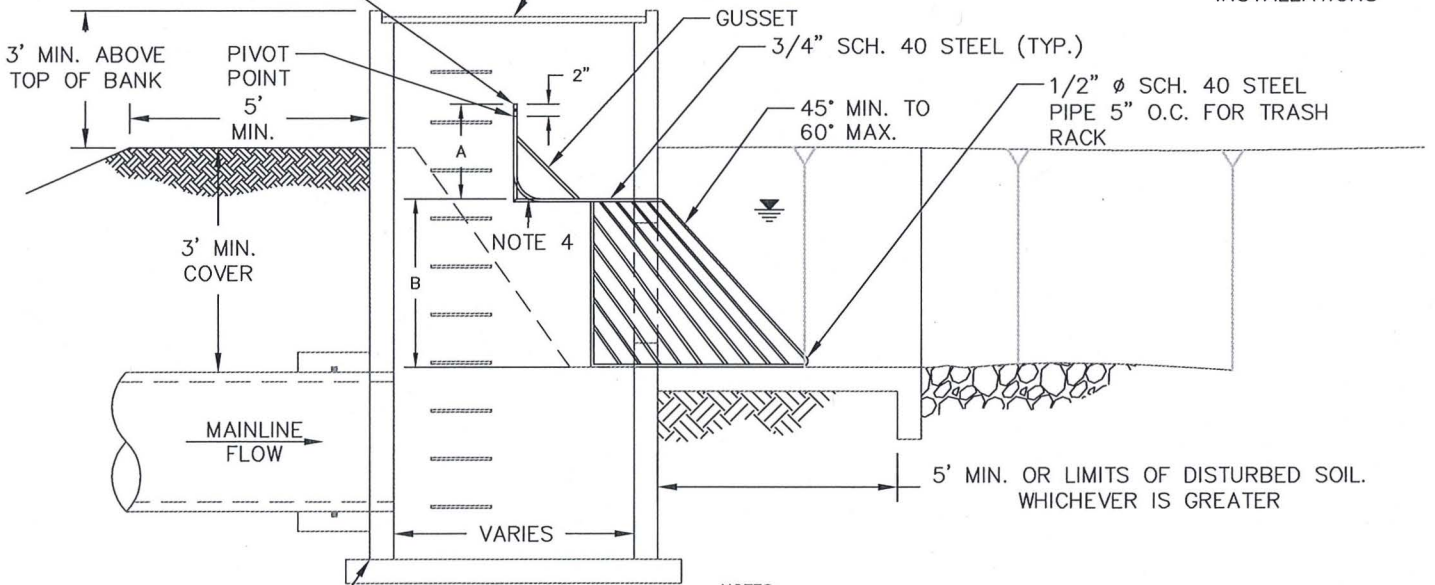
FLATTEN LAST 4" TO ACCOMMODATE  $\frac{1}{2}$ " BOLT

INSTALL  $\frac{1}{2}$ " BOLT WITH DROP-IN ANCHOR

TOP AND BOTTOM RING HAVE SAME RADIUS.

SEE DETAIL 5-05 FOR BATHTUB INSTALLATIONS

CONSTRUCT COVER PER DETAILS 6-02 OR 6-06, DETERMINED BY FID ENGINEER



SEE DETAIL 5-01 FOR STANDPIPE CONSTRUCTION

**NOTES:**

1. "A" IS TO BE ONE-HALF THE DISTANCE FROM "B" TO TOP OF PIPE PLUS 1 INCH.
2.  $R = \frac{1}{2} \times \text{O.D. OF PIPE STAND PLUS } 1\frac{1}{2} \text{ INCHES, CHECK ACTUAL STAND DIAMETER.}$
3. DIMENSIONS ARE CENTER LINE DIMENSIONS.
4. BENDS ARE 6 INCH RADIUS, BUT MAY BE WELDED AT 90°.
5. FOR REFERENCE ONLY. CONTRACTOR SHALL SUBMIT TRASH RACK DESIGN OR SHOP DESIGN TO FID FOR APPROVAL PRIOR TO CONSTRUCTION.
6. SPRAY RED OXIDE ON ENTIRE TRASH RACK PRIOR TO INSTALL.



