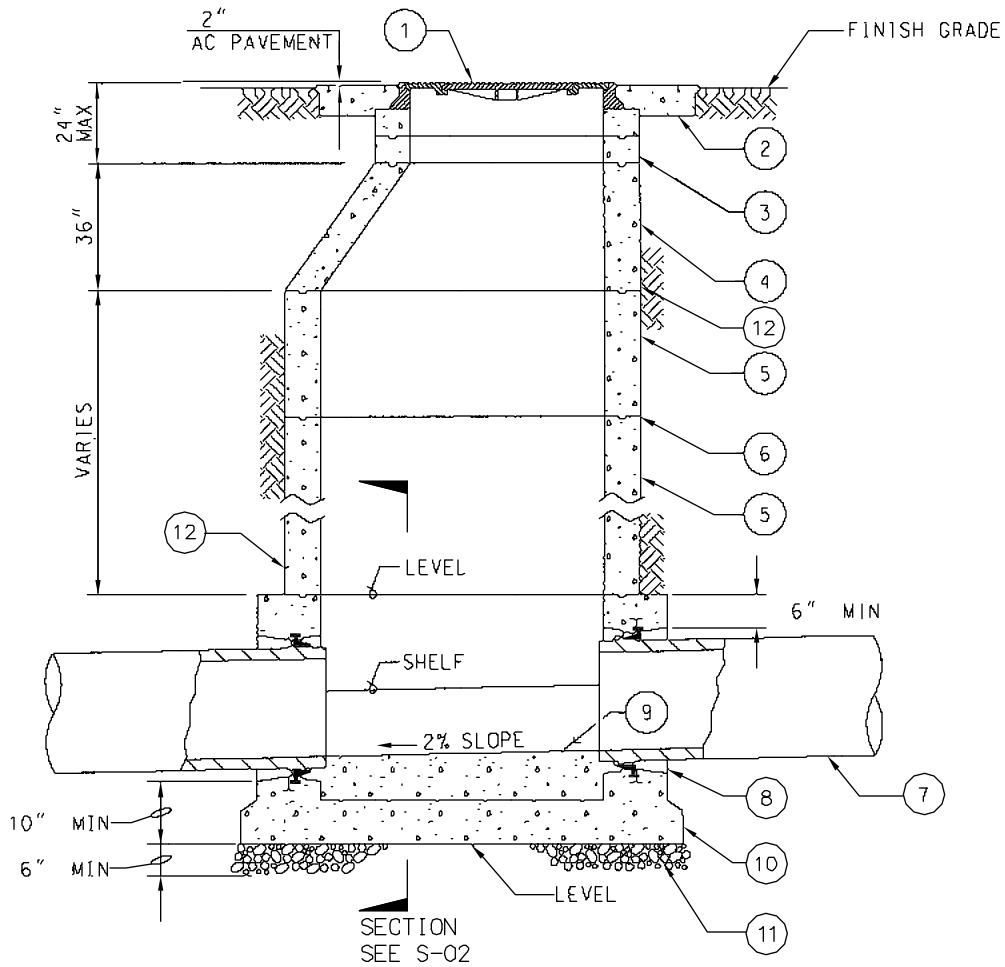


LIST OF SAWPA STANDARD DRAWINGS

1. S-01 60" DIAMETER PRECAST MANHOLE INSTALLATION
2. S-02 MANHOLE BASE FOR NEW OR EXISTING PIPE
3. S-03 MANHOLE PIPE CONNECTORS
4. S-04 MANHOLE MISCELLANEOUS DETAILS
5. S-05 36" MANHOLE FRAME AND TWO CONCENTRIC COVERS
6. S-06 MANHOLE LINING SYSTEM
7. S-07 LOCKING MANHOLE COVER
8. S-08 PIPE BEDDING AND TRENCH BACKFILL FOR SEWER FACILITIES
9. S-09 PERMISSIBLE DEPTH OF COVER FOR PVC PIPE
10. S-10 WATER, RECYCLED WATER AND SEWER MAIN PARALLEL SEPARATIONS
11. S-11 WATER, RECYCLED WATER AND SEWER MAIN PERPENDICULAR SEPARATIONS
12. S-12 WATER, RECYCLED WATER AND SEWER MAIN PARALLEL AND PERPENDICULAR SEPARATION NOTES
13. S-13 SEALED HDPE GRAVITY SEWER ACCESS MANHOLE
14. S-14 SEALED FRP GRAVITY SEWER ACCESS MANHOLE
15. S-15 PIPE SUPPORT FOR UNDERCUT SEWER MAINS



NOTES:

- 1) REFER TO SPECIFICATIONS
- 2) VERTICAL WALL OF CONE TO BE ON THE UPSTREAM SIDE OF MANHOLE
SEE S-04 FOR ACCESS LOCATIONS
- 3) FOR MANHOLE BASES SEE S-02
- 4) MANHOLES FOR MAINS 18" AND LARGER SHALL LINED PER S-06
- 5) PROVIDE ADDITIONAL BEDDING OR FOUNDATION ROCK TO SUIT PROJECT REQUIREMENTS.

ITEM NO	SIZE AND DESCRIPTION	ITEM NO	SIZE AND DESCRIPTION
1	36" MANHOLE FRAME AND TWO CONCENTRIC COVERS SEE S-05	5	60" DIA RING(S) VARIABLE HEIGHT
2	6" HIGH x 12" WIDE CONCRETE RING	6	WATER TIGHT JOINTS SEE S-04
3	36" DIA GRADE RING(S) 6" TO 18" HIGH	7	SEWER MAIN
4	ECCENTRIC CONE SEE NOTE 2	8	MANHOLE PIPE CONNECTOR SEE S-03
		9	FIELD INSTALLED INVERT SEE S-03
		10	CONCRETE BASE PRECAST OR CAST IN PLACE
		11	6" OF 3/4" CRUSHED ROCK
		12	EXTERIOR WATER PROOFING AS REQUIRED BY THE SPECIFICATIONS

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SANTA ANA WATERSHED PROJECT AUTHORITY
APPROVED BY:

DIRECTOR OF ENGINEERING

DATE

**60" DIAMETER PRECAST MANHOLE
INSTALLATION**

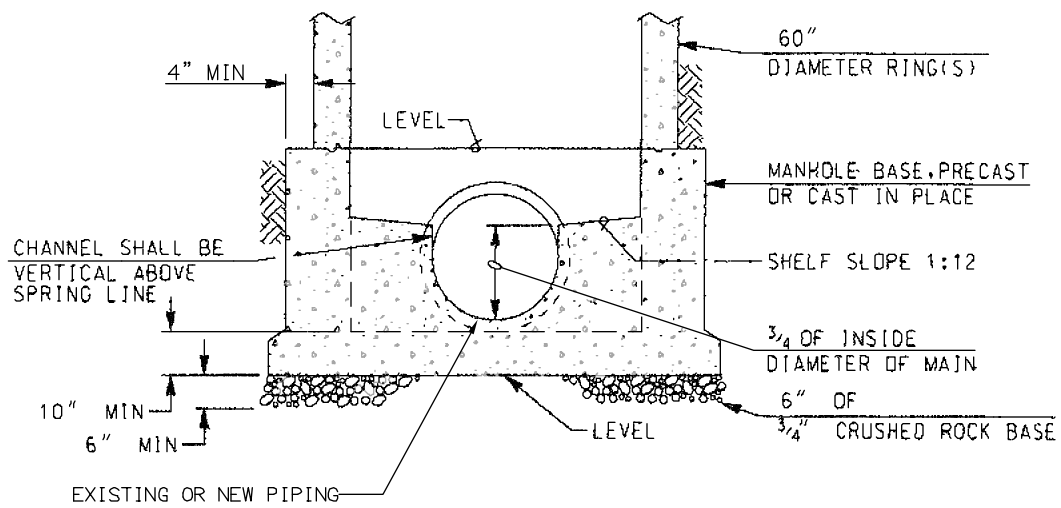


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Project Authority**

11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

S-01



MH BASE SECTION

NOTES:

- 1) REFER TO THE SPECIFICATIONS
- 2) FOR MANHOLE INSTALLATIONS SEE S-01 AND S-02
- 3) MANHOLE BASES FOR MAINS 18" AND LARGER SHALL BE COATED PER S-06


