

**TYPICAL  
TRENCH AND PIPE ZONES**  
N. T. S.

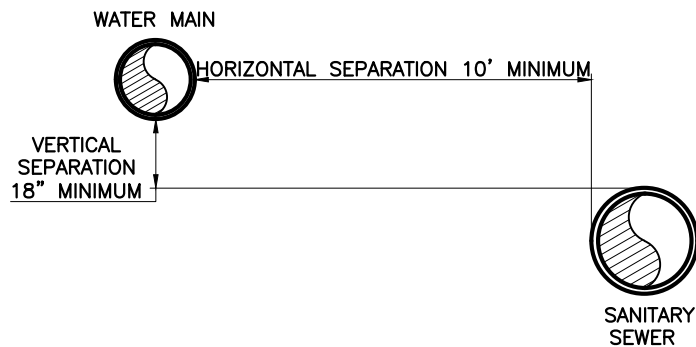
CENTER	TOWNSHIP
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SANITARY	AUTHORITY

DATE:	February 9, 2016
FILE NAME:	SAN-01 Trench & Pipe Zones.dwg
SCALE:	N.T.S.

## Trench and Pipe Zones (Appendix D)

SAN-01

N:\PROJ\495\495-02\Standard Details\dwg\ SAN-02 Utility Sep..dwg layout = Utility Separation Username = jasonm Date = Feb 09, 2016 - 2:37pm



**NOTES:**

1. WHEN THE HORIZONTAL SEPARATION OF THE WATER MAIN AND SEWER LINE IS LESS THAN 10', THE VERTICAL SEPARATION BETWEEN THE TOP (CROWN) OF THE SEWER LINE AND THE BOTTOM (INVERT) OF THE WATER MAIN SHALL BE AT LEAST 18". ENCASE WATERLINE IN CONCRETE WHERE SEWER / WATERLINE CROSSINGS OCCUR AND, WHERE THE CONDITIONS PREVENT AN 18" VERTICAL SEPARATION.
2. NO OTHER UNDERGROUND UTILITIES, SUCH AS GAS, STORM SEWER, ELECTRIC, TELEPHONE, OR CABLE, SHALL BE PLACED ABOVE THE SANITARY SEWER OR WITHIN THREE FEET OF EACH SIDE OF THE SANITARY SEWER.

**UTILITY SEPARATION**

N. T. S.

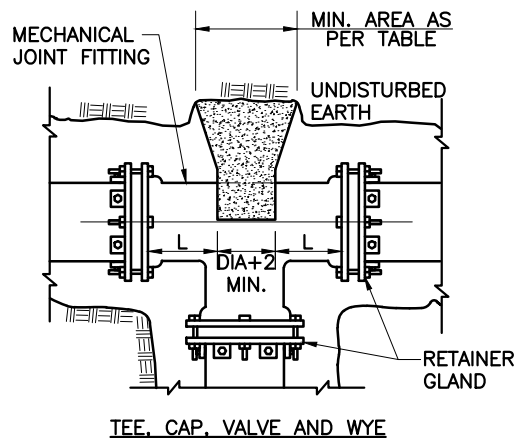
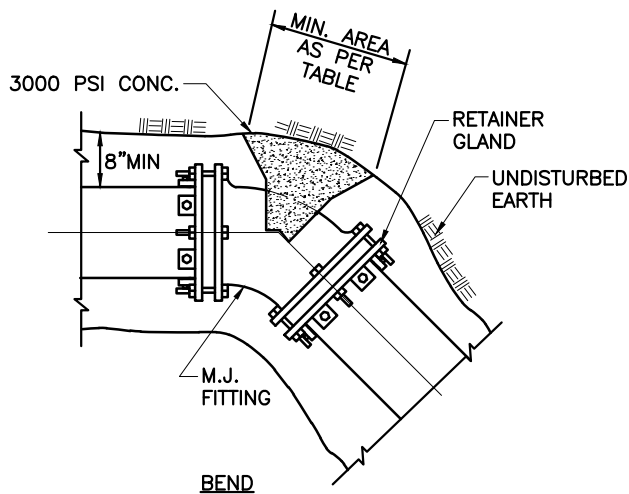
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DATE:	February 9, 2016
FILE NAME:	SAN-02 Utility Sep..dwg
SCALE:	N.T.S.

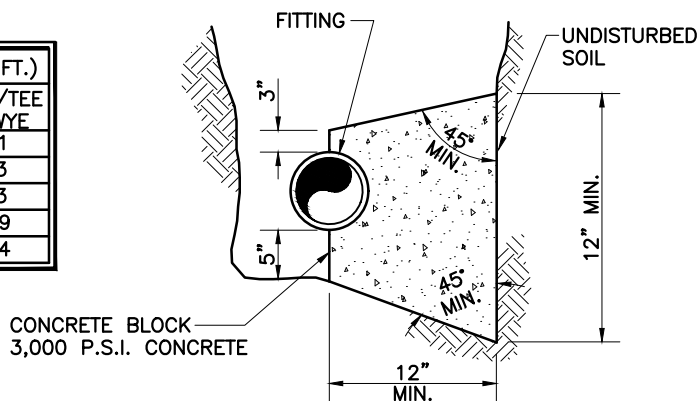
**Utility Separation  
(Appendix D)**

SAN-02

SAN-03



PIPE SIZE (in)	L (in.)	MINIMUM BEARING AREA OF BLOCK(SQ. FT.)				
		90° BENDS	45° BENDS	22.5° BENDS	11.25° BENDS	VALVE/TEE OR WYE
4	5	2.9	1.6	1.0	1.0	2.1
6	6	6.0	3.3	1.7	1.0	4.3
8	6.5	10.3	5.6	2.9	1.5	7.3
10	6.5	15.4	8.4	4.3	2.2	10.9
12	7	21.8	11.8	6.0	3.1	15.4



**NOTES:**

1. EARTH PRESSURE = 2,000 LBS./SQ.FT.
2. APPLIED PRESSURE = 150 P.S.I.+50% FOR WATER HAMMER OR SURGE
3. IF EARTH IN FIELD WILL NOT SUPPORT THE ABOVE EARTH PRESSURE, AREA OF BLOCK MUST BE INCREASED PROPORTIONATELY.
4. CONCRETE TO BE 3,000 P.S.I., PADOT CLASS A, 3" SLUMP
5. ALL MECHANICAL JOINT FASTENERS (I.E. BOLTS, NUTS, ETC.) SHALL BE FREE OF CONCRETE. ALL FITTINGS SHALL BE MECHANICAL JOINT AND HAVE MEG-A-LUG RETAINER GLANDS( OR EQUAL) INSTALLED TO MANUFACTURERS SPECIFICATIONS.
6. CONCRETE WITH BEARING AREAS GREATER THAN 3 S.F. TO HAVE W4 x W4 WELDED WIRE FABRIC.
7. ALL FITTINGS TO BE DUCTILE IRON WITH EPOXY LINING.

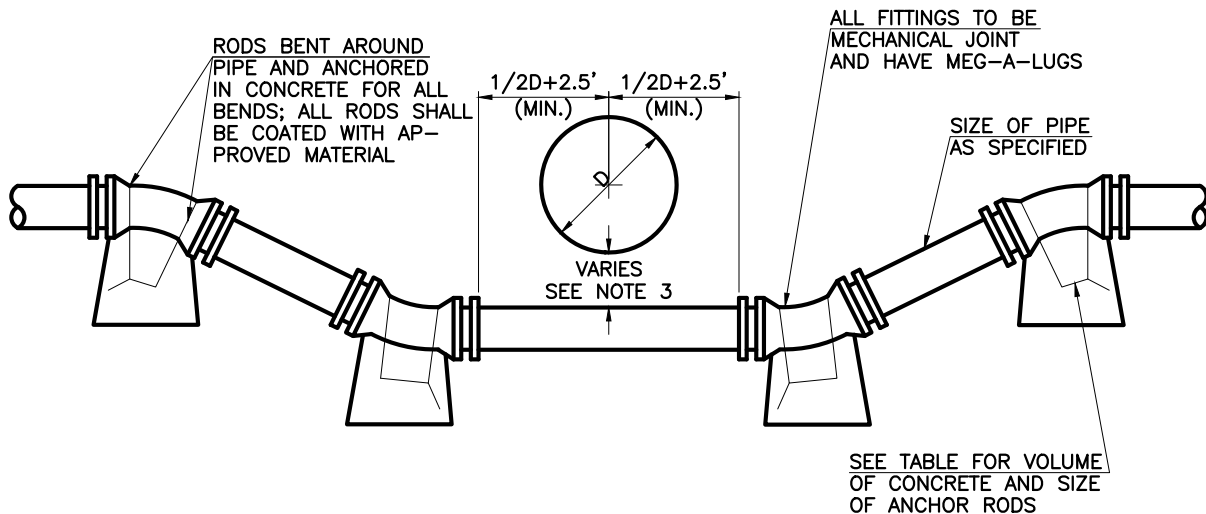
**FORCEMAIN HORIZONTAL THRUST BLOCKING**

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DATE:	February 9, 2016
FILE NAME:	SAN-04 Forcemain Horiz. Thrust Blocking.dwg
SCALE:	N.T.S.

