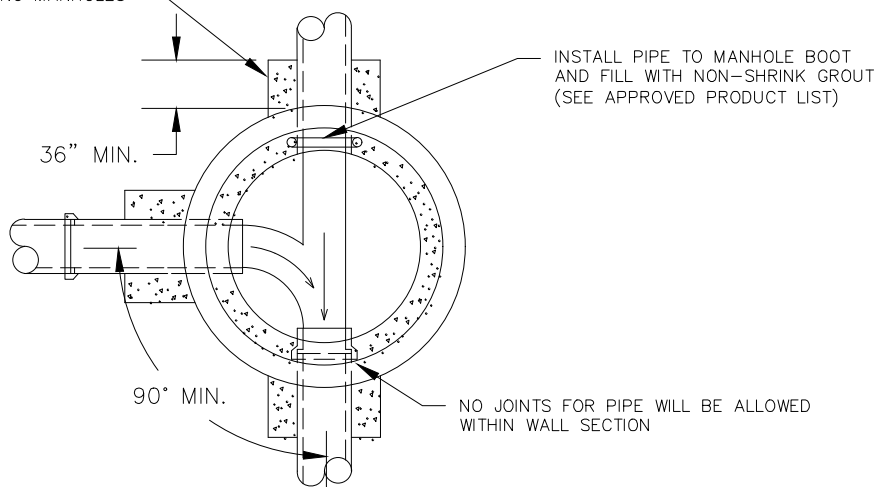


CONCRETE CRADLE TO NEAREST POINT OF ALL LINES LEAVING OR ENTERING MANHOLES

PRECAST MANHOLE



MANHOLE FLOOR PLAN

#### GENERAL NOTES:

1. STEPS SHALL NOT BE INSTALLED IN ANY MANHOLE.
2. SANITARY SEWER PIPE MATERIAL MUST BE THE SAME FROM MANHOLE TO MANHOLE. CHANGES IN TYPE OF PIPE SHALL ONLY BE MADE AT MANHOLES, OR SPECIAL STRUCTURES, EXCEPT AS APPROVED BY THE RIVER AUTHORITY.
3. ADAPTORS AND CONCRETE COLLARS SHALL BE USED AS DIRECTED BY THE RIVER AUTHORITY.
4. WATERTIGHT MANHOLE RINGS AND COVERS SHALL BE IN ACCORDANCE WITH THE APPROVED PRODUCT LIST.
5. THE MINIMUM ANGLE OF FLOW FOR A CONNECTING SEWER TO THE DIRECTION OF FLOW DEFINED BY A COLLECTION SYSTEM IS 90 DEGREES.



**SAN ANTONIO  
RIVER AUTHORITY**

PRECAST MANHOLE  
PRECAST BASE  
TYPICAL DETAIL

APPROVED

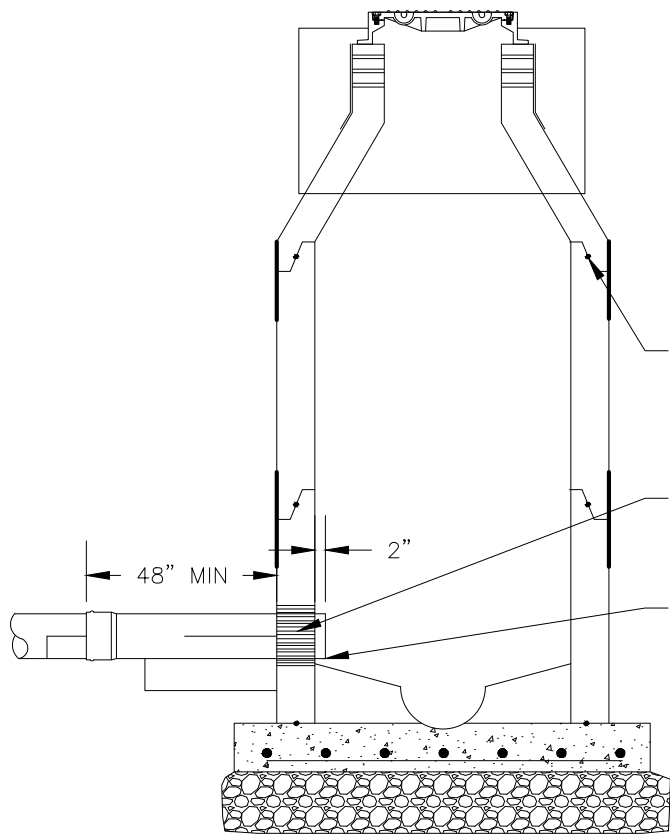
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SD 33-05-61-01

SHEET  
1 OF 28



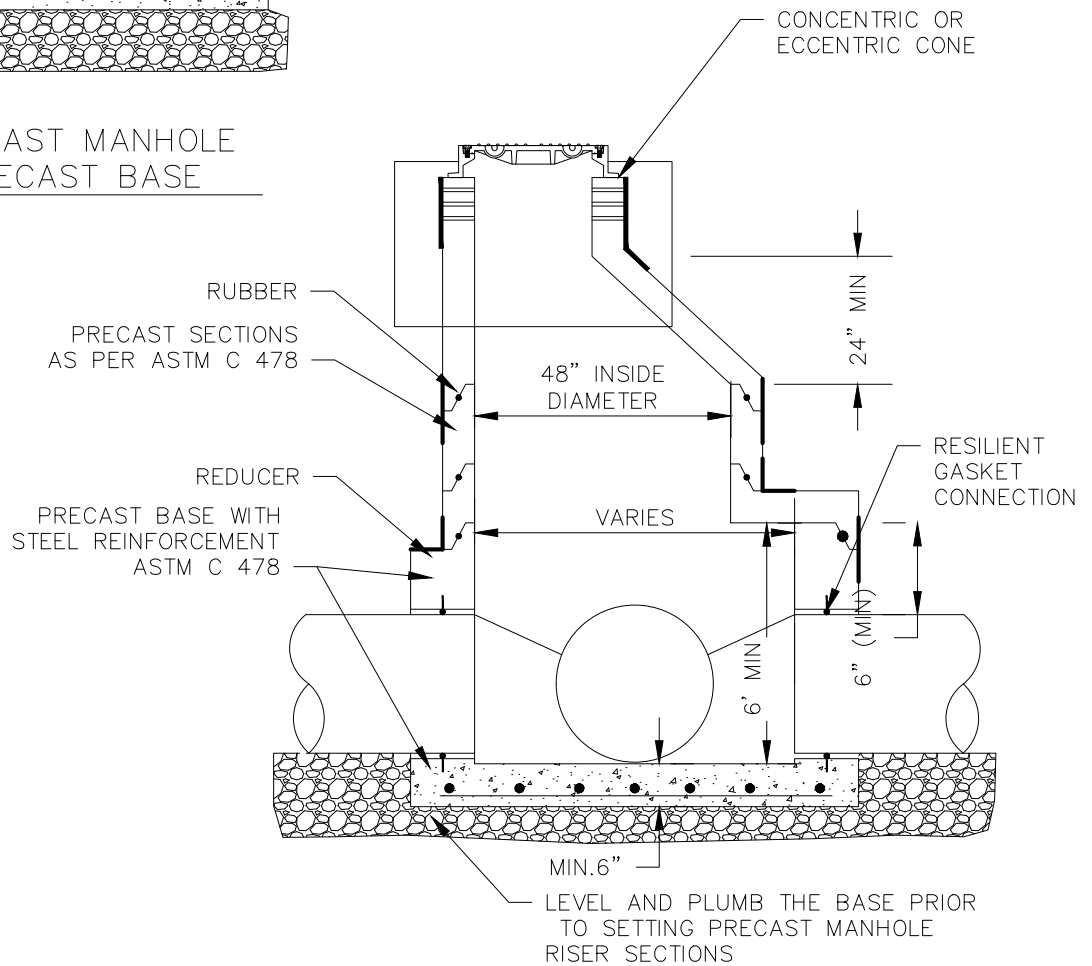
NOTE: REFER TO DETAIL  
1 - SD 33-05-61-01  
FOR TYPICAL MANHOLE

RUBBER GASKET  
COMPRESSION JOINTS  
(TYP) (SEE APPROVED  
PRODUCT LIST)

FLEXIBLE BOOT (SEE  
APPROVED PRODUCT  
LIST)

DROP STRUCTURE IS  
REQUIRED  
WHEN INFLOW INVERT  
IS MORE THAN 24"  
ABOVE OUTFLOW  
ELEVATION

PRECAST MANHOLE  
PRECAST BASE



CONCENTRIC OR  
ECCENTRIC CONE

RUBBER

PRECAST SECTIONS  
AS PER ASTM C 478

REDUCER

PRECAST BASE WITH  
STEEL REINFORCEMENT  
ASTM C 478

48" INSIDE  
DIAMETER

VARIES

24" MIN

RESILIENT  
GASKET  
CONNECTION

6" (MIN)

6" MIN

MIN. 6"

LEVEL AND PLUMB THE BASE PRIOR  
TO SETTING PRECAST MANHOLE  
RISER SECTIONS

PRECAST MANHOLE ON PRECAST BASE  
FOR PIPE SIZES 24" AND LARGER



SAN ANTONIO  
RIVER AUTHORITY

PRECAST MANHOLES

APPROVED

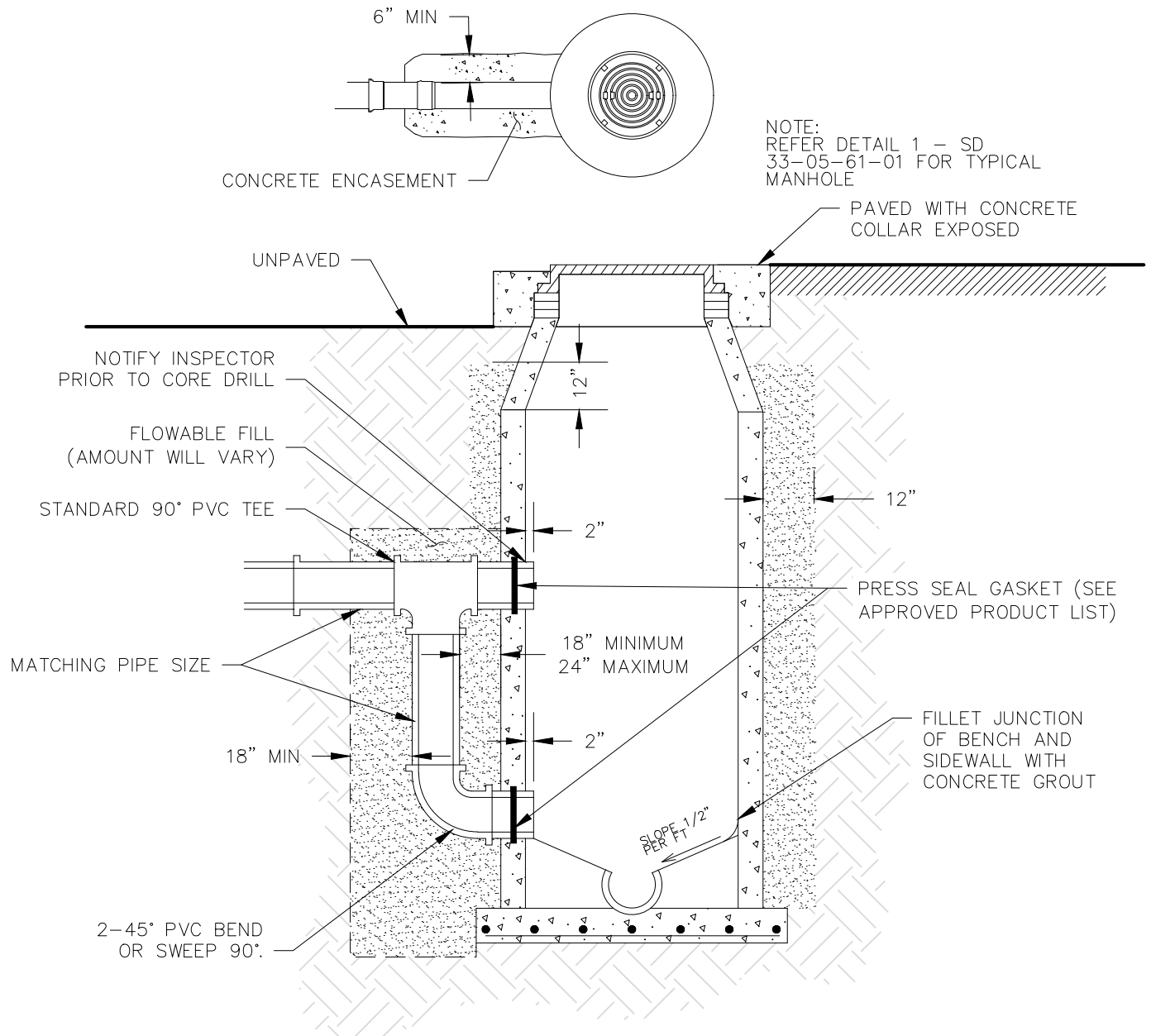
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SHEET  
2 OF 28



NOTES:

1. PRICE FOR DROP FITTINGS AND ENCASEMENT TO BE INCLUDED WITH THE PRICE OF MANHOLE.
2. CONCRETE FOR DROP STRUCTURES SHALL BE FORMED ON ALL SIDES.
3. ALL MANHOLE PENETRATIONS SHALL BE MADE BY CORE DRILLING, AND INSPECTOR SHALL BE NOTIFIED PRIOR TO WORK BEING PERFORMED.
4. ALL INTERIOR COATING SHALL BE REPAIRED AS NECESSARY.
5. DROP STRUCTURES SHALL BE APPROVED, IN WRITING, BY RIVER AUTHORITY.