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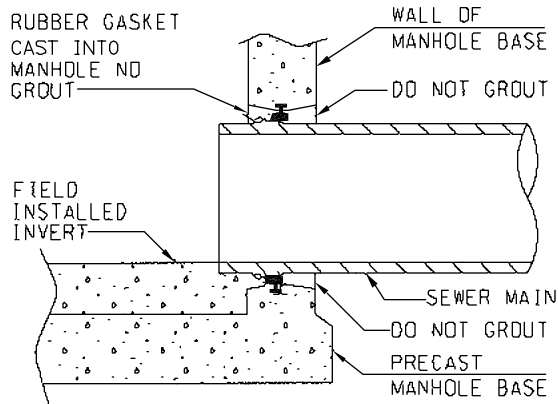
SANTA ANA WATERSHED PROJECT AUTHORITY

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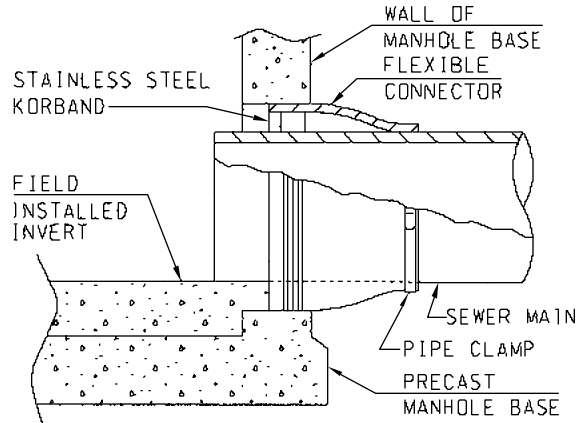
DIRECTOR OF ENGINEERING

DATE

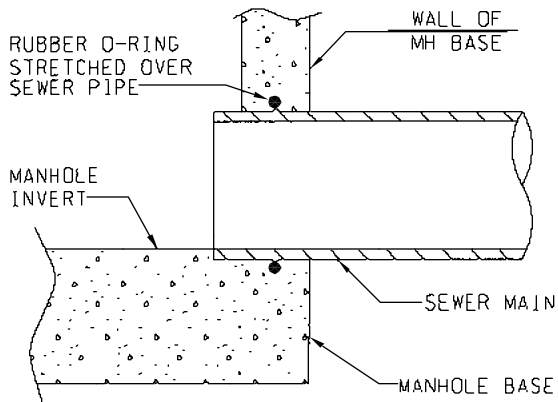
MANHOLE BASE FOR NEW OR EXISTING PIPE	
 <p>Santa Ana Watershed Project Authority</p> <p>11615 STERLING AVENUE RIVERSIDE, CA 92503 951-354-4220</p> <p>SAWPA</p>	DRAWING NUMBER
	S-02



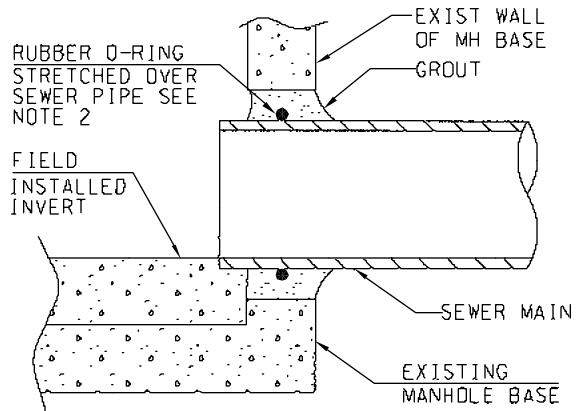
PRECAST MANHOLE BASE TYPE 'A'



PRECAST MANHOLE BASE TYPE 'B'



CAST IN PLACE MANHOLE BASE



BREAKING INTO EXIST MANHOLE BASE

NOTES.

- 1) REFER TO THE SPECIFICATIONS
- 2) A RUBBER O-RING OR A FLEXIBLE CONNECTOR (AS SHOWN IN PRECAST MANHOLE BASE TYPE 'B') CAN BE USED WHEN BREAKING INTO EXISTING MANHOLE
- 3) FOR MANHOLES REQUIRING COATING AND LINING SEE S-06

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SANTA ANA WATERSHED PROJECT AUTHORITY

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DATE

MANHOLE PIPE CONNECTORS

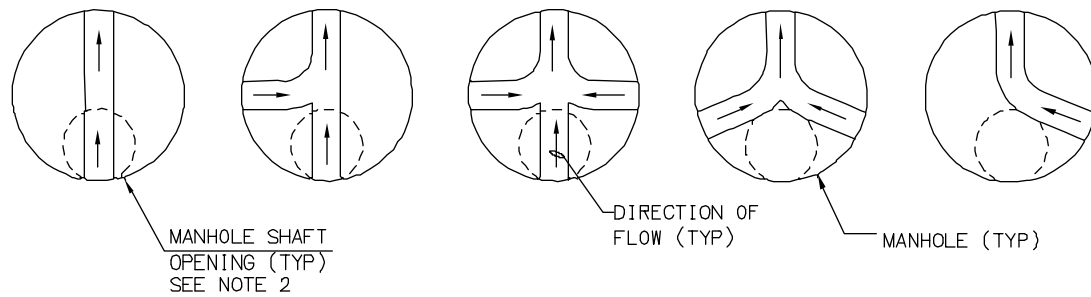


**Santa Ana Watershed
Project Authority**

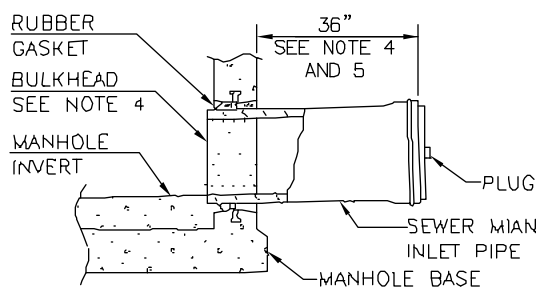
11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

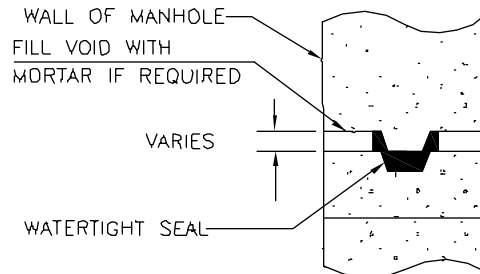
S-03



MANHOLE ACCESS LOCATION PLAN VIEW



MANHOLE STUB OUT FOR FUTURE CONNECTION



WATERTIGHT MANHOLE JOINT

NOTES

- 1) REFER TO SPECIFICATIONS
- 2) VERTICAL WALL OF CONE TO BE ON THE UP STREAM SIDE OF MANHOLE
- 3) FOR MANHOLES REQUIRING COATING AND LINING SEE SM-06
- 4) BULKHEADS SHALL BE INSTALLED AT THE MANHOLE END OF STUBS
- 5) SEWER MAIN TO BE LAID WITH BELLS UP-GRADE

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MANHOLE MISCELLANEOUS DETAILS

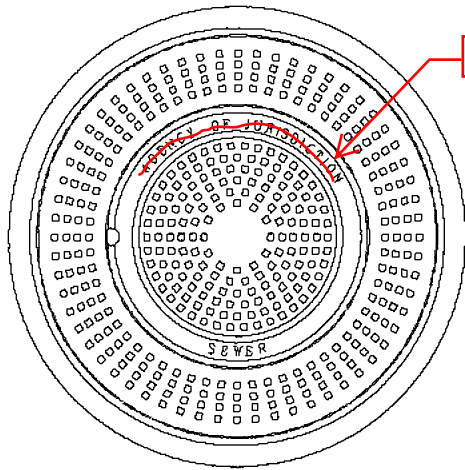


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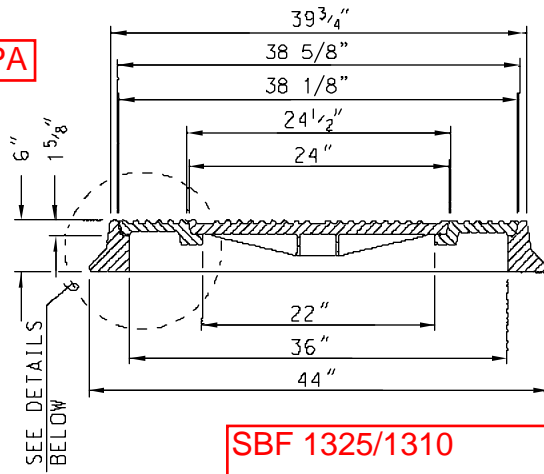
11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