**Forcemain Horizontal Thrust  
Blocking (150 PSI)  
(Appendix D)**  
SAN-04



PIPE SIZE	TOTAL PRESSURE IN POUNDS	VOLUME IN CUBIC FEET			SIZE AND No. OF ANCHORS		
		45° BENDS	22.5° BENDS	11.25° BENDS	45° BENDS	22.5° BENDS	11.25° BENDS
4	3900	20	10	5	1-#4	1-#4	1-#4
6	7200	37	19	9	2-#4	1-#4	1-#4
8	11800	60	31	15	2-#4	2-#4	1-#4
10	17100	87	45	22	2-#4	2-#4	2-#4
12	23700	122	62	31	2-#5	2-#4	2-#4

**NOTES:**

1. THE TABLE IS BASED ON 150# TEST PRESSURE.
2. REINFORCE ALL BLOCKS WITH #4 AT 6" E.F. MINIMUM 3" FROM ALL SIDES.
3. SEE "FORCEMAIN UNDER OBSTRUCTION" DETAIL.

**TYPICAL  
FORCEMAIN VERTICAL BLOCKING**

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DATE:	February 9, 2016
FILE NAME:	SAN-05 Vertical Blk 150psi.dwg
SCALE:	N.T.S.

**Forcemain Vertical Blocking (150 PSI)  
(Appendix D)**

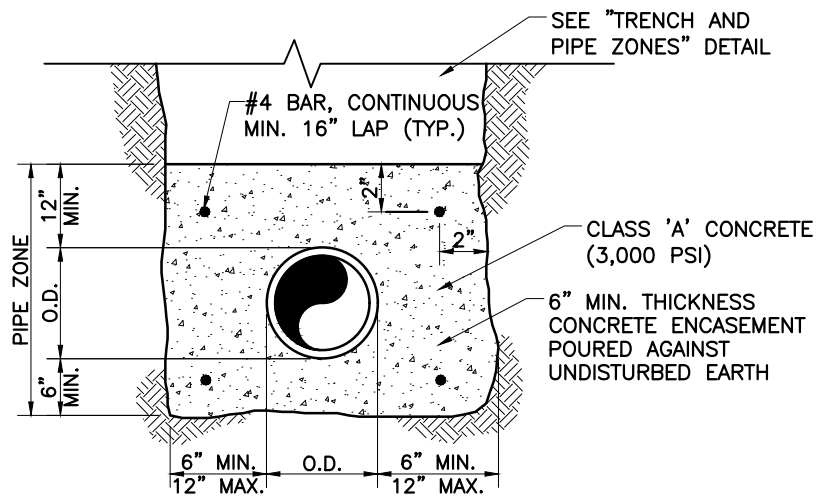
SAN-05





## Concrete Cradle (Appendix D)

DATE:	February 9, 2016
FILE NAME:	SAN-07 Conc. Cradle.dwg
SCALE:	N.T.S.



**TYPICAL  
CONCRETE ENCASEMENT**  
N. T. S.

**NOTE:**  
RESTRAIN PIPE AS REQUIRED TO  
PREVENT FROM FLOATING OR DISPLACEMENT  
UNTIL CONCRETE SET.

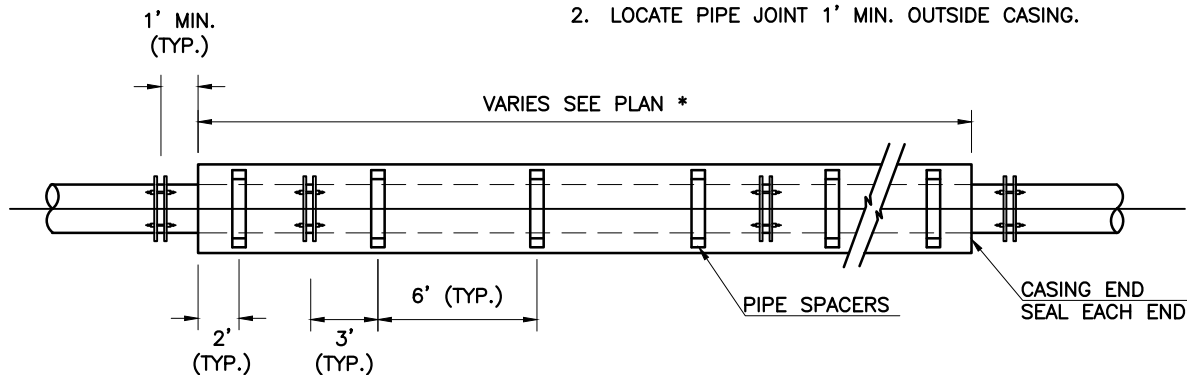
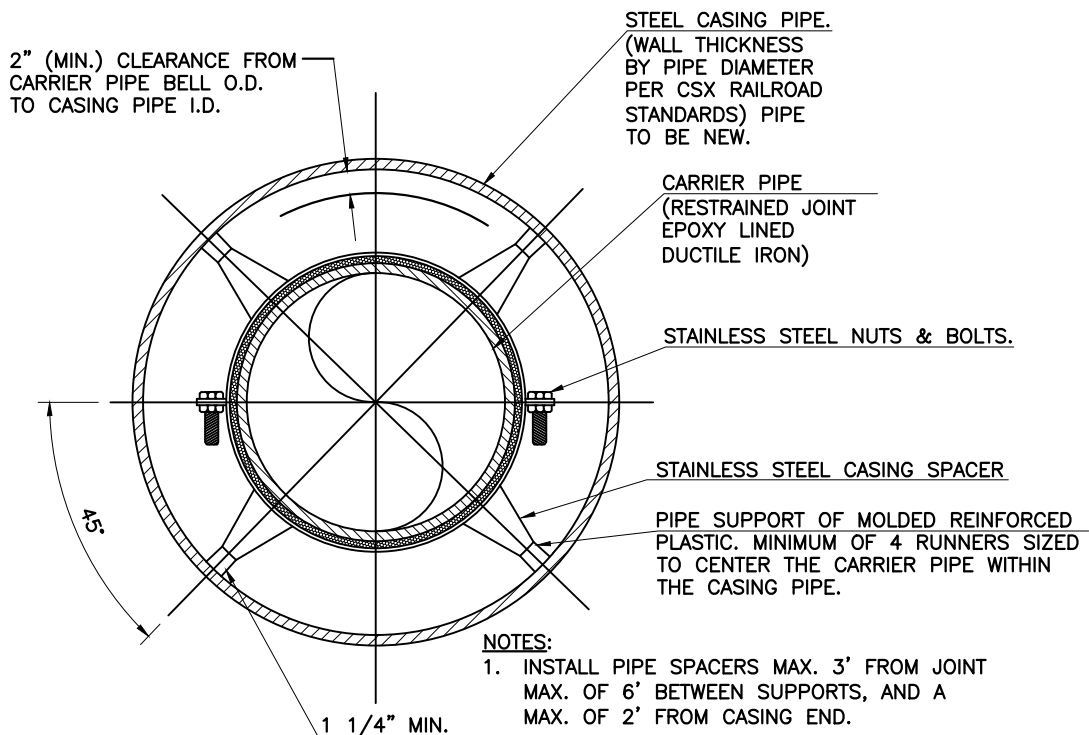
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DATE:	February 9, 2016
FILE NAME:	SAN-08 Conc. Encasement.dwg
SCALE:	N.T.S.

## Concrete Encasement (Appendix D)

SAN-08





\* EXACT LENGTH OF CASING PIPE TO BE DETERMINED IN THE FIELD.

