

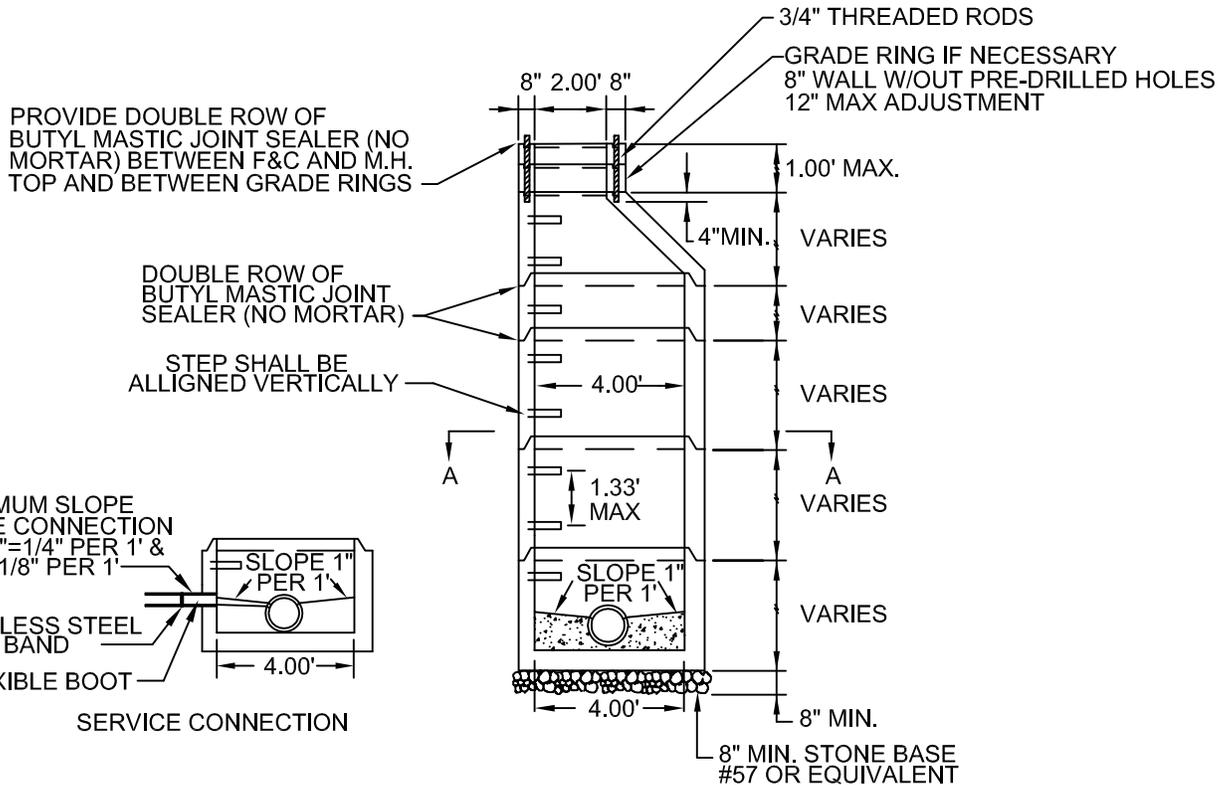
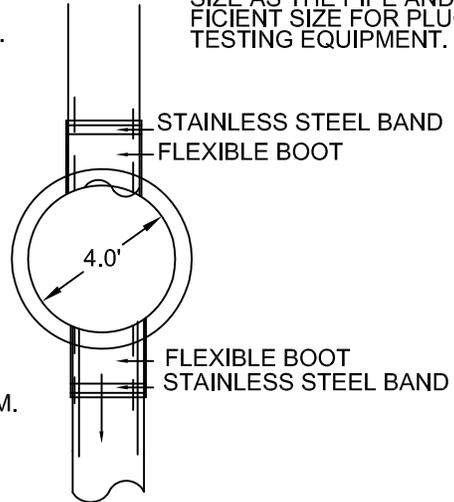
## LIST OF SEWER DETAIL DRAWINGS

<b>BC #</b>	<b>TITLE</b>
SS-01	4' Standard Manhole for Pipes 15" and Smaller
SS-02	Straddle Manhole for Pipes 15" and Smaller
SS-03	Mainline or Lateral Outside Drop Manhole (For Use with PVC Pipe)
SS-04	Mainline or Lateral Inside Drop Manhole (For Use with PVC Pipe)
SS-05	Watertight Manhole Frame
SS-06	Watertight Manhole Cover
SS-07	Commercial Sampling Structure (County Approval Required)
SS-08	Sanitary Sewer Lateral
SS-09	Sanitary Sewer Lateral for Deep Sewers
SS-10	Sanitary Sewer Lateral for Special Cases
SS-11	Combined 6" by Two 4" Laterals
SS-12	Private Force Main to Gravity Lateral Connection
SS-13	PVC – Force Main Cleanout
SS-14	Traffic Bearing Cleanout Box
SS-15	Concrete Encased Sewer Pipe
SS-16	Joining Dissimilar Pipe (Special Conditions Approved by County)
SS-17	Concrete Pier
SS-18	Anchor Block
SS-19	Road Crossing Detail - Pipe Support in Casing Pipe
SS-20	Type 1 Manhole Vent – Out of Right of Way
SS-21	Type 2 Manhole Vent
SS-22	Automatic Air/Vacuum Release Assembly for use on Force Main
SS-23	Sanitary Sewer Pipe Abandonment at a Manhole
SS-24	Sanitary Sewer Manhole Abandonment
SS-25	Fine Aggregate
SS-26	Air Testing Back Pressure Equivalency Table
SS-27	Air Testing Time for 1 PSI Drop
SS-28	Air Testing Time for 0.5 PSI Drop
SS-29	Deep Manhole w/Safety Slab - $\geq 15'$ Depth
SS-30	Inside Forcemain Connection to Manhole
SS-31	Manhole Invert Shaping
SS-32	Manhole Sizing Table

**NOTES:**

1. ALL MANHOLE FRAMES AND COVERS SHALL BE EAST JORDAN IRON WORKS, INC. WATERTIGHT MANHOLE FRAME MODEL #1045Z, WATERTIGHT COVER MODEL #1040AGS AND BOLT-DOWN MANHOLE COVER MODEL #1040ACLS. BOLT-DOWN MODEL TO BE USED IN AREAS SUBJECTED TO FLOODING OR AS DIRECTED BY BOTETOURT COUNTY.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2 FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
4. FLAT TOP MANHOLES MAY ONLY BE SUBSTITUTED WITH THE PERMISSION OF THE UTILITY DIRECTOR. WHEN USED, THE ECCENTRIC OPENING MUST LINE UP WITH THE STEPS.
5. SAMPLING MANHOLES IN TRAFFIC AREAS SHALL BE CONSTRUCTED AS PER MANHOLE DETAILS.
6. FLEXIBLE JOINT MANHOLE CONNECTION SHALL BE AS MANUFACTURED BY PRES-SEAL GASKET CORPORATION OR EQUAL.
7. PRECAST MANHOLES SHALL BE FROM MANUFACTURER WITH A VDOT APPROVED QUALITY ASSURANCE PROGRAM.

INVERTS WILL BE THE SAME SIZE AS THE PIPE AND SUFFICIENT SIZE FOR PLUGS AND TESTING EQUIPMENT.



CONCENTRIC MANHOLE WITH PRECAST INVERT



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

30 WEST BACK STREET, NUMBER 4  
FINCASTLE, VA 24090  
Ph: 540-473-8316  
Fx: 540-473-8360

**CONSTRUCTION STANDARDS**

**4ft STANDARD MANHOLE FOR PIPES 15" AND SMALLER**

DATE:  
MARCH 2005

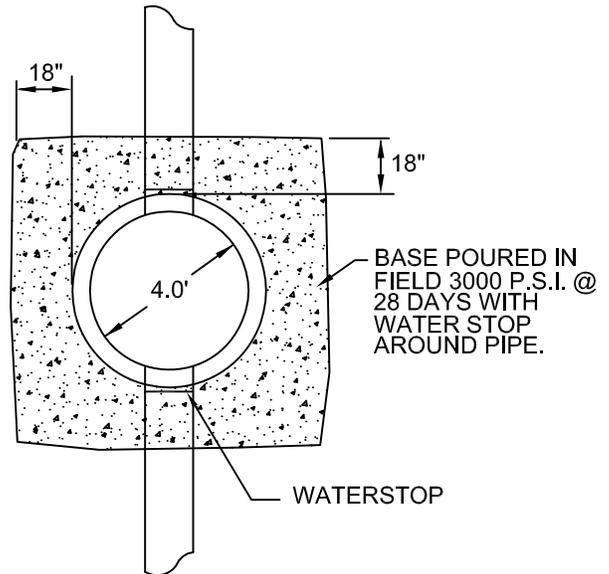
REVISIONS

BC #

SS-01

**NOTES:**

1. ALL MANHOLE FRAMES AND COVERS SHALL BE EAST JORDAN IRON WORKS, INC. WATERTIGHT MANHOLE FRAME MODEL #1045Z, WATERTIGHT COVER MODEL #1040AGS AND BOLT-DOWN MANHOLE COVER MODEL #1040ACLGS. BOLT-DOWN MODEL TO BE USED IN AREAS SUBJECTED TO FLOODING OR AS DIRECTED BY BOTETOURT COUNTY.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE ENTIRE MANHOLE STRUCTURE INCLUDING FRAME AND COVER SHALL BE INSTALLED BEFORE CUTTING THE TOP OF THE SEWER PIPE IN THE MANHOLE. BOTETOURT COUNTY INSPECTOR TO BE PRESENT DURING INSTALLATION.
4. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2 FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
5. RISER AND OTHER SECTIONS SHALL NOT BE INSTALLED FOR A MINIMUM OF 24 HOURS AFTER POURING OF BASE, BENCH, & INVERT.
6. PRECAST MANHOLES SHALL BE FROM MANUFACTURER WITH A VDOT APPROVED QUALITY ASSURANCE PROGRAM.



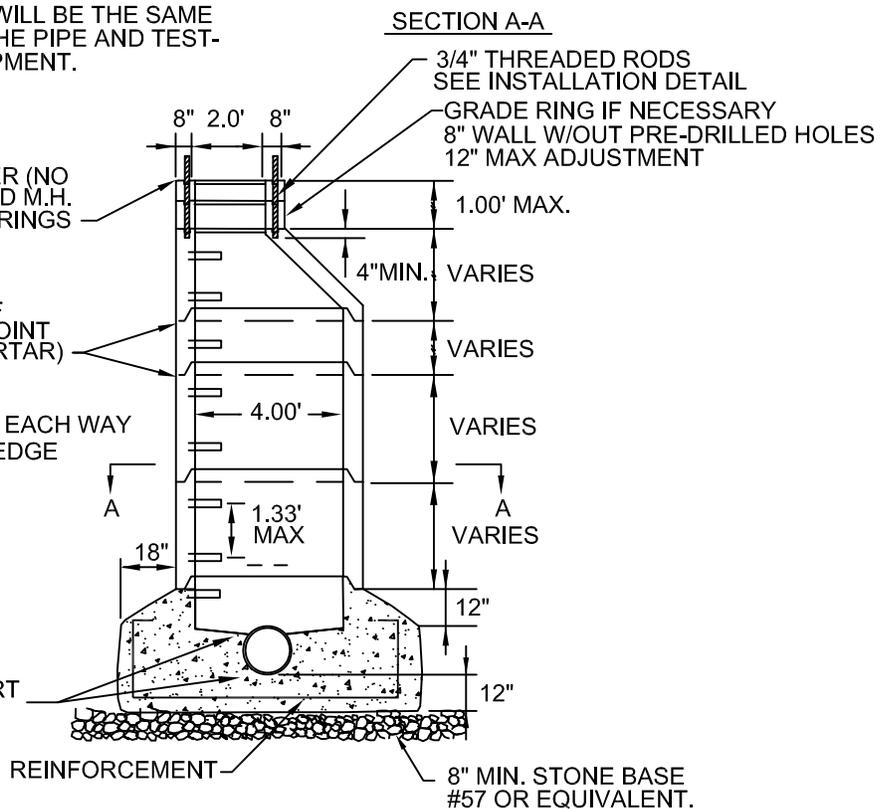
INVERTS WILL BE THE SAME SIZE AS THE PIPE AND TESTING EQUIPMENT.

PROVIDE DOUBLE ROW OF BUTYL MASTIC JOINT SEALER (NO MORTAR) BETWEEN F&C AND M.H. TOP AND BETWEEN GRADE RINGS

DOUBLE ROW OF BUTYL MASTIC JOINT SEALER (NO MORTAR)

BASE REINFORCEMENT:  
TWO LAYERS OF #4 BARS @ 6" O.C. EACH WAY  
IN TWO LAYERS W/ VERT. BARS @ EDGE

BASE, BENCH, & INVERT  
TO BE SINGLE POUR,  
3,000 P.S.I. @ 28 DAYS



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

30 WEST BACK STREET, NUMBER 4  
FINCASTLE, VA 24090  
Ph: 540-473-8316  
Fx: 540-473-8360

**CONSTRUCTION STANDARDS**

**STRADDLE MANHOLE  
FOR PIPES 15"  
AND SMALLER**

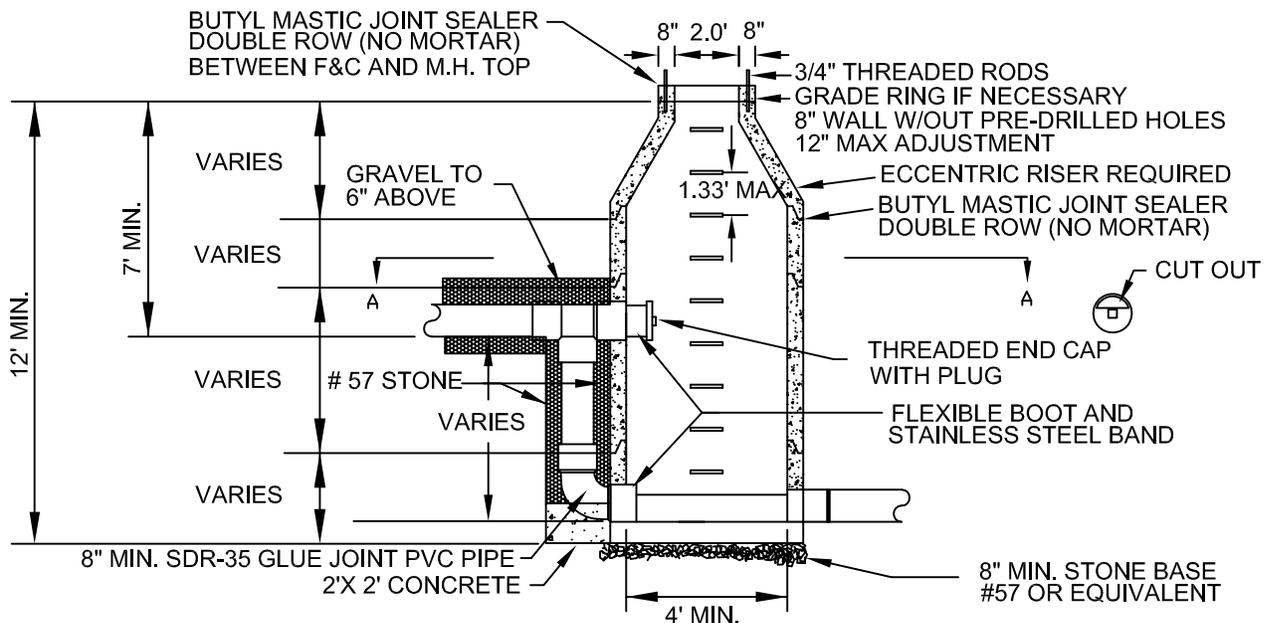
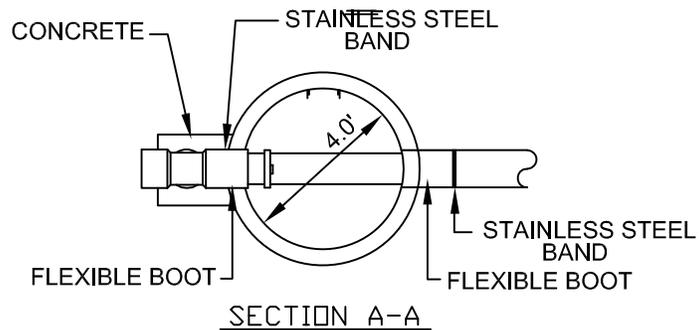
DATE:  
MARCH 2005