S-04

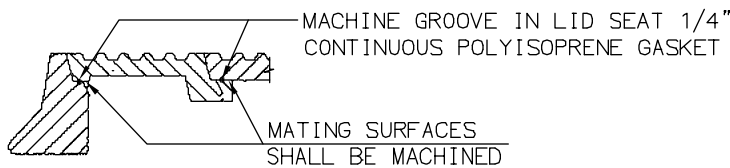


SAWPA

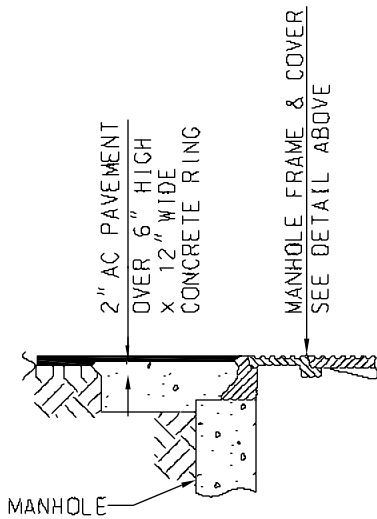


SBF 1325/1310

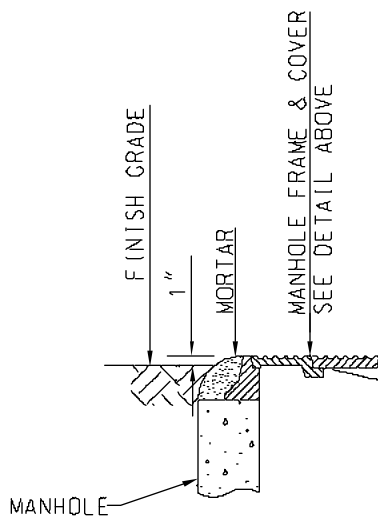
MANHOLE FRAME AND COVERS



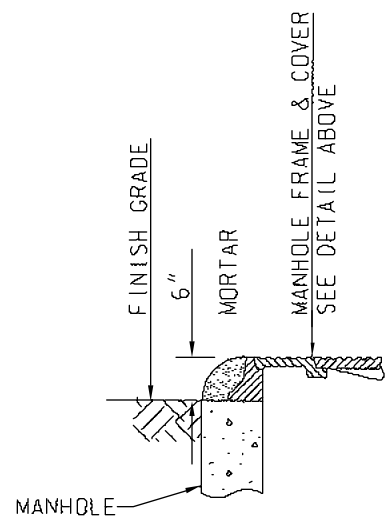
MACHINED DETAIL



PAVED AND TRAVELED AREAS



SHOULDER AREAS OUTSIDE TRAVELED WAY



UNPAVED, UNTRAVELED AREAS IN EASEMENTS

NOTES:

- 1) REFER TO SPECIFICATIONS
- 2) FOR MANHOLES REQUIRING COATING AND LINING SEE S-06

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DATE

36" MANHOLE FRAME AND TWO CONCENTRIC COVERS

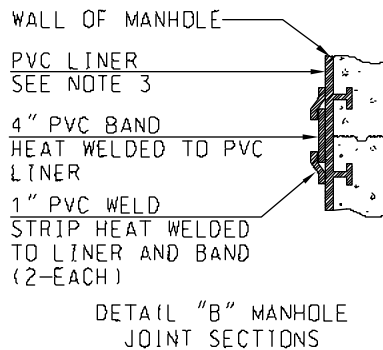
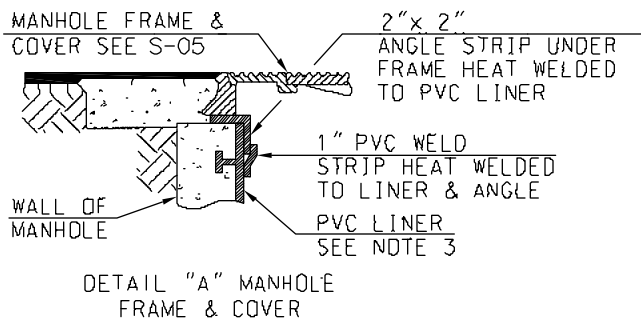
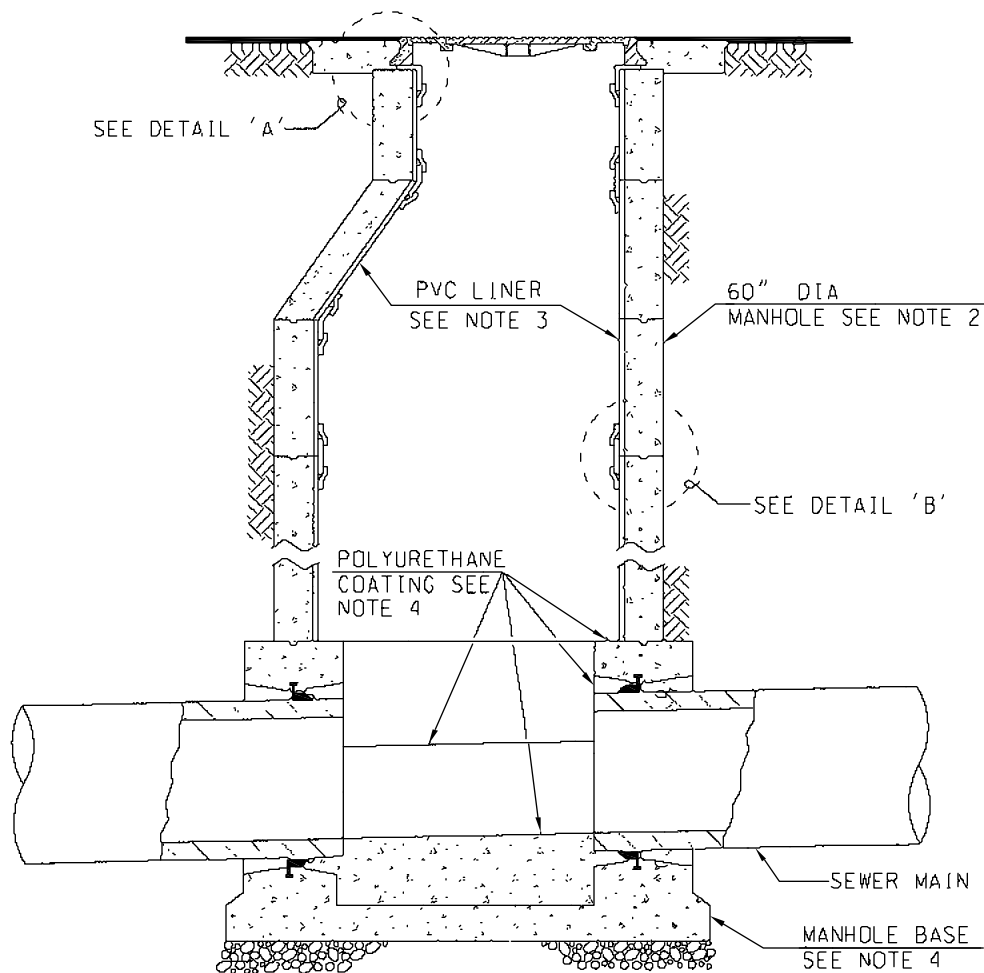


Santa Ana Watershed Project Authority

11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING NUMBER

S-05



NOTES:

- 1) REFER TO THE SPECIFICATIONS
- 2) MANHOLES FOR SEWER MAINS 18" AND LARGER SHALL BE COATED AND LINED
- 3) MANHOLE SHAFT AND CONE SECTIONS, AND GRADE RINGS SHALL HAVE A PVC LINER PLACED WITH T-SHAPED SUPPORTS INTEGRALLY CAST INTO THE CONCRETE
- 4) ELASTOMERIC POLYURETHANE COATING SHALL BE APPLIED TO THE INTERIOR OF MANHOLE BASES