## CASING PIPE ASSEMBLY DETAIL

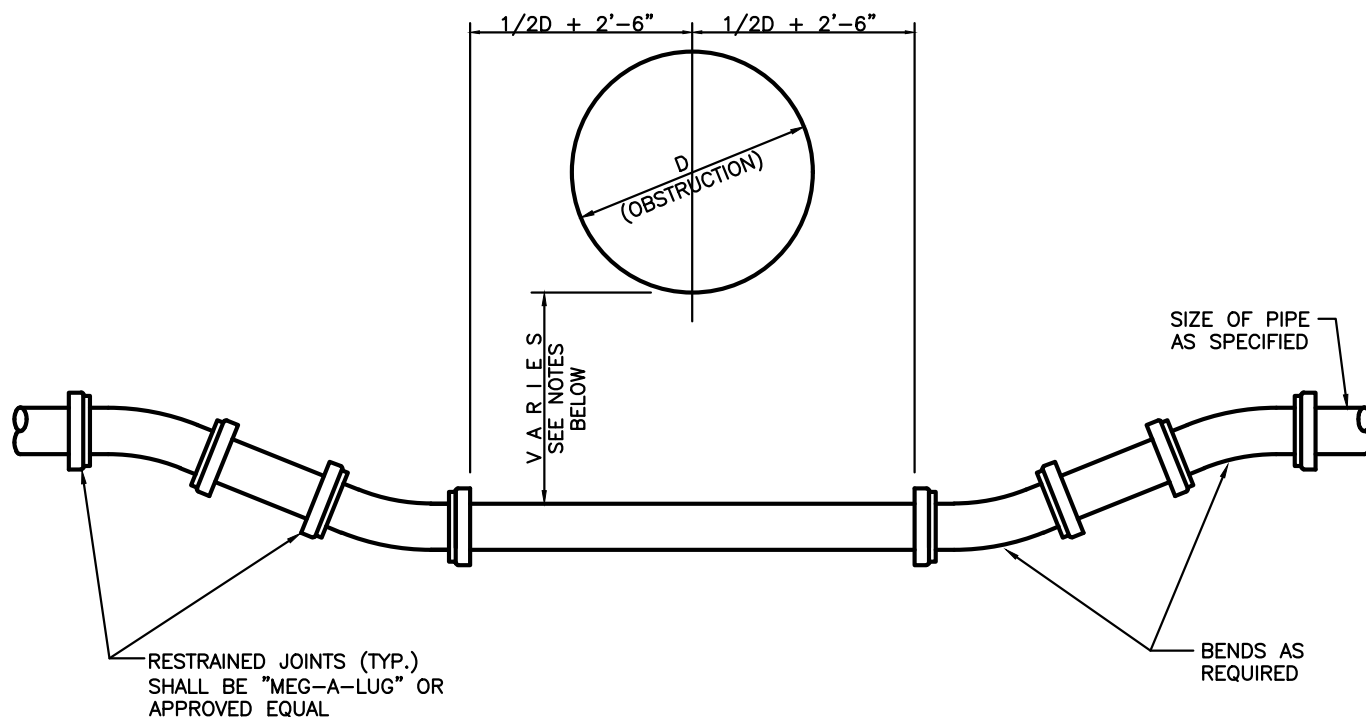
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DATE:	February 9, 2016
FILE NAME:	SAN-09 Casing Pipe Assem.dwg
SCALE:	N.T.S.

## Casing Pipe Assembly Detail (Appendix D)

SAN-09



**NOTES:**

1. ALL PIPE SHALL BE DUCTILE IRON CLASS 52 SELF RESTRAINED JOINT (EPOXY LINED) FOR CREEK CROSSINGS WITH A MINIMUM OF 3'-0" COVER FROM THE STREAM BOTTOM TO THE TOP OF THE PIPE AND SHALL EXTEND A MINIMUM OF 10'-0" BEYOND THE TOP OF BANK ON EACH SIDE OF CREEK.
2. FOR CROSSING UNDER EXISTING PIPE OR OBSTRUCTIONS A MINIMUM OF 18" CLEARANCE SHALL BE MAINTAINED FROM THE BOTTOM OF THE EXISTING PIPE TO THE TOP OF THE PROPOSED FORCEMAIN.
3. FOR CROSSING UNDER EXISTING PIPE THE CONTRACTOR MAY ELIMINATE FITTINGS, IF DEPTH CAN BE OBTAINED BY DEFLECTING PIPE JOINTS WITHIN ALLOWABLE LIMITS AND IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS.
4. SEE "FORCEMAIN VERTICAL BLOCKING" DETAIL.

**FORCEMAINS UNDER OBSTRUCTIONS**

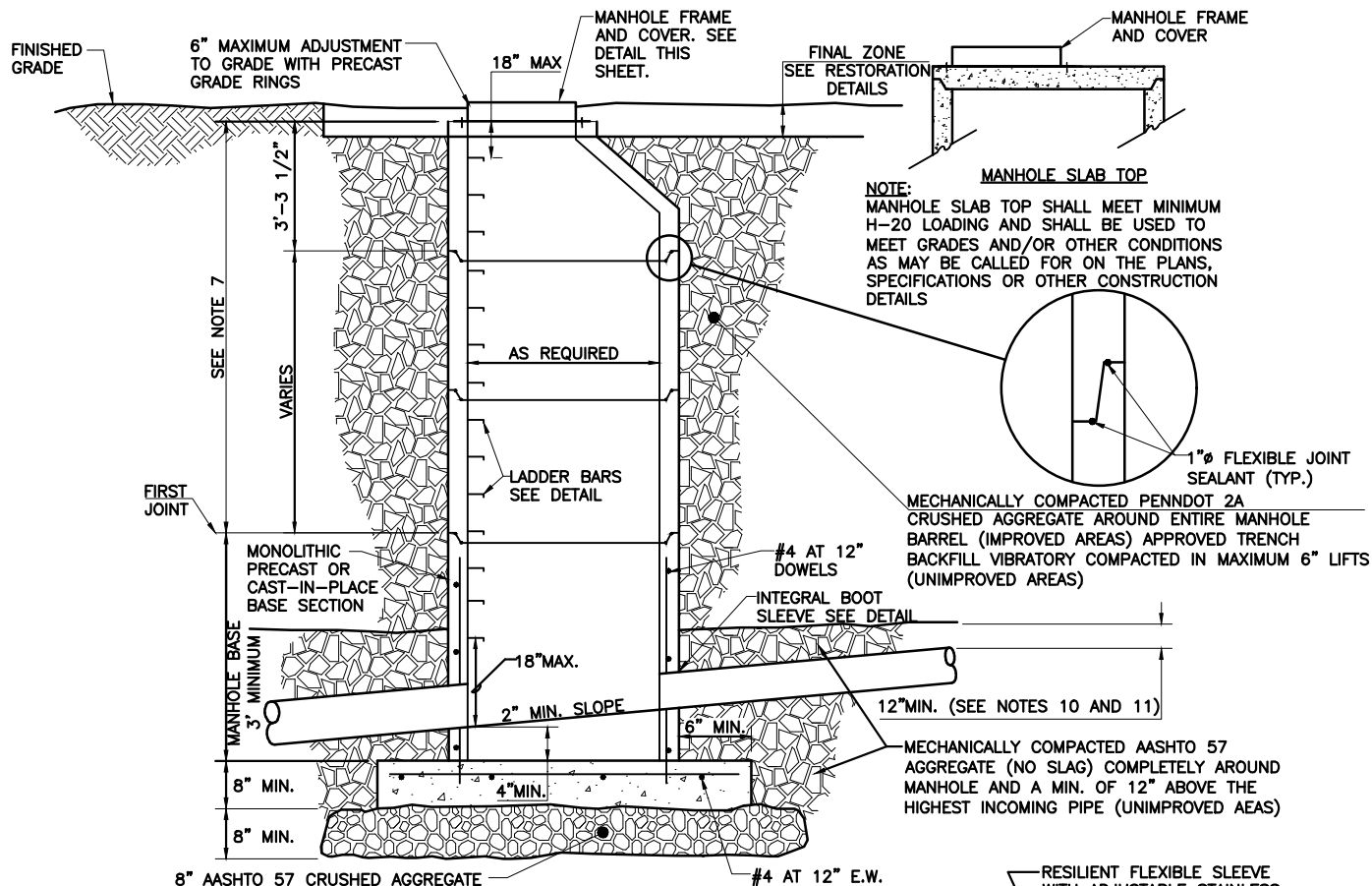
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**Forcemains Under Obstructions  
(Appendix D)**

SAN-10

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DATE:	February 9, 2016
FILE NAME:	SAN-10 Forcemains Under Obstruction.dwg
SCALE:	N.T.S.



**NOTES:**

1. ALL CONCRETE TO BE CLASS AAA CONCRETE, 4500 PSI, 5% ± 1% AIR ENTRAINMENT WITH XYPEX ADMIXTURE.
2. SEAL MANHOLE BARREL JOINTS WITH 2- 1"Ø FLEXIBLE BUTYL RUBBER JOINT SEALANT, USE 1/2"Ø FOR FRAME AND COVER.
3. ANCHOR FRAME AND COVER WITH 2-3/4" DIA. S.S. ANCHOR BOLTS SET PERMANENTLY INTO CONCRETE.
4. POINT LIFTING HOLES WITH NON-SHRINK GROUT, WATERTIGHT, NEAT AND SMOOTH.
5. MAXIMUM ADJUSTMENT TO FINISHED GRADE USING PRECAST GRADE RINGS IS SIX INCHES (6").
6. CONFORM PRECAST SECTIONS TO ASTM C-478 AS REVISED.
7. IF THIS DIMENSION IS LESS THAN 3'-3" USE PRECAST SLAB TOP DESIGNED TO MEET LOAD CONDITIONS (H-20 MIN.)
8. COAT EXTERIOR OF ALL MANHOLE BARREL SECTIONS WITH APPROVED BITUMINOUS COATING.
9. CAST LADDER BARS INTO BARREL SECTIONS AND CONFORMING TO ASTM C-478, AS REVISED.
10. WHERE MANHOLES ARE INSTALLED IN IMPROVED AREAS, BACKFILL THE ENTIRE EXCAVATED AREA WITH MECHANICALLY COMPACTED PENNDOT 2A AND AASHTO 57 CRUSHED AGGREGATE PER DETAIL (NO SLAG).
11. WHERE MANHOLES ARE CONSTRUCTED IN UNIMPROVED AREAS, BACKFILL THE ENTIRE EXCAVATED AREA WITH MECHANICALLY COMPACTED AASHTO 57 CRUSHED AGGREGATE (NO SLAG). FROM THE BOTTOM OF THE EXCAVATED AREA TO 12 INCHES ABOVE THE HIGHEST PIPE ENTERING THE MANHOLE.