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TRASH RACK - OUTLET

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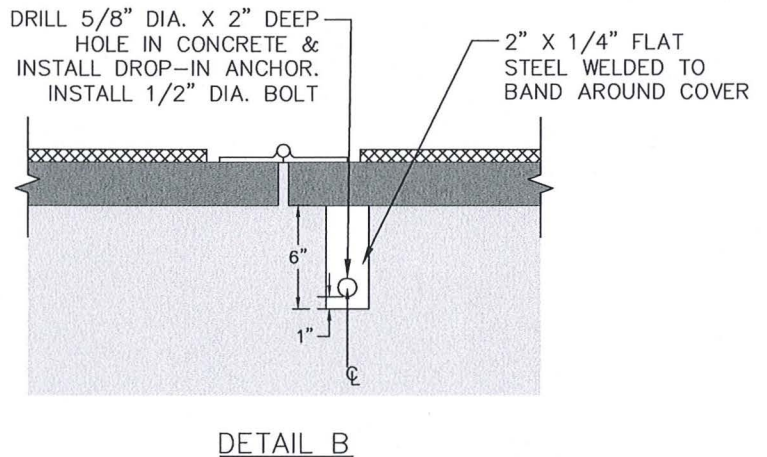
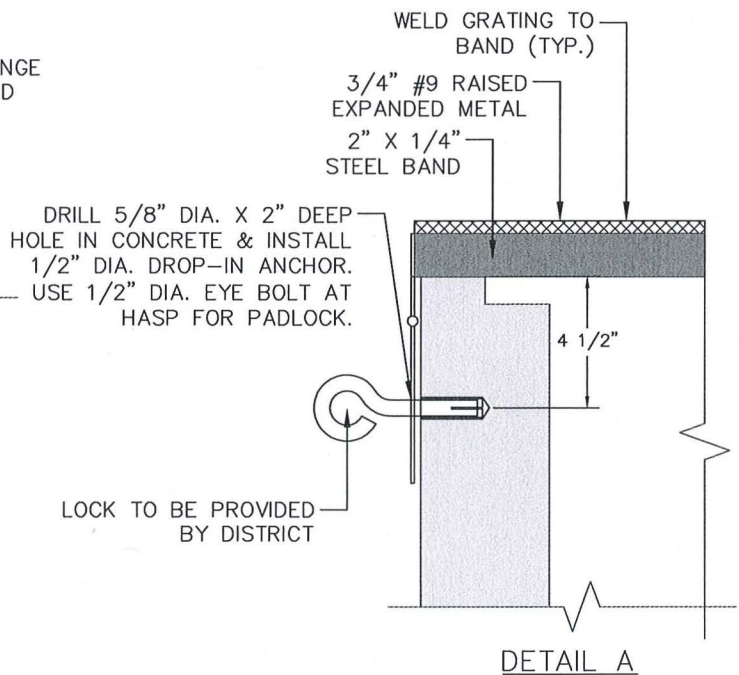
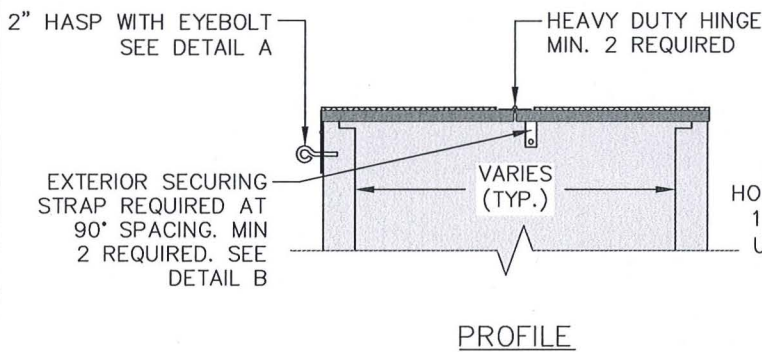
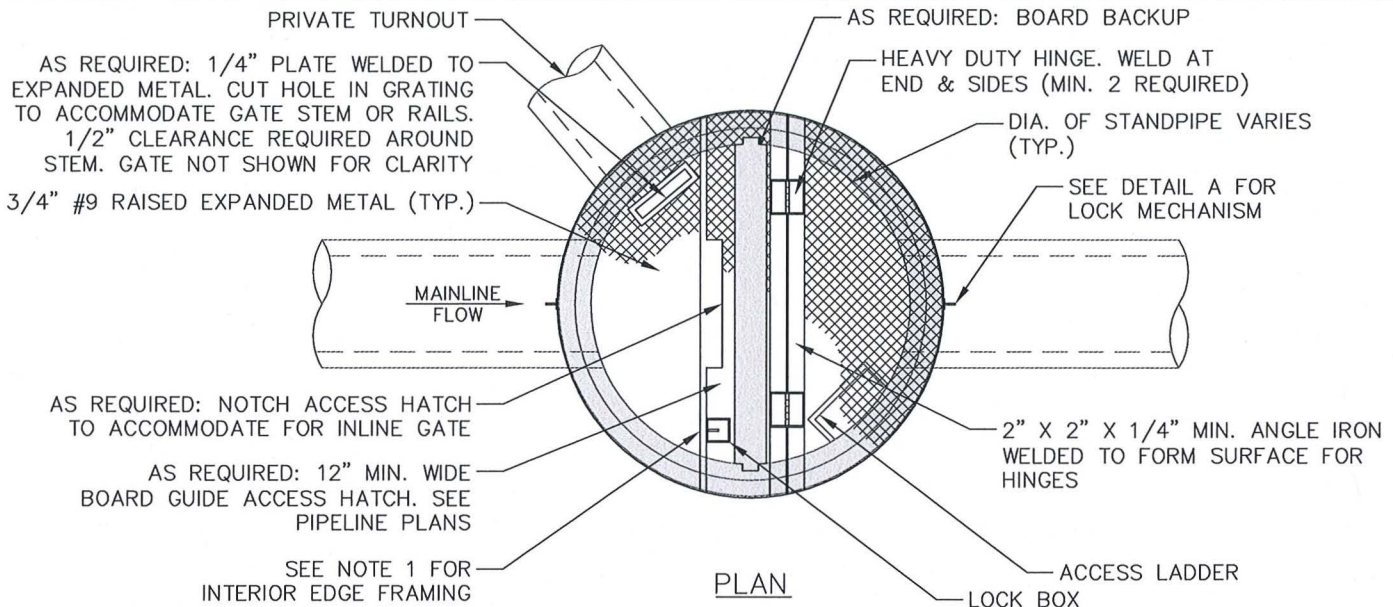
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STANDARD DETAIL

DATE: JANUARY 2018

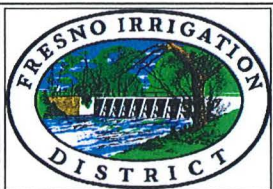
6-05

SHEET 1 OF 1



**NOTES:**

1. ALL INTERIOR EDGES SHALL BE FRAMED WITH 2 INCH X 2 INCH X 1/4 INCH ANGLE IRON.
2. CLEARANCE BETWEEN OUTSIDE EDGE OF STRUCTURE AND COVER SHALL BE 1/4 INCH MINIMUM TO 1/2 INCH MAX AROUND ALL SIDES.
3. COVER SHALL BE PAINTED ON TOP AND BOTTOM WITH A RUST INHIBITOR RED OXIDE PRIMER AND PRIMER SHALL BE APPLIED BEFORE INSTALLING THE COVER ON THE STRUCTURE.
4. DETAIL PROVIDED IS FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR SHALL FABRICATE TRASH RACK BASED ON FIELD DIMENSIONS.
5. DISTRICT MAY REQUIRE SHOP DRAWINGS AND FID APPROVAL PRIOR TO FABRICATION.
6. TURNOUT/ACCESS STANDS - 48 INCH Ø OR LESS SHALL BE A COVER WITHOUT HINGES. STAND COVERS GREATER THAN 48 INCH Ø SHALL BE INSTALLED PER THIS DETAIL (SEE PLAN) WITH HINGES CENTERED ON OPENING.