REVISIONS

BC #  
SS-02

NOTES:

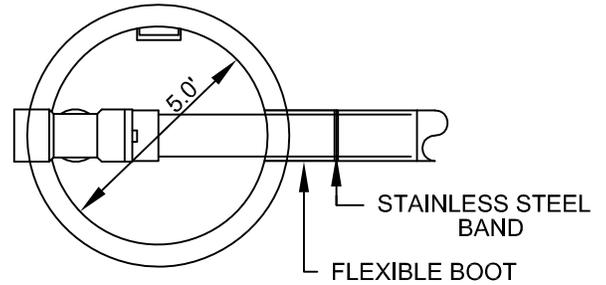
1. ALL MANHOLE FRAMES AND COVERS SHALL BE EAST JORDAN IRON WORKS, INC. WATERTIGHT MANHOLE FRAME MODEL #1045Z, WATERTIGHT COVER MODEL #1040AGS AND BOLT-DOWN MANHOLE COVER MODEL #1040ACLGS. BOLT-DOWN MODEL TO BE USED IN AREAS SUBJECTED TO FLOODING OR AS DIRECTED BY BOTETOURT COUNTY.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2 FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
4. TOP INVERT LINE SHALL NOT ENTER THROUGH RISER (CONE) SECTION OR JOINT.
5. FLEXIBLE JOINT MANHOLE CONNECTION SHALL BE AS MANUFACTURED BY PRES-SEAL GASKET CORPORATION OR EQUAL.
6. PRECAST MANHOLES SHALL BE FROM MANUFACTURER WITH A VDOT APPROVED QUALITY ASSURANCE PROGRAM.



	<b>BOTETOURT COUNTY</b> PUBLIC FACILITIES & PROGRAMS	<b>CONSTRUCTION STANDARDS</b>	DATE: MARCH 2005	BC #  SS-03
	30 WEST BACK STREET, NUMBER 4 FINCASTLE, VA 24090 Ph: 540-473-8316 Fx: 540-473-8360	<b>MAINLINE OR LATERAL          OUTSIDE DROP MANHOLE          (FOR USE WITH PVC PIPE)</b>	REVISIONS	

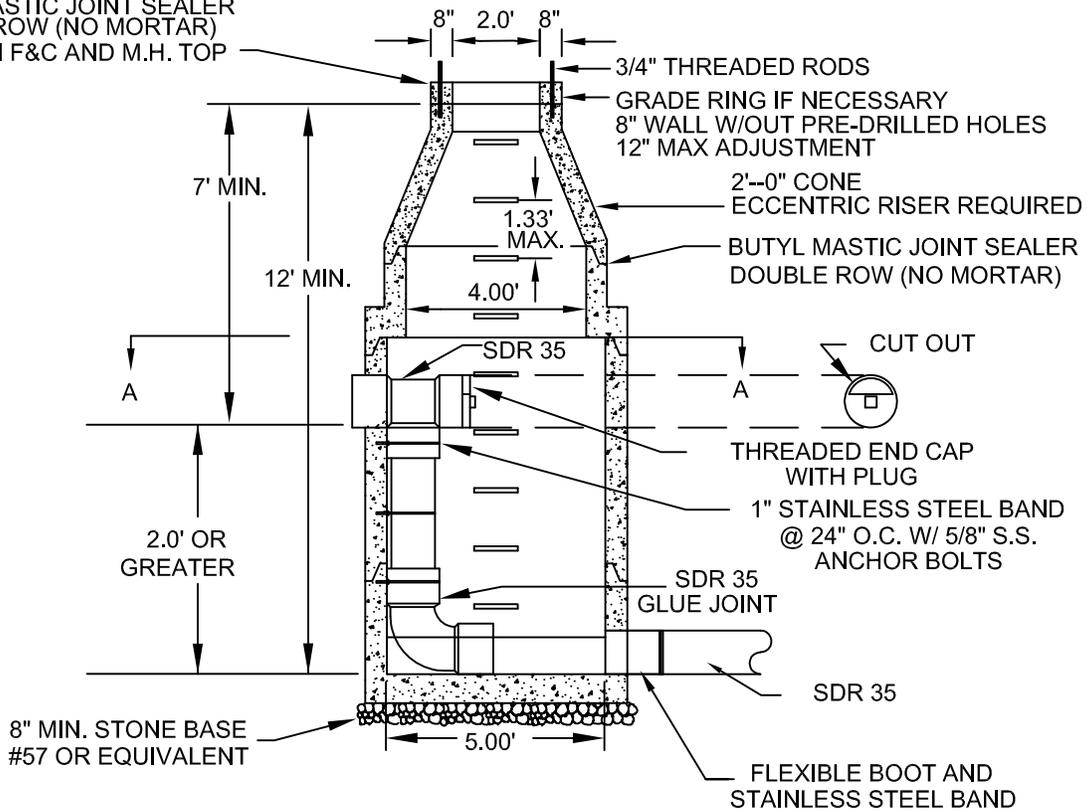
**NOTES:**

1. ALL MANHOLE FRAMES AND COVERS SHALL BE EAST JORDAN IRON WORKS, INC. WATERTIGHT MANHOLE FRAME MODEL #1045Z, WATERTIGHT COVER MODEL #1040AGS AND BOLT-DOWN MANHOLE COVER MODEL #1040ACLGS. BOLT-DOWN MODEL TO BE USED IN AREAS SUBJECTED TO FLOODING OR AS DIRECTED BY BOTETOURT COUNTY.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2 FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
4. PRECAST MANHOLES SHALL BE FROM MANUFACTURER WITH A VDOT APPROVED QUALITY ASSURANCE PROGRAM.



SECTION A-A

BUTYL MASTIC JOINT SEALER  
DOUBLE ROW (NO MORTAR)  
BETWEEN F&C AND M.H. TOP



**NOTE : 6' DIAMETER MANHOLE REQUIRED  
FOR TWO INSIDE DROP CONNECTIONS  
(MAIN LINE OR LATERAL)**



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

30 WEST BACK STREET, NUMBER 4  
FINCASTLE, VA 24090  
Ph: 540-473-8316  
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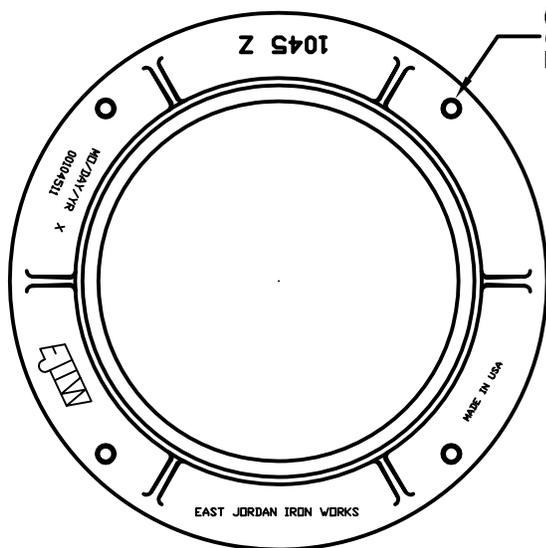
**CONSTRUCTION STANDARDS**

**MAINLINE OR LATERAL  
INSIDE DROP MANHOLE  
(FOR USE WITH PVC PIPE)**

DATE:  
MARCH 2005

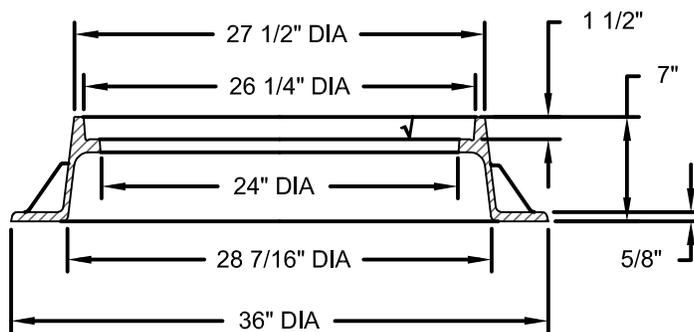
REVISIONS

**BC #**  
**SS-04**



(4) 1" DIA HOLES  
ON 32 3/4" DIA  
BOLT CIRCLE.

✓ MACHINED SURFACE

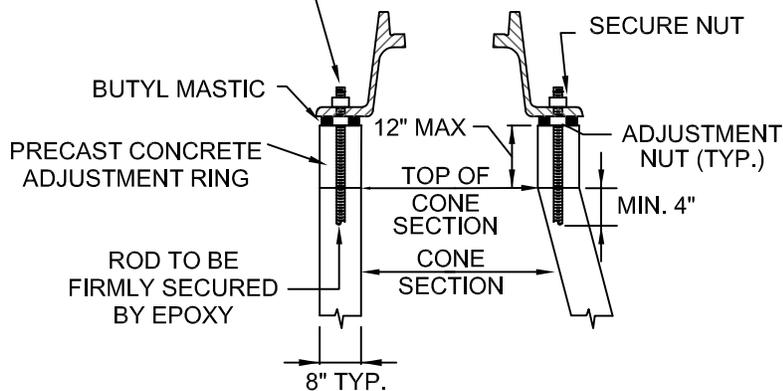


FRAME SECTION

3/4" THREADED ROD  
STAINLESS STEEL OR  
STEEL WITH APPROVED  
COATING. (3 TYP.)

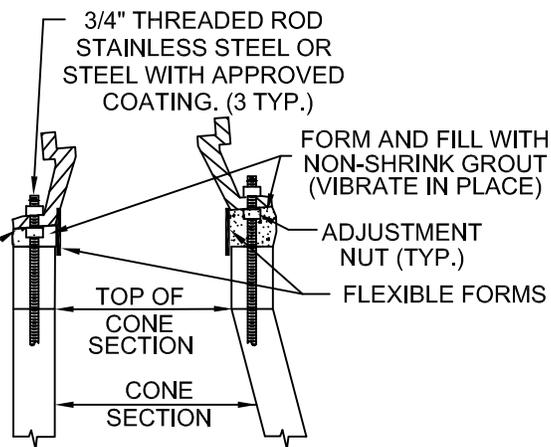
NOTE:

APPROVED WATER SEALANT  
REQUIRED AT ALL JOINTS.



INSTALLATION DETAIL  
FOR ALL FRAMES AND COVERS

APPLY CONCRETE BONDING  
AGENT TO BOTTOM OF FRAME



INSTALLATION DETAIL  
FOR SLOPE ADJUSTMENT

WATERTIGHT MANHOLE FRAME MODEL #1045Z  
BY EAST JORDAN IRON WORKS, INC.



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

30 WEST BACK STREET, NUMBER 4  
FINCASTLE, VA 24090  
Ph: 540-473-8316  
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**CONSTRUCTION STANDARDS**

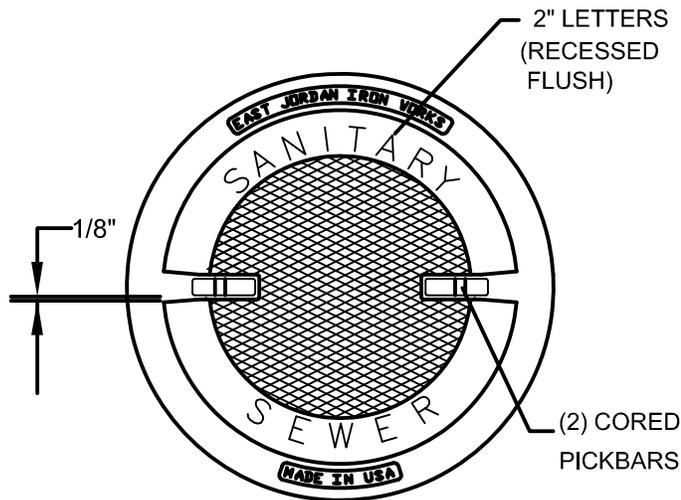
**WATERTIGHT  
MANHOLE FRAME**

DATE:  
MARCH 2005

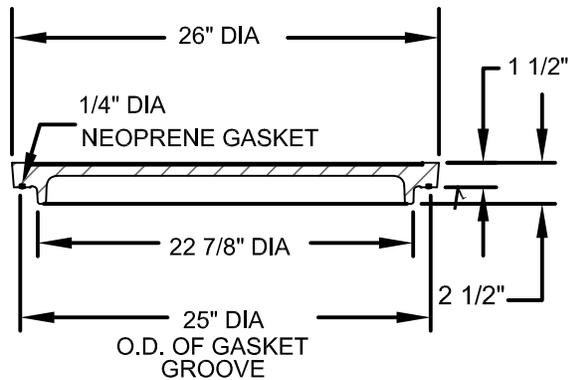
REVISIONS

BC #

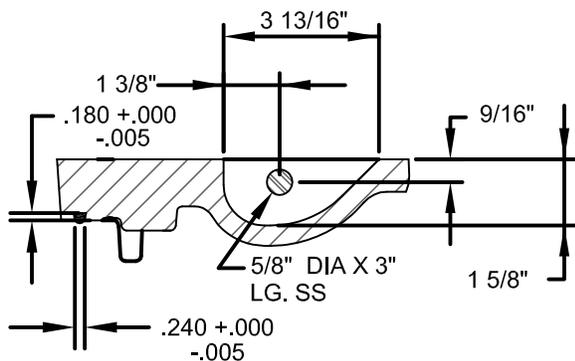
SS-05



TOP VIEW STANDARD & BOLT DOWN COVER



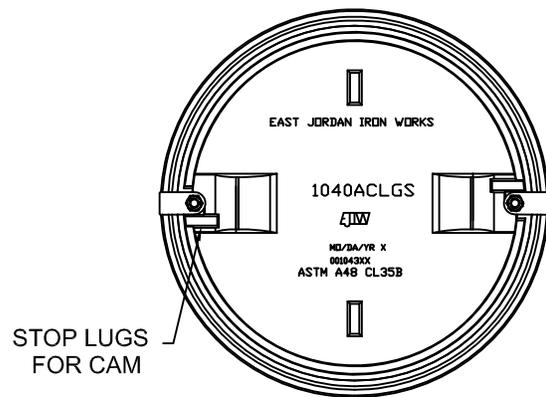
SECTION



GASKETGROOVE & PICKBAR DETAIL

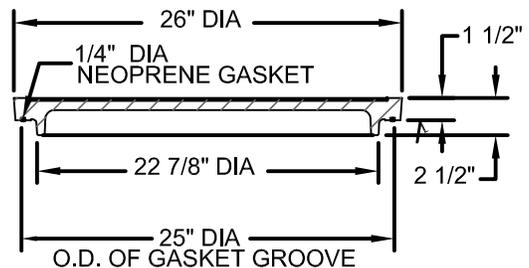
STANDARD MANHOLE COVER MODEL #1040AGS  
BY EAST JORDAN IRON WORKS, INC OR EQUIVALENT.