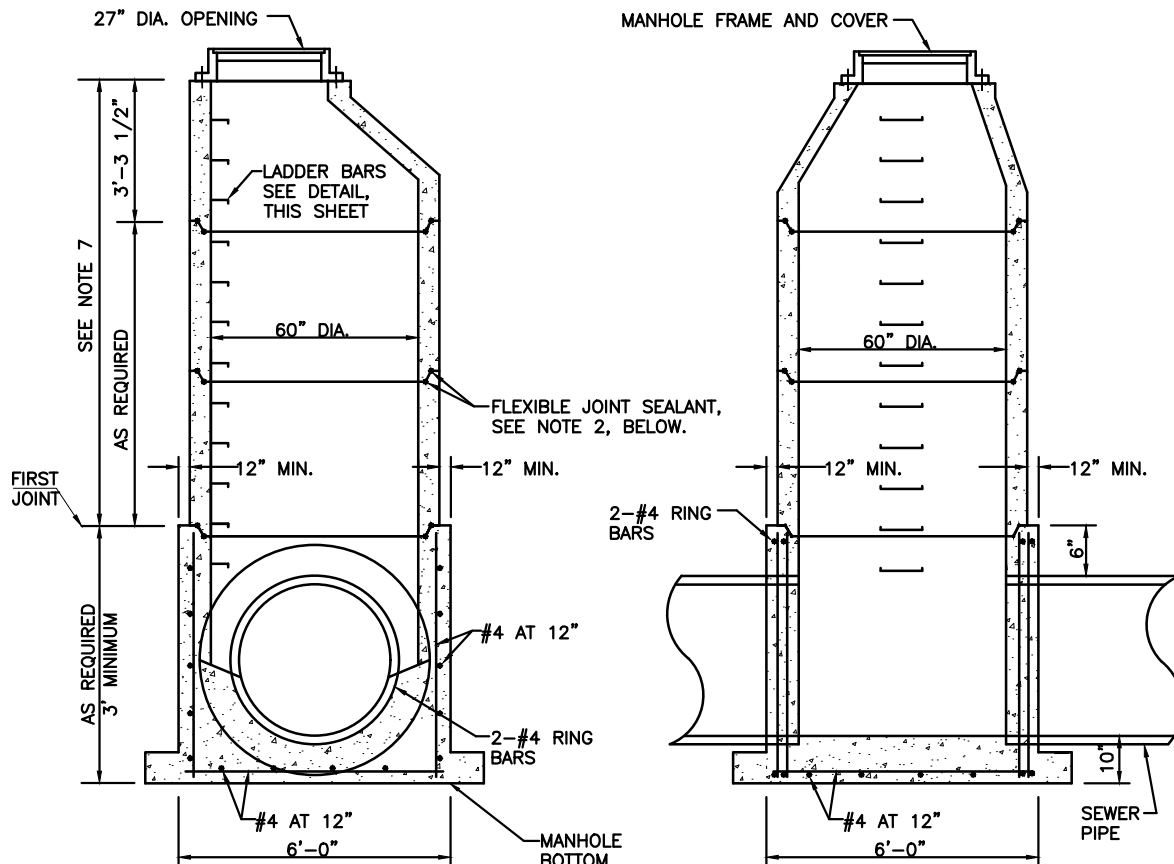
**TYPICAL  
PRECAST CONCRETE SANITARY MANHOLE AND SLAB TOP**

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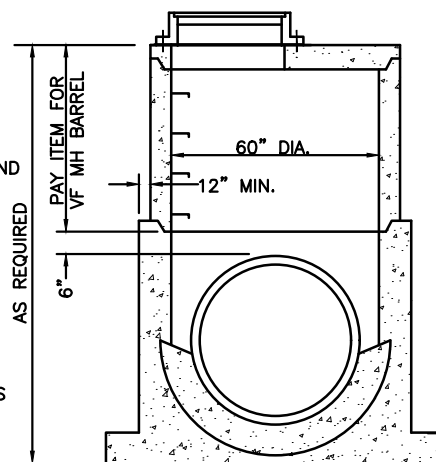
DATE:	February 9, 2016
FILE NAME:	SAN-11 Precast Conc. Manhole & Slab Top.dwg
SCALE:	N.T.S.

**Precast Concrete Sanitary Manhole  
and Slab Top  
(Appendix D)**  
SAN-11



**NOTES:**

1. ALL CONCRETE TO BE CLASS 'AAA' CONCRETE, 4500 PSI, 5%  $\pm$  1% AIR ENTRAINED. WITH XYPEX ADMIXTURE.
2. SEAL MANHOLE BARREL JOINTS WITH 2- 1"  $\phi$  FLEXIBLE BUTYL RUBBER JOINT SEALANT, USE 1/2"  $\phi$  FOR FRAME AND COVER.
3. ANCHOR FRAME AND COVER WITH 2-3/4" DIA. S.S. ANCHOR BOLTS SET PERMANENTLY ANCHORED INTO CONCRETE.
4. POINT LIFTING HOLES WITH NON-SHRINK GROUT, AND LEFT WATERTIGHT, NEAT AND SMOOTH.
5. MAXIMUM ADJUSTMENT TO FINISHED GRADE USING PRECAST GRADE RINGS SHALL NOT EXCEED SIX INCHES (6").
6. CONFORM PRECAST SECTIONS TO ASTM C-478 AS REVISED.
7. IF THIS DIMENSION IS LESS THAN 3'-3" USE PRECAST SLAB TOP DESIGNED TO MEET LOAD CONDITIONS.(H-20 MIN).
8. COAT EXTERIOR OF ALL MANHOLE BARREL SECTIONS WITH APPROVED BITUMINOUS COATING.
9. CAST LADDER BARS INTO BARREL SECTIONS AND SHALL CONFORM TO ASTM C-478, AS REVISED.
10. WHERE MANHOLES ARE INSTALLED IN IMPROVED AREAS, THE ENTIRE EXCAVATED AREA SHALL BE BACKFILLED WITH PENNDOT 2A AND AASHTO 57 CRUSHED AGGREGATE. PER SAN-11
11. WHERE MANHOLES ARE CONSTRUCTED IN UNIMPROVED AREAS, BACKFILL THE ENTIRE EXCAVATED AREA WITH AASHTO 57 CRUSHED AGGREGATE FROM THE BOTTOM OF THE EXCAVATED AREA TO 12 INCHES ABOVE THE HIGHEST PIPE ENTERING THE MANHOLE.
12. PROVIDE FLANGED BASE.



**CAST-IN PLACE OR PRECAST CONCRETE  
5' DIAMETER SANITARY MANHOLE**

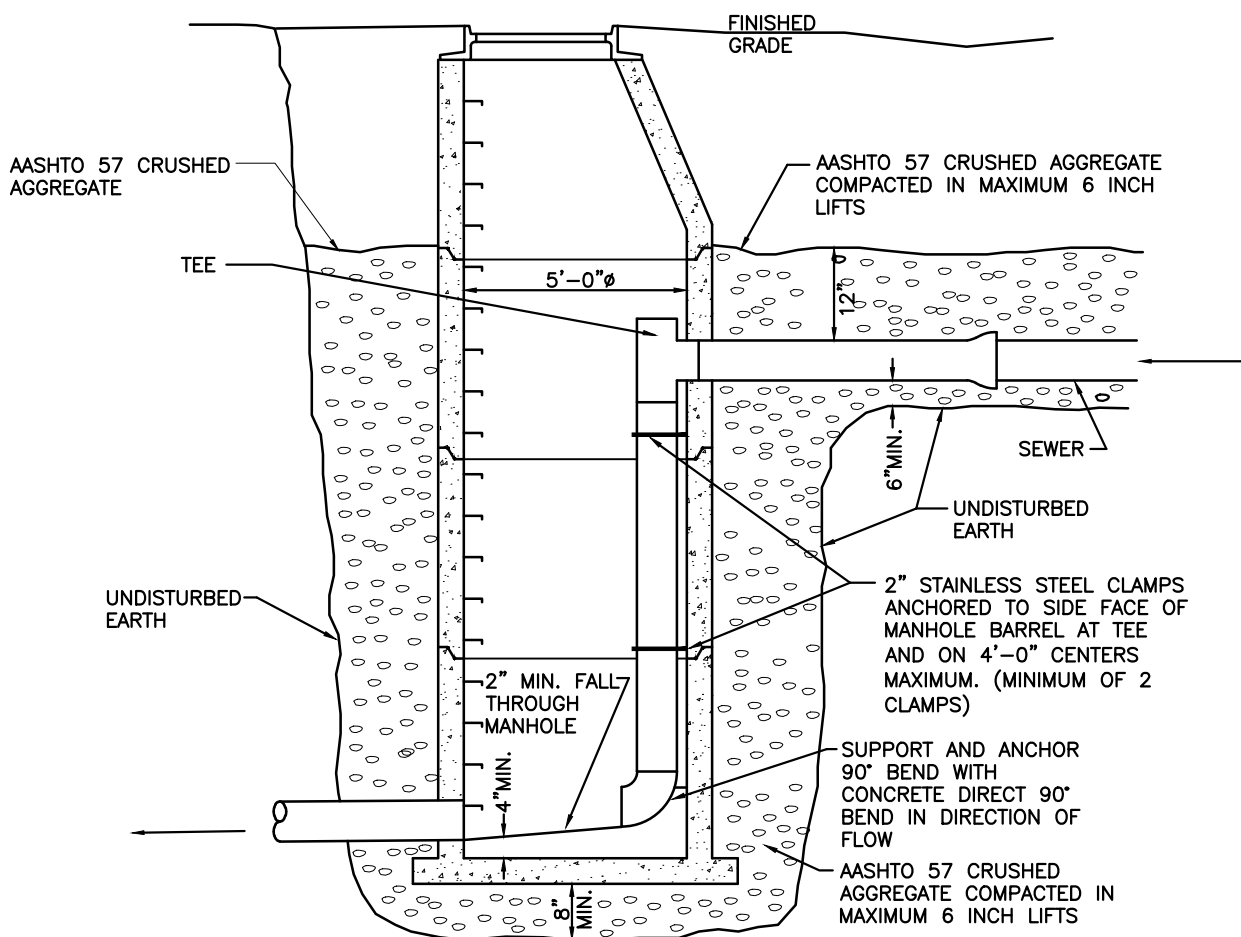
N. T. S.