FRESNO IRRIGATION DISTRICT

EXPANDED METAL COVER - STANDPIPE

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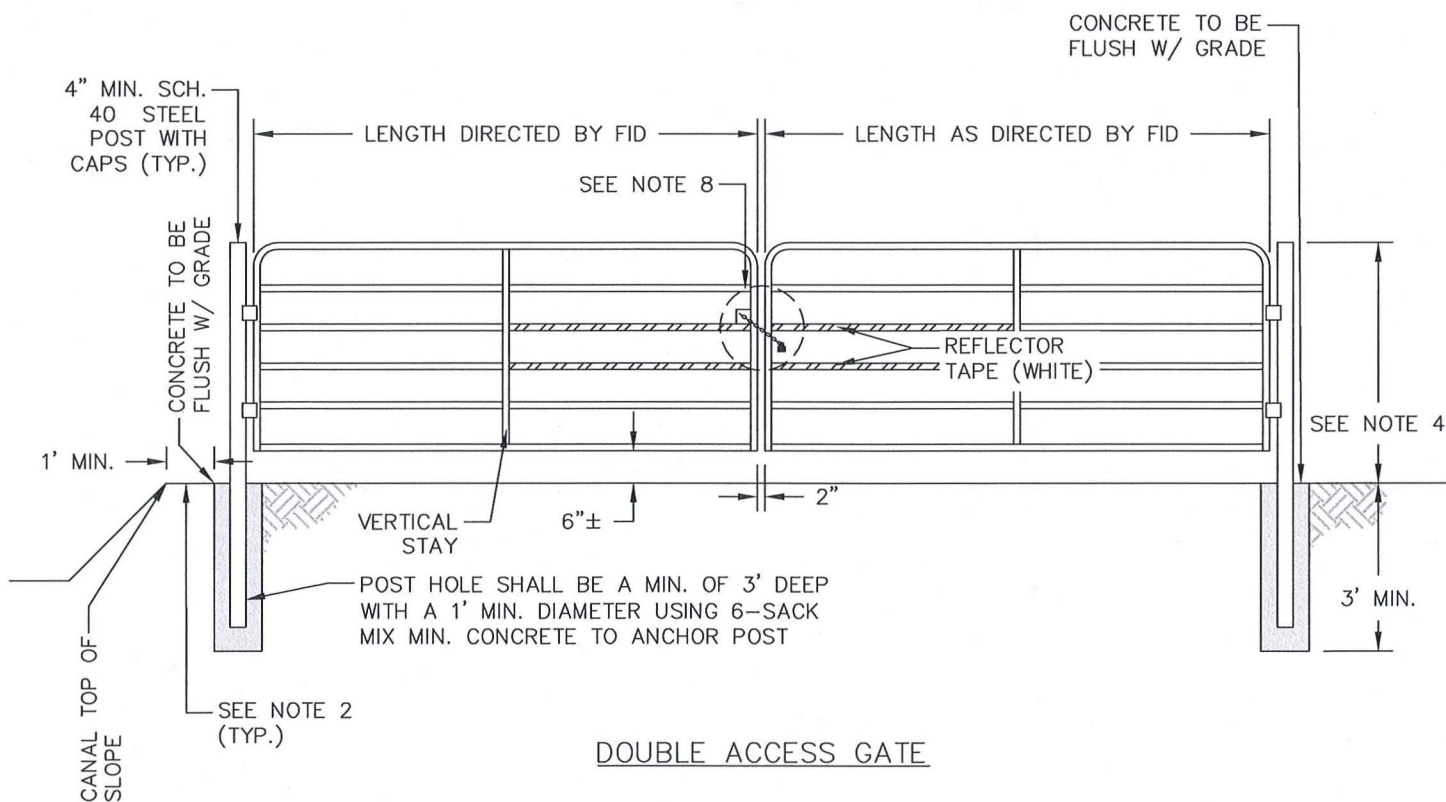
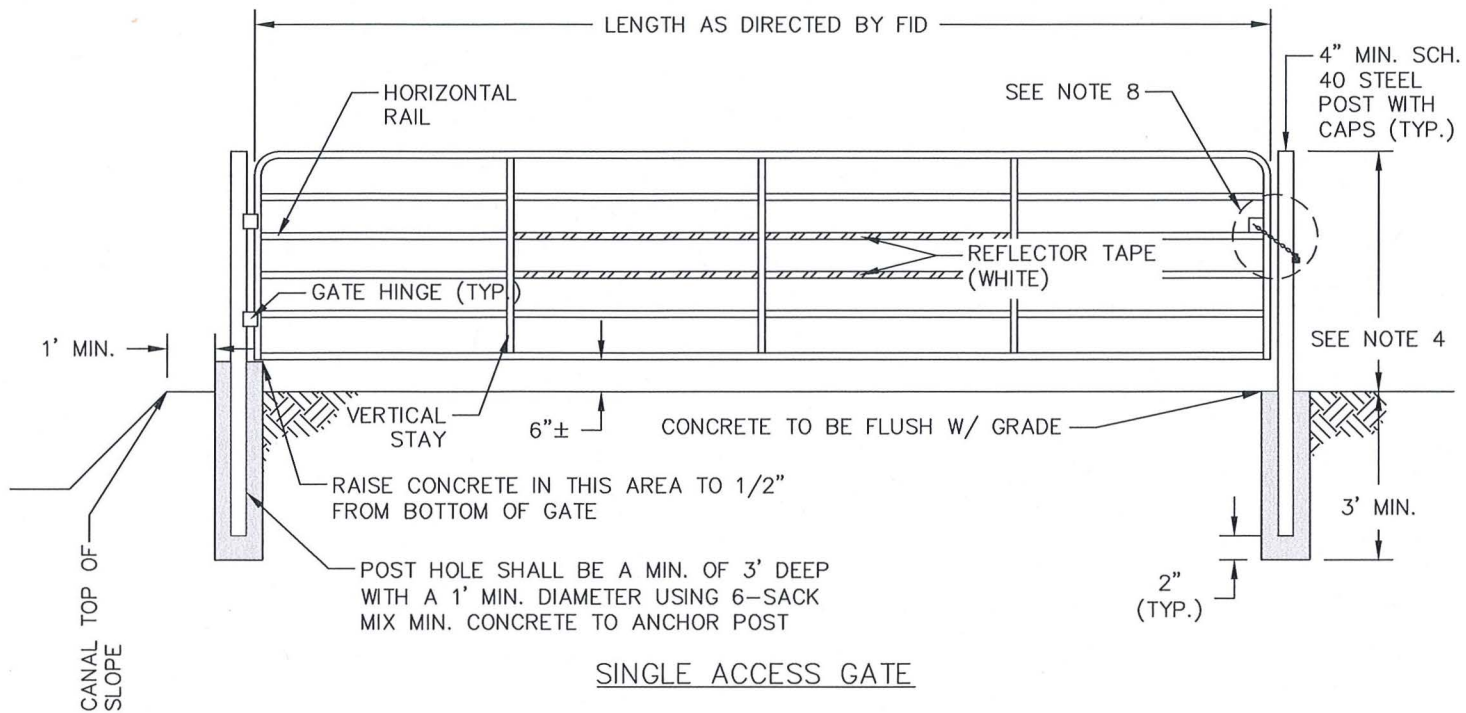
SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