SANTA ANA WATERSHED PROJECT AUTHORITY

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DATE

MANHOLE LINING SYSTEM

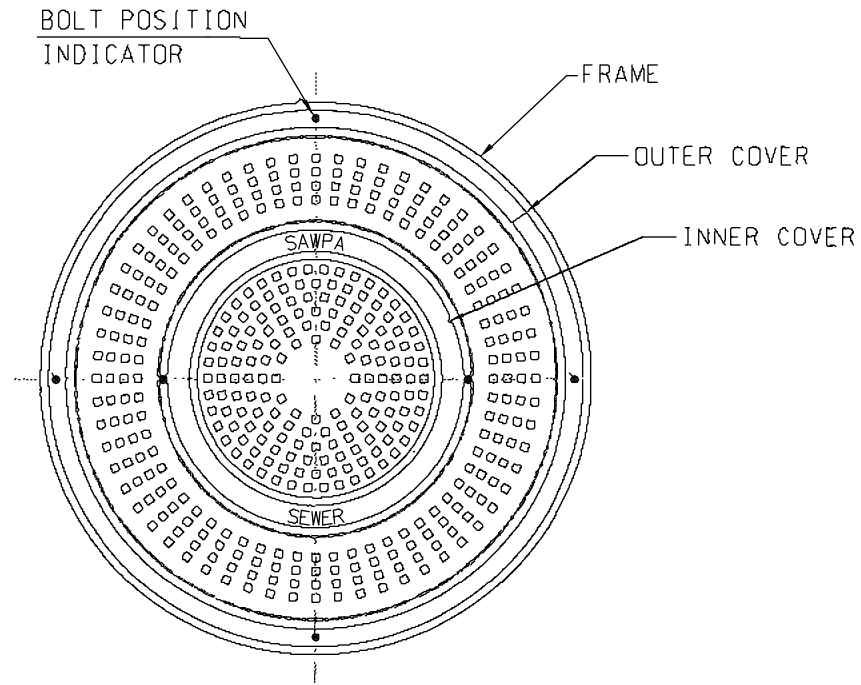


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NUMBER

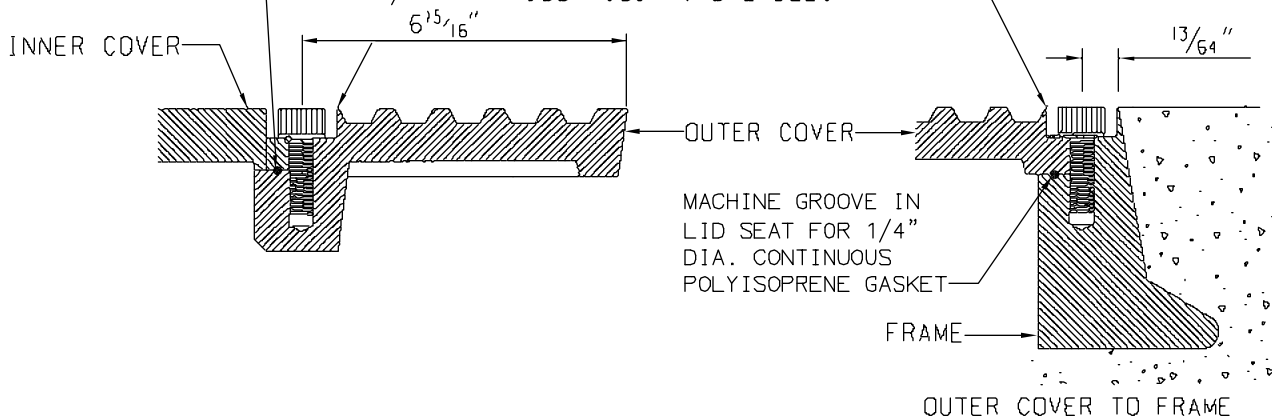
S-06



CONCENTRIC COVERS AND FRAME
BOLT PLACEMENT

MACHINE GROOVE IN
LID SEAT FOR 1/4"
DIA. CONTINUOUS
POLYISOPRENE GASKET

DRILL AND TAP FOR 5/8" x
20 UNC THREAD, 1 1/2" DEEP
CBORE 1 5/8" DIA x 5/8"
DEEP SEE NOTE 2 BELOW



NOTES:

- 1) REFER TO THE SPECIFICATIONS
- 2) 5/8" x 20 UNC THREAD, 316 STAINLESS STEEL SOCKET HEAD CAP SCREW AND 1 1/2" OD x 1 1/16" ID x 5/64" THICK 316 STAINLESS STEEL WASHER
- 3) BOLTDOWN PATTERNS:
BETWEEN INNER AND OUTER COVERS, INSTALL TWO 2 BOLTS AT 180 DEGREES
BETWEEN OUTER COVER AND FRAME, INSTALL FOUR 4 BOLTS AT 90 DEGREES

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DATE

LOCKING MANHOLE COVER

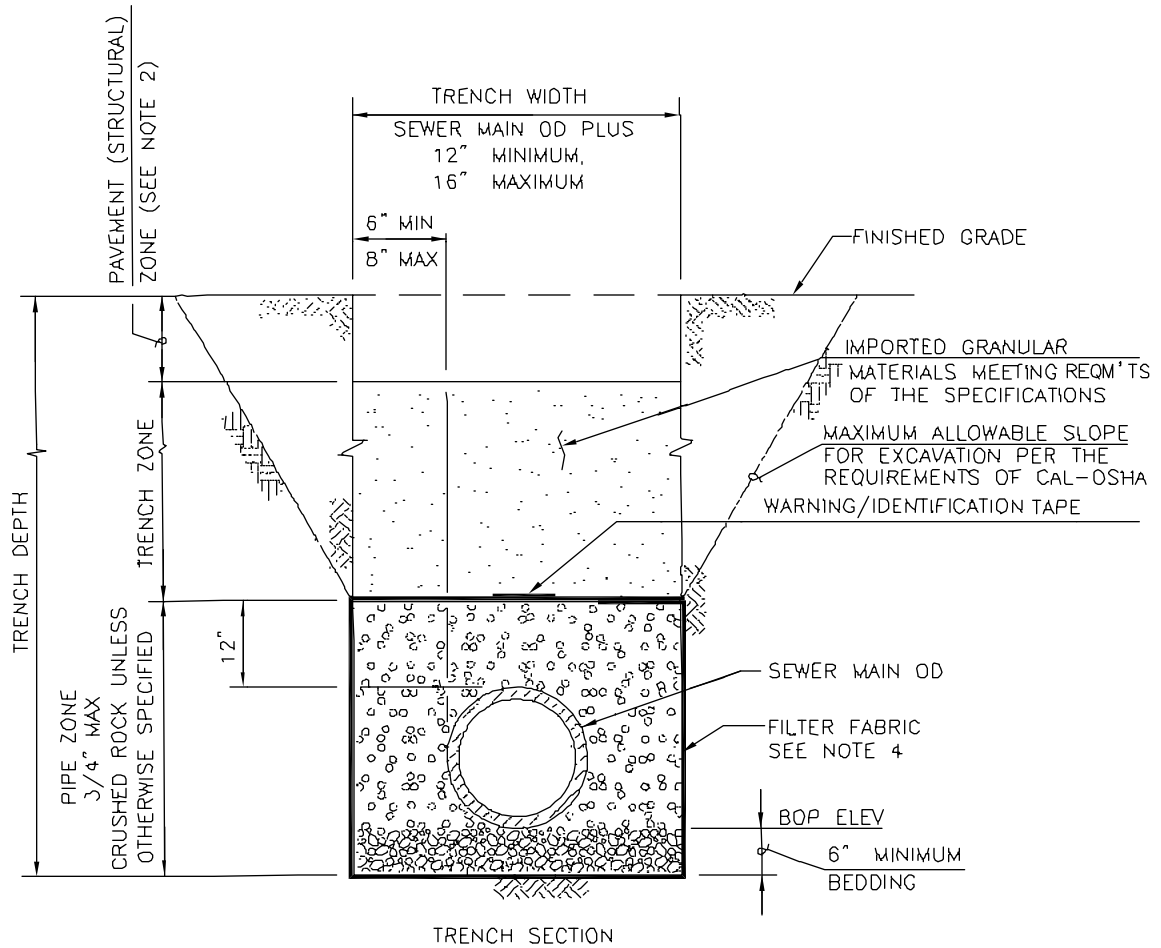


**Santa Ana Watershed
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11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

S-07



NOTES

- 1) REFER TO SPECIFICATIONS FOR TRENCHING, BACKFILLING AND COMPACTING WHERE APPLICABLE
- 2) PAVING OR PAVEMENT REPAIR TO BE DONE IN ACCORDANCE WITH AGENCY OF JURISDICTION
- 3) EXCAVATE BELL HOLES AT EACH JOINT TO PERMIT PROPER ASSEMBLY AND INSPECTION OF THE ENTIRE JOINT
- 4) FILTER FABRIC AS REQUIRED BY THE ENGINEER OF RECORD IN GROUNDWATER CONDITIONS.