SAN ANTONIO  
RIVER AUTHORITY

OUTSIDE DROP  
MANHOLE

APPROVED

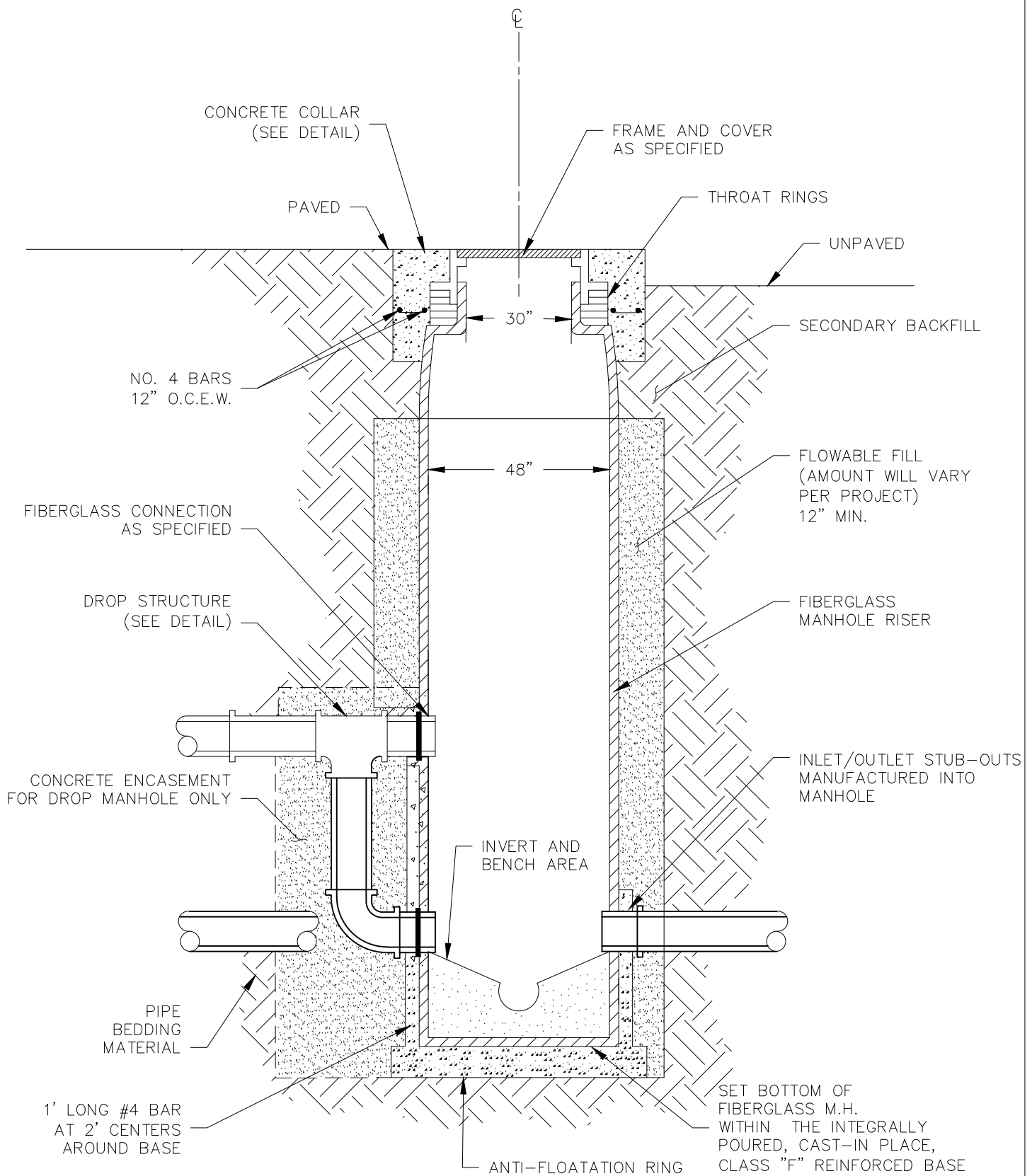
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SHEET  
3 OF 28



SAN ANTONIO  
RIVER AUTHORITY

TYPICAL FIBERGLASS  
MANHOLE DETAIL

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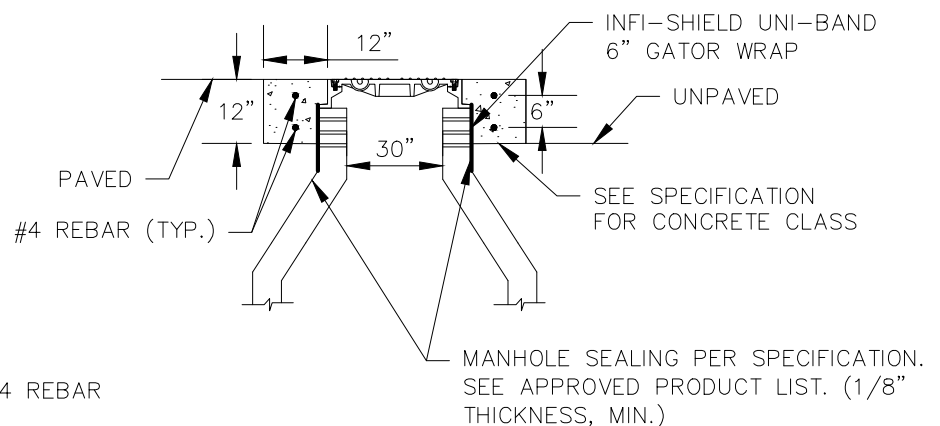
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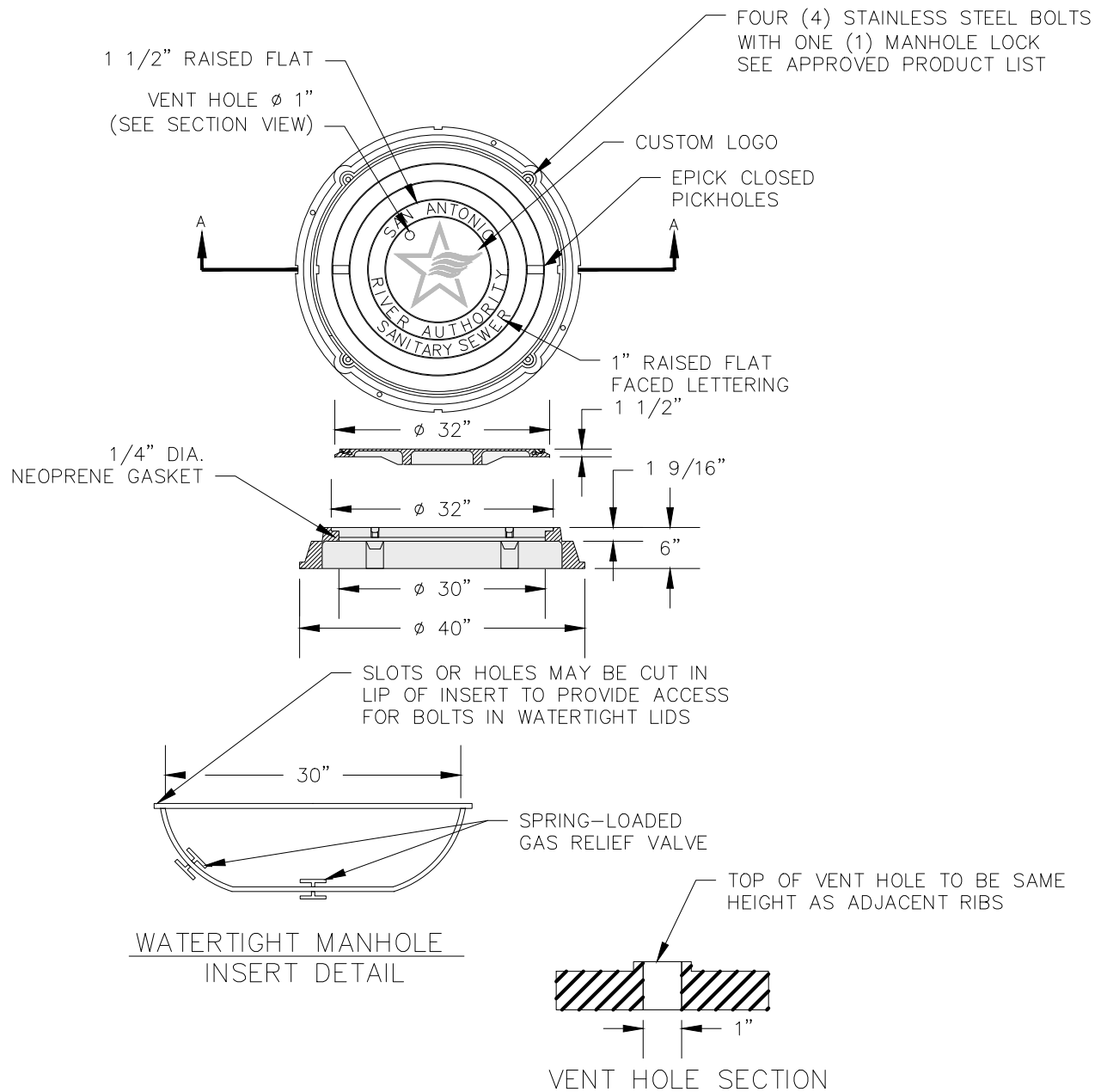
SHEET  
4 OF 28



Diagram illustrating the flow direction and dimensions for a manhole cover. The cover is labeled "MANHOLE COVER" and "HOLE ON". The flow direction is indicated by arrows labeled "FLOW OUT" and "FLOW IN". The minimum distance between pipes is specified as "MIN. DISTANCE BETWEEN PIPES = APPROX. 1/2 PIPE O.D.". The cover is shown with a central hole and a surrounding circular area.



SHEET  
5 OF 28



NOTE:

1. MANHOLE RING ENCASEMENT (COLLAR) REQUIRED ON ALL MANHOLES. SEE DETAIL.



SAN ANTONIO  
RIVER AUTHORITY

VENTED MANHOLE  
RING AND COVER

APPROVED

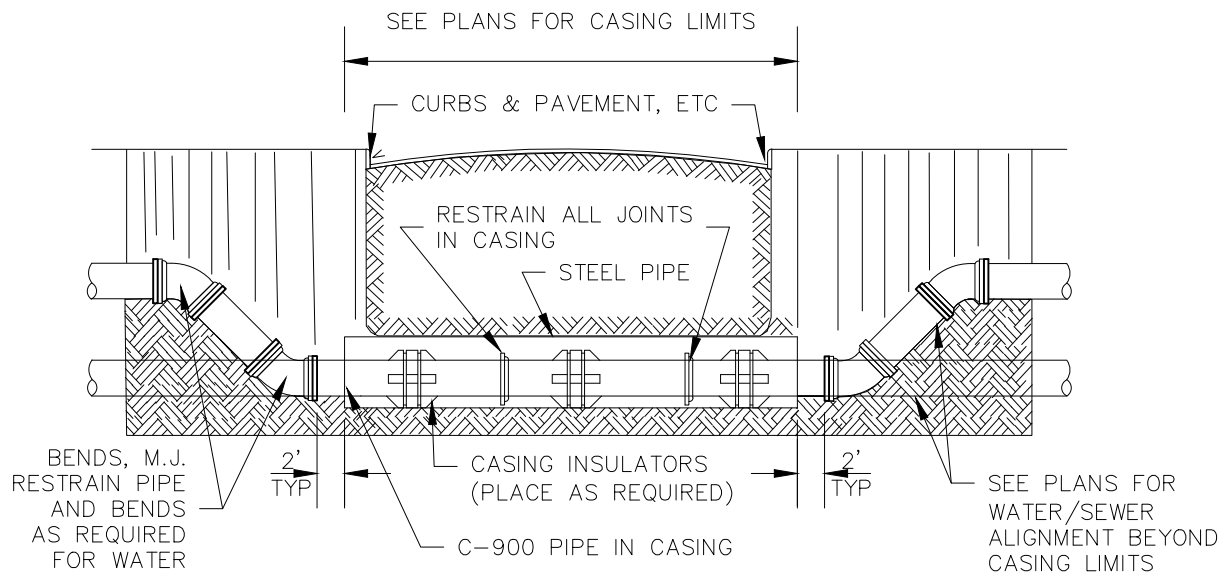
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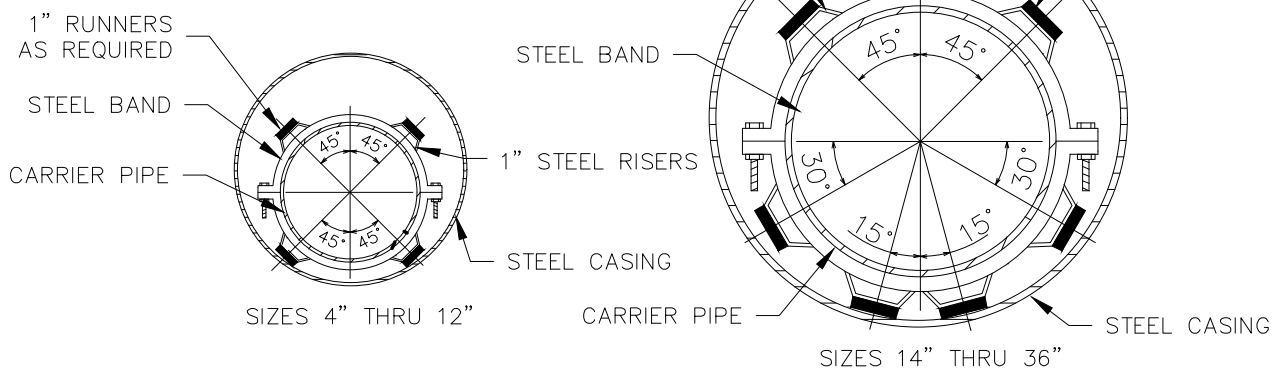
SHEET  
6 OF 28



SIZE	BAND WIDTH	NO. RUNNERS PER TIE
8"	8"	2 TOP, 2 BOTTOM
12"	8"	2 TOP, 2 BOTTOM
16"	8"	2 TOP, 4 BOTTOM
20"	8"	2 TOP, 4 BOTTOM
24"	8"	2 TOP, 4 BOTTOM
30"	12"	2 TOP, 4 BOTTOM
36"	12"	2 TOP, 4 BOTTOM

NOTES:

1. FITTINGS SHALL BE PAID FOR BY SEPARATE ITEM JOINT RESTRAINTS SHALL BE APPROVED AS SPECIFIED IN STANDARD MATERIAL SPECIFICATION ITEM NO. 800
2. CASING INSULATORS IN ACCORDANCE TO STANDARD MATERIAL SPECIFICATION NO. 800 CONTRACTOR SHALL DETERMINE ENTRY AND EXIT PIT
3. PIT LOCATIONS. NOT SHOWN.