**STANDARD MANHOLE COVER**

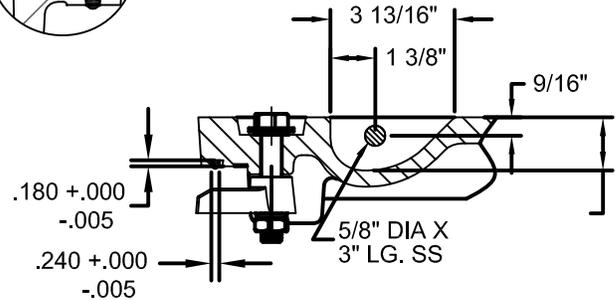
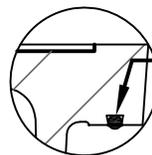


BOTTOM VIEW OF COVER

√ MACHINED SURFACE



SECTION



GASKET GROOVE & PICKBAR DETAIL

1. BOLT-DOWN MANHOLE COVER MODEL #1040ACLGS BY EAST JORDAN IRON WORKS, INC OR EQUIVALENT.
2. BOLT-DOWN MANHOLE COVERS TO BE USED IN AREAS SUBJECT TO FLOODING, SUCH AS ALONG STREAM OR CREEK BANKS, OR AS DIRECTED BY BOTETOURT COUNTY.

**BOLT-DOWN MANHOLE COVER**



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

30 WEST BACK STREET, NUMBER 4  
FINCASTLE, VA 24090  
Ph: 540-473-8316  
Fx: 540-473-8360

**CONSTRUCTION STANDARDS**

**WATERTIGHT  
MANHOLE COVER**

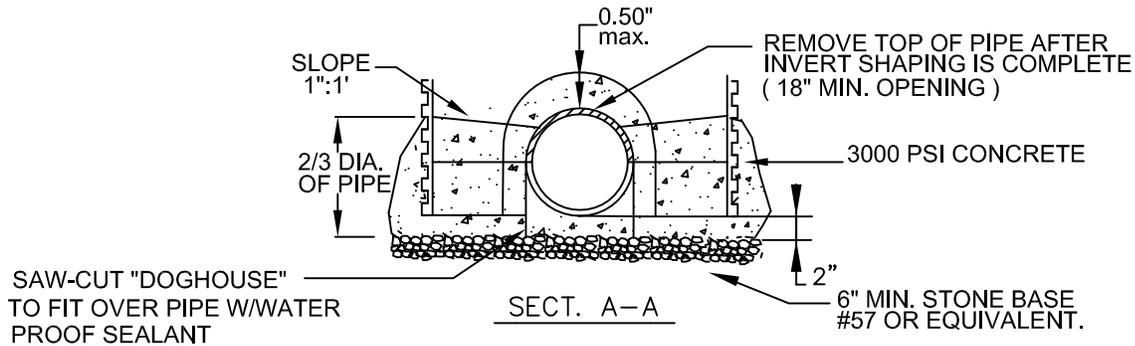
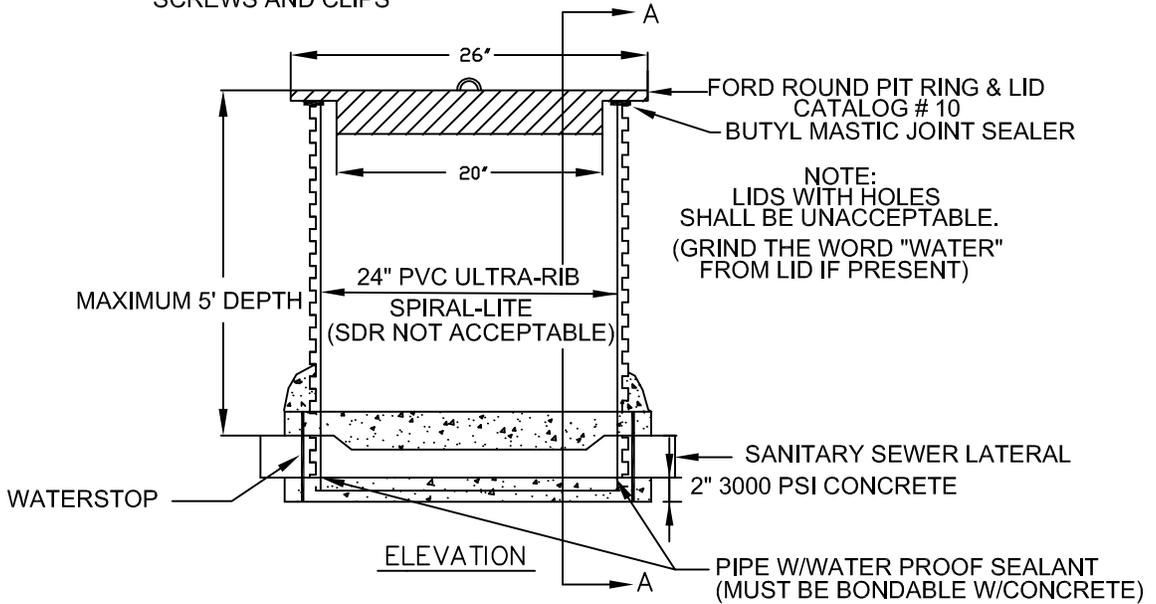
DATE:  
MARCH 2005

REVISIONS

BC #

SS-06

NOTE:  
LID SHALL BE SECURELY FASTENED  
TO PIPE BY STAINLESS STEEL  
SCREWS AND CLIPS



NOTES:

1. NOT ACCEPTABLE FOR USE IN TRAFFIC AREAS OR AREAS SUBJECT TO FLOODING.
2. VACUUM OR EXFILTRATION TESTING SHALL BE USED. VACUUM TESTING SHALL MEET THE SAME STANDARD FOR CONCRETE MANHOLES. EXFILTRATION TESTING SHALL HAVE NO LEAKAGE WITHIN 1 HOUR.
3. "AquaBlok" WASTEWATER ACCESS CHAMBERS MAY BE SUBSTITUTED. TRAFFIC BEARING BOXES WILL BE REQUIRED IF INSTALLED IN TRAFFIC AREAS. TESTING OF "AquaBlok" SHALL BE BY APPLICABLE PLUMBING CODE FOR SEWER LATERALS.
4. 2' DIA. CONCRETE WELL CASING 3000 PSI MAY BE SUBSTITUTED FOR ULTRA-RIB PIPE. ANY VERT. JOINTS IN THE CASING PIPE MUST BE BY BELL & SPIGOT CONNECTION WITH MASTIC.



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

30 WEST BACK STREET, NUMBER 4  
FINCASTLE, VA 24090  
Ph: 540-473-8316  
Fx: 540-473-8360

**CONSTRUCTION STANDARDS**

**COMMERCIAL SAMPLING  
STRUCTURE (COUNTY  
APPROVAL REQUIRED)**

DATE:  
MARCH 2005

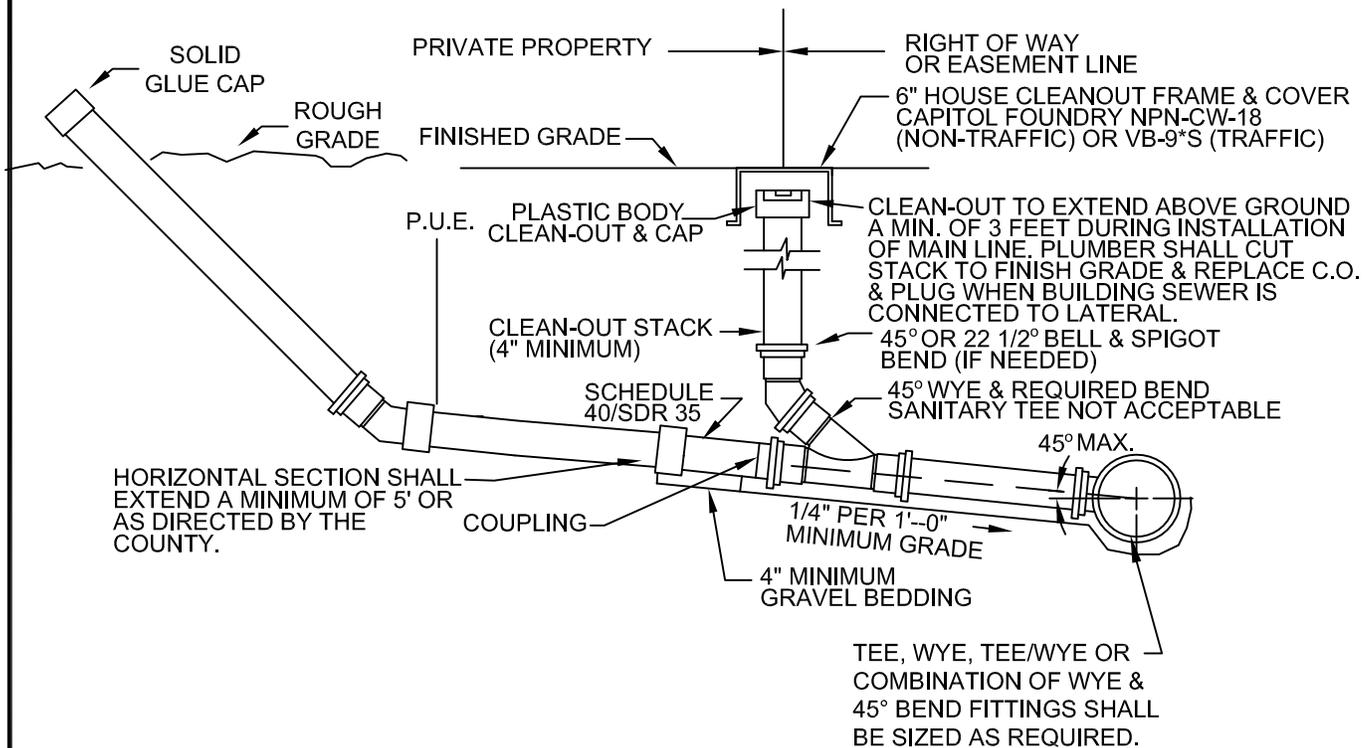
REVISIONS

BC #

SS-07

**GENERAL NOTES:**

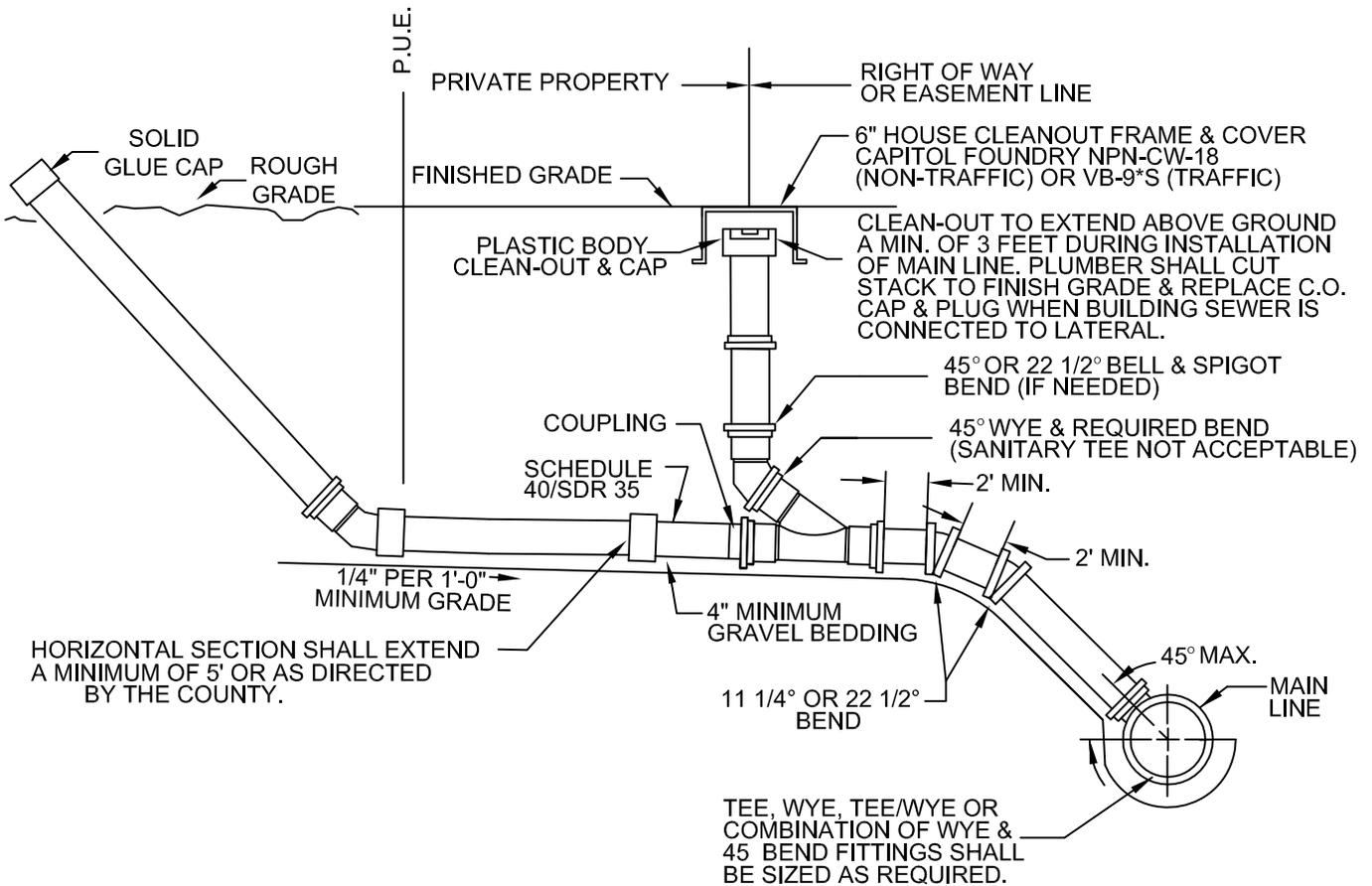
1. TRAFFIC BEARING BOX REQUIRED IN TRAFFIC AREAS.
2. ALL PIPE AND FITTINGS SHALL BE OF SIMILAR MATERIAL.
3. ALL PIPE SHALL BE OF SAME SIZE.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEANOUT STACK WYE. (EXCEPT AS NOTED)
5. ALL MAIN LINE TAPS ON ACTIVE MAINS WILL BE PERFORMED BY CONTRACTOR AND INSPECTED BY BOTETOURT COUNTY.
6. PIPING BEHIND CLEANOUT TO BE INSTALLED PER BOCA CODE.
7. MINIMUM LATERAL SIZE:  
 4" FOR RESIDENTIAL SERVICE  
 6" FOR NON-RESIDENTIAL SERVICE
8. MINIMUM COVER FOR ALL SEWER LATERALS SHALL BE THREE(3') FEET.
9. PROPERTY OWNER RESPONSIBLE FOR INSTALLING CLEANOUT ON PROPERTY LINE WHEN MAINTENANCE OCCURS.