**Cast-In Place or Precast Concrete  
5' Diameter Sanitary Manhole  
(Appendix D)**

SAN-12

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DATE:	February 9, 2016
FILE NAME:	SAN-12 Cast In Place or Precast Conc. Manhole.dwg
SCALE:	N.T.S.



NOTES:

1. USE SAME PIPE MATERIAL USED TO CONSTRUCT THE MAIN FROM WHICH THE DROP CONNECTION IS MADE.
2. PVC DROP CONNECTION PIPE SHALL BE ASTM SDR 26.
3. DIAMETER OF THE DROP CONNECTION INLET PIPING SHALL EQUAL THE DIAMETER OF THE INLET PIPE.
4. MECHANICALLY COMPACTED AASHTO No. 57 CRUSHED AGGREGATE 8" MINIMUM LEVELING COURSE UNDER BOTTOM OF MANHOLE.
5. PROVIDE 5'-0" DIAMETER MANHOLES FOR MANHOLE DROP CONNECTIONS. SEE 5' DIAMETER SANITARY MANHOLE DETAIL. (SAN-12) FOR SPECIFIC MANHOLE DETAIL INFORMATION.
6. ALL MOUNTING HARDWARE TO BE STAINLESS STEEL.

TYPICAL  
INSIDE MANHOLE DROP CONNECTION  
**8", 10", 12" AND 15" DIAMETER SEWER PIPES**

N. T. S.

A diagram with a central white box labeled "CTSA". Surrounding this central box are four green boxes, each containing a label: "CENTER" (top-left), "TOWNSHIP" (top-right), "SANITARY" (bottom-left), and "AUTHORITY" (bottom-right). The boxes are arranged in a 2x2 grid around the central "CTSA" box.

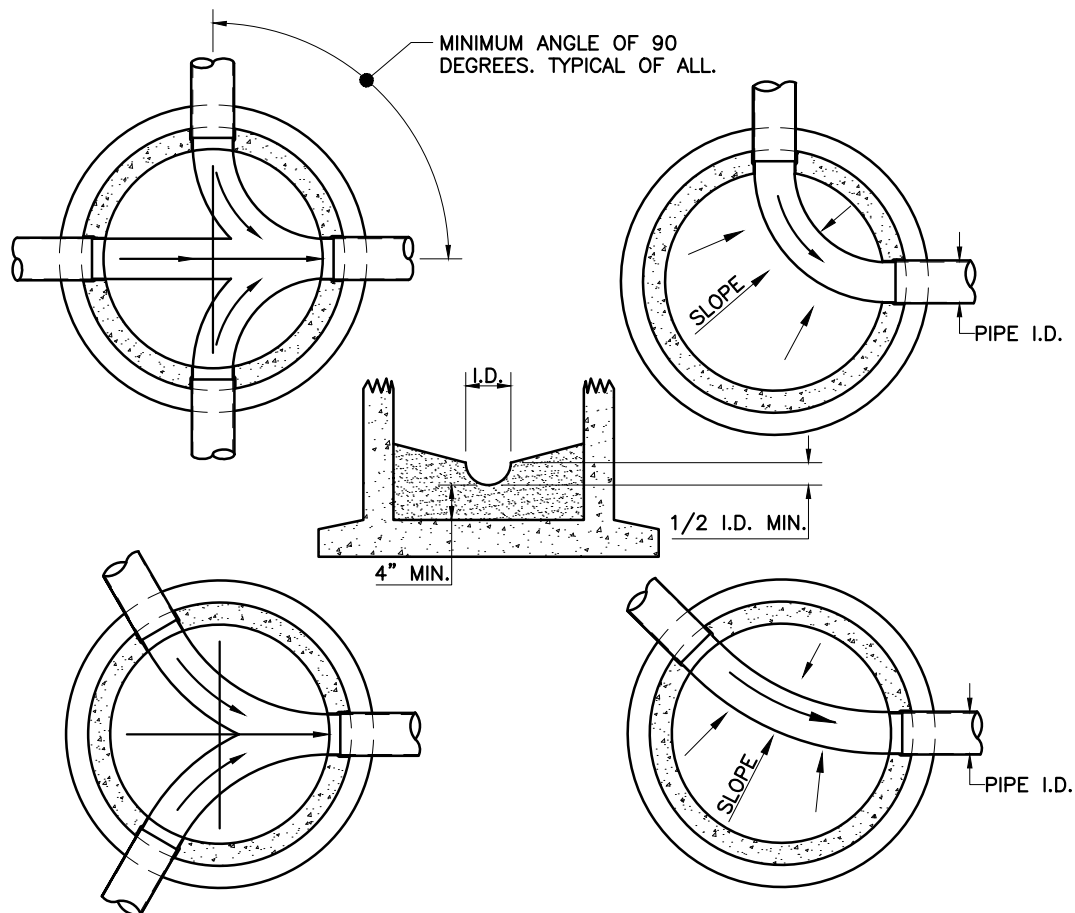
DATE:	February 9, 2016
FILE NAME:	SAN-13 Inside Manhole Drop Connec...dwg
SCALE:	N.T.S.

# INSIDE MANHOLE DROP CONNECTION

## 8", 10" , 12" and 15" Diameter Sewer Pipes

### (Appendix D)

SAN-13



**NOTES:**

1. CHANNELS TYPICAL, NUMBER AND LOCATION TO MEET FIELD CONDITIONS.
2. CHANNELS TO BE SEMI-CIRCULAR IN SECTION.
3. SLOPE MANHOLE FLOOR TO CHANNEL FOR DRAINAGE.
4. USE PADOT CLASS 'AAA' CONCRETE (4,500 PSI) TO FORM CHANNELS AND HAVE A MINIMUM DEPTH OF 4 INCHES. ADD XYPEX TO CONCRETE MIX.
5. PROVIDE SMOOTH FLOAT FINISH. PROVIDE UNIFORM RADIUS.
6. PRE-POURED INVERTS PROHIBITED. ALL INVERTS TO BE FIELD POURED. UNLESS OTHERWISE APPROVED BY CTSA

TYPICAL  
**MANHOLE CHANNELS**  
N. T. S.