SAN ANTONIO  
RIVER AUTHORITY

INSTALLATION OF  
PIPE IN BORE

APPROVED

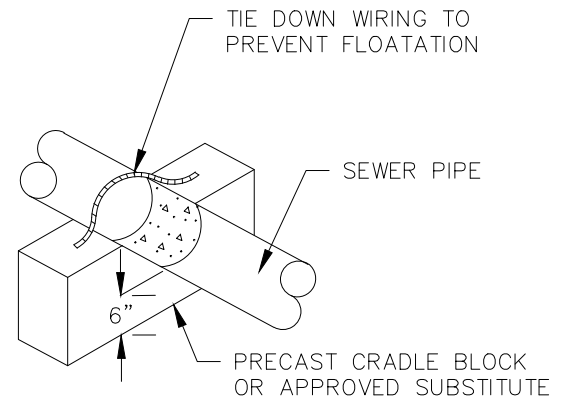
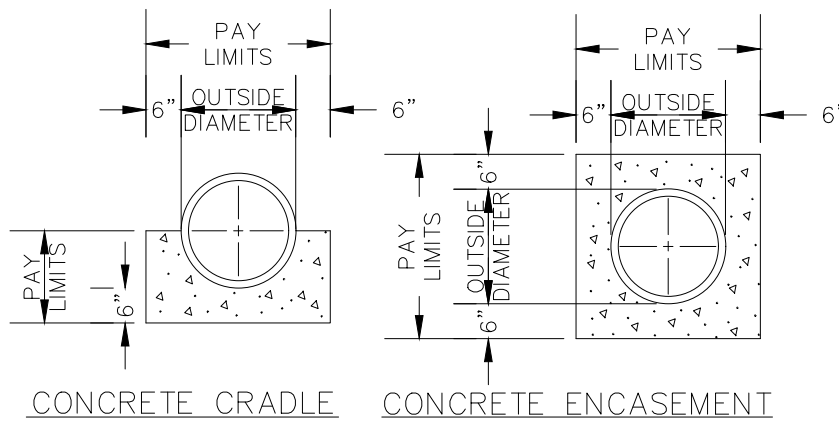
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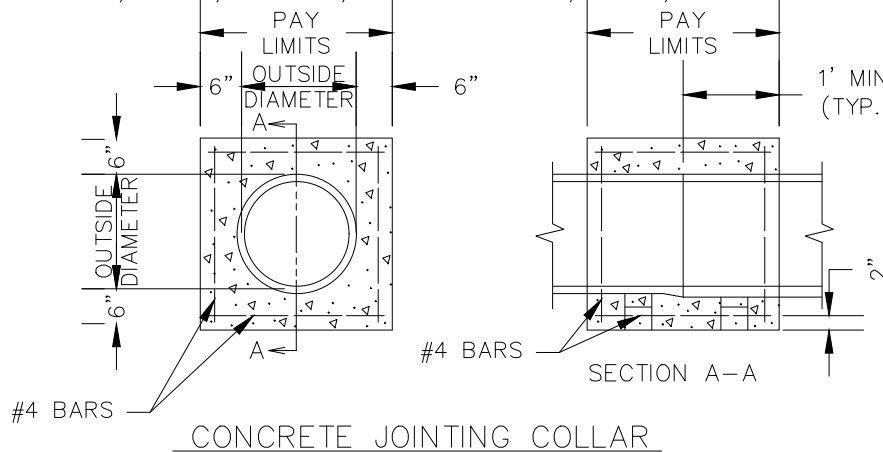
SHEET  
7 OF 28



SUPPORT FOR  
ENCASEMENT OR CRADLE

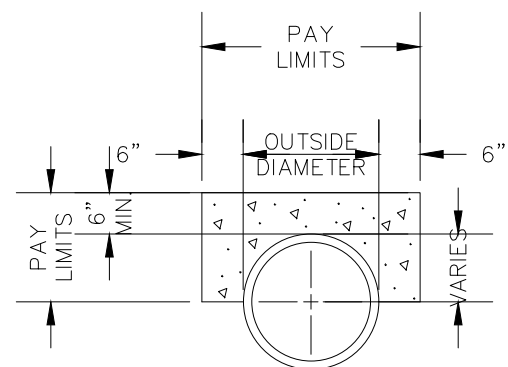
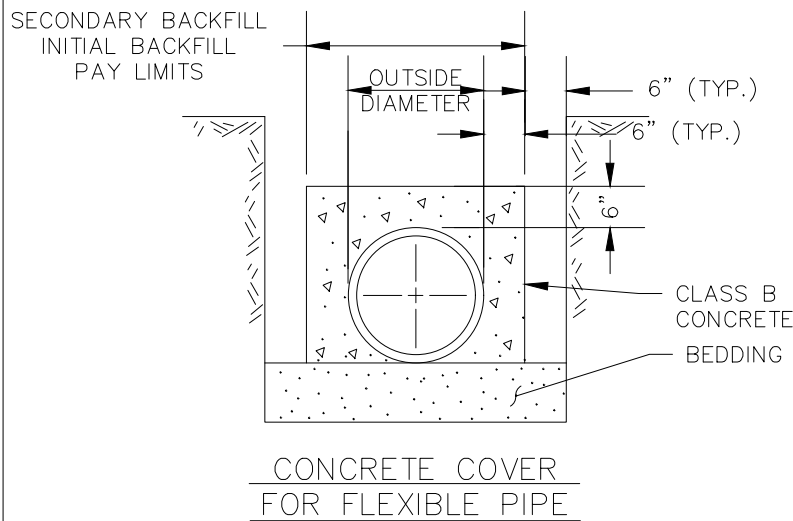
NOTES:

- 1) ALL CONCRETE ENCASEMENT SHALL BE POURED AT A PLANE 6" ABOVE THE PIPE BETWEEN EXCAVATED TRENCH WALLS.
- 2) ALL SEWER PIPE WITH LESS THAN 3' OF COVER TO SUBGRADE SHALL BE CONCRETE ENCASED.
- 3) ALL FORCE MAINS SHALL BE PROVIDED WITH THRUST BLOCKS, WHERE CHANGES IN DIRECTION OCCUR, AT TEES, BENDS, CROSSES, CHANGES IN SIZE, STOPS, OR AS DIRECTED BY SARA.



AFTER CENTERING PIPE ENDS, WRAP JOINTS WITH 3" WIDE POLYVINYL TAPE OR RUBBER ADAPTER, CAN-TEX.1-70A OR EQUAL

PIPE SECTIONS TO BE BLOCKED AND SUPPORTED SIMILAR TO THE ENCASEMENT DETAIL SHOWN BELOW, (SUBJECT TO APPROVAL)



TO BE USED WHEREVER TRENCH WIDTH IS GREATER THAN TWO FEET (2') PLUS O.D.



**SAN ANTONIO  
RIVER AUTHORITY**

TYPICAL CONCRETE  
DETAILS

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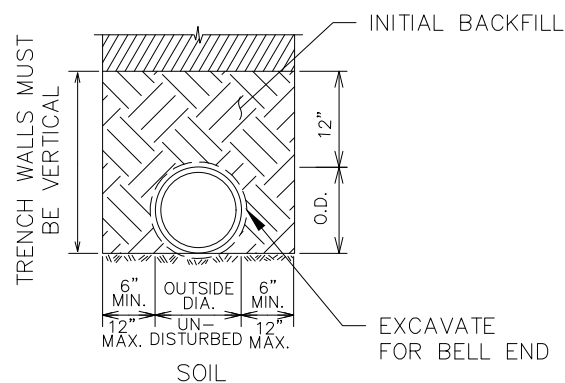
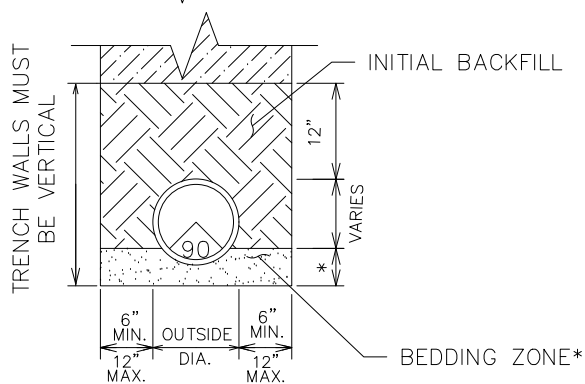
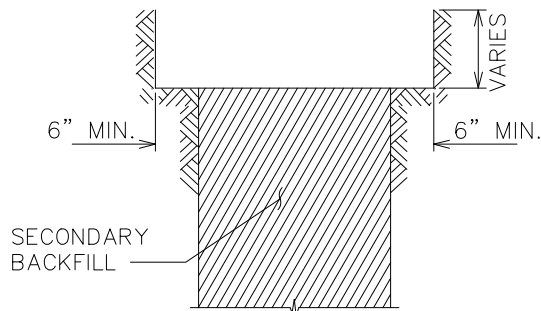
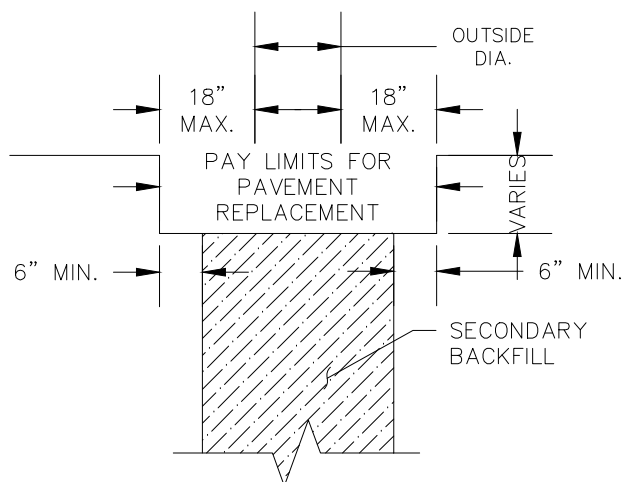
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SHEET  
8 OF 28





\* SEWER GRAVEL 12" MIN. OR 1/8 O.D. OF THE PIPE WHICHEVER IS GREATER AS DIRECTED BY THE RIVER AUTHORITY

- 1) RIGID PIPE - UNSTABLE OR UNACCEPTABLE CONDITIONS
- FLEXIBLE PIPE - ALL CONDITIONS

\* IN AREAS OF OVER EXCAVATION, ENCASEMENT SHALL EXTEND FROM TRENCH WALL TO TRENCH WALL. PAY LIMITS SHALL NOT EXCEED 12" MAX. AS SHOWN ON DETAIL. ADDITIONAL ENCASEMENT SHALL BE INCIDENTAL.