	<b>BOTETOURT COUNTY</b> PUBLIC FACILITIES & PROGRAMS 30 WEST BACK STREET, NUMBER 4 FINCASTLE, VA 24090 Ph: 540-473-8316 Fx: 540-473-8360	<b>CONSTRUCTION STANDARDS</b>		DATE: MARCH 2005	BC #  SS-08
		<b>SANITARY SEWER LATERAL</b>		REVISIONS	

**GENERAL NOTES:**

1. TRAFFIC BEARING BOX REQUIRED IN TRAFFIC AREA.
2. ALL PIPE AND FITTINGS SHALL BE OF SIMILAR MATERIAL.
3. ALL PIPE SHALL BE OF SAME SIZE.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEAN-OUT STACK WYE (EXCEPT AS NOTED.)
5. ALL MAIN LINE TAPS ON ACTIVE MAINS WILL BE PERFORMED BY CONTRACTOR AND INSPECTED BY THE COUNTY.
6. PIPING BEHIND CLEANOUT TO BE INSTALLED PER BOCA CODE.
7. MINIMUM LATERAL SIZE:  
 4" FOR RESIDENTIAL SERVICE  
 6" FOR NON-RESIDENTIAL SERVICE
8. PROPERTY OWNER RESPONSIBLE FOR INSTALLING CLEANOUT ON PROPERTY LINE WHEN MAINTENANCE OCCURS.



**BOTETOURT COUNTY**  
 PUBLIC FACILITIES & PROGRAMS  
 30 WEST BACK STREET, NUMBER 4  
 FINCASTLE, VA 24090  
 Ph: 540-473-8316  
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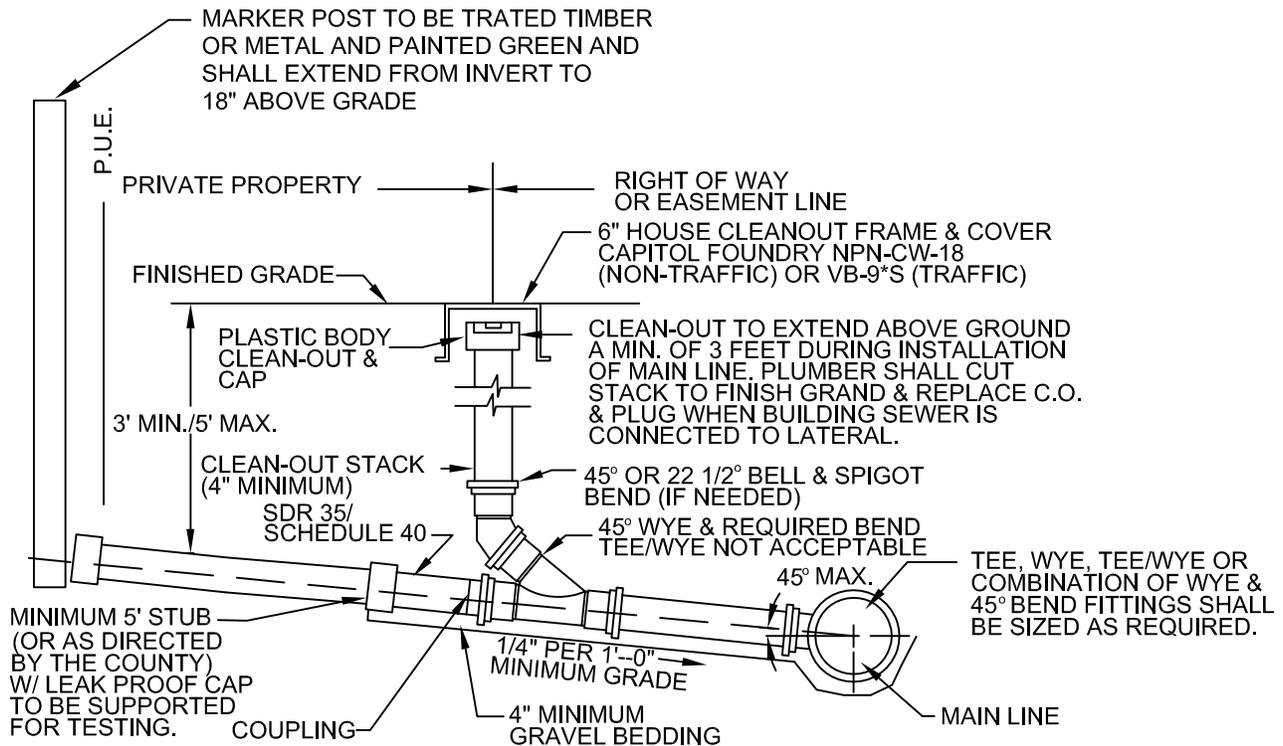
**CONSTRUCTION STANDARDS**  
**SANITARY SEWER LATERAL**  
**FOR DEEP SEWERS**

DATE:	MARCH 2005
REVISIONS	

**BC #**  
**SS-09**

**GENERAL NOTES:**

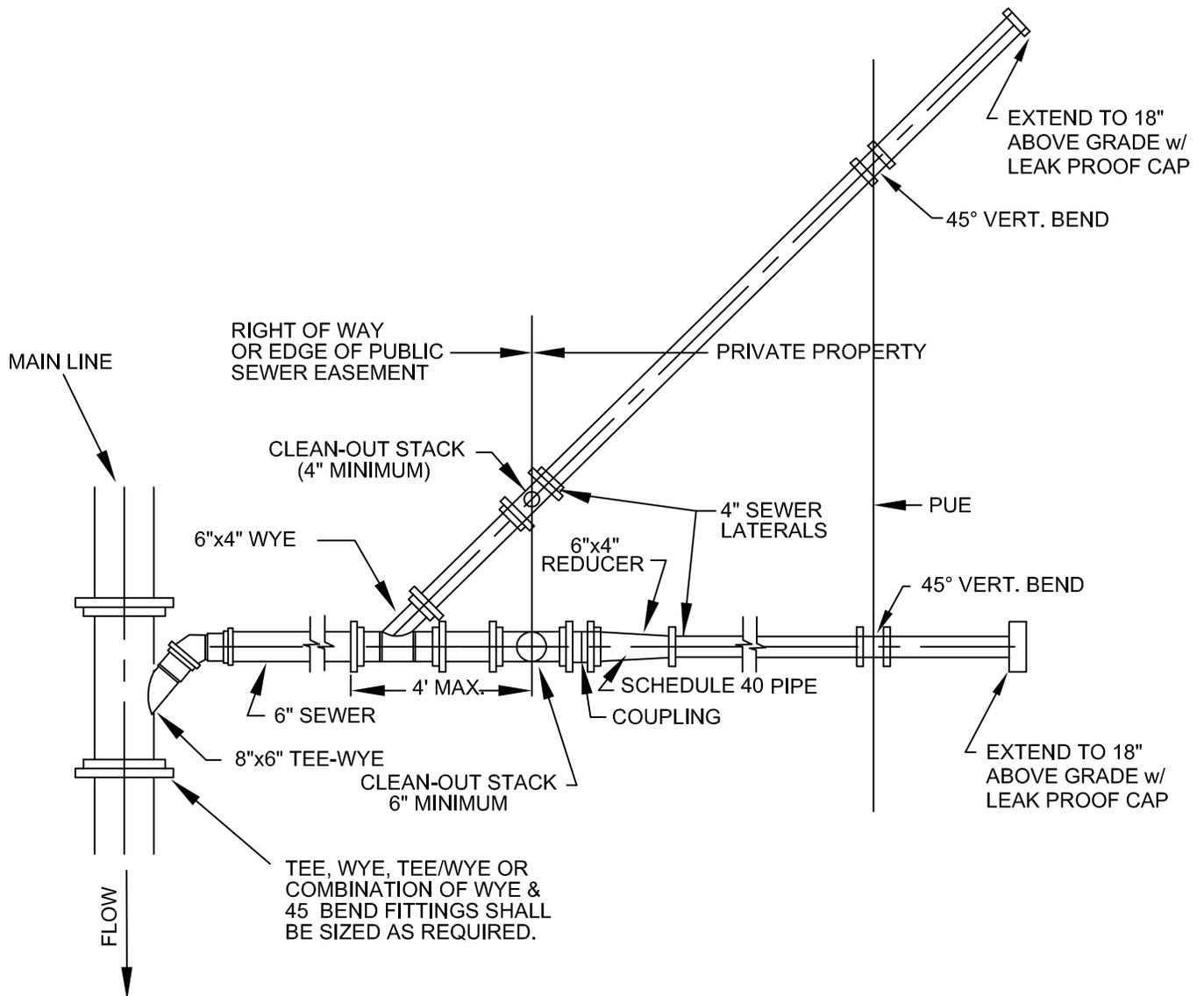
1. THIS CONFIGURATION MAY ONLY BE USED IN SPECIAL CASES WHEN SPECIFICALLY DESIGNED BY THE PROJECT ENGINEER AND INDICATED ON SITE PLANS.
2. ALL PIPE AND FITTINGS SHALL BE OF SAME MATERIAL.
3. ALL PIPE SHALL BE OF SAME SIZE.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEAN OUT STACK WYE (EXCEPT AS NOTED)
5. ALL MAIN LINE TAPS ON ACTIVE MAINS SHALL BE PERFORMED BY CONTRACTOR AND INSPECTED BY BOTETOURT COUNTY.
6. PIPING BEHIND CLEANOUT TO BE INSTALLED PER BOCA CODE.
7. MINIMUM LATERAL SIZE:  
 4" FOR RESIDENTIAL SERVICE  
 6" FOR NON-RESIDENTIAL SERVICE
8. MINIMUM COVER FOR ALL SEWER LATERALS SHALL BE THREE (3') FEET.
9. PROPERTY OWNER RESPONSIBLE FOR INSTALLING CLEANOUT ON PROPERTY LINE WHEN MAINTENANCE OCCURS.



	<b>BOTETOURT COUNTY</b> PUBLIC FACILITIES & PROGRAMS 30 WEST BACK STREET, NUMBER 4 FINCASTLE, VA 24090 Ph: 540-473-8316 Fx: 540-473-8360	<b>CONSTRUCTION STANDARDS</b> <b>SANITARY SEWER LATERAL</b> <b>FOR SPECIAL CASES</b>	DATE: MARCH 2005 REVISIONS	BC # SS-10

GENERAL NOTES:

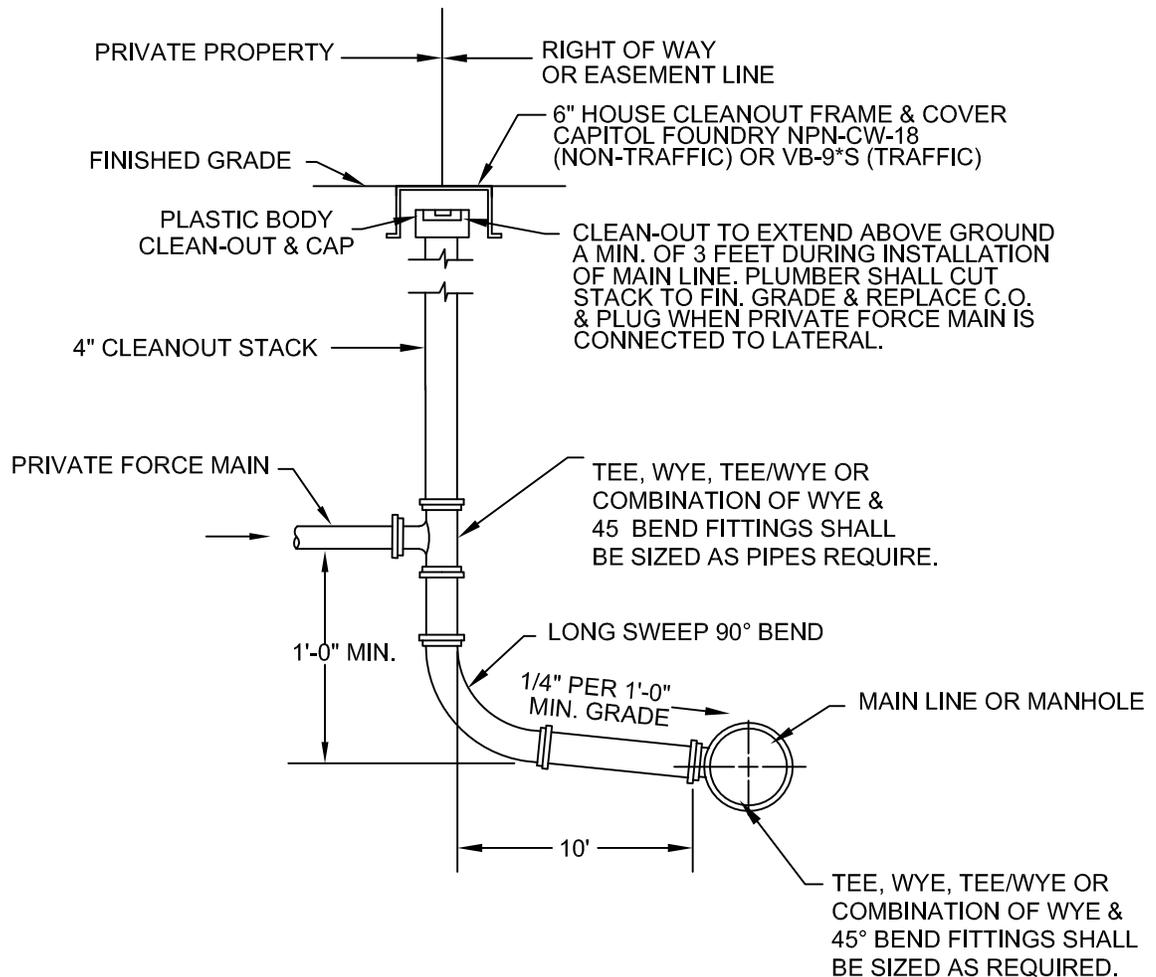
1. TRAFFIC BEARING BOX REQUIRED IN TRAFFIC AREAS.
2. ALL PIPE AND FITTINGS SHALL BE OF SIMILAR MATERIAL.
3. ALL PIPE SHALL BE OF SIZE SHOWN.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEAN-OUT STACK WYE.  
(EXCEPT AS NOTED.)
5. ALL MAIN LINE TAPS ON ACTIVE MAINS WILL BE PERFORMED BY CONTRACTOR AND INSPECTED BY THE COUNTY.
6. PIPING BEHIND CLEANOUT TO BE INSTALLED PER BOCA CODE.
7. MINIMUM COVER FOR ALL SEWER LATERALS SHALL BE THREE (3') FEET.
8. PROPERTY OWNER RESPONSIBLE FOR INSTALLING CLEANOUT ON PROPERTY LINE WHEN MAINTENANCE OCCURS.