6-06

SHEET 1 OF 1



FRESNO IRRIGATION DISTRICT

GATE - RURAL

"Your Most Valuable Resource - Water"

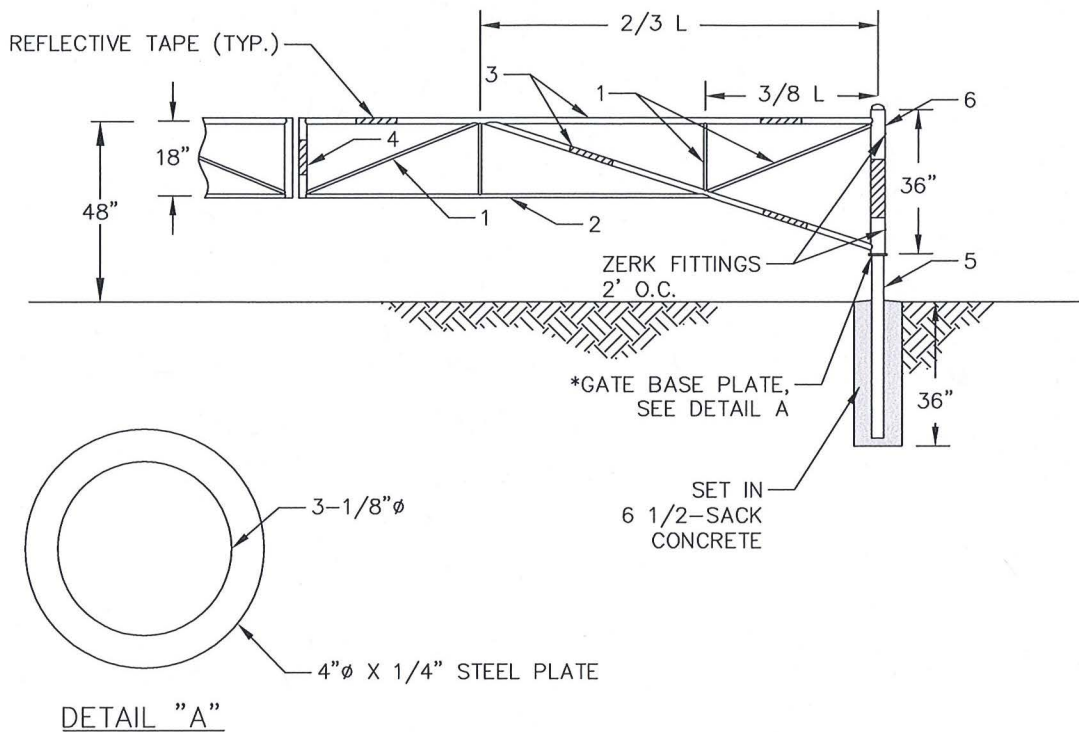
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STANDARD DETAIL

DATE: JANUARY 2018

6-07

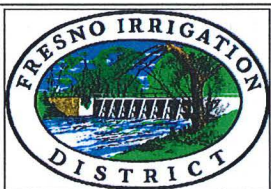
SHEET 1 OF 3



\*NOTE: USE .25Z ALL AROUND TO WELD BASE PLATE,  
BOTTOM ONLY TO BE PLACED 6" - 12" FROM GRADE

### FID PANEL GATE (STEEL PIPE)

PIPE SCHEDULE (SCHEDULE 40)	
PIPE NO.	DIA.
1	3/4"
2	1"
3	1-1/2"
4	2"
5	3"
6	3-1/2"



FRESNO IRRIGATION DISTRICT

GATE - RURAL PANEL

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SCALE: NOT TO SCALE

STANDARD DETAIL

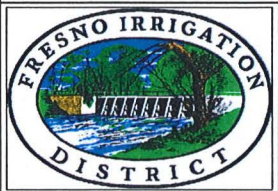
DATE: JANUARY 2018

6-07

SHEET 2 OF 3

GATE SPECIFICATIONS (RURAL PANEL GATES):