- 2) RIGID PIPE - EXISTING STABLE BEDDING CONDITIONS



SAN ANTONIO  
RIVER AUTHORITY

SANITARY SEWER  
TRENCH DETAIL

APPROVED

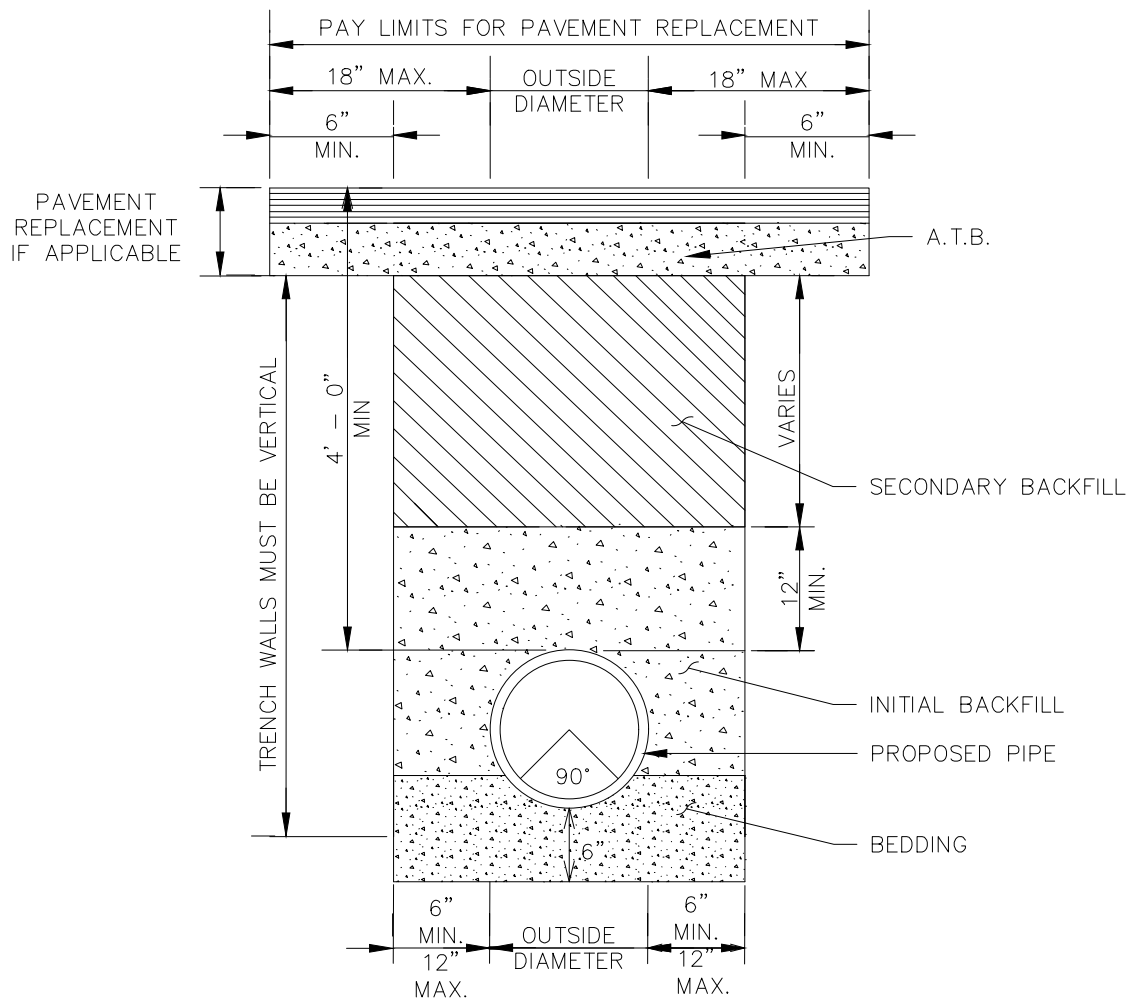
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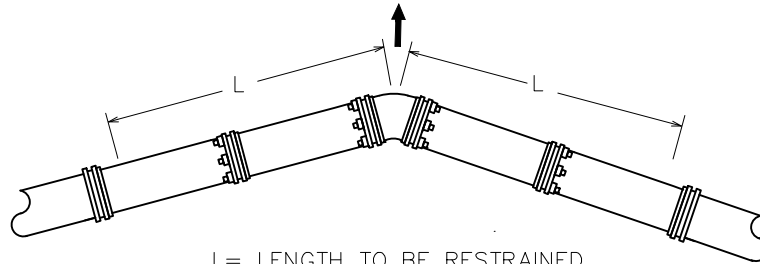
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SHEET  
9 OF 28





L= LENGTH TO BE RESTRAINED  
ON BOTH SIDES OF FITTING

PIPE SIZE (INCH)	BEND ANGLE (DEG)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 psi	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 psi
6	90	23	17
6	45	9	7
6	22.5	5	3
6	11.25	2	2
8	90	30	22
8	45	12	9
8	22.5	6	4
8	11.25	3	2
12	90	43	32
12	45	18	13
12	22.5	8	6
12	11.25	4	3

#### RESTRAINED LENGTH DESIGN

RESTRAINED LENGTH CALCULATIONS ARE FOR P.V.C PIPE BEDDED IN COMPACTED GRANULAR MATERIAL EXTENDING TO THE TOP OF THE PIPE. THE NATIVE SOIL MATERIAL IS ASSUMED TO BE INORGANIC CLAY OF HIGH PLASTICITY. DEPTH OF BURY IS ASSUMED TO BE 4 FEET.

#### NOTE:

THESE CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINED LENGTH SHALL BE DESIGNED BY A LICENSED ENGINEER BASED UPON THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION.



SAN ANTONIO  
RIVER AUTHORITY

RESTRAINED  
LENGTHS FOR  
HORIZONTAL BENDS

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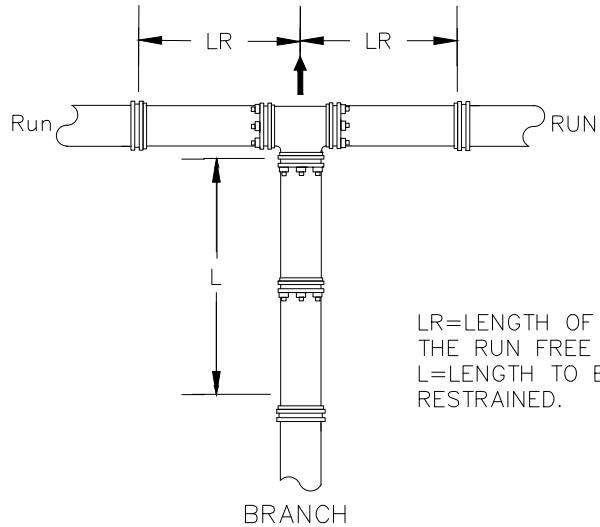
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SHEET  
11 OF 28

# RESTRAINED LENGTH DESIGN

RESTRAINED LENGTH CALCULATIONS ARE FOR P.V.C PIPE BEDDED IN COMPACTED GRANULAR MATERIAL EXTENDING TO THE TOP OF THE PIPE. THE NATIVE SOIL MATERIAL IS ASSUMED TO BE INORGANIC CLAY OF HIGH PLASTICITY. DEPTH OF BURY IS ASSUMED TO BE 4 FEET.

NOTE:  
THESE CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINED LENGTH SHALL BE DESIGNED BY A LICENSED ENGINEER BASED UPON THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION.



## RESTRAINED LENGTH FOR TEES

PIPE SIZE (inch)	BRANCH SIZE (inch)	LENGTH OF RUN (ft.)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 psi	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 psi
6	4	0	42	31
6	4	5	7	1
6	4	10	1	1
6	6	0	59	44
6	6	5	35	20
6	6	10	11	1
8	4	0	42	31
8	4	5	1	1
8	6	0	59	44
8	6	5	28	13
8	6	10	1	1
8	8	0	77	58
8	8	5	53	34
8	8	10	30	11
8	8	15	6	1

## RESTRAINED LENGTH FOR TEES (CONT'D)

PIPE SIZE (inch)	BRANCH SIZE (inch)	LENGTH OF RUN (ft.)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 psi	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 psi
12	4	0	42	31
12	4	5	1	1
12	6	0	59	44
12	6	5	13	1
12	6	10	1	1
12	8	0	77	58
12	8	5	42	23
12	8	10	7	1
12	8	15	1	1
12	12	0	109	82
12	12	5	86	59
12	12	10	63	35
12	12	15	39	12



SAN ANTONIO  
RIVER AUTHORITY

RESTRAINED  
LENGTHS FOR TEES

APPROVED

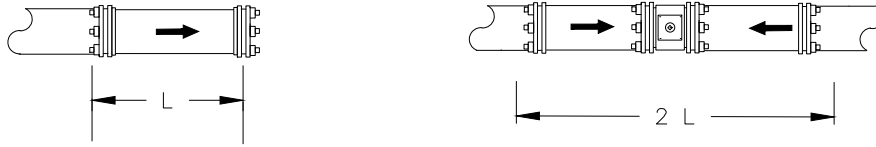
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SD 33-31-00-02

SHEET  
12 OF 28



L=LENGTH TO BE RESTRAINED

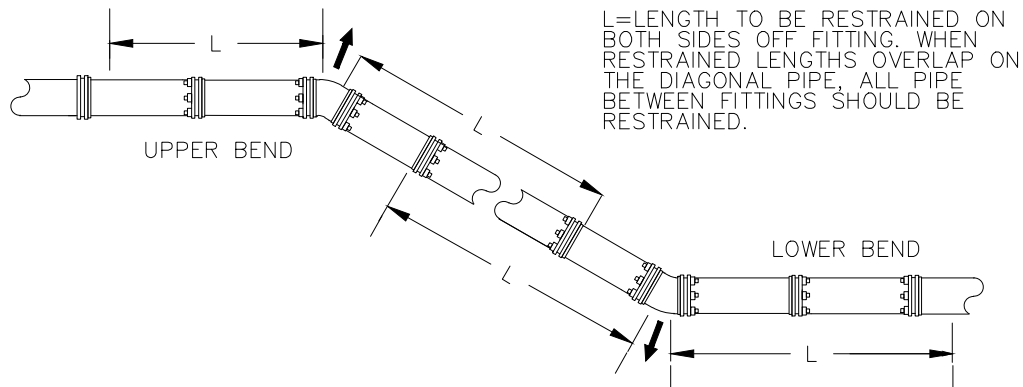
PIPE SIZE (inch)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 psi	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 psi
6	59	44
8	77	58
10	93	69
12	109	82

#### RESTRAINED LENGTH DESIGN

RESTRAINED LENGTH CALCULATIONS ARE FOR P.V.C PIPE BEDDED IN COMPACTED GRANULAR MATERIAL EXTENDING TO THE TOP OF THE PIPE. THE NATIVE SOIL MATERIAL IS ASSUMED TO BE INORGANIC CLAY OF HIGH PLASTICITY. DEPTH OF BURY IS ASSUMED TO BE 4 FEET.

NOTE: THESE CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINED LENGTH SHALL BE DESIGNED BASED UPON THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION.





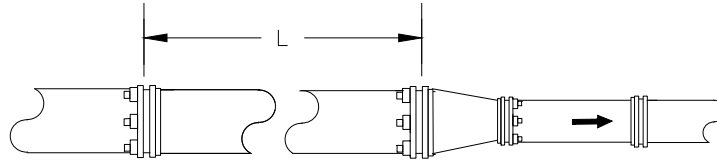
PIPE SIZE (INCH)	BEND ANGLE (DEG.)	LOW SIDE DEPTH	UPPER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE = 200 psi	LOWER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE = 200 psi	UPPER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE = 150 psi	LOWER BEND RESTRAINED LENGTH IN FEET TEST PRESSURE = 150 psi
6	45	5	24	8	18	6
6	22.5	5	12	4	9	3
6	11.25	5	6	2	4	1
6	45	10	24	5	18	4
6	22.5	10	12	2	9	2
6	11.25	10	6	1	4	1
8	45	5	32	11	24	8
8	22.5	5	15	5	11	4
8	11.25	5	8	3	6	2
8	45	10	32	7	24	5
8	22.5	10	15	3	11	2
8	11.25	10	8	2	6	1
12	45	5	45	16	34	12
12	22.5	5	22	7	16	6
12	11.25	5	11	4	8	3
12	45	10	45	10	34	7
12	22.5	10	22	5	16	3
12	11.25	10	11	2	8	2

#### RESTRAINED LENGTH DESIGN

RESTRAINED LENGTH CALCULATIONS ARE FOR P.V.C PIPE BEDDED IN COMPACTED GRANULAR MATERIAL EXTENDING TO THE TOP OF THE PIPE. THE NATIVE SOIL MATERIAL IS ASSUMED TO BE INORGANIC CLAY OF HIGH PLASTICITY. DEPTH OF BURY IS ASSUMED TO BE 4 FEET.

NOTE: THESE CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINED LENGTH SHALL BE DESIGNED BY A LICENSED ENGINEER BASED UPON THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION.





L=LENGTH TO BE RESTRAINED

PIPE SIZE (inch)	SMALL SIZE (inch)	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 200 psi	RESTRAINED LENGTH IN FEET, WHEN TEST PRESSURE = 150 psi
6	4	30	23
8	4	55	42
8	6	32	24
12	4	95	71
12	6	80	60
12	8	58	43

#### RESTRAINED LENGTH DESIGN

RESTRAINED LENGTH CALCULATIONS ARE FOR P.V.C PIPE BEDDED IN COMPACTED GRANULAR MATERIAL EXTENDING TO THE TOP OF THE PIPE. THE NATIVE SOIL MATERIAL IS ASSUMED TO BE INORGANIC CLAY OF HIGH PLASTICITY. DEPTH OF BURY IS ASSUMED TO BE 4 FEET.

NOTE: THESE CALCULATIONS ARE PROVIDED FOR REFERENCE. THE RESTRAINED LENGTH SHALL BE DESIGNED BY A LICENSED ENGINEER BASED UPON THE CONDITIONS ENCOUNTERED DURING THE INSTALLATION.