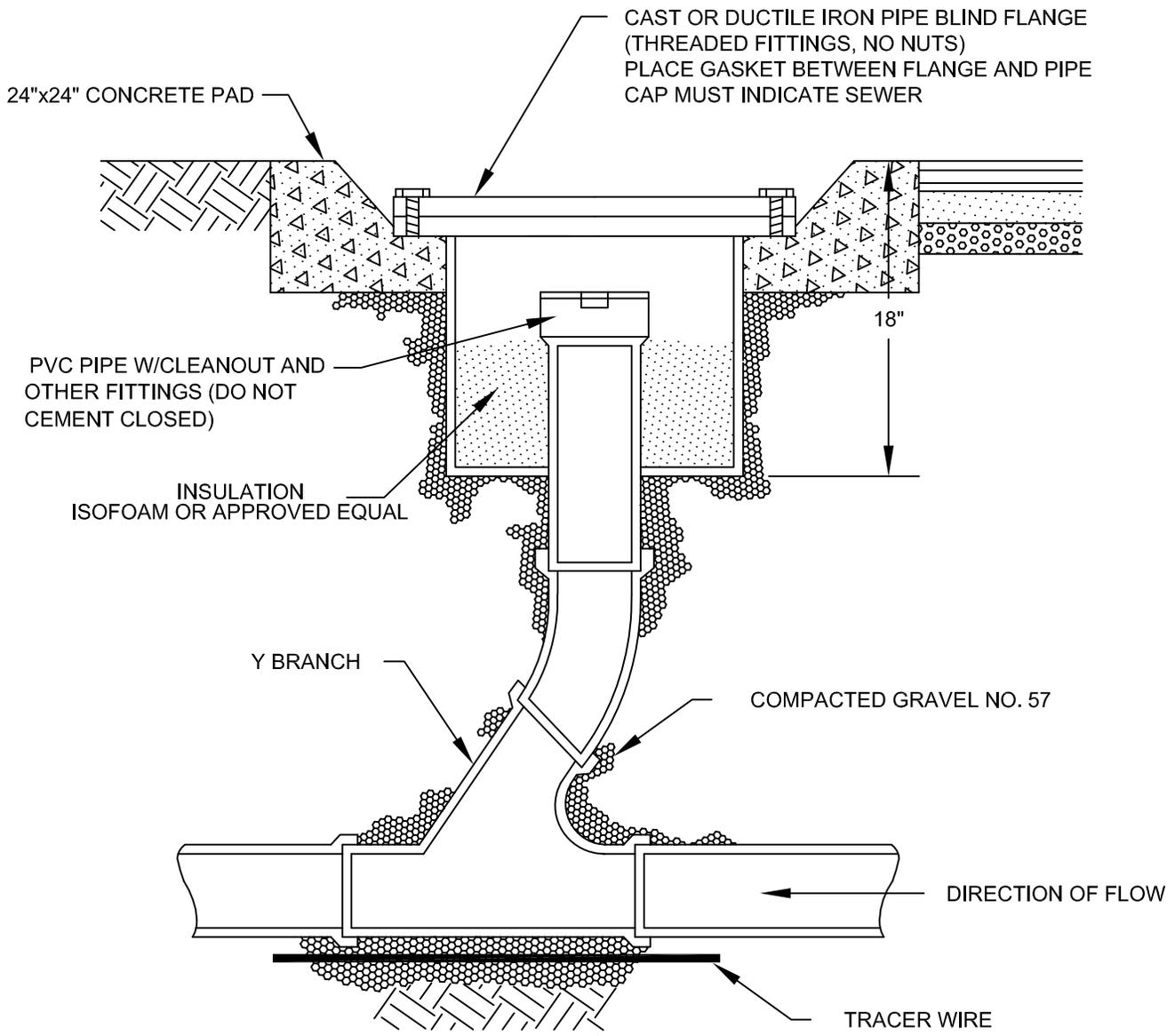
	<b>BOTETOURT COUNTY</b> PUBLIC FACILITIES & PROGRAMS	<b>CONSTRUCTION STANDARDS</b>	DATE: MARCH 2005	BC #  SS-11
	30 WEST BACK STREET, NUMBER 4 FINCASTLE, VA 24090 Ph: 540-473-8316 Fx: 540-473-8360	<b>COMBINED 6" BY          TWO 4" SANITARY          SEWER LATERALS</b>	REVISIONS	

**GENERAL NOTES:**

1. TRAFFIC BEARING BOX REQUIRED IN TRAFFIC AREAS.
2. ALL PIPE AND FITTINGS SHALL BE OF SIMILAR MATERIAL
3. ALL PIPE SHALL BE OF SAME SIZE.
4. NO BENDS ARE ALLOWED IN THE LATERAL FROM THE MAIN TO THE CLEAN-OUT STACK WYE (EXCEPT AS NOTED.)
5. ALL MAIN LINE TAPS ON ACTIVE MAINS WILL BE PERFORMED BY THE CONTRACTOR AND INSPECTED BY BOTETOURT COUNTY.
6. MINIMUM COVER FOR ALL SEWER LATERAL SHALL BE THREE (3') FEET.
7. GRAVITY SECTION AND CLEANOUT SHALL BE 6" DIAMETER FOR PUBLIC FORCE MAINS AND 4" DIAMETER FOR PRIVATE FORCE MAINS.
8. PUBLIC FORCE MAINS SHALL CONNECT TO SEWER MANHOLES.
9. PROPERTY OWNER RESPONSIBLE FOR INSTALLING CLEANOUT ON PROPERTY LINE WHEN MAINTENANCE OCCURS.



	<b>BOTETOURT COUNTY</b> PUBLIC FACILITIES & PROGRAMS	<b>CONSTRUCTION STANDARDS</b>	DATE: MARCH 2005	BC #  SS-12
	30 WEST BACK STREET, NUMBER 4 FINCASTLE, VA 24090 Ph: 540-473-8316 Fx: 540-473-8360	<b>PRIVATE FORCE MAIN TO GRAVITY LATERAL CONNECTION</b>	REVISIONS	



PVC PIPE TO BE OF AWWA C-909, SDR-21, CLASS 100 SPECIFICATION



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS  
30 WEST BACK STREET, NUMBER 4  
FINCASTLE, VA 24090  
Ph: 540-473-8316  
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**CONSTRUCTION STANDARDS**

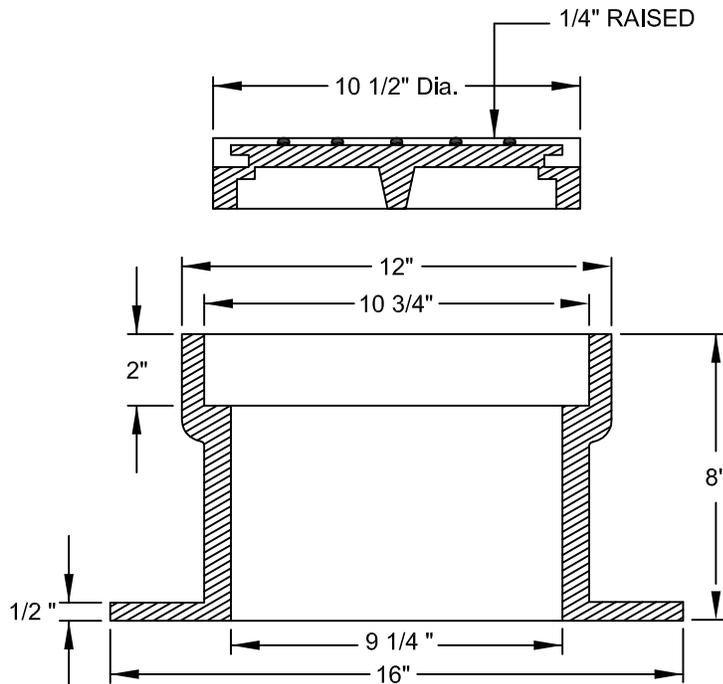
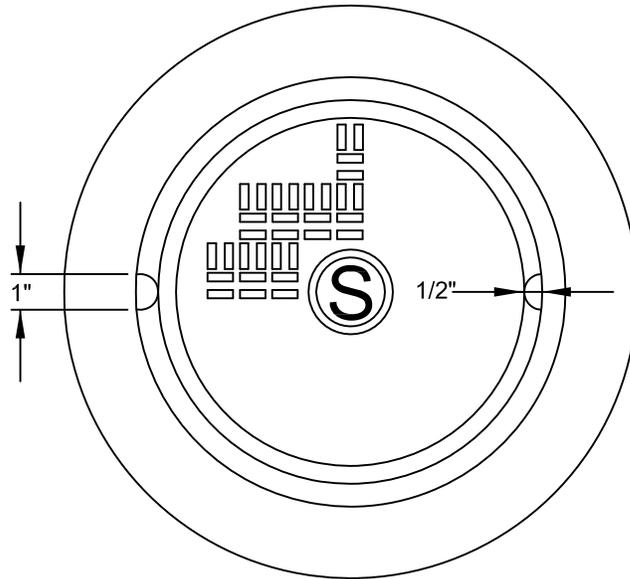
**PVC FORCE MAIN  
CLEANOUT**

DATE:  
MARCH 2005  
REVISIONS


BC #  
SS-13

NOTES:

1. A MINIMUM CLEARANCE OF 4 INCHES IS REQUIRED BETWEEN CLEANOUT CAP AND TOP OF COVER.
2. CAPITOL FOUNDRY FRAME AND COVER ITEM # VB-9\*S



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

30 WEST BACK STREET, NUMBER 4  
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**CONSTRUCTION STANDARDS**

**TRAFFIC BEARING  
CLEANOUT BOX**

DATE:  
MARCH 2005

REVISIONS

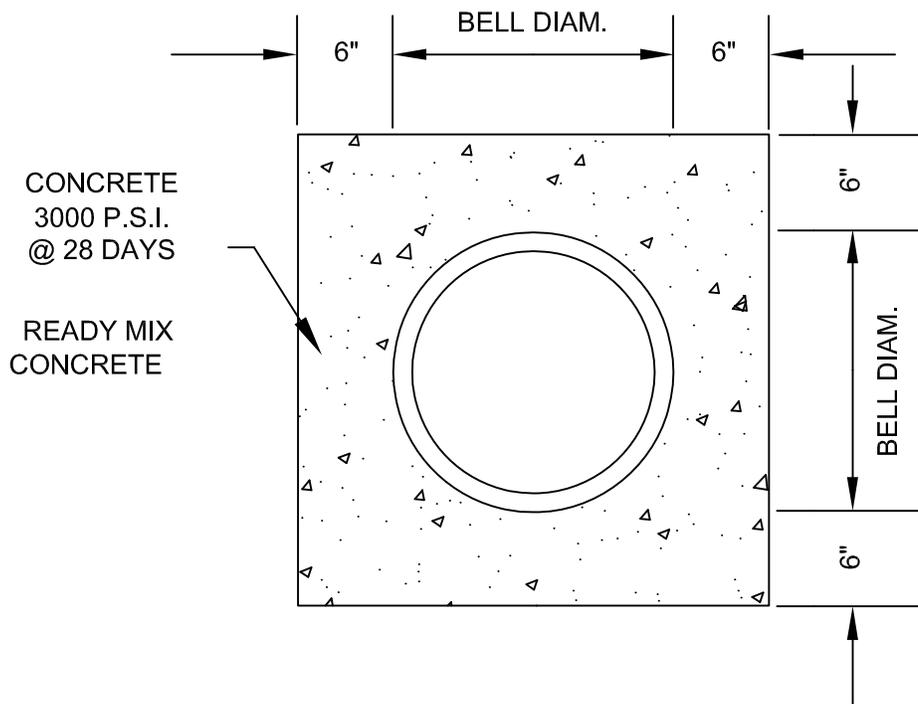
REVISIONS

BC #

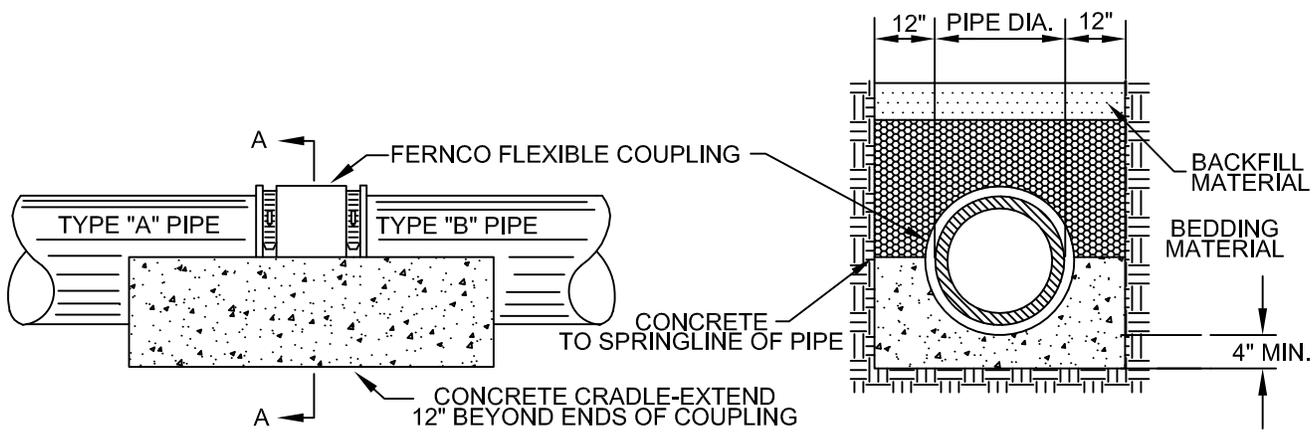
SS-14

NOTES:

1. When water line is located below a sewer line, the sewer line to be encased along its length where it is within 10' of water line.
2. Sewer lines crossing streams must be concrete encased.



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		<b>CONCRETE ENCASED SEWER PIPE</b>		REVISIONS	



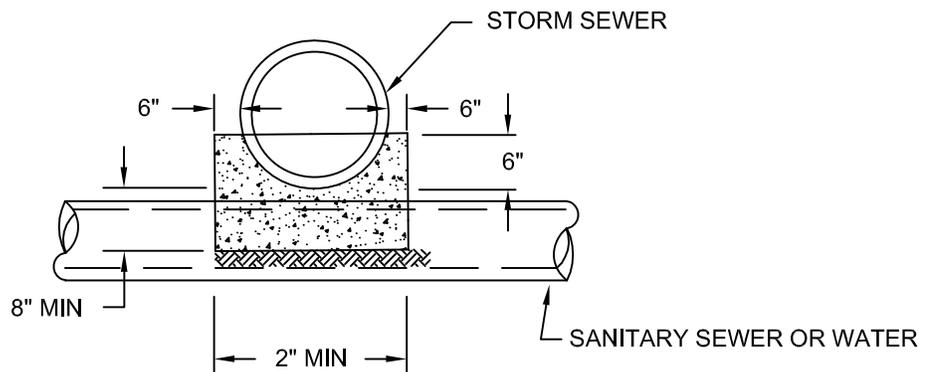
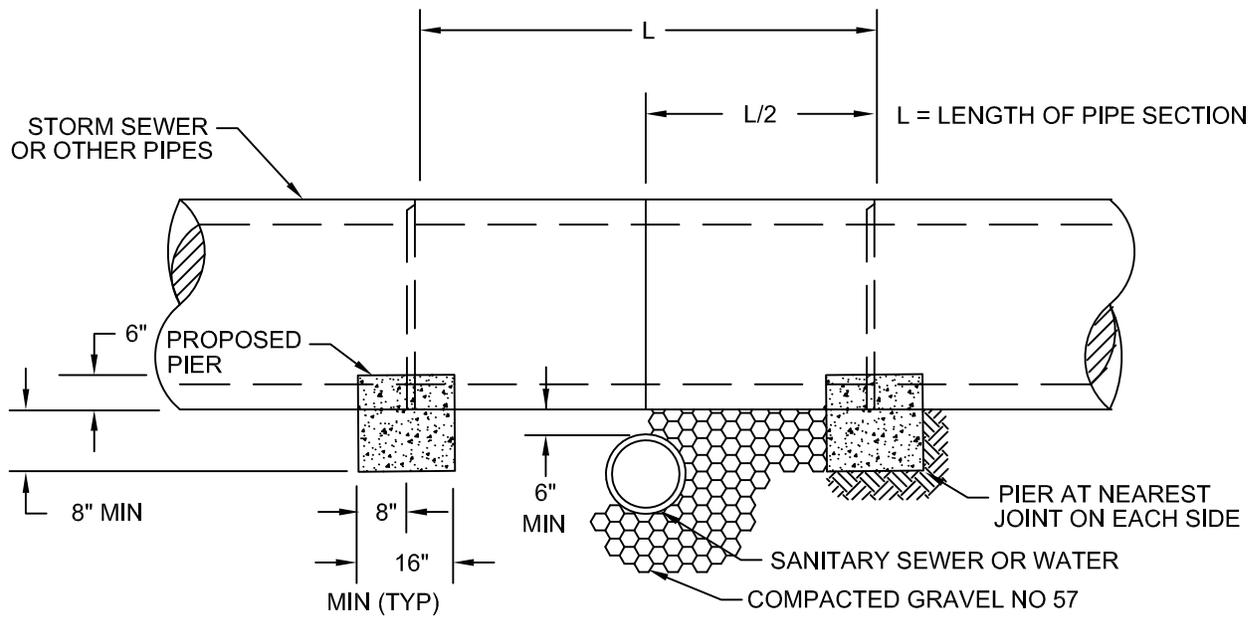
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 Fx: 540-473-8360

**CONSTRUCTION STANDARDS**

**JOINING DISSIMILAR PIPE  
 (SPECIAL CONDITIONS  
 APPROVED BY COUNTY)**

DATE:	MARCH 2005
REVISIONS	

BC #  
 SS-16



**NOTE:**

1. PIER REQUIRED WHEN STORM DRAIN OR OTHER PIPES CROSS OVER THE OTHER UTILITY WITH A VERTICAL CLEARANCE OF LESS THAN 18".
2. PIER TO BE BUILT ON UNDISTURBED EARTH.
3. CONCRETE TO BE READY MIX, CLASS A3.