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DATE

**PIPE BEDDING AND TRENCH BACKFILL
FOR SEWER FACILITIES**

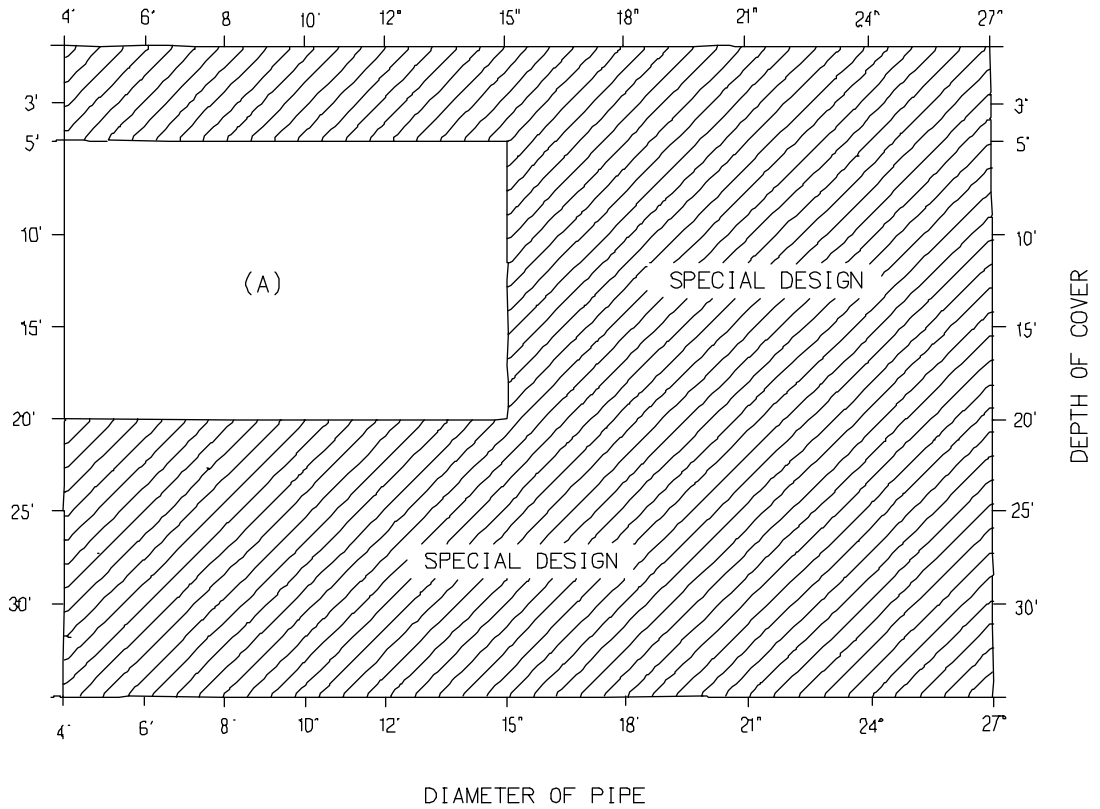


Santa Ana Watershed
Project Authority

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DRAWING
NUMBER

S-08



(A) SDR - 35 OR PIPE STIFFNESS OF 46 PSI PER ASTM D2412

NOTES:


- 1 This standard drawing shall be used only where existing soil conditions are stable. Stable soils defined as standard penetration test blow count equal to or greater than 13 blows per foot or shear strength greater than 750 psf Obtained from unconfined compression test.
2. Standard design assumption : $K_b = 110$, $D_c = 10$, $E' = 750$ psi
 $W_c =$ Prism load @ $W = 125$ lbft³
- 3 Bedding requirements per Drawing S-08
- 4 Installations in ground water shall require a special design.

Design Ref: ASCE Manuals and reports on Engineering Practice- No. 60 "Gravity Sanitary Sewer Design and Construction"

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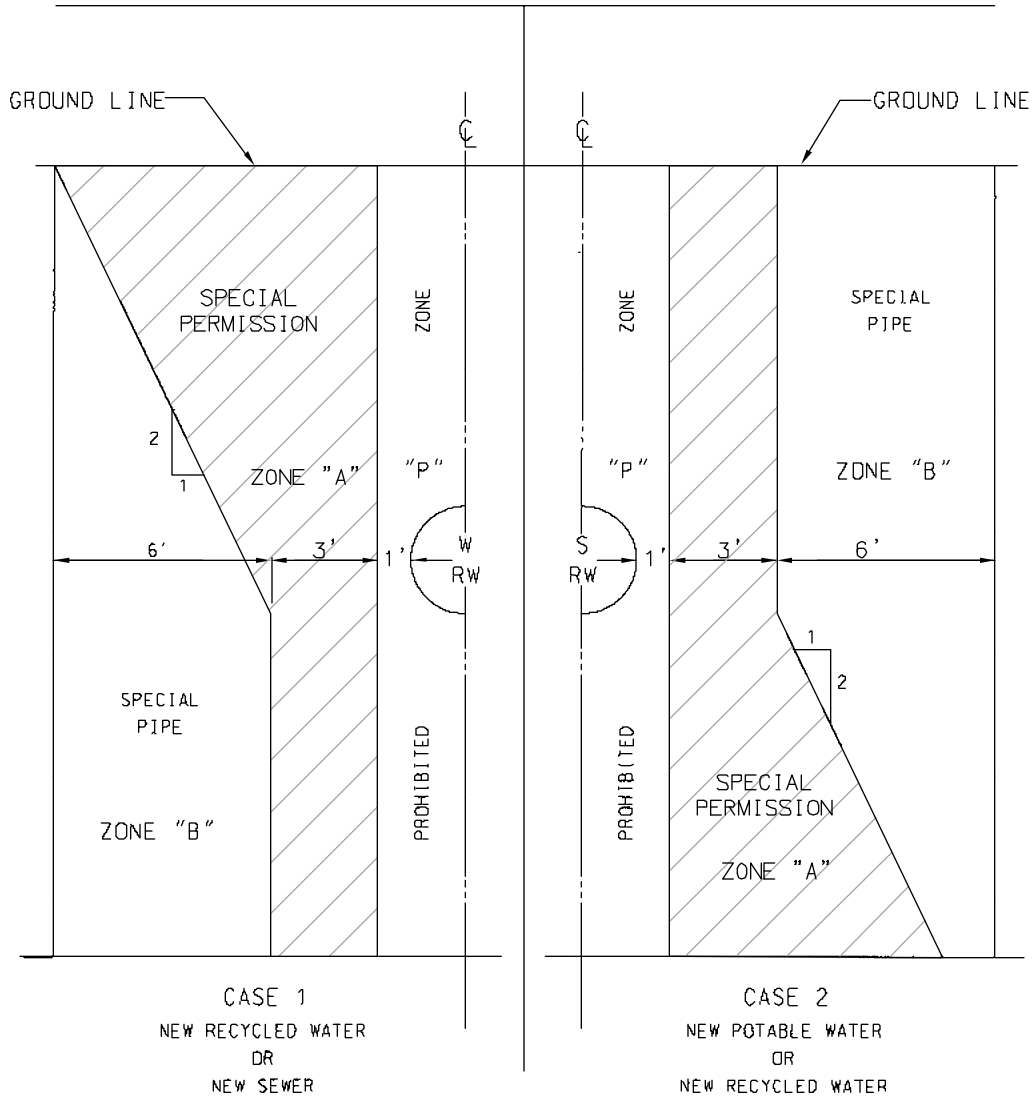
SANTA ANA WATERSHED PROJECT AUTHORITY
 APPROVED BY:

 DIRECTOR OF ENGINEERING DATE

PERMISSIBLE DEPTH OF COVER FOR PVC PIPE	
 Santa Ana Watershed Project Authority 11615 STERLING AVENUE RIVERSIDE, CA 92503 951-354-4220 SAWPA	DRAWING NUMBER S-09

NOTES

- 1) ZONES IDENTICAL ON EITHER SIDE OF CENTERLINE AS SHOWN BELOW
- 2) REQUIREMENTS OF THE STATE OF CALIFORNIA, HEALTH AND WELFARE AGENCY, DEPARTMENT OF HEALTH SERVICES
- 3) SEE S-12 FOR NOTES ON WATER, RECYCLED WATER AND SEWER MAIN PARALLEL AND PERPENDICULAR SEPARATIONS
- 4) REFER TO THE WATER AGENCIES STANDARDS DESIGN GUIDE FOR PIPE SEPARATION REQUIREMENTS