SAN ANTONIO  
RIVER AUTHORITY

RESTRAINED LENGTHS  
FOR REDUCERS

APPROVED

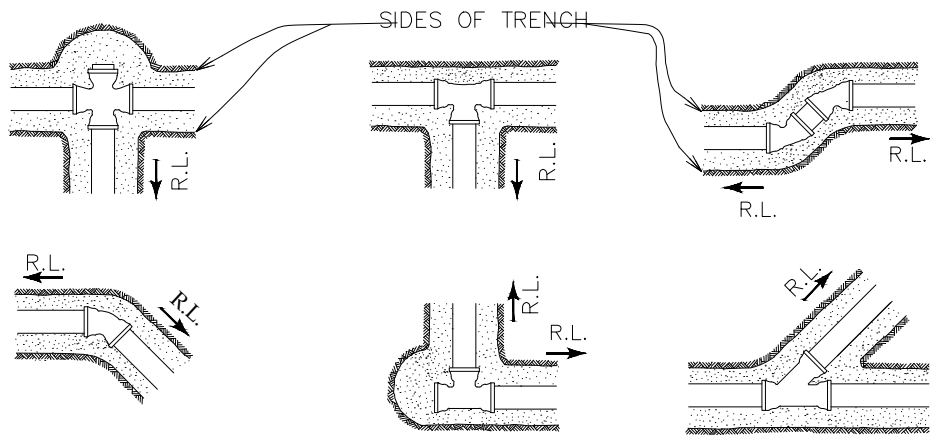
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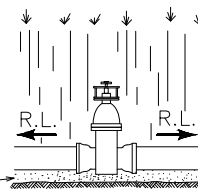
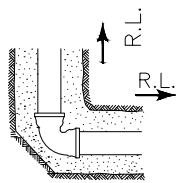
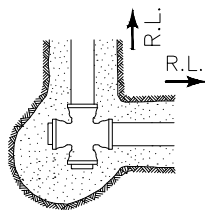
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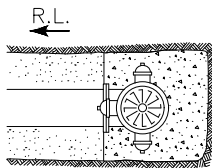
SHEET  
15 OF 28



R.L. = RESTRAINED LENGTHS TO BE DETERMINED BY DESIGNING ENGINEER

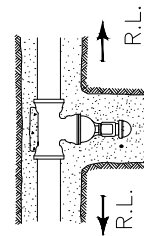
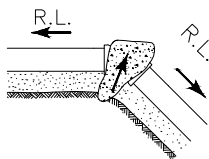


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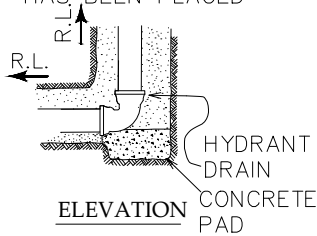


PLAN

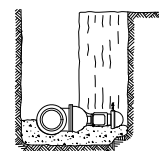
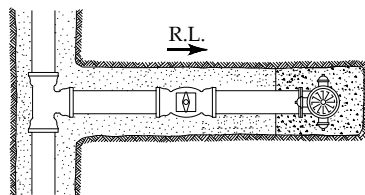
POUR CONCRETE PAD  
AFTER HYDRANT  
HAS BEEN PLACED



PLAN



ELEVATION



ELEVATION

NOTE: ALL NEW PRESSURIZED PIPELINES SHALL USE RESTRAINED JOINTS ONLY.  
THIS DETAIL IS TO ACCOMMODATE EXISTING PRESSURED PIPELINES AS DIRECTED.



SAN ANTONIO  
RIVER AUTHORITY

JOINT RESTRAINTS  
FOR FITTINGS

APPROVED

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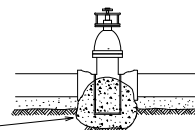
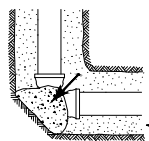
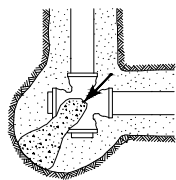
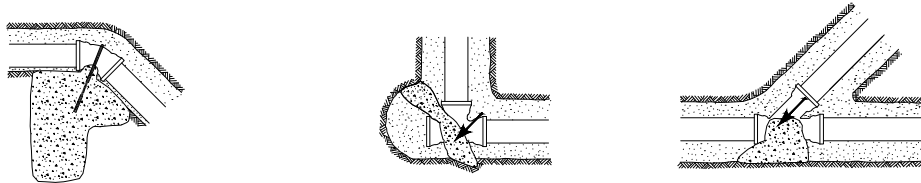
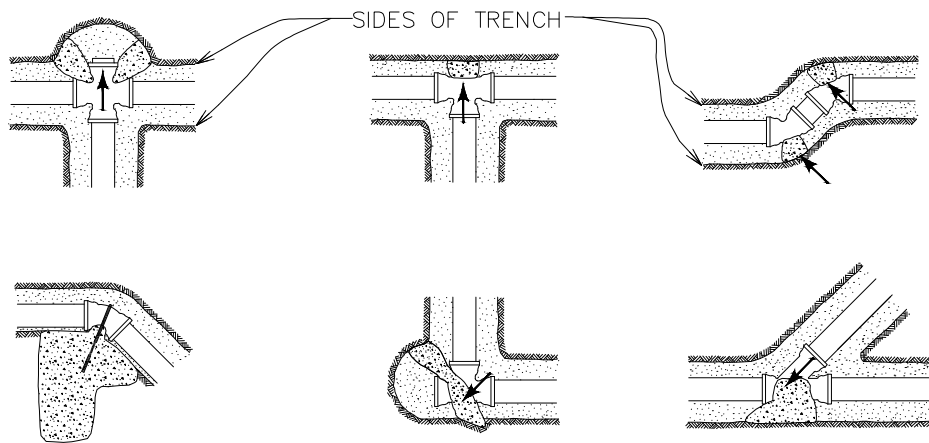
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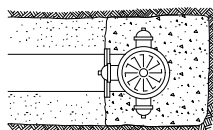
SHEET  
16 OF 28





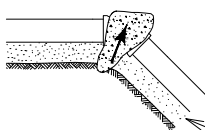
SELECT MATERIAL

CONCRETE BLOCKING REQUIRED FOR ALL 12" & LARGER, EXCEPT IN HIGH PRESSURE DISTRIBUTION SYSTEM WHERE BLOCKING IS REQUIRED FOR ALL VALVES

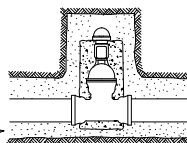


PLAN

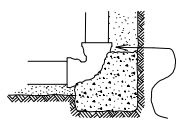
POUR BASE AFTER HYDRANT HAS BEEN PLACED



SELECT MATERIAL

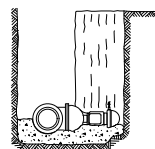
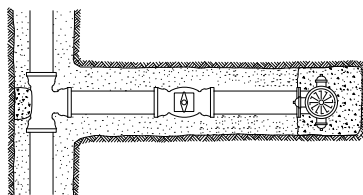


PLAN



ELEVATION

HYDRANT DRAIN



ELEVATION

NOTE:

ALL NEW PRESSURIZED PIPELINES SHALL USE RESTRAINED JOINTS ONLY. THIS DETAIL IS TO ACCOMMODATE EXISTING PRESSURED PIPELINES AS DIRECTED.



SAN ANTONIO  
RIVER AUTHORITY

RESTRAINED LENGTHS  
FOR VERTICAL  
OFFSETS

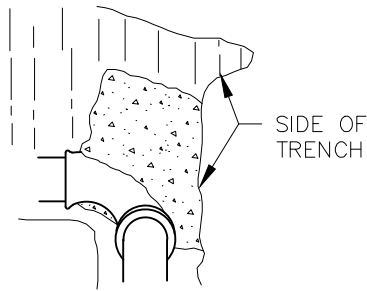
APPROVED  
APRIL 2012

REVISED  
MAY 2024

SD 33-31-00-04

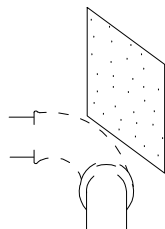
SHEET  
17 OF 28

TYPICAL  
BLOCKING  
FOR 90  
BEND  
AREA IN SQ.  
FT. FOR  
EACH OF THE  
FOLLOWING  
PIPE SIZES



AREA SQ. FT.

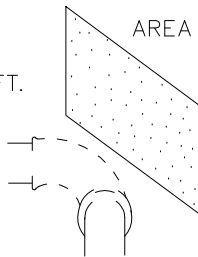
2 SQ. FT. IN  
ROCK & 4  
SQ. FT. IN  
OTHER SOILS



6" CLASS 200

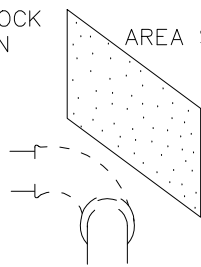
AREA SQ. FT.

4 SQ. FT. IN  
ROCK & 6 SQ. FT.  
IN OTHER SOILS



8" CLASS 200

9 SQ. FT. IN ROCK  
& 14 SQ. FT. IN  
OTHER SOILS



12" CLASS 200

BLOCKING AREA FOR 200 PSI TESTS  
& 175 PSI WORKING PRESSURES.

## THRUST BLOCKING DESIGN

ON BASIS OF 200 PSI WATER PRESSURE USED FOR TESTS, THE BLOCKING REQUIRED FOR TWO TYPES OF SOILS ARE NOTED BELOW. IN ONE CASE, A SOIL PRESSURE OF 5000 PSI IS USED FOR ROCK EXCAVATION AND FOR SOILS OTHER THAN ROCK A 3000 PSI BEARING SOIL PRESSURE IS USED. THE DISTRIBUTION ON SYSTEM IS DESIGNED TO OPERATE WITH A MAXIMUM WATER PRESSURE OF 175 PSI ALL CALCULATIONS APPLY TO A.C. PIPE CLASS 200 AND DUCTILE IRON PIPE CLASS 2. PVC PIPE CLASS 200 (SDR 13.5)

SQUARE FEET OF BLOCKING  
REQUIRED FOR ROCK EXCAVATION

SIZE PIPE	TEES & DEAD ENDS	90° BENDS	45° BENDS	22° 1/2° BENDS
6"	2	2	1	1
8"	3	4	2	1
12"	6	9	5	2
16"	11	15	8	4

SQUARE FEET OF BLOCKING REQUIRED  
FOR OTHER THAN ROCK EXCAVATION

SIZE PIPE	TEES & DEAD ENDS	90° BENDS	45° BENDS	22° 1/2° BENDS
6"	3	4	2	1
8"	4	6	4	2
12"	10	14	8	4
16"	18	25	14	7

ANCHORAGE AND BLOCKING SHALL BE PROVIDED IN A MANNER AS INDICATED BY DD-839-01 AND DD-839-02 IN ACCORDANCE WITH SECTION 5.4 ANCHORING BLOCKING STANDARD SPECIFICATIONS FOR WATER WORKS CONSTRUCTION EXCEPT THAT 2500 PSI WILL BE REQUIRED.

TRANSIT 2500 PSI CONCRETE MIX SHALL BE USED HOWEVER FOR SMALL VOLUME REQUIREMENTS CONCRETE MIXED AT JOB SITE WILL BE ACCEPTABLE ONLY IF A CONCRETE MIXER IS USED, ALL AGGREGATE SHALL BE CLEAN AND THE FIELD MIX SHALL BE IN THE RATIO OF 1:3:4 AND CONTAIN NOT LESS THAN 4 SACKS OF CEMENT PER cu. YD.

### NOTE:

ALL NEW PRESSURIZED PIPELINES SHALL USE RESTRAINED JOINTS ONLY. THIS DETAIL IS TO ACCOMMODATE EXISTING PRESSURED PIPELINES AS DIRECTED.



SAN ANTONIO  
RIVER AUTHORITY

THRUST BLOCKS FOR  
HIGH PRESSURE  
SYSTEM

APPROVED

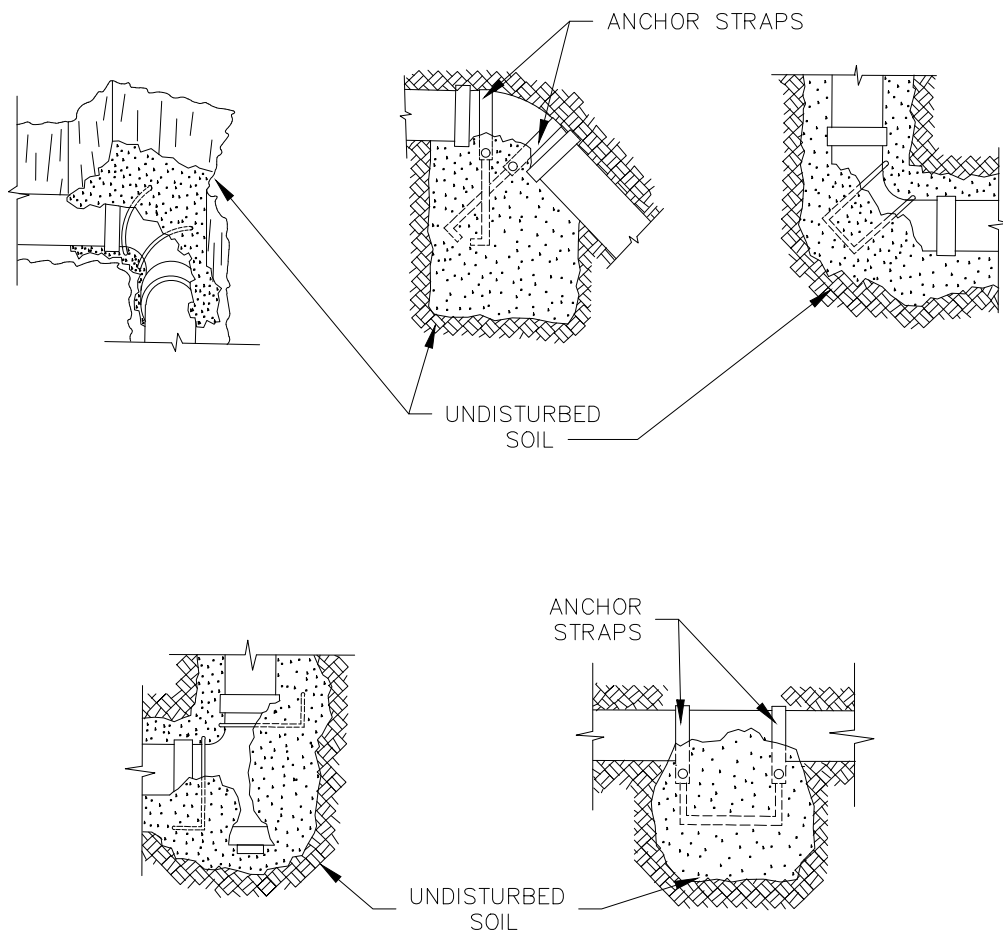
APRIL 2012

SD 33-31-00-08

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MAY 2024

SHEET  
18 OF 28



NOTE:  
 ALL NEW SEWER SYSTEMS SHALL USE RESTRAINED JOINTS ONLY. THIS DETAIL IS TO ACCOMODATE EXISTING  
 PRESSURE SEWER SYSTEMS UNLESS INDICATED OTHERWISE. ALL CONCRETE USED FOR THRUST BLOCKING  
 SHALL HAVE A MINIMUM CONCRETE STRENGTH OF 3500 PSI