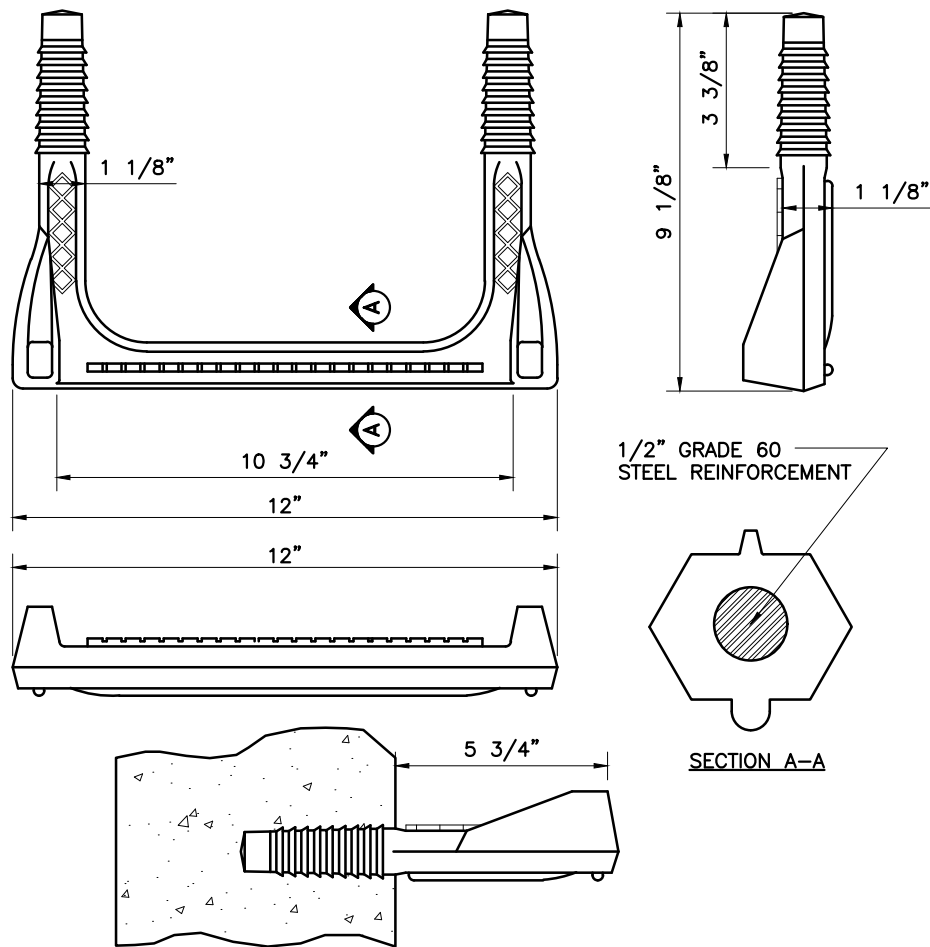
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DATE:	February 9, 2016
FILE NAME:	SAN-14 Manhole Chann..dwg
SCALE:	N.T.S.

**Manhole Channels  
(Appendix D)**

SAN-14

N:\PROJ\495-02\Standard Details\dwg\ SAN-15 Ladder Bars for Manhole.dwg layout = Ladder Bars For Manhole Date = Feb 09, 2016 - 2:38pm Username = jasonm



**TYPICAL  
LADDER BARS FOR MANHOLE**  
N. T. S.

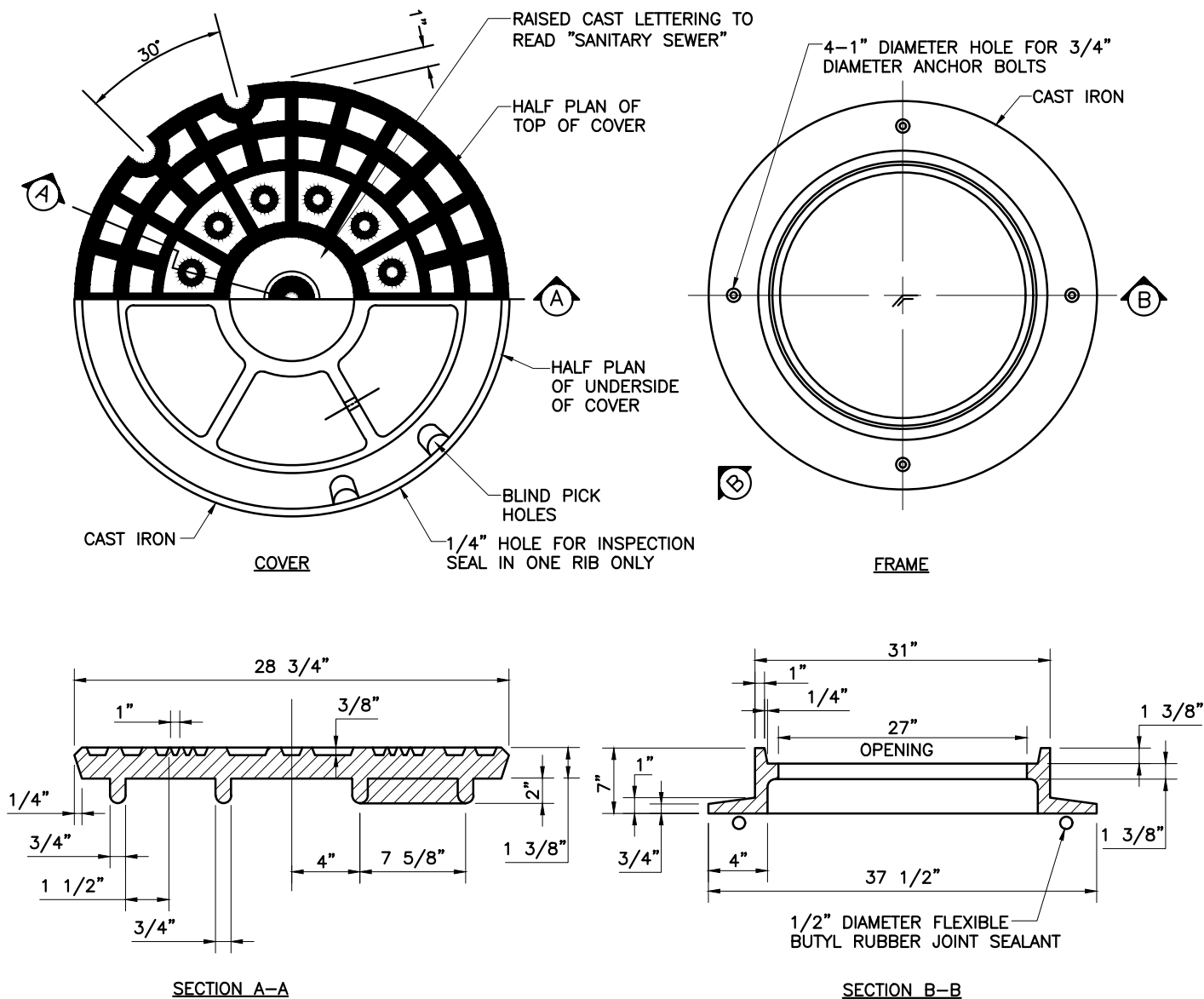
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DATE:	February 9, 2016
FILE NAME:	SAN-15 Ladder Bars for Manhole.dwg
SCALE:	N.T.S.

## Ladder Bars for Manhole (Appendix D)

SAN-15

N:\PROJ\495\495-02\Standard Details\dwg\ SAN-16 St. Manhole F&C.dwg layout = Standard Manhole Frame And Cover Username = Jasonm Date = Feb 09, 2016 - 2:39pm



# TYPICAL STANDARD SANITARY MANHOLE FRAME AND COVER

N. T. S.

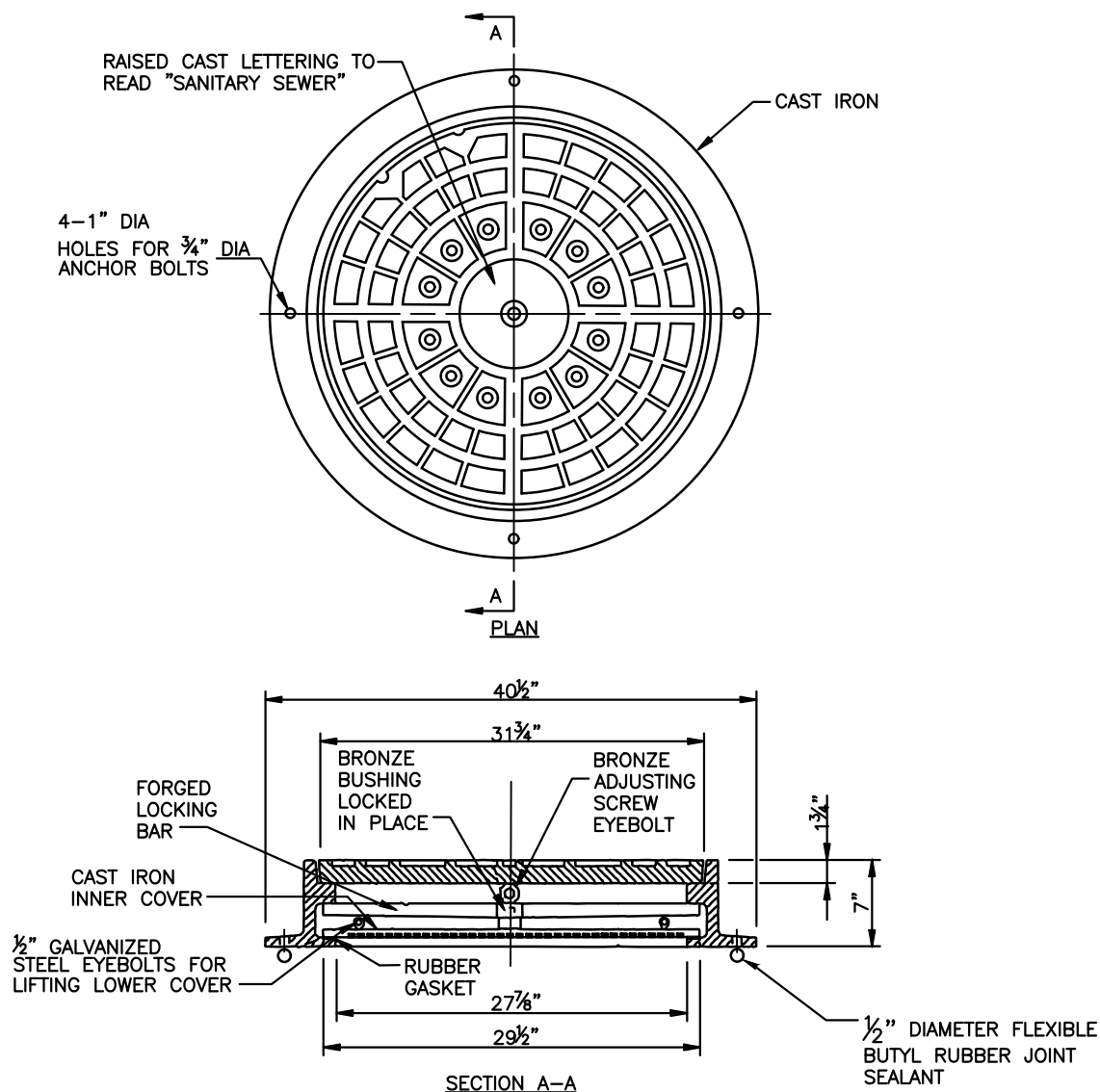
**Standard Sanitary Manhole  
Frame and Cover  
(Appendix D)**  
SAN-16