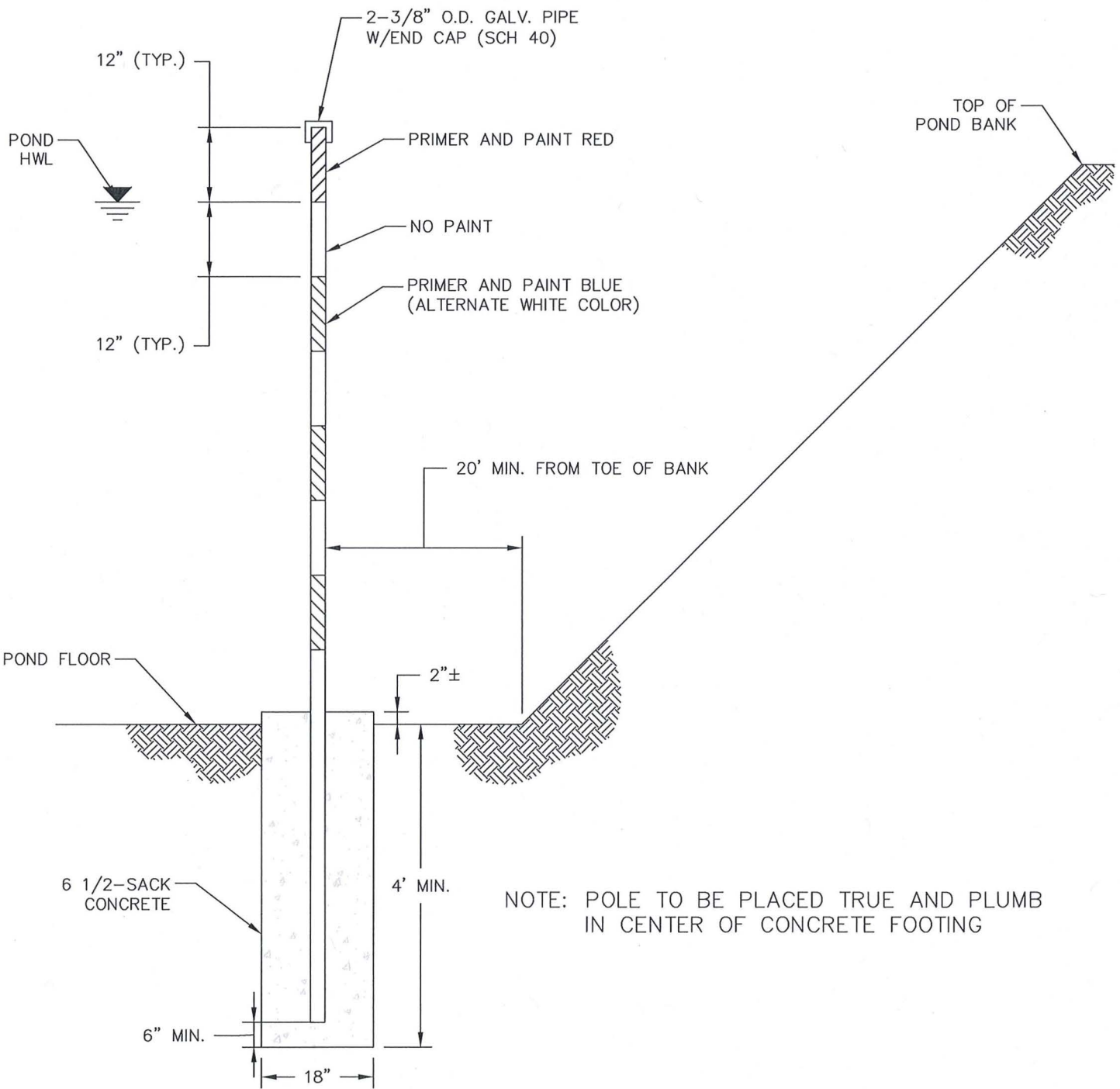
1. STRUCTURE PERMIT AND/OR CONSTRUCTION PERMIT IS REQUIRED FOR ALL GATE INSTALLATIONS.
2. LOCATION TO BE VERIFIED WITH FID INSPECTOR PRIOR TO INSTALLATION.
3. INSTALLED GATE SHALL BE MANUFACTURED BY POWDER RIVER OR APPROVED EQUIVALENT.
4. GATE HEIGHT – 50 INCH MINIMUM.  
GATE WIDTH – AS SPECIFIED IN PLANS OR AS DIRECTED BY FID.
5. GATE FRAME SHALL BE MADE FROM 1.66 INCH O.D. TUBE, OR LARGER TUBULAR STEEL.
6. GATE SHALL HAVE A MINIMUM OF 5 HORIZONTAL RAILS EVENLY SPACED.
7. GATE SHALL HAVE A MINIMUM OF 2 METAL HINGES.
8. GATE SHALL BE SECURED BY A CHAIN (FURNISHED BY THE LANDOWNER) AND PADLOCK (FURNISHED BY THE DISTRICT). AT THE LANDOWNER’S OPTION, ADDITIONAL LOCKS CAN BE INTERLOCKED WITH DISTRICT FURNISHED PADLOCK.
9. VERTICAL STAYS SHALL BE EVENLY SPACED.
10. GATE POSTS WILL BE PAINTED WITH 1 COAT RUSTOLEUM PRIMER AND 2 COATS EXTERIOR RUSTOLEUM (COLOR TO MATCH GATE) OR APPROVED EQUIVALENT. INSTALL OUTRIGGERS AS NECESSARY TO PREVENT 2 WHEEL BYPASS TRAFFIC ON SLOPES.
11. ALL WEEP HOLES SHALL BE FILLED WITH SPRAY FOAM TO PREVENT INSECT INFESTATION.
12. LANDOWNER IS RESPONSIBLE TO MAINTAIN GATE.
13. REFLECTIVE TAPE REQUIRED ON ALL GATES.
14. THESE ARE GUIDELINES ONLY, FINAL DESIGN TO BE PROVIDED BY CONTRACTOR.