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WATER, RECYCLED WATER AND SEWER MAIN PARALLEL SEPARATIONS



Santa Ana Watershed Project Authority

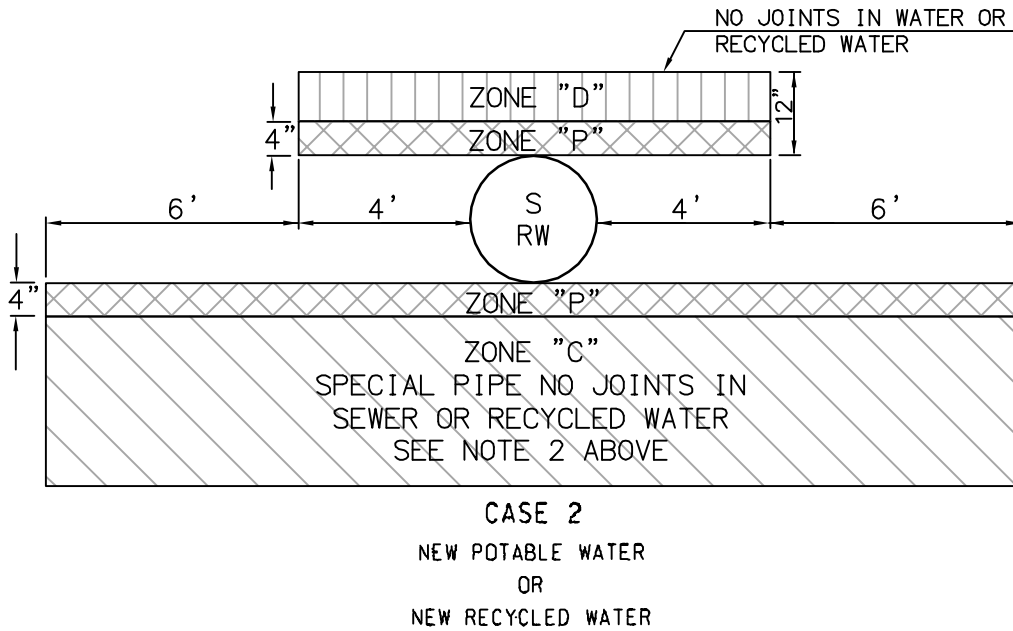
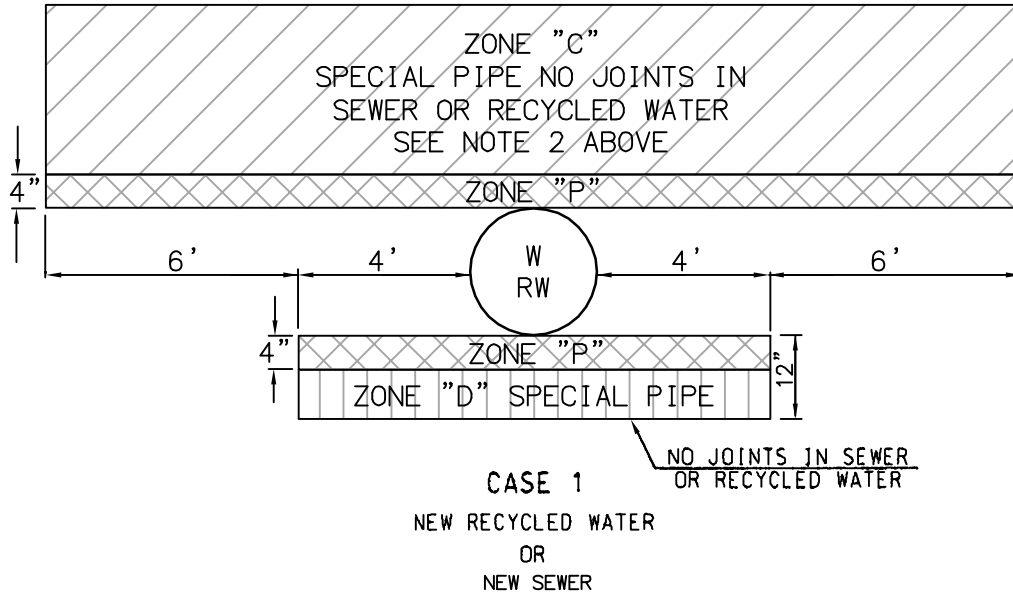
11615 STERLING AVENUE
 RIVERSIDE, CA 92503
 951-354-4220

DRAWING NUMBER

S-10

NOTES:

- 1) REQUIREMENTS OF THE STATE OF CALIFORNIA, HEALTH AND WELFARE AGENCY, DEPARTMENT OF HEALTH SERVICES
- 2) SEE S-12 FOR NOTES ON WATER, RECYCLED WATER AND SEWER MAIN PARALLEL AND PERPENDICULAR SEPARATIONS
- 3) MAINS SHALL CROSS OTHER UTILITIES AT A PERPENDICULAR ANGLE, UNLESS OTHERWISE APPROVED. IN ANY CASE, UTILITIES CROSSING AT A SKEW ANGLE OF SEVENTY FIVE DEGREES (75°) OR LESS SHALL BE AVOIDED.
- 4) REFER TO THE WATER AGENCIES' STANDARDS DESIGN GUIDE FOR PIPE SEPARATION REQUIREMENTS



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**WATER, RECYCLED WATER AND SEWER MAIN
PERPENDICULAR SEPARATIONS**



**Santa Ana Watershed
Project Authority**

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RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

S-11

CONSTRUCTION REQUIREMENTS FOR WATER, RECYCLED WATER AND SEWER MAINS

CASE 1: NEW RECYCLED WATER OR SEWER MAINS

ZONE

- A SPECIAL PERMISSION REQUIRED. DO NOT LOCATE ANY PARALLEL SEWER OR RECYCLED WATER MAINS IN THIS AREA WITHOUT DISTRICT AND STATE HEALTH DEPARTMENT APPROVAL
- B PVC SEWER PIPE WITH PUSH-ON TYPE RUBBER RING JOINTS FOR SEWER MAINS
C-900,CL200 OR C-905,PR235 PVC PIPE WITH PUSH ON TYPE RUBBER RING JOINTS FOR RECYCLED WATER MAINS
- C A 20' SECTION OF PVC SEWER PIPE CENTERED AT THE MAIN BEING CROSSED.
OR SEWER PIPE INSTALLED IN A CASING (FOR SEWER MAINS)
A 20' SECTION OF C-900,CL200 OR C-905,PR235 PVC PIPE CENTERED AT THE MAIN BEING CROSSED, OR RECYCLED WATER PIPE INSTALLED IN A CASING (FOR RECYCLED WATER MAINS)
- D A 20' SECTION OF PVC SEWER PIPE CENTERED AT THE MAIN BEING CROSSED.
OR SEWER PIPE INSTALLED IN A CASING (FOR SEWER MAINS)
A 20' SECTION OF C-900,CL200 OR C-905,PR235 PVC PIPE CENTERED AT THE MAIN BEING CROSSED, OR RECYCLED WATER PIPE INSTALLED IN A CASING (FOR RECYCLED WATER MAINS)
- P PROHIBITED ZONE. NO SEWER, WATER OR RECYCLED WATER MAINS; SECTION 64630 (e) (2) CALIFORNIA ADMINISTRATIVE CODE, TITLE 22

CONSTRUCTION REQUIREMENTS FOR WATER, RECYCLED WATER AND SEWER MAINS

CASE 2 NEW WATER OR RECYCLED WATER MAINS

ZONE

- A SPECIAL PERMISSION REQUIRED DO NOT LOCATE ANY PARALLEL WATER OR RECYCLED WATER MAINS IN THIS AREA WITHOUT DISTRICT AND STATE HEALTH DEPARTMENT APPROVAL
- B C-900,CL200 OR C-905,PR235 PVC PIPE WITH PUSH ON TYPE RUBBER RING JOINTS FOR WATER MAINS
C-900,CL200 OR C-905,PR235 PVC PIPE WITH PUSH ON TYPE RUBBER RING JOINTS FOR RECYCLED WATER MAINS
- C A 20' SECTION OF C-900,CL200 OR C-905,PR235 PVC PIPE CENTERED AT THE MAIN BEING CROSSED, OR WATER PIPE INSTALLED IN A CASING (FOR WATER MAINS)
A 20' SECTION OF C-900,CL200 OR C-905,PR235 PVC PIPE CENTERED AT THE MAIN BEING CROSSED, OR RECYCLED WATER PIPE INSTALLED IN A CASING (FOR RECYCLED WATER MAINS)
- D A 20' SECTION OF C-900,CL200 OR C-905,PR235 PVC PIPE CENTERED AT THE MAIN BEING CROSSED, OR WATER PIPE INSTALLED IN A CASING (FOR WATER MAINS)
A 20' SECTION OF C-900,CL200 OR C-905,PR235 PVC, PIPE CENTERED AT THE MAIN BEING CROSSED, OR RECYCLED WATER PIPE INSTALLED IN A CASING (FOR RECYCLED WATER MAINS)
- P PROHIBITED ZONE; NO SEWER, WATER OR RECYCLED WATER MAINS, SECTION 64630 (e) (2) CALIFORNIA ADMINISTRATIVE CODE, TITLE 22