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**CONSTRUCTION STANDARDS**

**CONCRETE PIER**

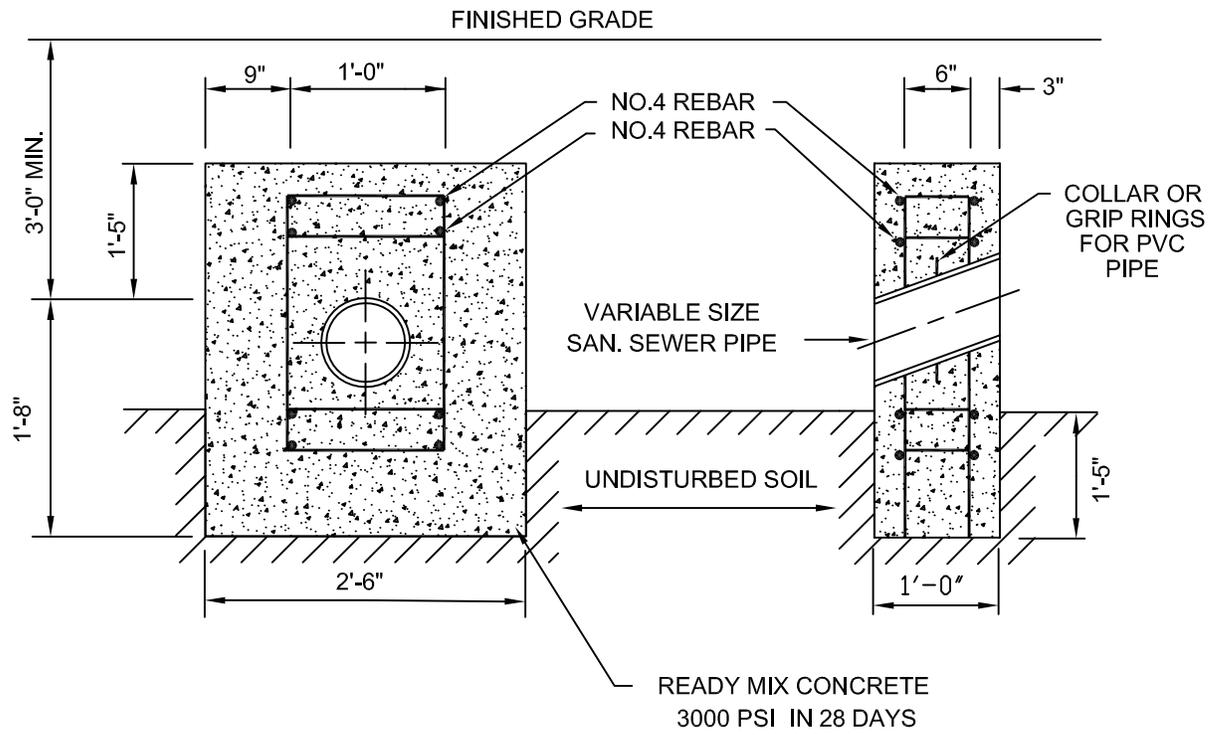
DATE:  
MARCH 2005

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NO.	DATE	DESCRIPTION

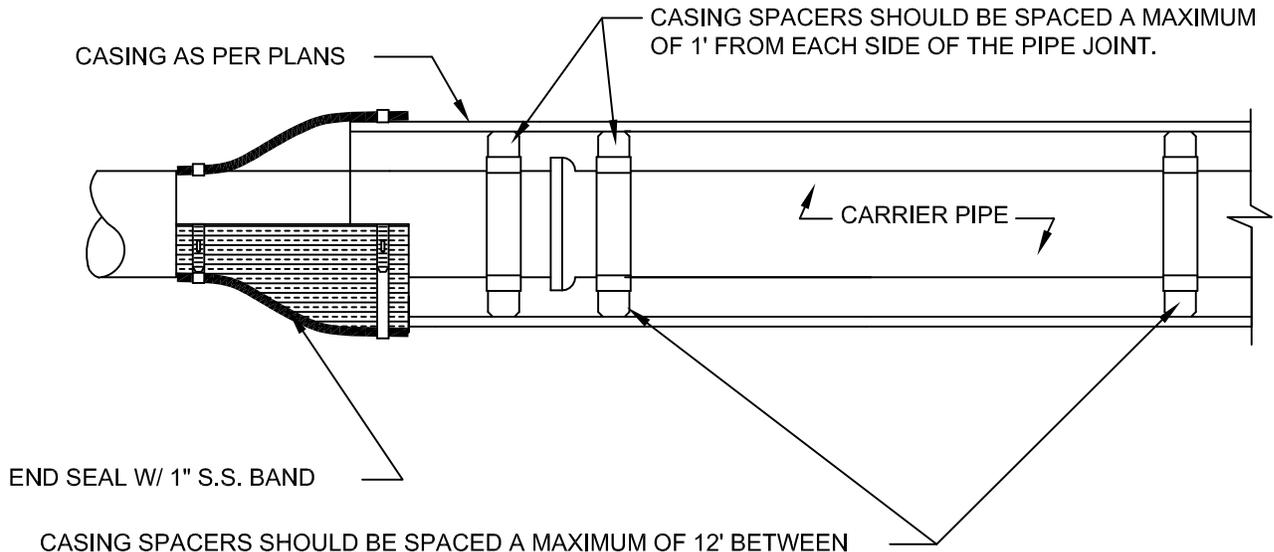
BC #

SS-17

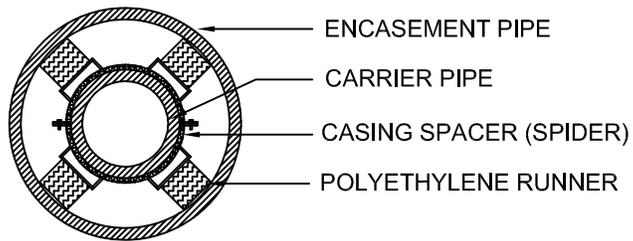


- GRADES 20% TO 35% -- 36 FT ON CENTER
- \* GRADES 35% TO 50% -- 24 FT ON CENTER
- \* GRADES 50% TO 60% -- 16 FT ON CENTER

\* WITH WRITTEN APPROVAL OF ENGINEERING/UTILITY DEPARTMENT

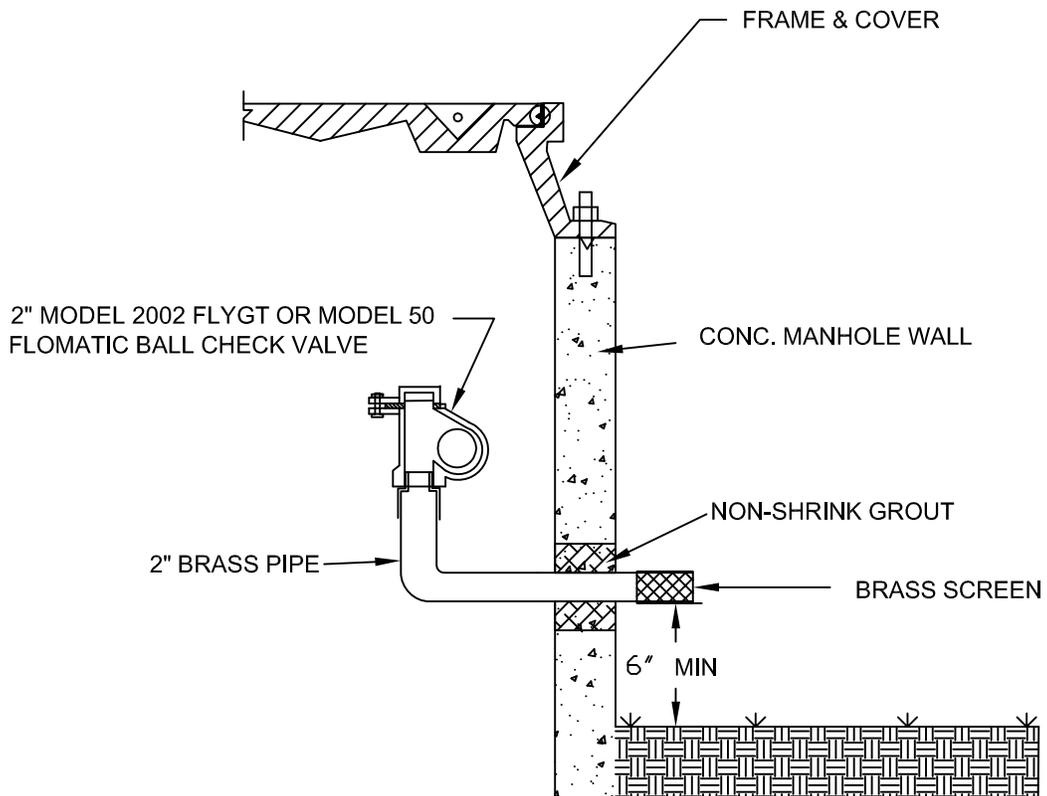


CASING SPACERS SHOULD BE SPACED A MAXIMUM OF 12' BETWEEN CASING SPACERS OR AS RECOMMENDED BY MANUFACTURER.  
 MAXIMUM TOTAL FREE PLAY BETWEEN OUTSIDE OF SPACERS AND INSIDE OF CASING PIPE SHALL BE 1 INCH.

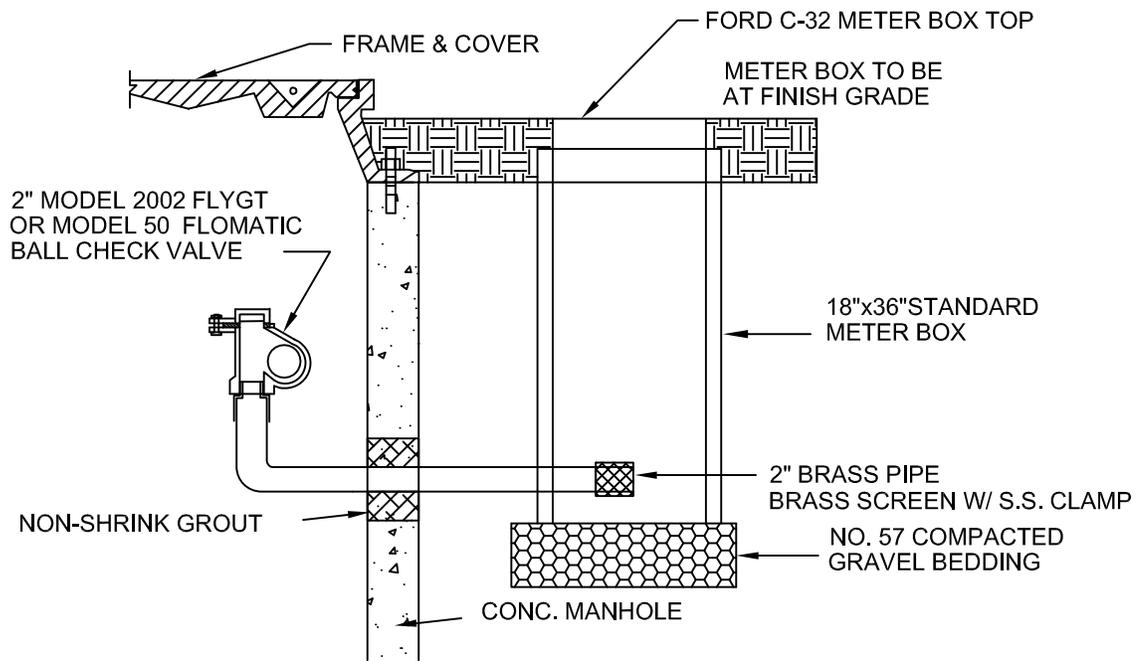


NOTE: A 1" DRAIN WILL BE REQUIRED ON THE LOWER END OF THE CASING IF THE CASING ENDS ARE SEALED WITH MORTAR AND BRICK.