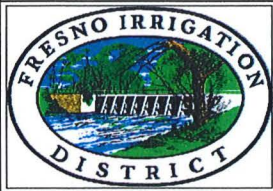
FRESNO IRRIGATION DISTRICT

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GATE – RURAL PANEL NOTES	
SCALE: NOT TO SCALE	STANDARD DETAIL
DATE: JANUARY 2018	6-07
	SHEET 3 OF 3



NOTE: POLE TO BE PLACED TRUE AND PLUMB  
IN CENTER OF CONCRETE FOOTING



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POND MEASURING POLE

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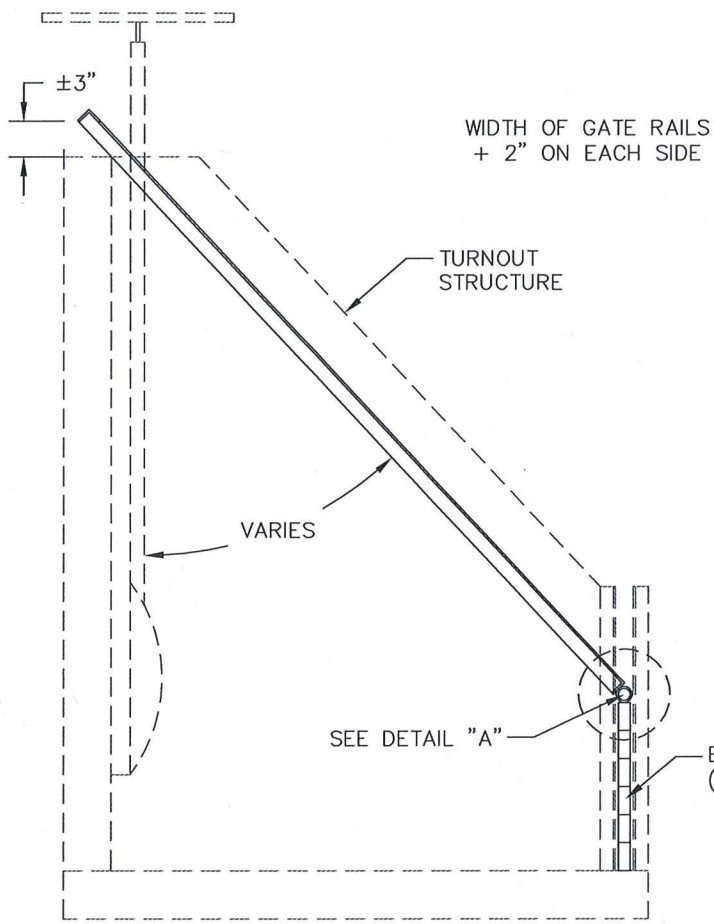
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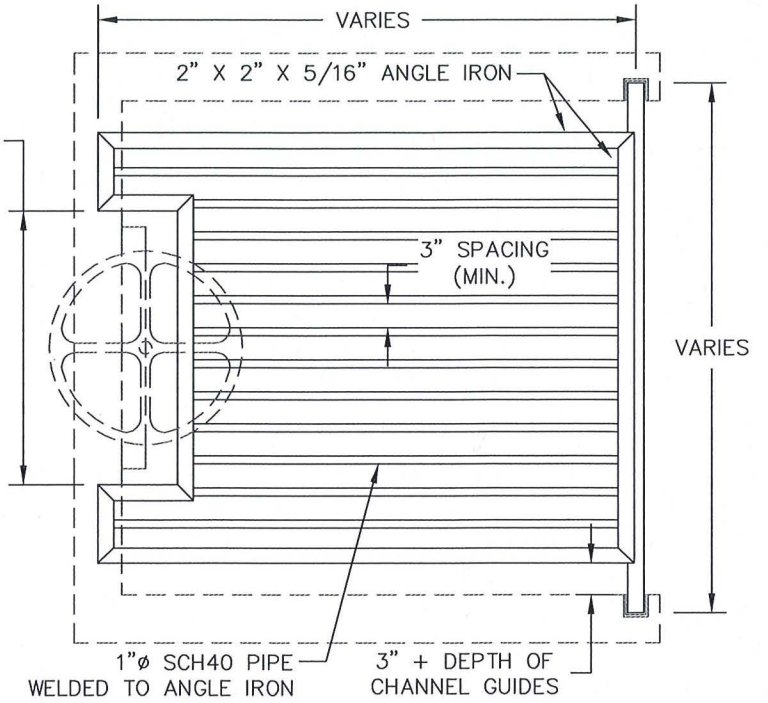
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SHEET 1 OF 1



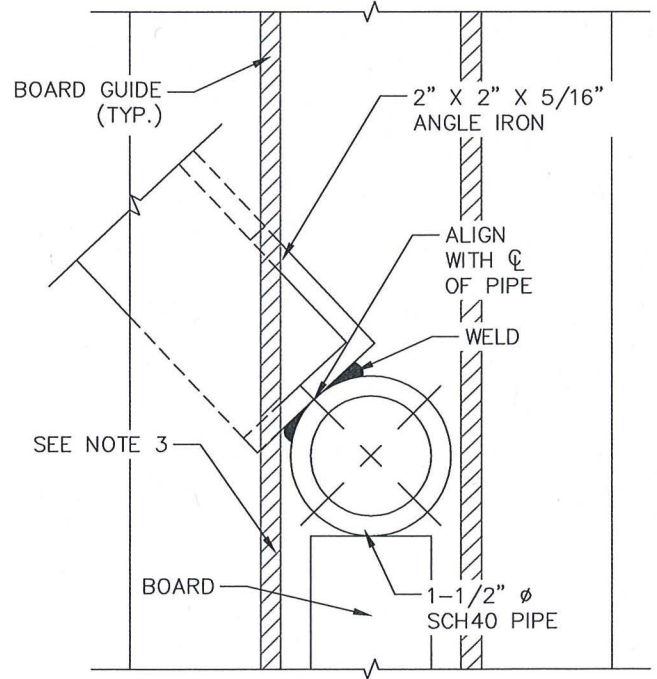
SIDE VIEW



TOP VIEW

NOTES:

1. UNLESS OTHERWISE NOTES, ALL METAL SHALL BE HOT-DIPPED GALVANIZED.
2. ANY CHANGES OR DEVIATIONS REQUIRED BY FIELD CONDITIONS SHALL BE APPROVED BY FID INSPECTOR.
3. DISTRICT MAY REQUIRE CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION.
4. 2.5 INCH X 2.5 INCH X 1/4 INCH BOARD GUIDES. SEE DETAIL 5-10.
5. ALL METALWORK SHALL BE WELDED.
6. DETAIL PROVIDED IS FOR SCHEMATIC PURPOSES ONLY. CONTRACTOR SHALL FABRICATE TRASH RACK BASED ON FIELD DIMENSIONS.