SAN ANTONIO  
 RIVER AUTHORITY

THRUST BLOCKS FOR  
 HIGH PRESSURE  
 SYSTEM

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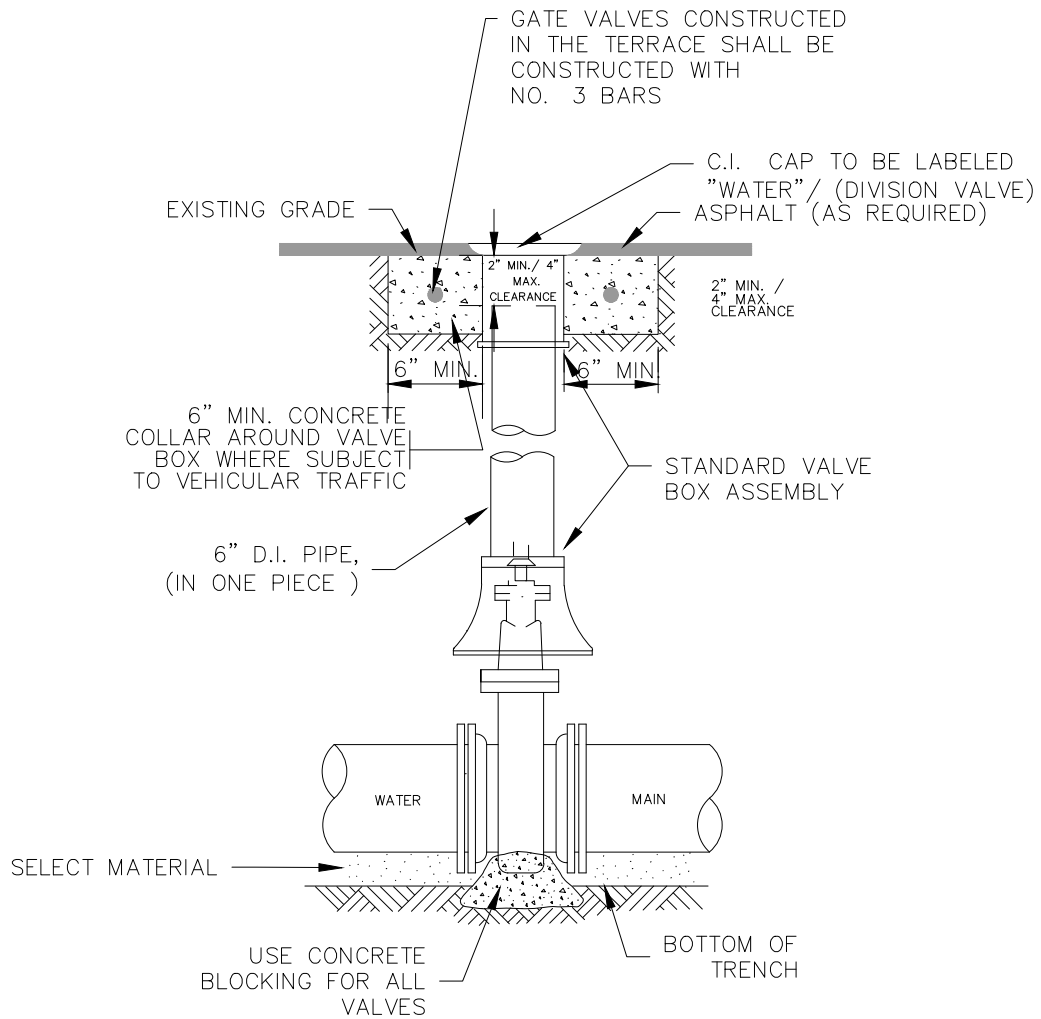
APRIL 2012

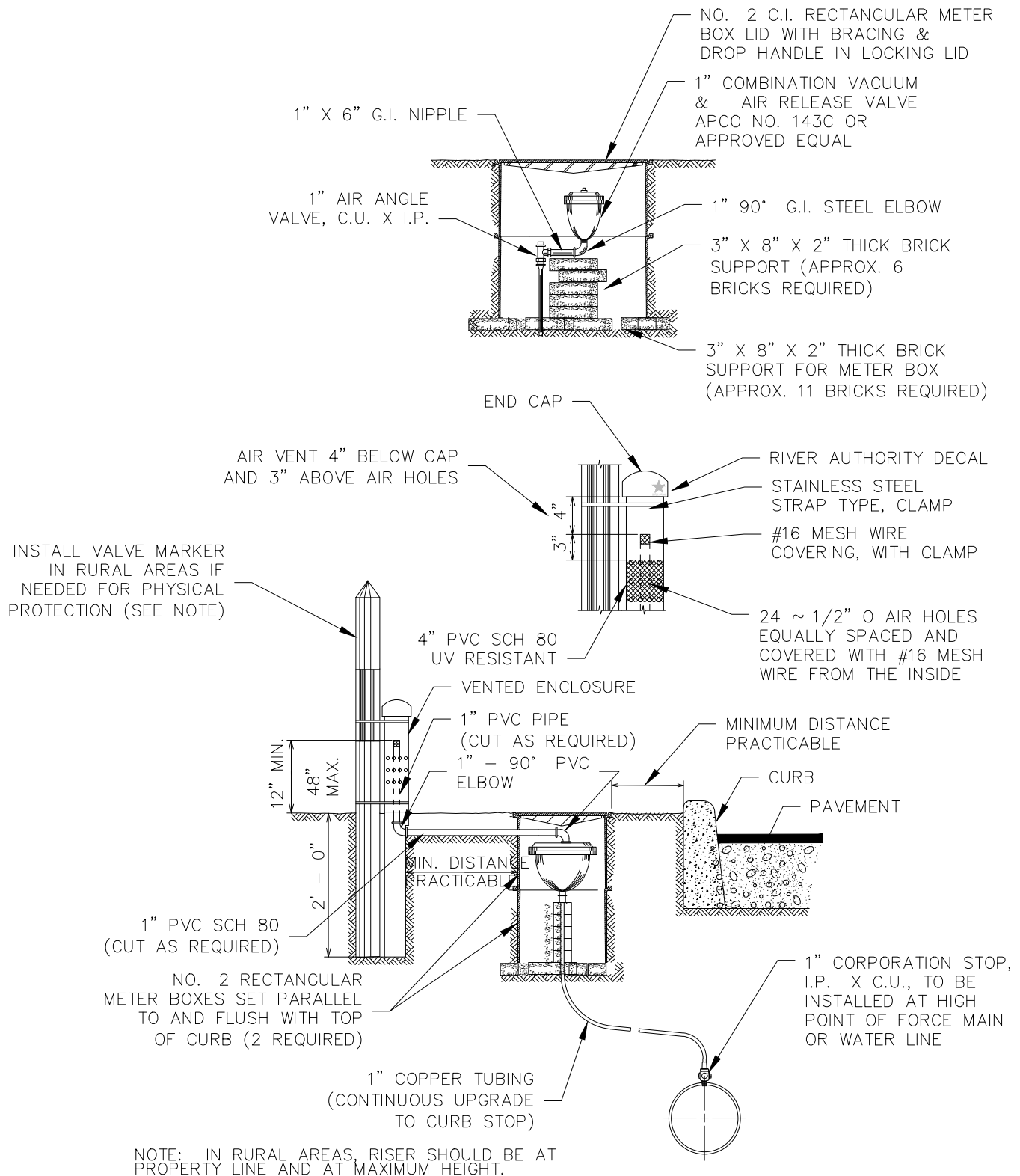
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SHEET  
 19 OF 28





SAN ANTONIO  
RIVER AUTHORITY

INSTALLATION OF 1"  
AIR RELEASE VALVE

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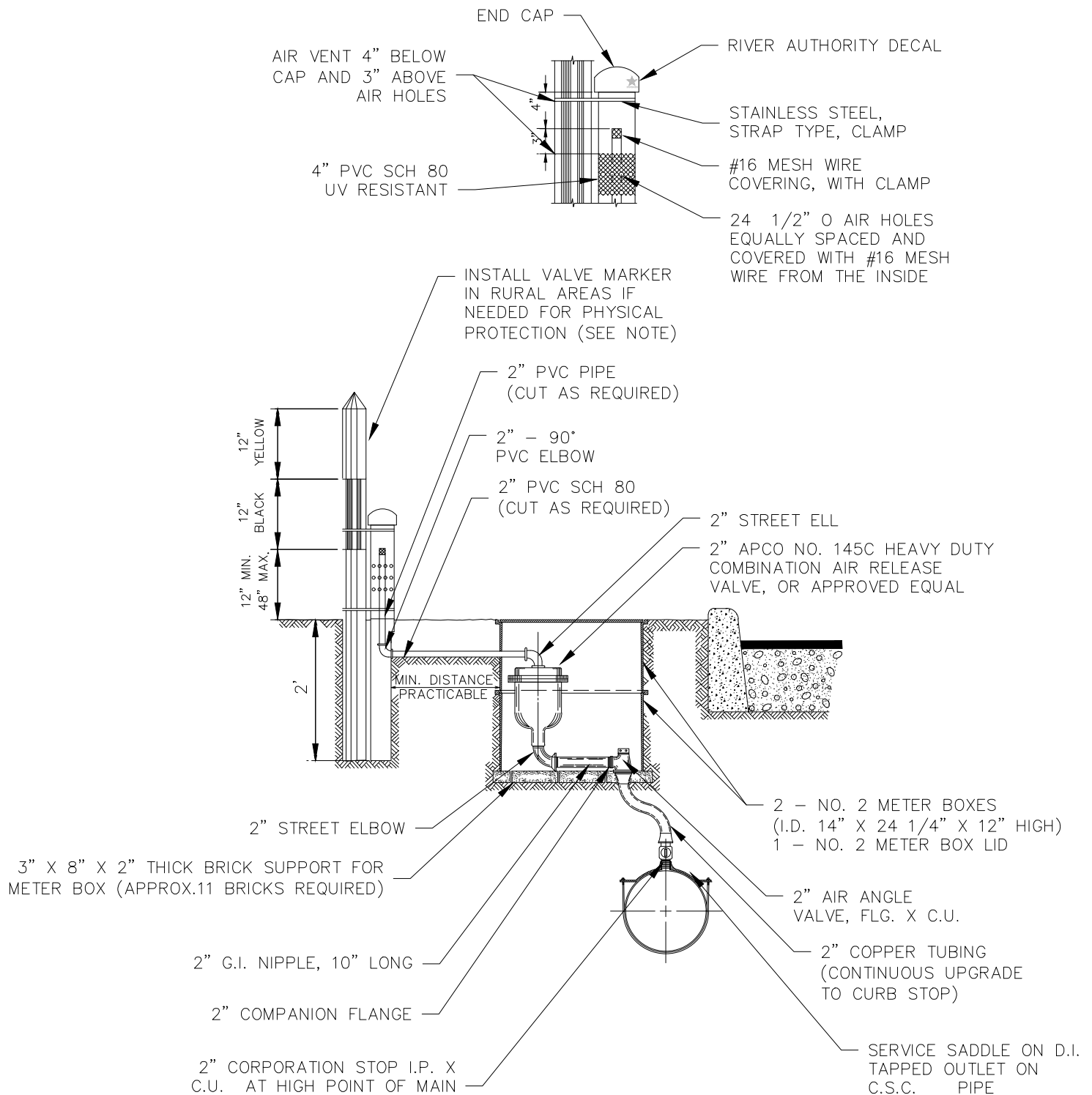
APRIL 2012

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SD 33-31-00-11

SHEET  
21 OF 28



NOTE: IN RURAL AREAS, RISER SHOULD BE AT PROPERTY LINE AND AT MAXIMUM HEIGHT.