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		<b>ROAD CROSSING DETAIL PIPE SUPPORT IN CASING PIPE</b>		REVISIONS	



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		<b>TYPE 1 MANHOLE VENT OUT OF RIGHT-OF-WAY</b>		REVISIONS	



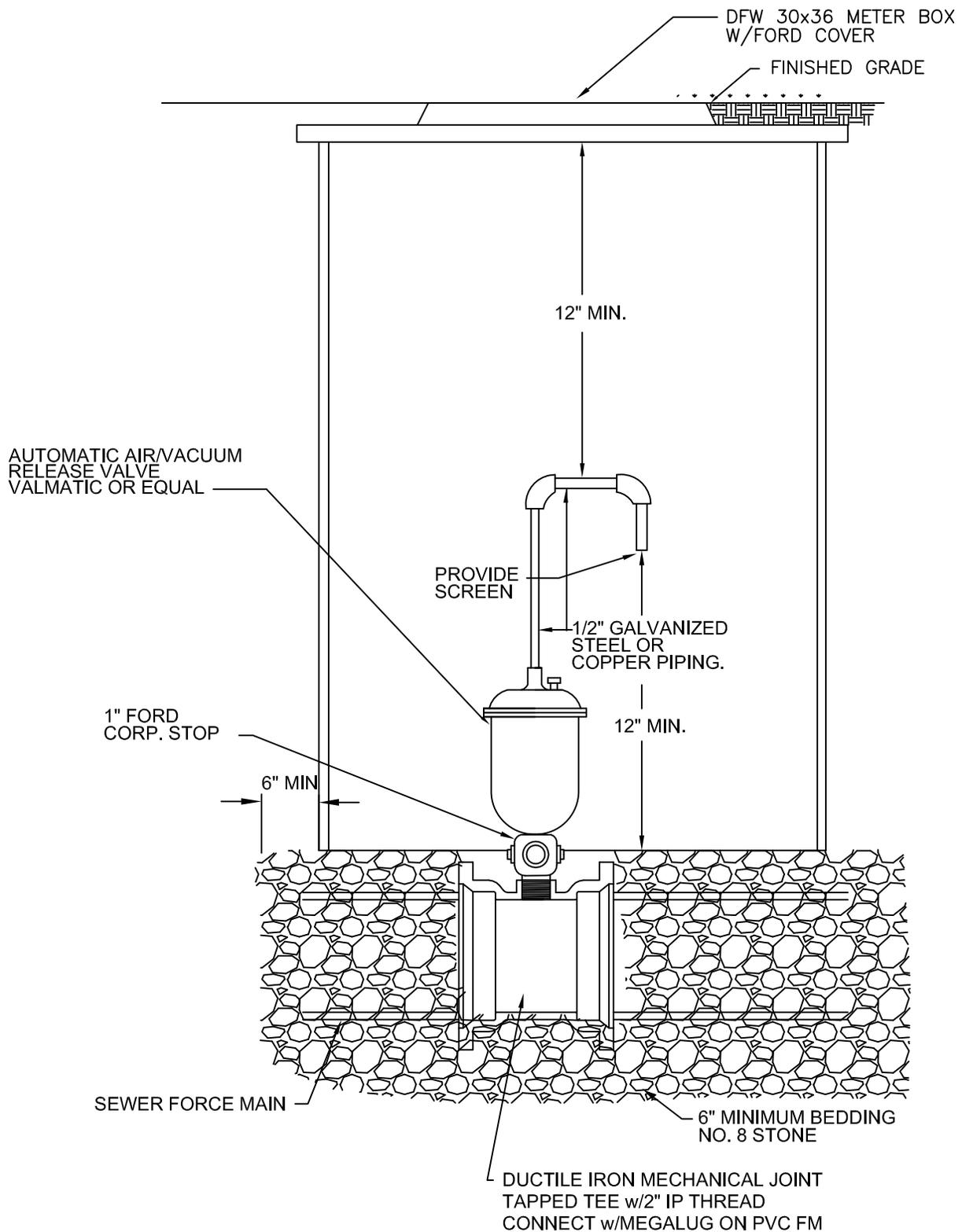
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**CONSTRUCTION STANDARDS**

**TYPE 2  
 MANHOLE VENT**

DATE: MARCH 2005
REVISIONS

BC #  
 SS-21



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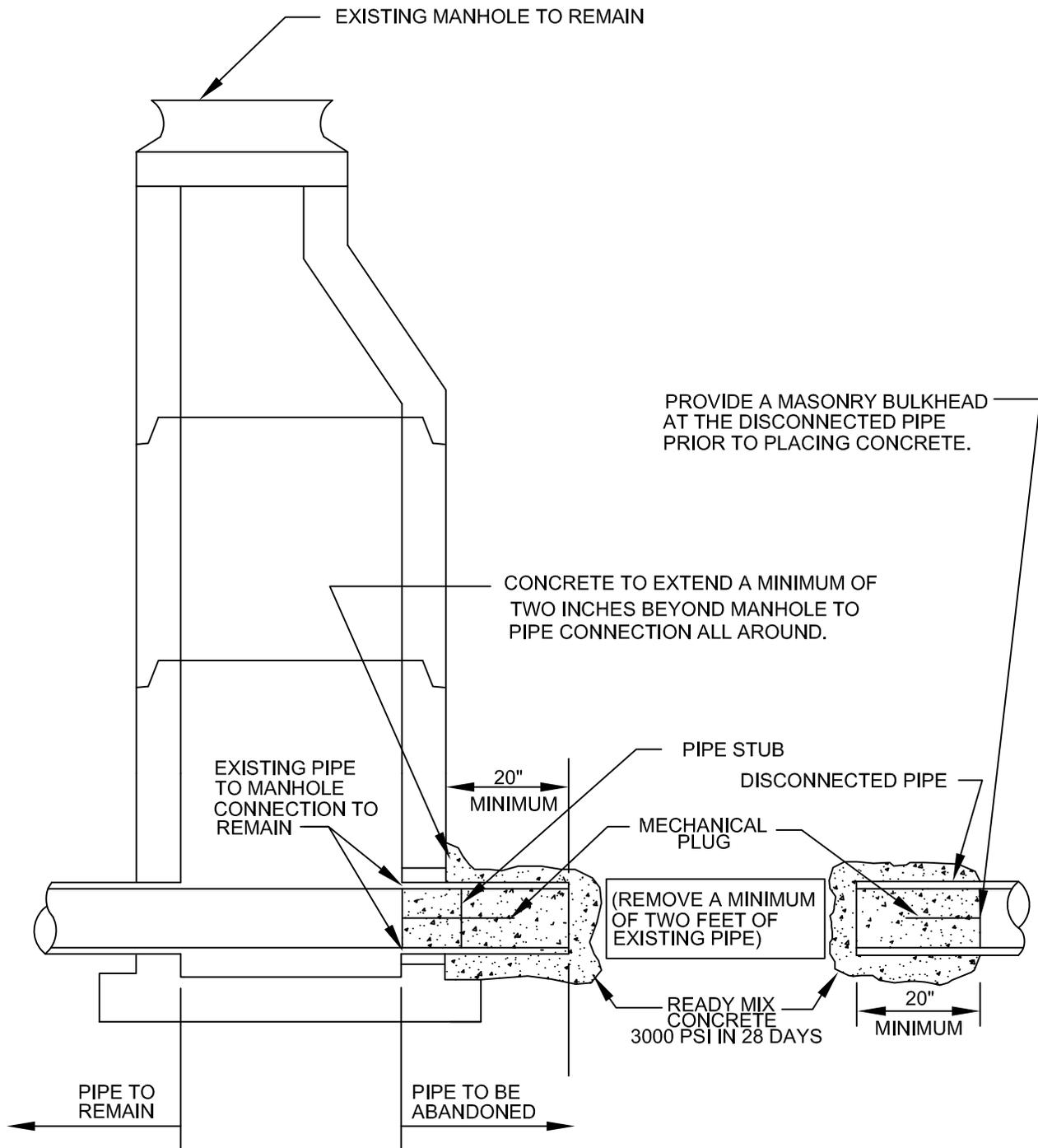
**CONSTRUCTION STANDARDS**

**AUTOMATIC AIR/VACUUM  
RELEASE ASSEMBLY  
FOR USE ON FORCE MAIN**

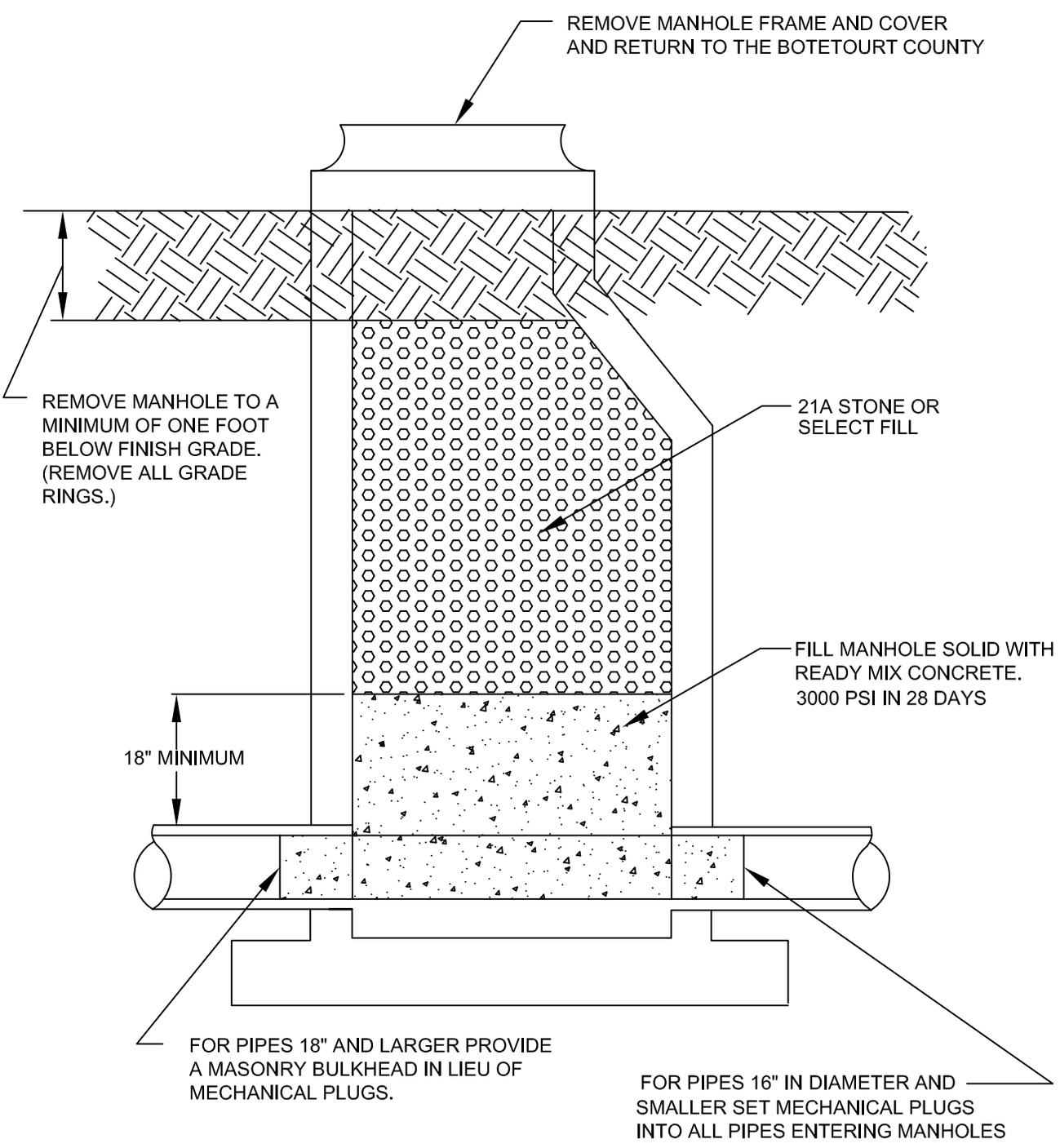
DATE:  
MARCH 2005

REVISIONS


BC #  
SS-22



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		<b>SANITARY SEWER PIPE ABANDONMENT AT A MANHOLE</b>		REVISIONS	



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**CONSTRUCTION STANDARDS**  
**SANITARY SEWER**  
**MANHOLE ABANDONMENT**

DATE:	MARCH 2005
REVISIONS	

BC #  
 SS-24

## TABLE II-1 FINE AGGREGATE

Amounts Finer Than Each Laboratory Sieve (Square Openings *), Percentage by Weight							
Grading	3/8	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100
A	Min. 100	97+/-3	90+/-10	67+/-18	42+/-17	17+/-	Max. 10
B	Min. 100	97+/-3					Max. 10
C		Min. 100	97+/-				Max. 25

\* In inches, except where otherwise indicated. Numbered sieves are those of the U.S. Standard Sieve Series

EQUIVALENT PSI	HEIGHT OF GROUND WATER ABOVE PIPE INV. (Ft.)
0.43	1
0.87	2
1.30	3
1.73	4
2.17	5
2.60	6
3.03	7
3.47	8
3.90	9
4.34	10
4.77	11
4.98	11.5
For anything above 11.5 VF, allow maximum 5.0 PSI.	

**NOTES:**

1. Table based on 1.0 v.f. of water = 0.4335 PSI.
2. The appropriate PSI allowance for average vertical foot of ground water shall be added to the base starting pressure of 4.0 PSI, but in no CASE shall the resulting pressure be more than 9.0 PSI.
3. Interpolate for fractions of a foot of water.

Pipe Diameter (in.)	Min. Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specified Time for Length (L) Shown (min:sec)									
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft		
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:34	7:34	8:52	10:08	11:24	
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48		
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38		
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04		
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41		
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31		
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33		
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48		
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15		
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53		
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46		

MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

NOTES:

1. DUCTILE IRON PIPE - TEST SHALL BE IN ACCORDANCE WITH ASTM C924 AND C828.
2. PVC AND PE PIPE - TEST SHALL BE IN ACCORDANCE WITH ASTM F1417-92(2005).



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**CONSTRUCTION STANDARDS**

**MINIMUM SPECIFIED TIME  
FOR A 1.0 PSIG  
PRESSURE DROP**

DATE:  
MARCH 2005

REVISIONS


BC #  
SS-27

MINIMUM SPECIFIED TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

Pipe Diameter (in.)	Min. Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specified Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
18	8:30	133	3,846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5,235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6,837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8,653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:52	64:54
30	14:10	80	10,683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12,926 L	21:33	32:19	43:56	53:25	64:38	75:24	86:10	96:57
36	17:00	66	15,384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23

NOTES:

1. DUCTILE IRON PIPE - TEST SHALL BE IN ACCORDANCE WITH ASTM C924 AND C828.
2. PVC AND PE PIPE - TEST SHALL BE IN ACCORDANCE WITH ASTM F1417-92(2005).