DETAIL "A"



FRESNO IRRIGATION DISTRICT

TRASH RACK – TURNOUT

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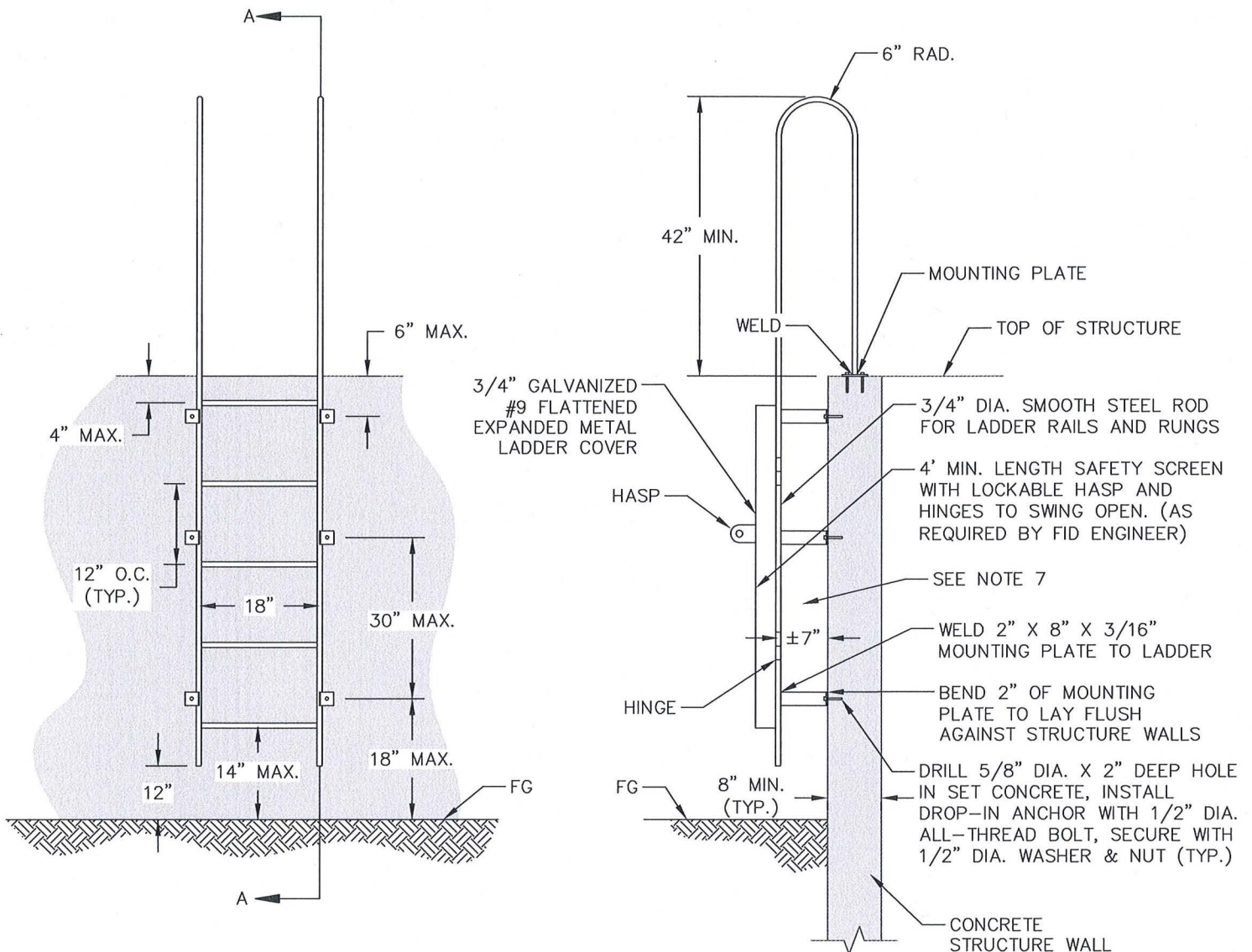
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DATE: JANUARY 2018

6-09

SHEET 1 OF 1



SECTION A-A

NOTES:

1. LADDER SHALL BE GALVANIZED AND ALL HARDWARE SHALL BE STAINLESS STEEL. LADDER COVER SHALL BE 3/4 INCH #9 FLATTENED EXPANDED METAL.
2. INSTALL HASP FOR LOCK ON SAFETY LADDER COVER.
3. ANY CHANGES OR DEVIATIONS REQUIRED BY FIELD CONDITIONS SHALL BE APPROVED BY FID INSPECTOR.
4. LADDER MUST CONFORM TO ALL CAL OSHA STANDARDS.
5. LADDER SHALL BE REQUIRED FOR STRUCTURES GREATER THAN OR EQUAL TO 5 FEET IN HEIGHT.
6. LADDER COVER SHALL BE TO TOP OF STAND OR MAXIMUM 10 FEET FROM GRADE, BOTTOM OF COVER SHALL BE AT BOTTOM LADDER RUNG.
7. COVER SIDE GAP WITH 3/4 INCH GALV. #9 FLATTENED EXPANDED METAL.