SAN ANTONIO  
RIVER AUTHORITY

INSTALLATION OF 2"  
AIR RELEASE VALVE

APPROVED

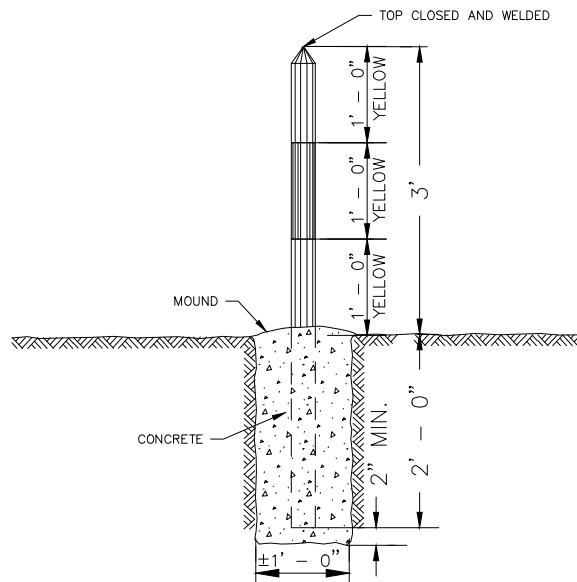
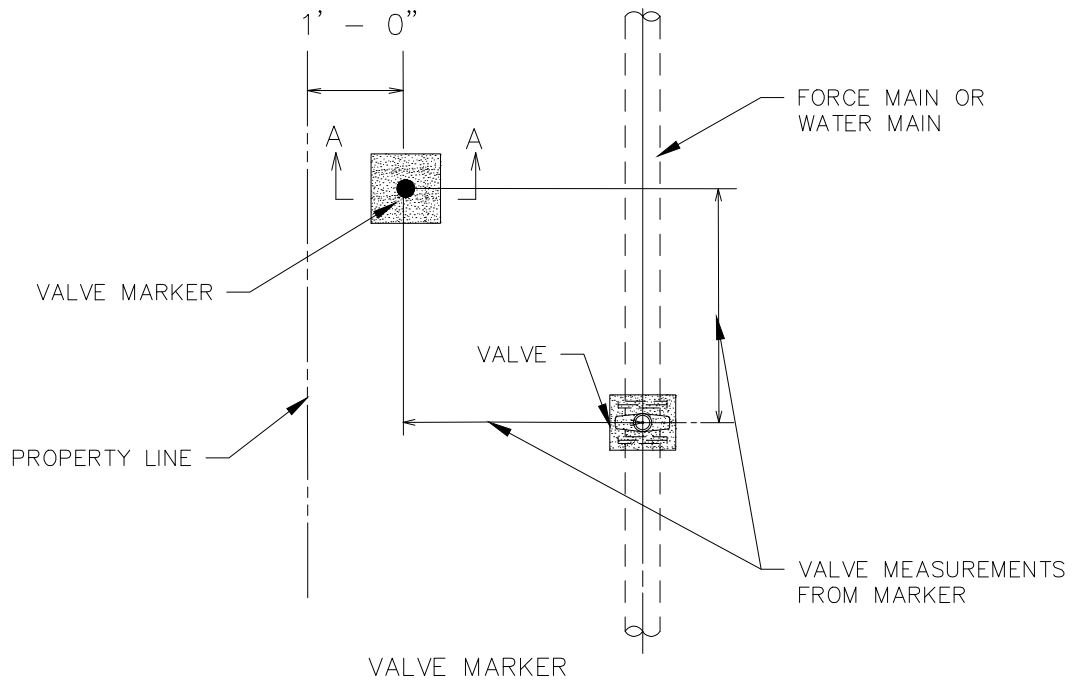
APRIL 2012

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SD 33-31-00-12

SHEET  
22 OF 28



NOTES:

1. VALVE MARKER IS 3" STEEL PIPE PAINTED AS SHOWN
2. VALVE MEASUREMENTS SHALL BE REFERENCED TO MARKER
3. SARA DECAL SHALL BE NOTED ON THE MARKER AND FACING THE DIRECTION OF THE VALVE.



SAN ANTONIO  
RIVER AUTHORITY

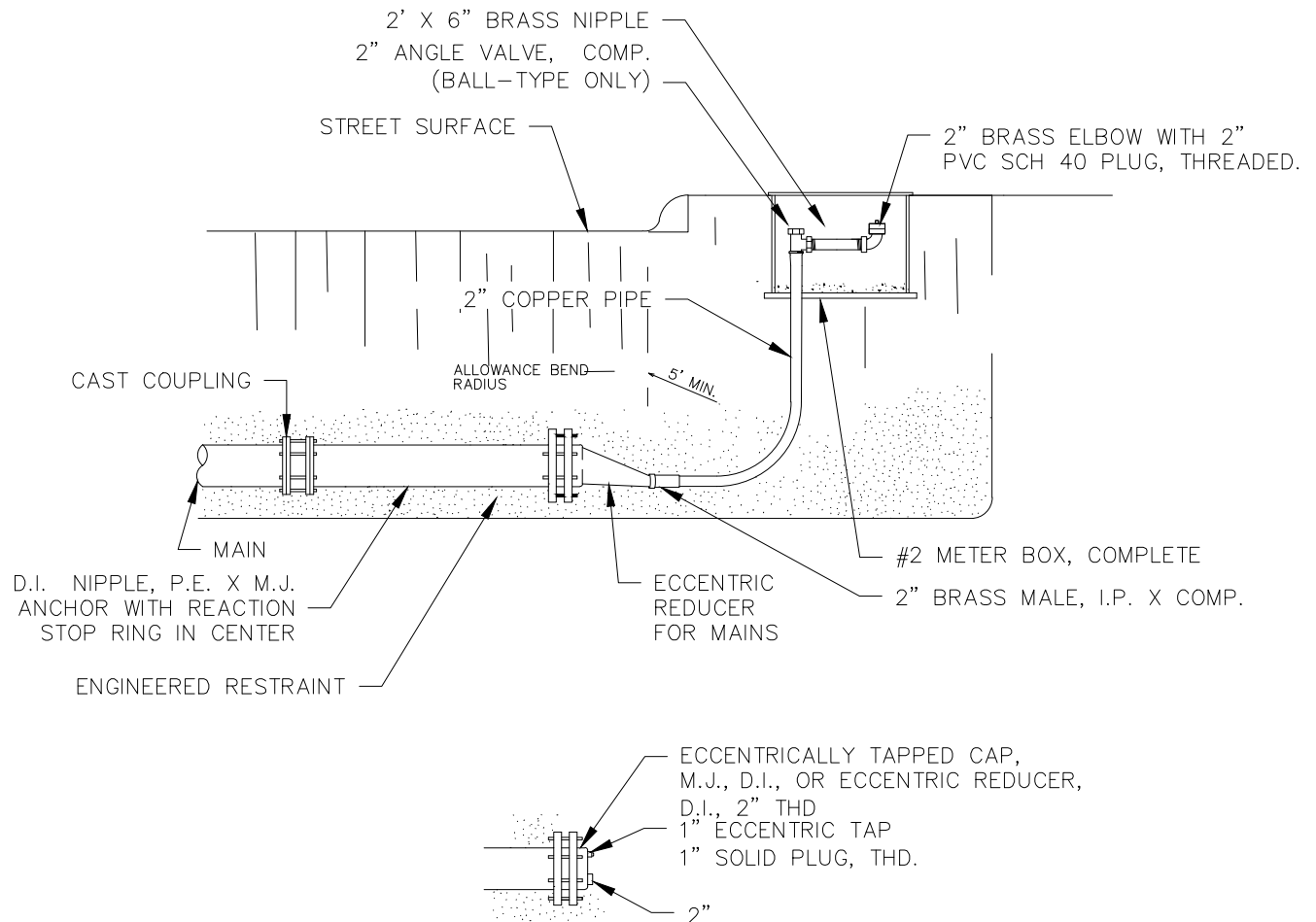
VALVE MARKER

APPROVED  
APRIL 2012

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MAY 2024

SD 33-31-00-13

SHEET  
23 OF 28



NOTE:

- EXCEPT AS DIRECTED BY THE ENGINEER, ANTI CORROSION EMBEDMENT SHALL BE PROVIDED FOR ALL DUCTILE-IRON PIPE FITTINGS, AND VALVES, AND AT ALL VALVE FITTINGS, OR OUTLETS FOR NON-FERROUS OR REINFORCED CONCRETE STEEL CYLINDER PIPE. THE EMBEDDING MATERIAL SHOULD BE MODIFIED GRADE 5 GRAVEL WASHED SAND.



SAN ANTONIO  
RIVER AUTHORITY

2" PERMANENT  
BLOW-OFF ASSEMBLY

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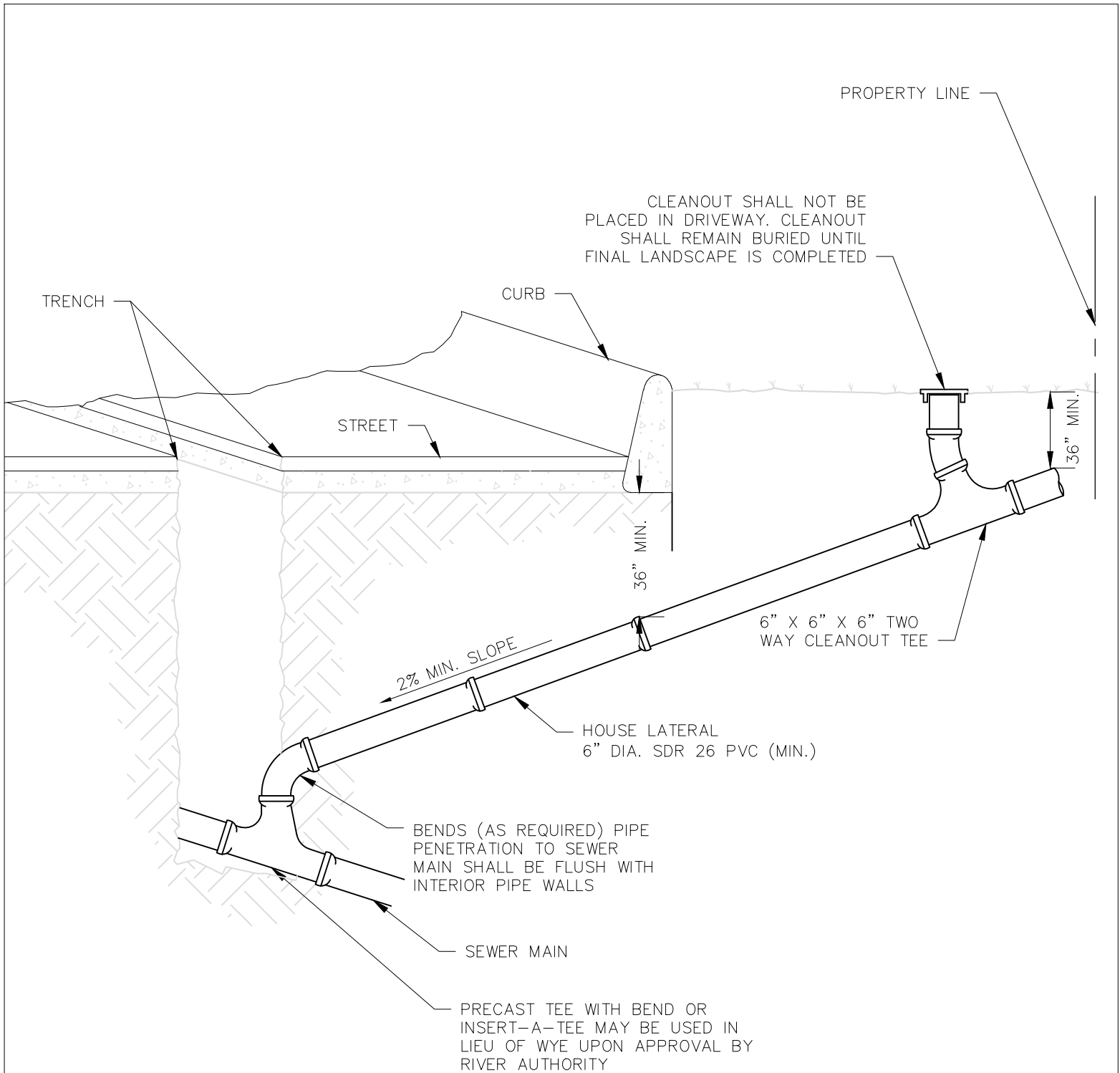
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SD 33-31-00-14

SHEET  
24 OF 28





NOTES:

1. A MINIMUM OF 36" OF COVER FROM GRADE IS REQUIRED. IF 36" OF COVER CANNOT BE OBTAINED, THEN CONCRETE ENCASEMENT WILL BE REQUIRED.
2. DEPTH AND GRADE OF SERVICE LATERALS AS SHOWN, ARE TYPICAL AND NOT TO SCALE. ACTUAL DEPTH, ALIGNMENT AND GRADE OF SERVICE LATERALS SHALL BE DETERMINED BY THE ENGINEER BASED ON THE ELEVATIONS OF THE SEWER MAIN, STREET, NATURAL GROUND AND BUILDING TO BE SERVICED.