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**CONSTRUCTION STANDARDS**

**MINIMUM SPECIFIED TIME FOR A 0.5 PSIG PRESSURE DROP**

DATE:  
MARCH 2005

REVISIONS

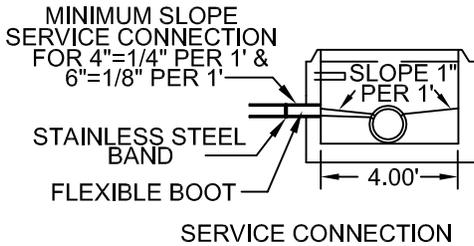
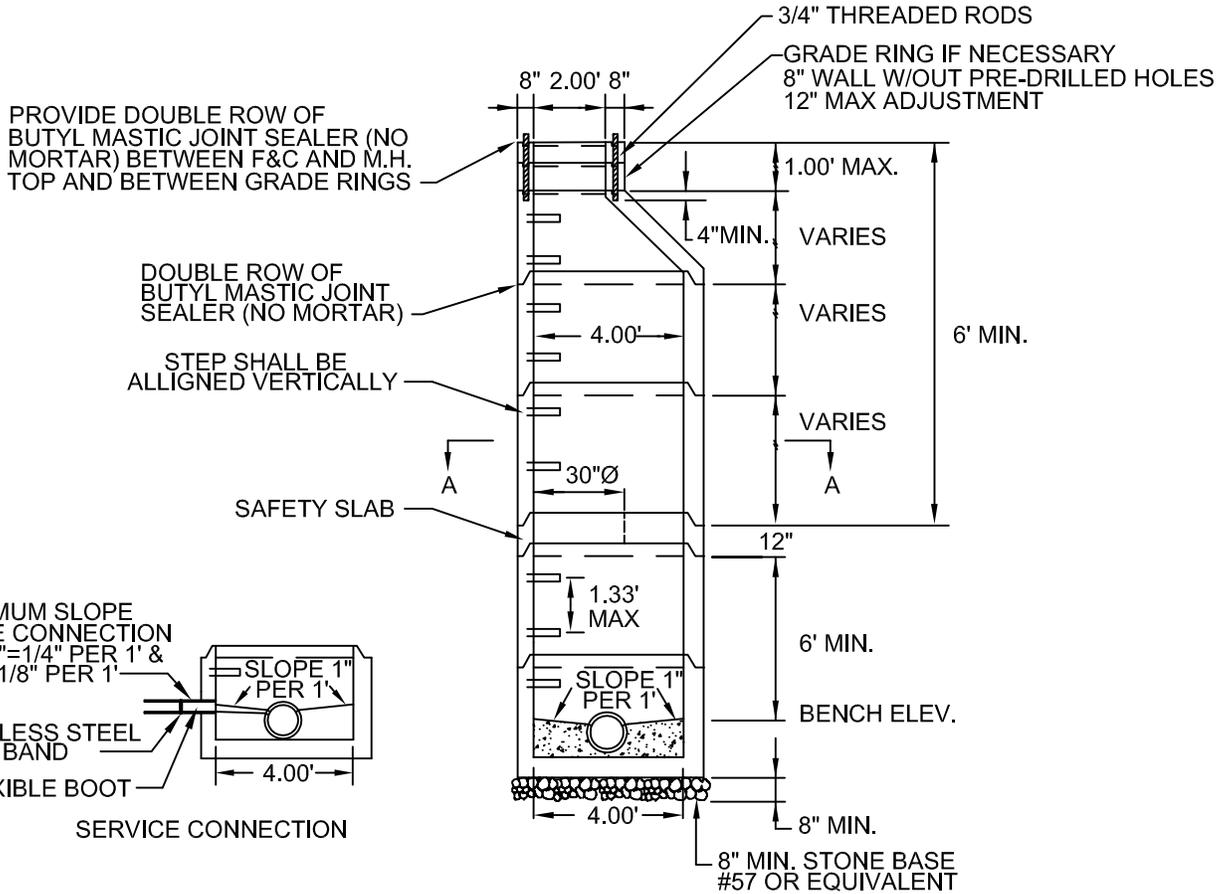
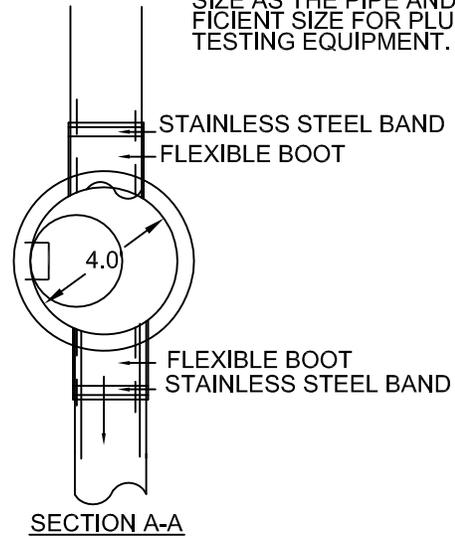

BC #

SS-28

**NOTES:**

1. ALL MANHOLE FRAMES AND COVERS SHALL BE EAST JORDAN IRON WORKS, INC. WATERTIGHT MANHOLE FRAME MODEL #1045Z, WATERTIGHT COVER MODEL #1040AGS AND BOLT-DOWN MANHOLE COVER MODEL #1040ACLS. BOLT-DOWN MODEL TO BE USED IN AREAS SUBJECTED TO FLOODING OR AS DIRECTED BY BOTETOURT COUNTY.
2. STEPS TO BE VERTICALLY ALIGNED.
3. THE FRAME AND COVER SHALL BE PROPERLY ALIGNED WITH THE 2 FOOT OPENING OF THE MANHOLE STRUCTURE AND BOLTED IN PLACE.
4. FLAT TOP MANHOLES MAY ONLY BE SUBSTITUTED WITH THE PERMISSION OF THE UTILITY DIRECTOR. WHEN USED, THE ECCENTRIC OPENING MUST LINE UP WITH THE STEPS.
5. FLEXIBLE JOINT MANHOLE CONNECTION SHALL BE AS MANUFACTURED BY PRES-SEAL GASKET CORPORATION OR EQUAL.
6. PRECAST MANHOLES SHALL BE FROM MANUFACTURER WITH A VDOT APPROVED QUALITY ASSURANCE PROGRAM.

INVERTS WILL BE THE SAME SIZE AS THE PIPE AND SUFFICIENT SIZE FOR PLUGS AND TESTING EQUIPMENT.



CONCENTRIC MANHOLE WITH PRECAST INVERT



**BOTETOURT COUNTY**  
PUBLIC FACILITIES & PROGRAMS

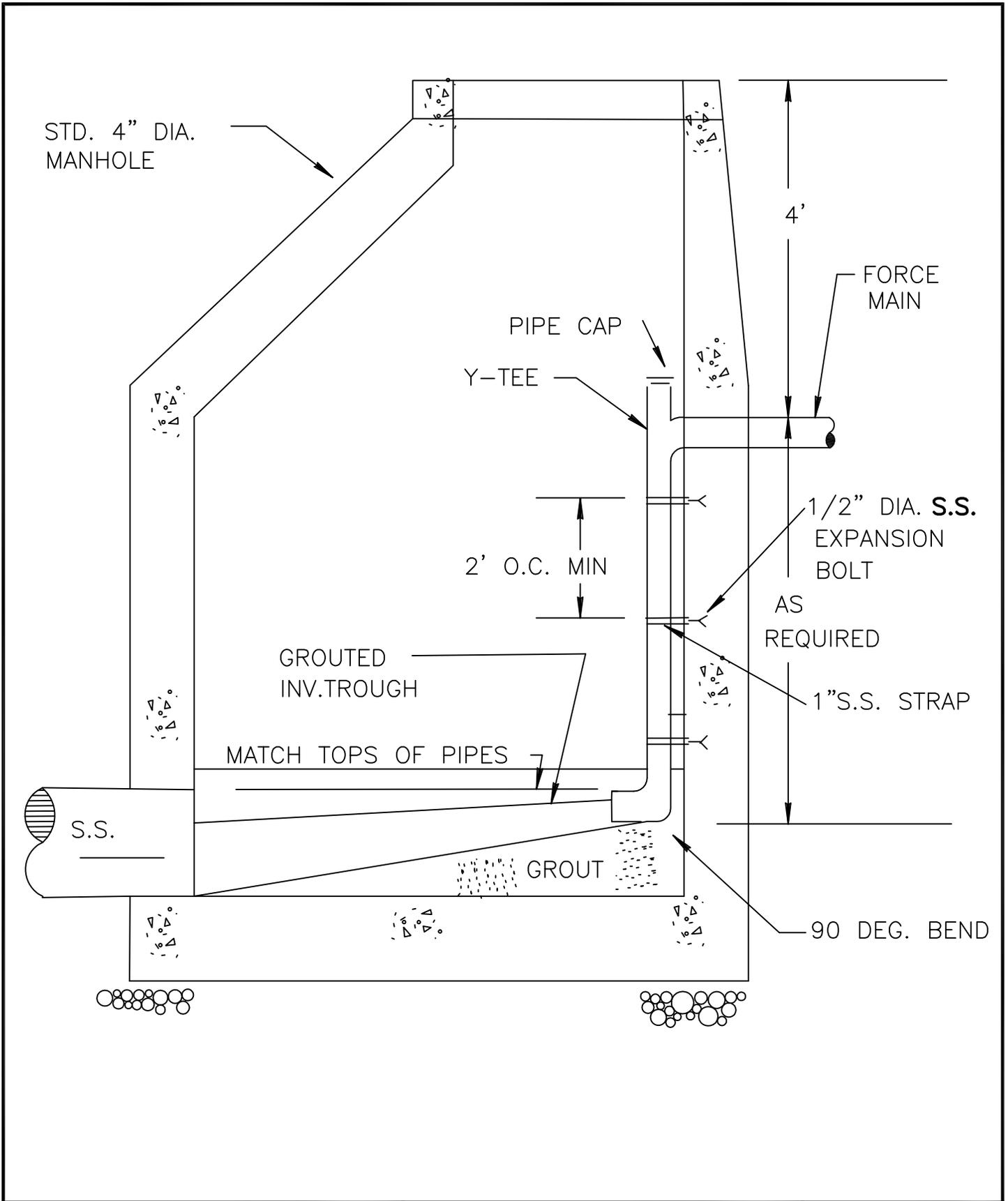
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**CONSTRUCTION STANDARDS**

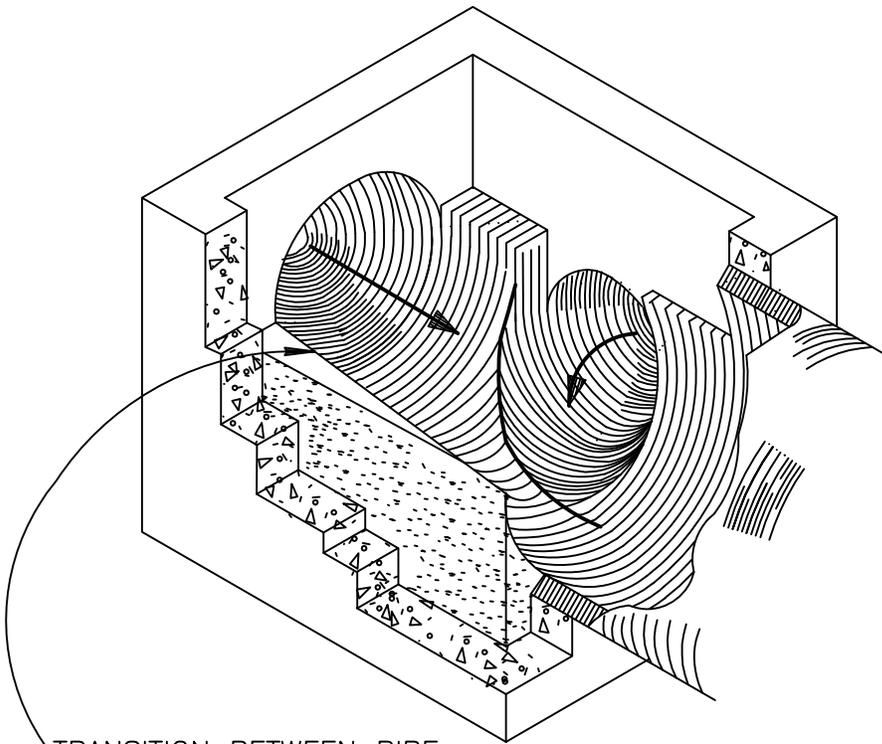
**DEEP MANHOLE  
W/SAFETY SLAB  
≥15' DEPTH**

DATE:  
JULY 2008  
REVISIONS

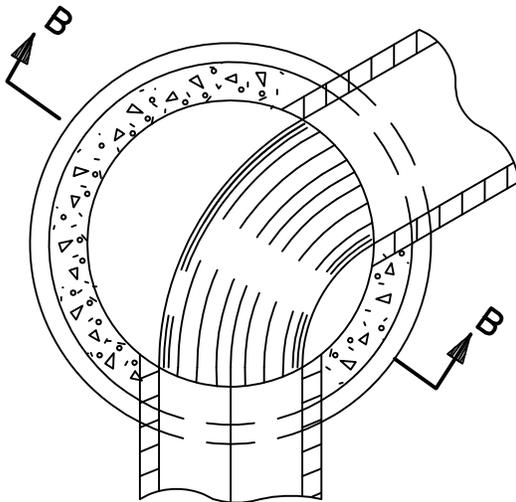

BC #  
SS-29



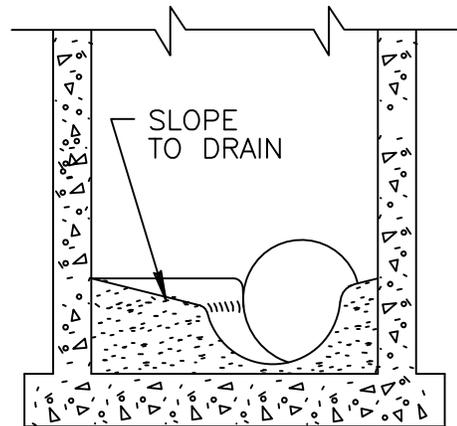
	<b>BOTETOURT COUNTY</b> PUBLIC FACILITIES & PROGRAMS 30 WEST BACK STREET, NUMBER 4 FINCASTLE, VA 24090 Ph: 540-473-8316 Fx: 540-473-8360	<b>CONSTRUCTION STANDARDS</b>		DATE: JULY 2008	<b>BC #</b>  <b>SS-30</b>
		<b>INSIDE FORCEMAIN CONNECTION TO MANHOLE</b>		REVISIONS	



TRANSITION BETWEEN PIPE DIAMETERS WHEN DIFFERENT SIZES OF PIPE ARE ENCOUNTERED.



PLAN



SECTION B-B

METHOD OF TREATMENT IN MANHOLES



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**CONSTRUCTION STANDARDS**

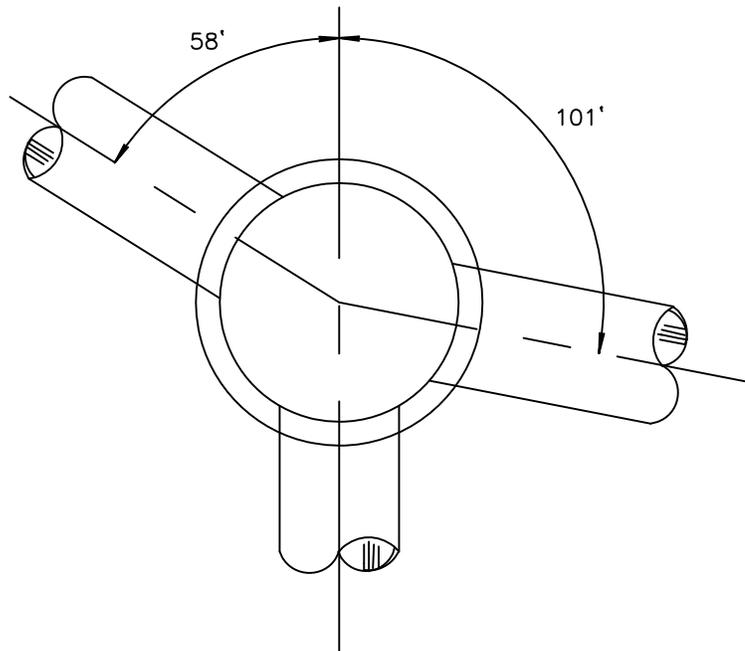
**MANHOLE  
INVERT SHAPING**

DATE:  
JULY 2008

REVISIONS


BC #

SS-31



MANHOLE SIZING TABLE					
MAXIMUM Δ'S AT MANHOLE (DEGREES)					
SEWER PIPE SIZE	SIZE OF MANHOLE				
	48"	60"	72"	84"	96"
21"	68'	92'	107'		
24"	58'	85'	101'		
27"	47'	77'	95'		
30"	35'	68'	89'	103'	
36"	USE NEXT SIZE	50'	75'	92'	103'
42"		USE NEXT SIZE	60'	80'	94'
48"			USE NEXT SIZE	67'	84'
54"				USE NEXT SIZE	72'



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**CONSTRUCTION STANDARDS**

**MANHOLE SIZING TABLE**

DATE: JULY 2008
REVISIONS

BC #  
 SS-32