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SANTA ANA WATERSHED PROJECT AUTHORITY

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DATE

**WATER, RECYCLED WATER AND SEWER MAIN
PARALLEL AND PERPENDICULAR SEPARATION NOTES**

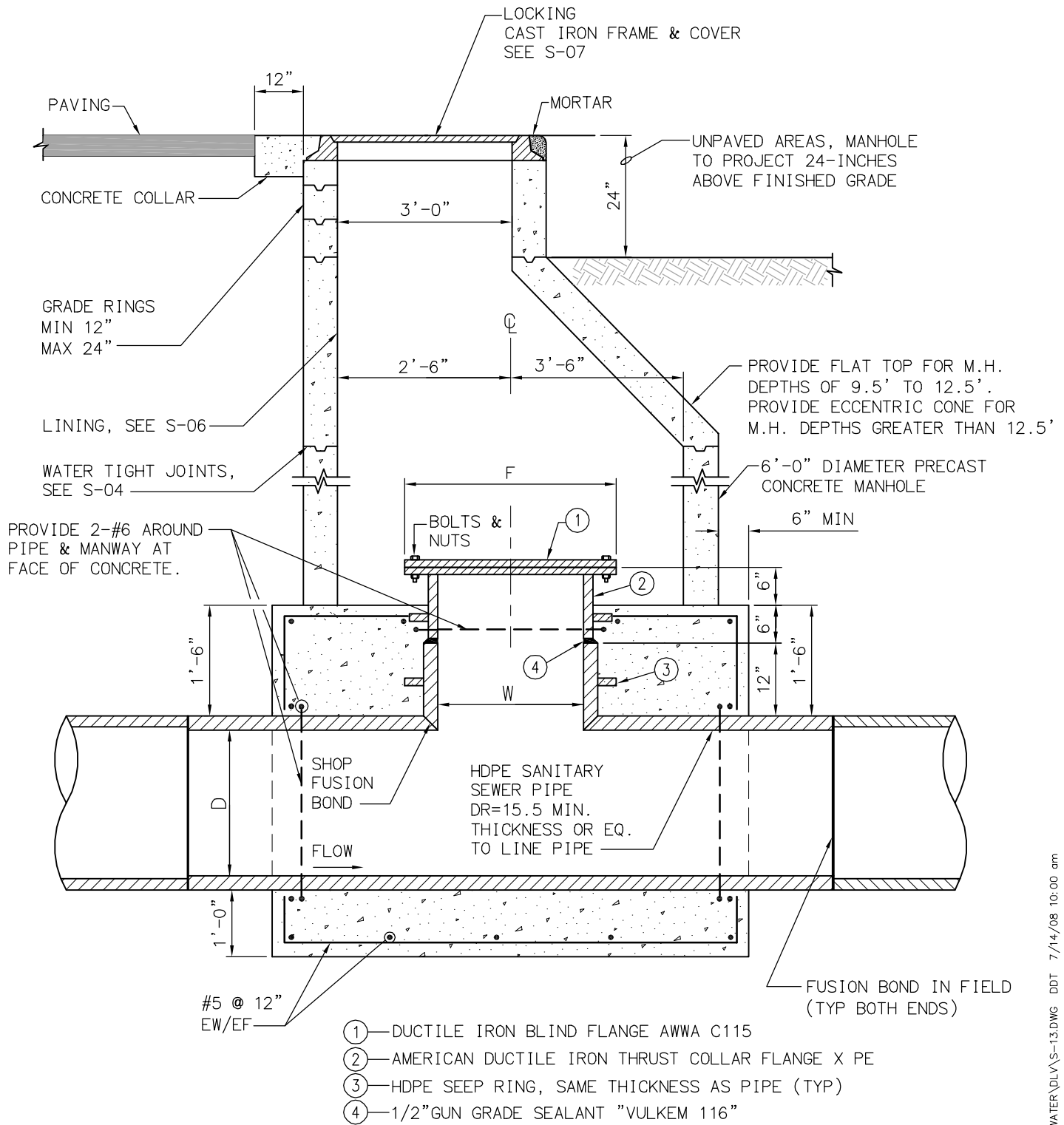


Santa Ana Watershed
Project Authority

11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

S-12



D	W	F	#BOLT HOLES	BOLT CIRCLE	BOLT HOLE DIAMETER	GASKET	BOLT DIA
24"	24"	32"	20	29.5"	1.375	FLAT FACED	1.250
30"-42"	30"	38.75"	28	36	1.375	RING	1.250

NOTES:

1. BOLTS AND NUTS SHALL BE 316 SS.

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SANTA ANA WATERSHED PROJECT AUTHORITY

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DATE

SEALED HDPE GRAVITY SEWER ACCESS MANHOLE

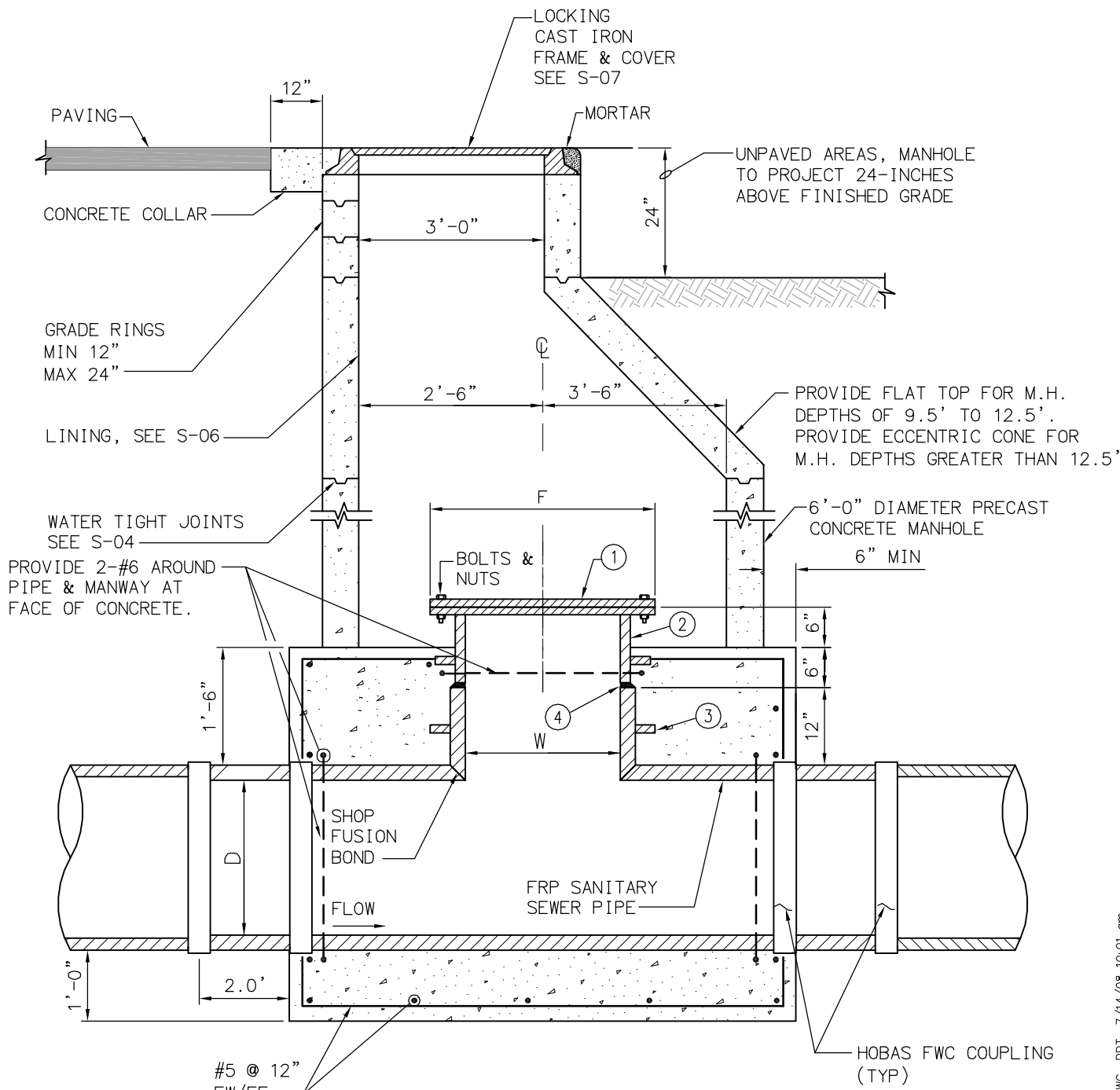


Santa Ana Watershed
Project Authority

11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

S-13



#5 @ 12"
EW/EF

- ① — DUCTILE IRON BLIND FLANGE AWWA C115
- ② — AMERICAN DUCTILE IRON THRUST COLLAR FLANGE X PE
- ③ — FRP SEEP RING, SAME THICKNESS AS PIPE (TYP)
- ④ — 1/2" GUN GRADE SEALANT "VULKEM 116"