DATE: February 9, 2016  
FILE NAME: SAN-16 St. Manhole F&C.dwg  
SCALE: N.T.S.

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N:\PROJ\495\02\Standard Details\dwg\ SAN-17 W.T. Manhole F&C Lock Bar Option.dwg Layout = Watertight Manhole Frame And Cover Username = jasonm Date = Feb 09, 2016 - 2:39pm



**NOTES:**

1. ALL CONTACT SURFACES MACHINED.
2. PROVIDE SECURITY SADDLE OVER EYEBOLT IF SPECIFIED.
3. REFER TO STANDARD SANITARY MANHOLE FRAME AND COVER DETAIL FOR DETAIL ON COVER.

**WATERTIGHT SANITARY MANHOLE FRAME AND COVER**

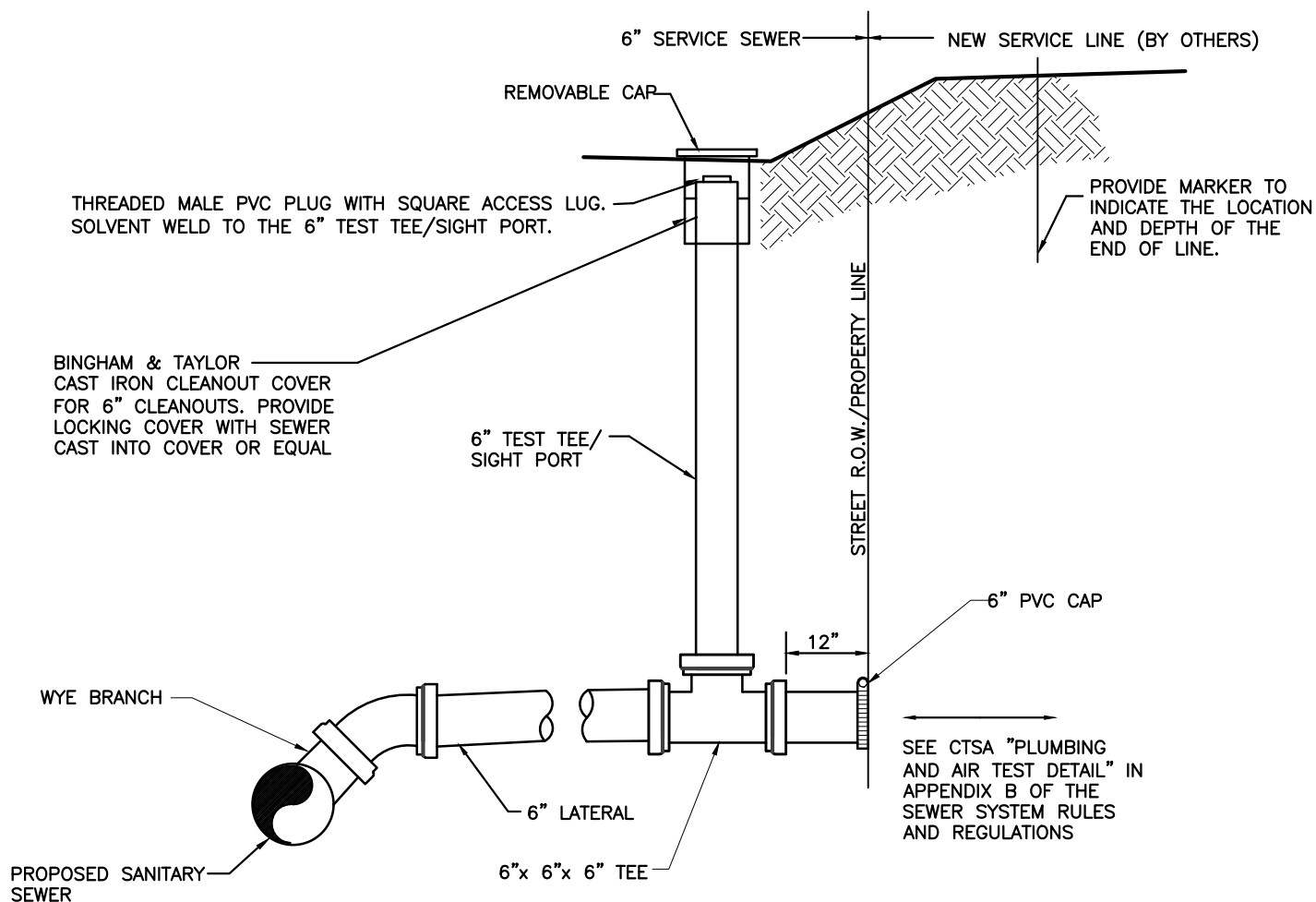
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DATE:	February 9, 2016
FILE NAME:	SAN-17 W.T. Manhole F&C Lock Bar Option.dwg
SCALE:	N.T.S.

**Watertight Sanitary Manhole Frame and Cover (with Inner Cover Option)**  
**(Appendix D)**  
SAN-17

N:\PROJ\495\495-02\Standard Details\dwg\ SAN-18 New WYE Serv. Lat. Site T.dwg layout = Wye Connection Service Lat Sight Tee (New Service) Username = jasonm Date = Feb 09, 2016 - 2:39pm



**NOTES:**

1. CONFORM PVC PIPE AND FITTINGS TO THE REQUIREMENTS OF ASTM D-3034-SDR 26 AND ASTM D-3212 JOINTS.
2. CONSTRUCT ALL LATERALS AT A MINIMUM SLOPE OF TWO PERCENT(2%).
3. INSTALL ALL LATERALS ACCORDING TO THE TRENCH AND PIPE ZONE DETAIL.
4. THE CONTRACTOR TO COORDINATE PLACEMENT OF WYE CONNECTION, SERVICE LATERAL AND SIGHT TEE WITH THE PROPERTY OWNER AND THE OWNER'S REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION.