SAN ANTONIO  
RIVER AUTHORITY

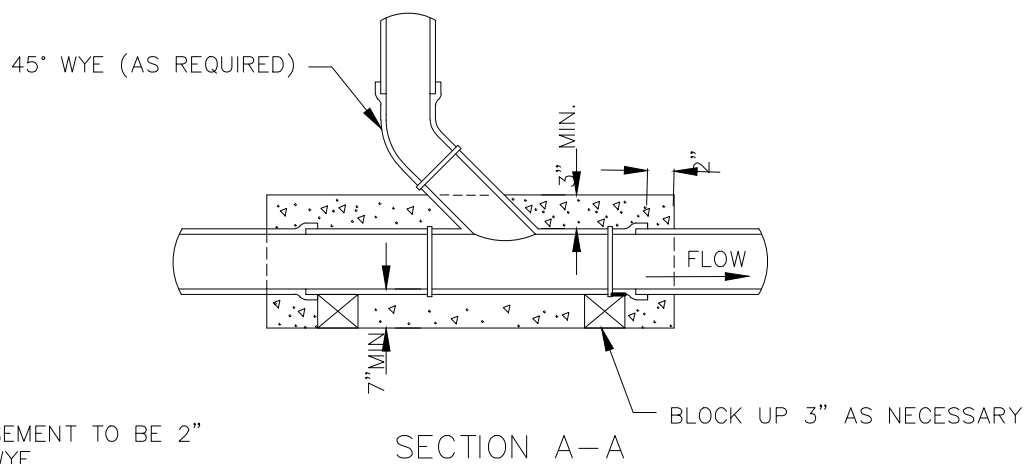
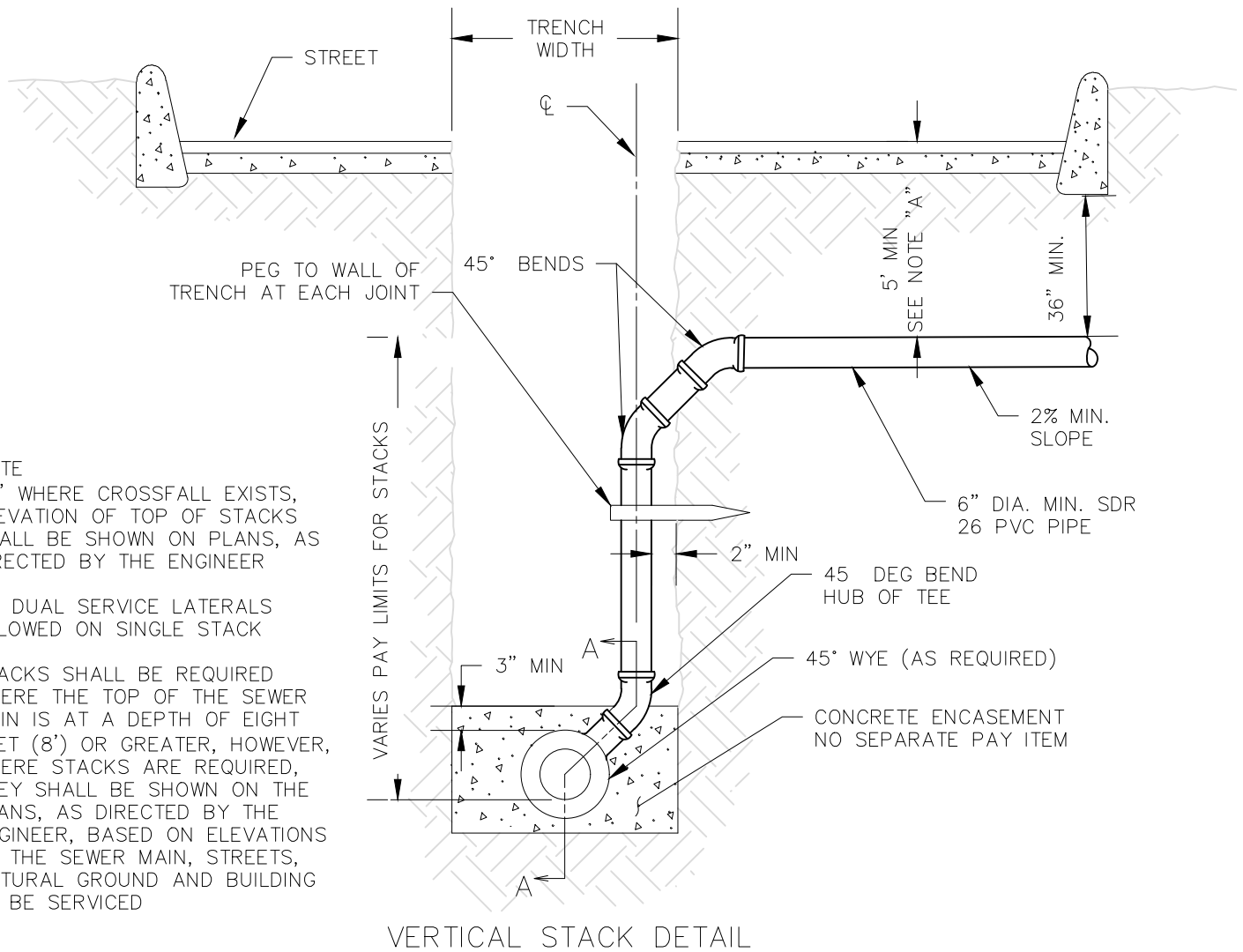
HOUSE LATERAL  
DETAIL

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APRIL 2012

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MAY 2024

SD 33-31-00-15

SHEET  
25 OF 28



SAN ANTONIO  
RIVER AUTHORITY

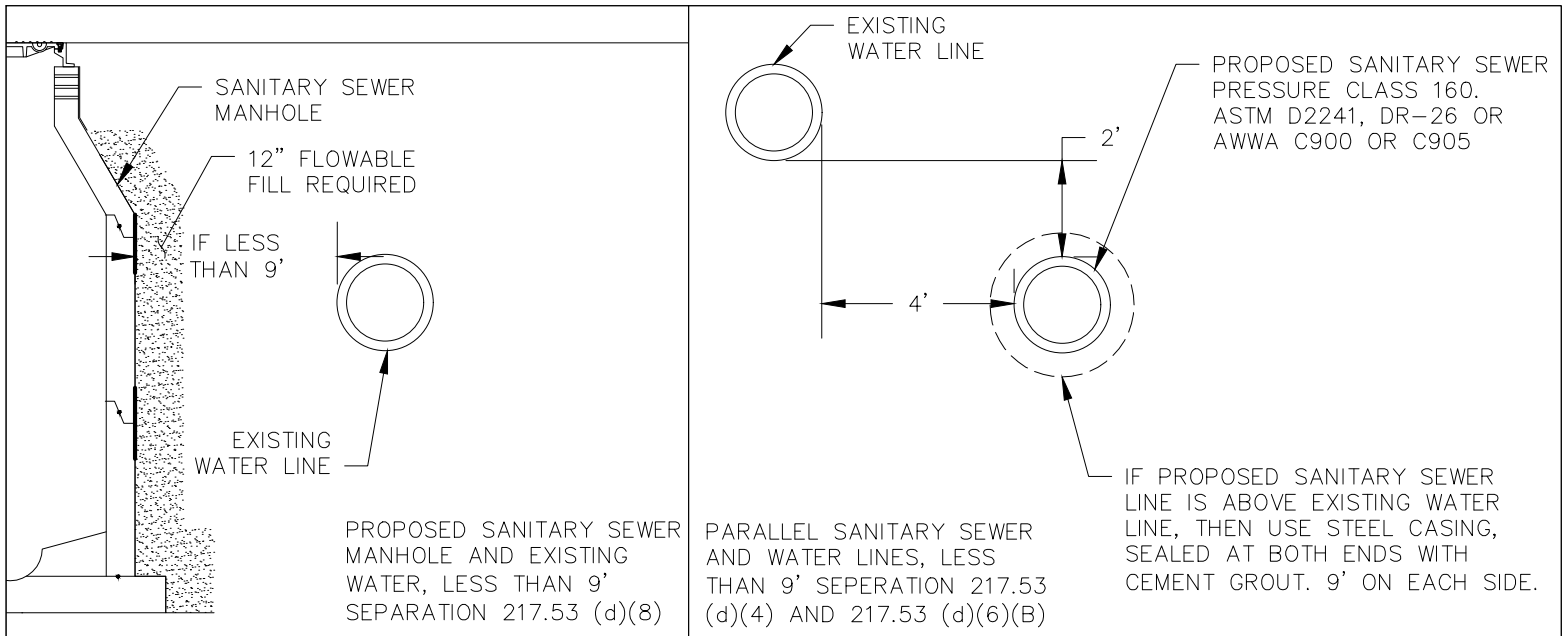
VERTICAL STACK  
DETAIL

APPROVED  
APRIL 2012

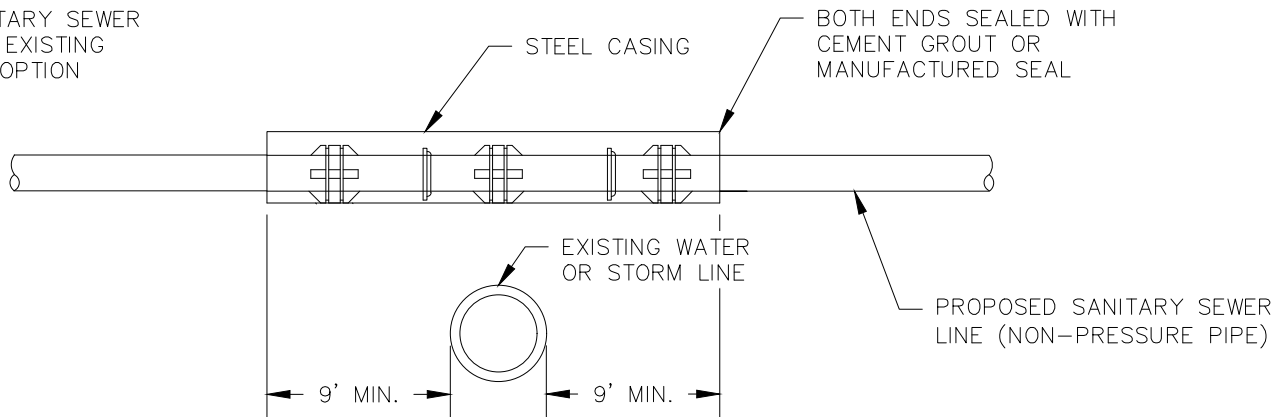
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MAY 2024

SD 33-31-00-16

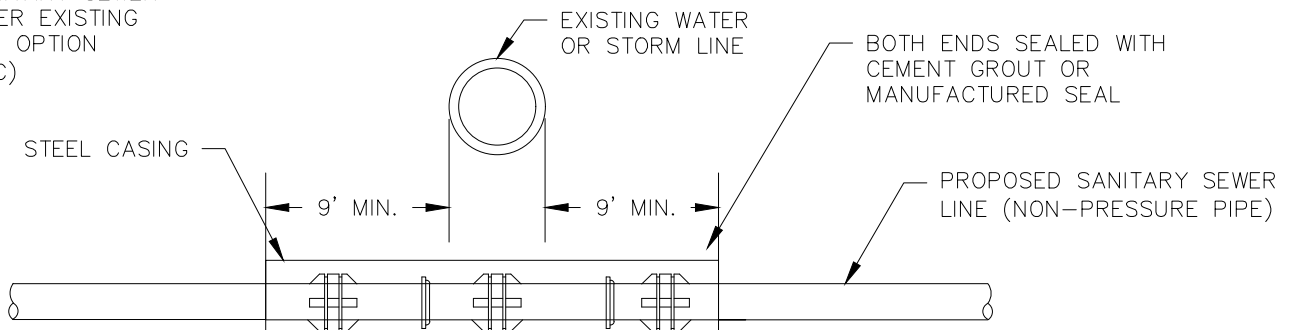
SHEET  
26 OF 28



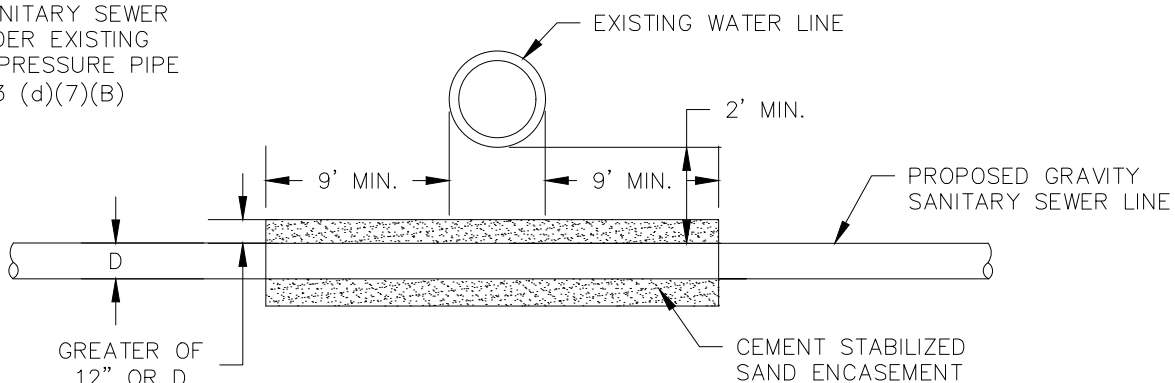
PROPOSED SANITARY SEWER CROSSING OVER EXISTING WATER, CASING OPTION 217.53 (d)(5)(A)



PROPOSED SANITARY SEWER CROSSING UNDER EXISTING WATER, CASING OPTION 217.53 (d)(7)(C)



PROPOSED SANITARY SEWER CROSSING UNDER EXISTING WATER, NON-PRESSURE PIPE OPTION 217.53 (d)(7)(B)



SAN ANTONIO  
RIVER AUTHORITY

TCEQ WASTEWATER  
SEPARATION  
REQUIREMENTS

APPROVED

APRIL 2012

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SHEET  
27 OF 28