D	W	F	#BOLT HOLES	BOLT CIRCLE	BOLT HOLE DIAMETER	GASKET	BOLT DIA
24"	24"	32"	20	29.5"	1.375	FLAT FACED	1.250
30"-42"	30"	38.75"	28	36	1.375	RING	1.250

NOTES:

1. BOLTS AND NUTS SHALL BE 316 SS.

SANTA ANA WATERSHED PROJECT AUTHORITY
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DATE

SEALED FRP GRAVITY SEWER ACCESS MANHOLE



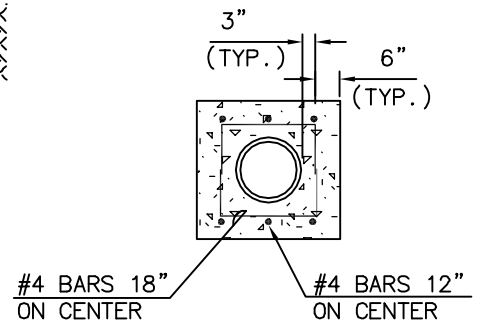
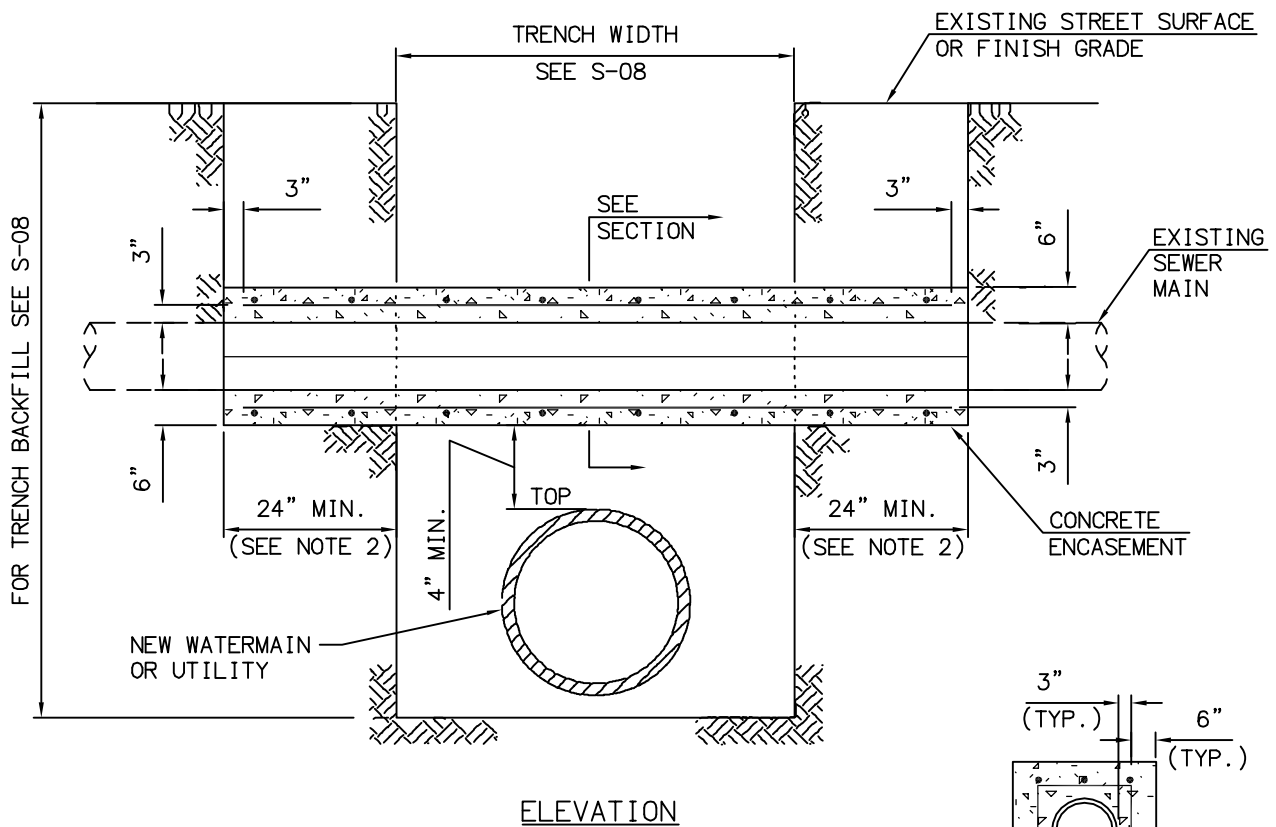
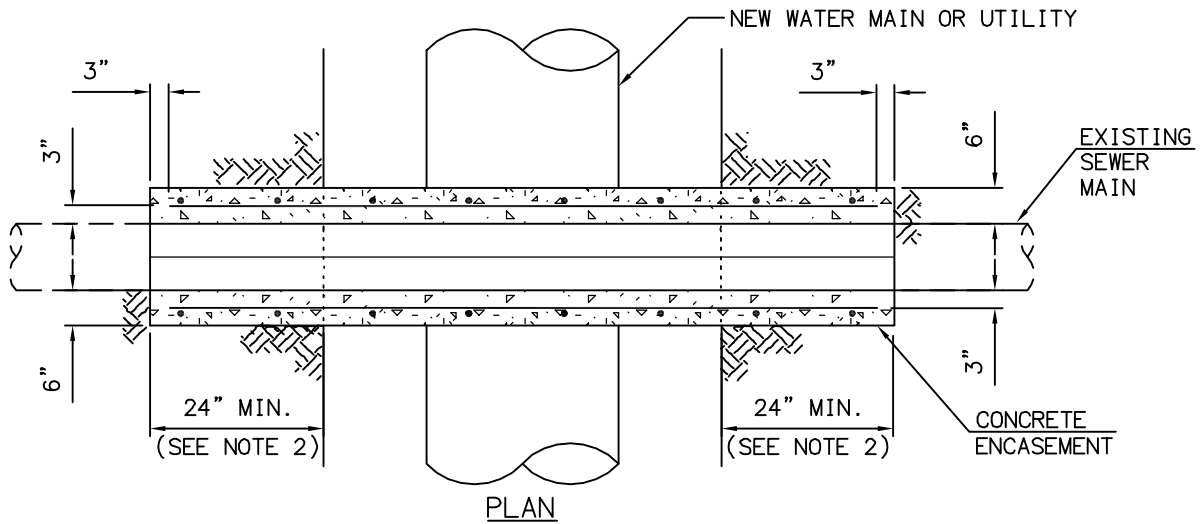
Santa Ana Watershed
Project Authority

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951-354-4220

DRAWING
NUMBER

S-14

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NOTE:

1. REFER TO SPECIFICATIONS.
2. ENCASEMENT SHALL EXTEND TO FIRST JOINT OR TO A DISTANCE OF 24" BEYOND BOTH SIDES OF TRENCH WHICH EVER IS GREATER.
3. FOR PIPE BEDDING AND TRENCH BACKFILL SEE S-08

SANTA ANA WATERSHED PROJECT AUTHORITY

APPROVED BY:

DIRECTOR OF ENGINEERING

DATE

PIPE SUPPORT FOR UNDERCUT SEWER MAINS



**Santa Ana Watershed
Project Authority**

11615 STERLING AVENUE
RIVERSIDE, CA 92503
951-354-4220

DRAWING
NUMBER

S-15