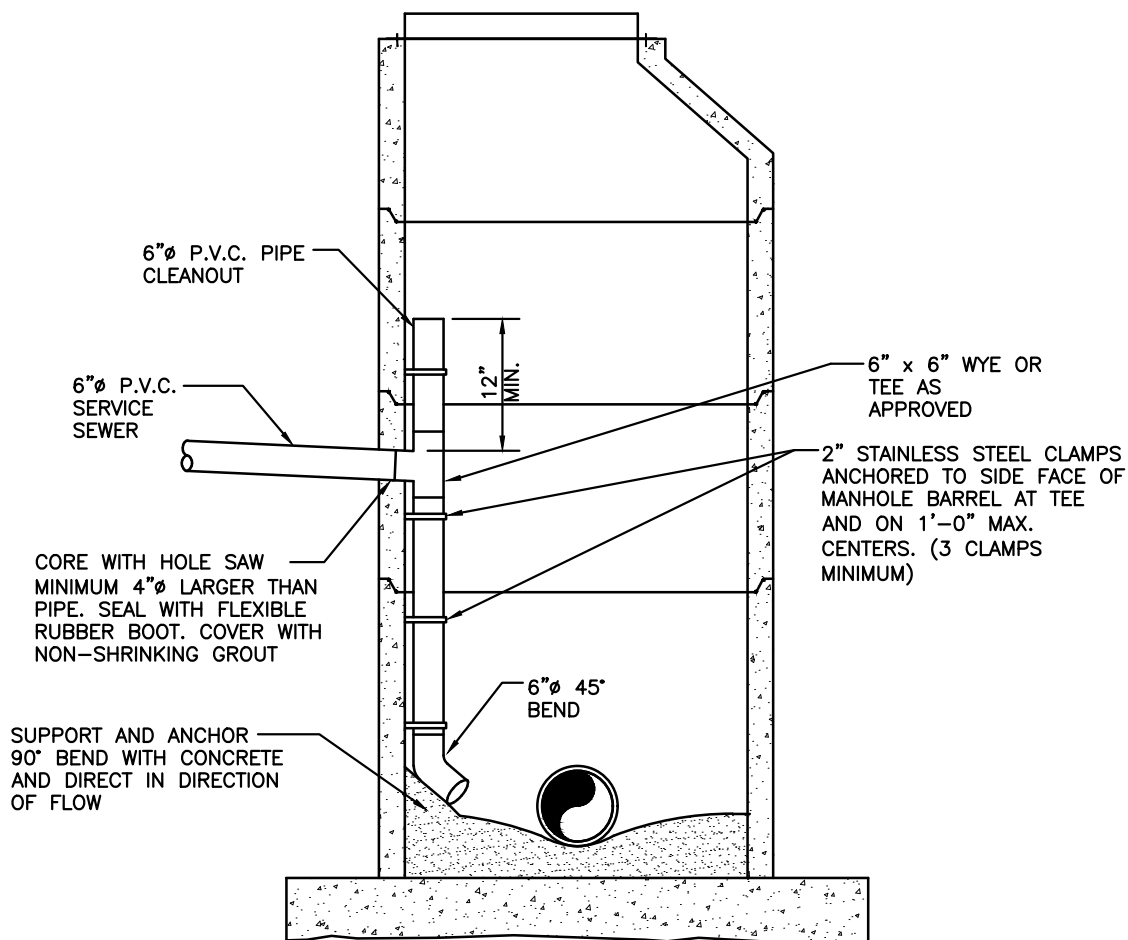
**TYPICAL**  
**WYE CONNECTION, SERVICE LATERAL**  
**SIGHT TEE DETAIL**  
**N. T. S.**

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DATE:	February 9, 2016
FILE NAME:	SAN-18 New WYE Serv. Lat. Site T.dwg
SCALE:	N.T.S.

**Wye Connection, Service Lateral**  
**Sight Tee Detail (New Service)**  
**(Appendix D)**  
SAN-18

N:\PROJ\495-02\Standard Details\dwg\ SAN-19 Serv. Connec. at Manhole.dwg SAN-19 Serv. Connec. at Manhole.dwg layout = Service Connection At Manhole Username = jasonm Date = Feb 09, 2016 - 2:39pm



**NOTE:**  
DROP CONNECTION INLET PIPE SHALL BE 6"Ø P.V.C. PIPE CONFORMING TO ASTM SDR26.

# TYPICAL SERVICE CONNECTION AT MANHOLE

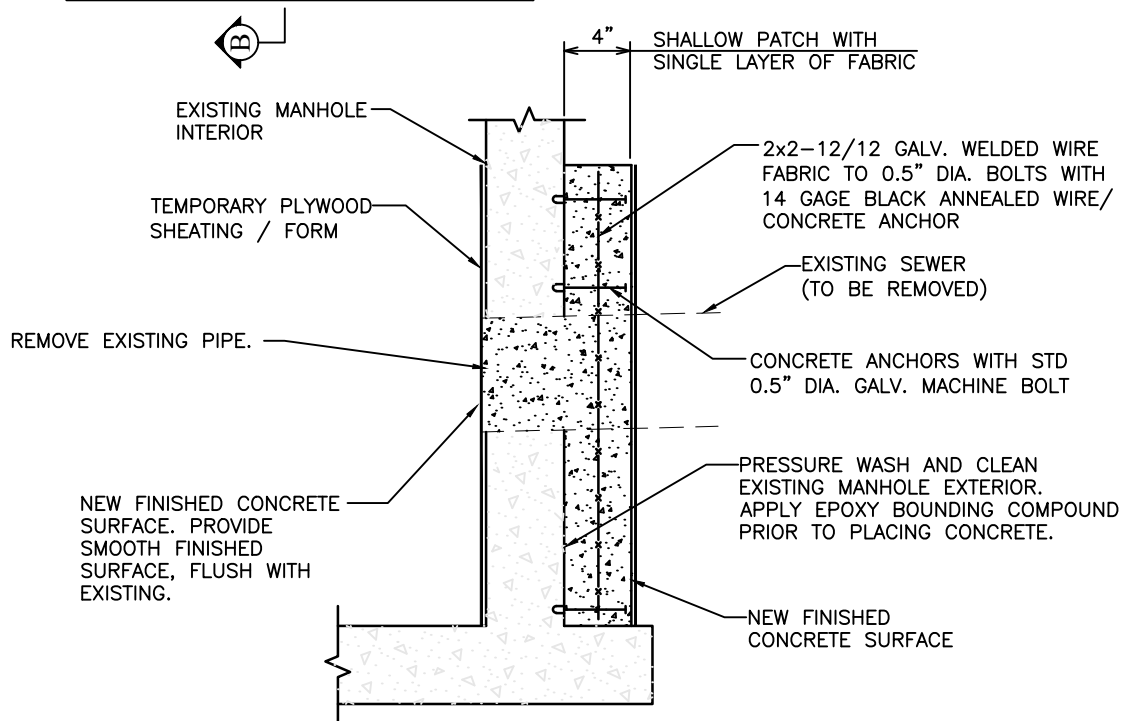
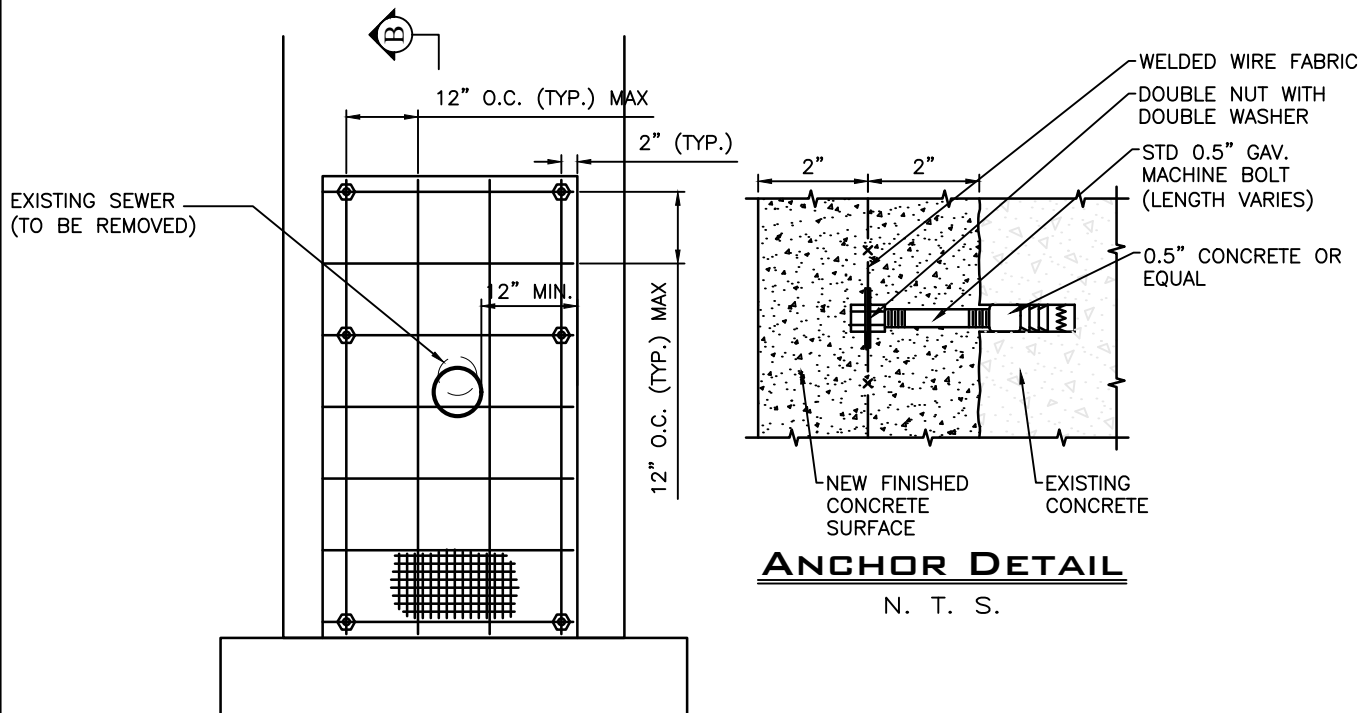
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SANITARY	AUTHORITY

DATE:	February 9, 2016
FILE NAME:	SAN-19 Serv. Connec. at Manhole.dwg
SCALE:	N.T.S.

## **Service Connection at Manhole (Appendix D)**

SAN-19



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DATE:	February 9, 2016
FILE NAME:	SAN-20 Sewer Term. Manhole Repair.dwg
SCALE:	N.T.S.

## Sewer Termination Manhole Repair (Appendix D)

SAN-20