FRESNO IRRIGATION DISTRICT

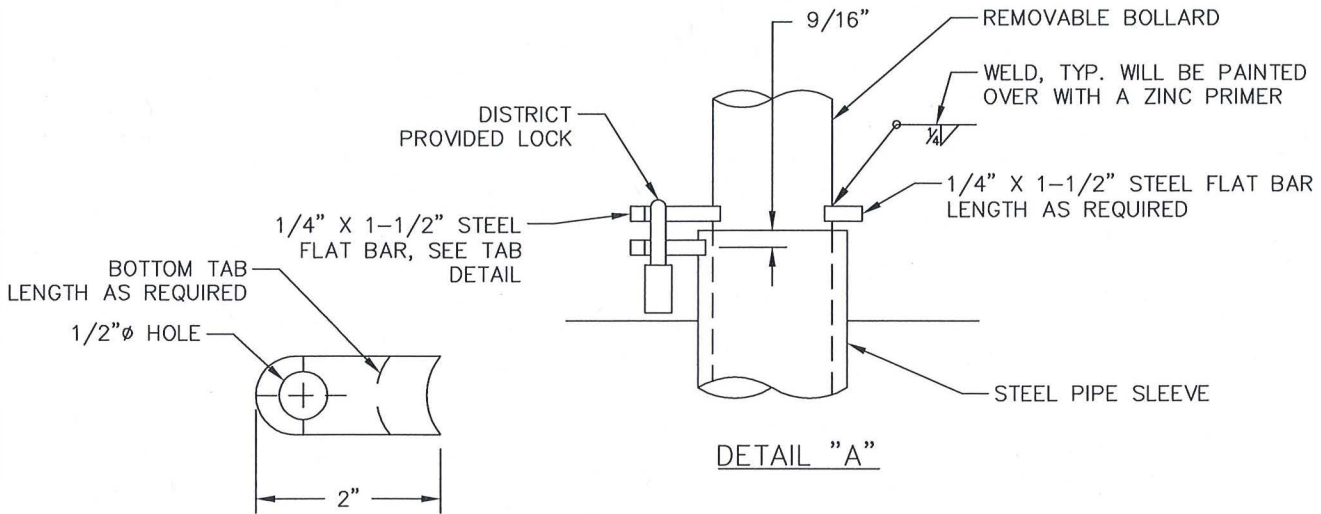
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LADDER AND COVER  
CONCRETE STRUCTURES

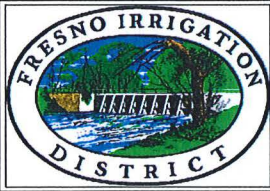
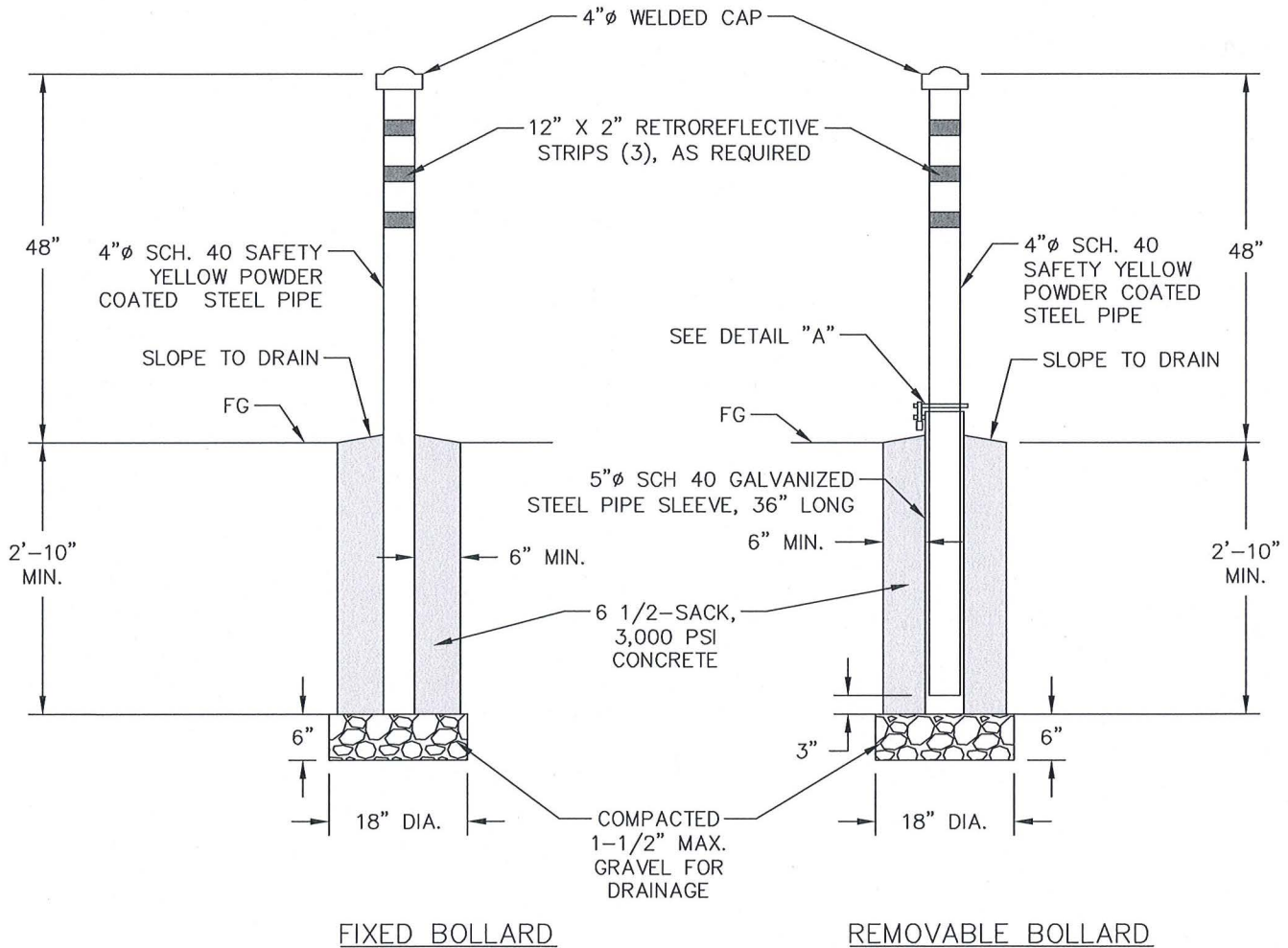
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STANDARD DETAIL  
6-10  
SHEET 1 OF 1





TAB DETAIL



FRESNO IRRIGATION DISTRICT

BOLLARD

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SCALE: NOT TO SCALE

STANDARD DETAIL

DATE: JANUARY 2018

6-11

SHEET 1 OF 1