

SECTION 7.00 SANITARY SEWER

A. DESIGN

LOCATION

1. ALL PUBLIC SANITARY SEWER MAINS SHALL BE INSTALLED IN DEDICATED STREET RIGHT-OF-WAY OR IN DEDICATED UTILITY EASEMENTS. SANITARY SEWER MAINS INSTALLED IN TOWN OF SMITHFIELD MAINTAINED STREETS SHALL BE LOCATED IN THE CENTER OF THE PAVEMENT. MAINS LOCATED WITHIN NCDOT RIGHT-OF-WAY SHALL BE PLACED OUTSIDE OF PAVEMENT LIMITS, IN ACCORDANCE WITH NCDOT STANDARDS.
2. MINIMUM WIDTHS OF PUBLIC SANITARY SEWER EASEMENTS SHALL BE 30 FEET FOR ALL MAIN SIZES UP TO 24". FOR SANITARY SEWER MAINS GREATER THAN 24", THE EASEMENT SHALL BE 40 FEET. SEE SECTION 2.10 FOR LANDSCAPE PLANTINGS WITHIN UTILITY EASEMENTS.
3. SEWER MAINS SHALL BE CENTERED WITHIN THEIR EASEMENTS UNLESS OTHERWISE DETERMINED BY THE TOWN ENGINEER.
4. PROPOSED SANITARY SEWER PARALLELING A CREEK SHALL BE DESIGNED TO A PROPER DEPTH TO ALLOW LATERAL CONNECTIONS SUCH THAT ALL CREEK CROSSINGS WILL BE BELOW STREAM BED ELEVATION UNLESS APPROVED BY THE TOWN ENGINEER. THE TOP OF THE SEWER MAIN SHALL HAVE AT LEAST THREE (3) FEET OF COVER BETWEEN THE MAIN AND THE STREAM BED. WHEN SUFFICIENT COVER CANNOT BE ACHIEVED, THE SEWER MAIN MUST BE MADE OF DUCTILE IRON PIPE WITH RESTRAINED JOINTS EQUIVALENT TO WATER MAIN STANDARDS. NO CROSSING WILL BE PERMITTED WITH LESS THAN ONE (1) FOOT OF COVER.
5. SANITARY SEWER MAINS SHALL NOT BE INSTALLED UNDER ANY PART OF WATER IMPOUNDMENT.
6. THE FOLLOWING MINIMUM SEPARATIONS MUST BE MAINTAINED:
 - a) ANY PRIVATE OR PUBLIC WATER SUPPLY SOURCE - 100 FEET
 - b) ANY OTHER STREAM, LAKE, OR IMPOUNDMENT - 10 FEETWHERE THE REQUIRED MINIMUM SEPARATION CANNOT BE MAINTAINED, DUCTILE IRON PIPE WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS MUST BE USED. THE MINIMUM SEPARATIONS SHALL NOT BE LESS THAN 50 FEET FROM A PRIVATE WELL OR A PUBLIC WATER SUPPLY SOURCE.
7. SANITARY SEWER LINES SHALL BE EXTENDED ALONG NATURAL DRAINAGE COURSES TO THE ADJACENT PROPERTY LINES.



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SIZE

1. THE MINIMUM SIZE OF A PUBLIC GRAVITY SANITARY SEWER MAIN SHALL BE 8".
2. MAJOR INTERCEPTORS SHALL BE SIZED IN ACCORDANCE WITH THE MOST CURRENT TOWN OF SMITHFIELD LONG RANGE DEVELOPMENT PLAN. NEW SEWER SYSTEMS SHALL BE SIZED IN ACCORDANCE WITH THE FOLLOWING FLOW FACTORS:

LAND USE	FLOW FACTOR
RESIDENTIAL	120 GAL/BEDROOM (MINIMUM 2 BEDROOMS)
OFFICE & INSTITUTIONAL	0.09 GPD/SQ.FT. BLDG. SPACE
COMMERCIAL	0.12 GPD/SQ.FT. BLDG. SPACE
INDUSTRIAL	0.20 GPD/SQ.FT. BLDG. SPACE

FLOW FACTORS NOT LISTED HEREIN SHALL BE IN ACCORDANCE WITH THE FACTORS RECOMMENDED BY THE NCDEQ.

THESE FIGURES COVER NORMAL INFILTRATION; HOWEVER, AN ADDITIONAL ALLOWANCE SHALL BE MADE WHERE CONDITIONS ARE UNFAVORABLE.

3. FOR EXISTING SEWER SYSTEMS AN ADDITIONAL ALLOWANCE SHALL BE MADE TO THE ABOVE FLOW FACTORS WHERE THE EXISTING FLOW EXCEEDS THESE VALUES AND IMMEDIATE REMEDIAL MEASURES ARE NOT PROPOSED.
4. THE RATIO OF PEAK TO AVERAGE DAILY FLOW SHALL BE 2.5.
5. SANITARY SEWERS SHALL BE DESIGNED TO CARRY THE PROJECTED PEAK FLOW AT NO MORE THAN $\frac{1}{2}$ FULL. THE MINIMUM VELOCITY FOR SANITARY SEWER LINES IS 2.0 FPS.
6. THE MINIMUM GRADES FOR PUBLIC SANITARY SEWER SHALL BE AS FOLLOWS:

MAIN SIZE (IN)	MINIMUM SLOPE (%)
8	0.50
10	0.40
12	0.28
15	0.15
18	0.12
21	0.10
24	0.08
30	0.06

THE MINIMUM SLOPE FOR THE UPPERMOST REACH OF A SANITARY SEWER LINE SHALL BE 1.00%, REGARDLESS OF LINE SIZE.



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7. THE MAXIMUM GRADE FOR SANITARY SEWER SHALL BE 10%. THE MAXIMUM VELOCITY IN SANITARY SEWERS IS 15 FT/SEC. THESE LIMITS MAY BE EXCEEDED WITH THE APPROVAL OF THE TOWN ENGINEER AND THE INCORPORATION OF THE FOLLOWING PROVISIONS:
 - a. ALL SEWERS OF GREATER THAN 10% SLOPE SHALL BE DUCTILE IRON PIPE.
 - b. CONCRETE ANCHORS SHALL BE INSTALLED ON ALL SEWERS OF GREATER THAN 10% SLOPE AT THE FOLLOWING SPACINGS:
 1. NOT OVER 36' CENTER TO CENTER ON GRADES FROM 10% TO 25%
 2. NOT OVER 24' CENTER TO CENTER ON GRADES FROM 25% TO 40%
 3. NOT OVER 16' CENTER TO CENTER ON GRADES OVER 40%
8. SEWER EXTENSIONS SHOULD BE DESIGNED FOR PROJECTED FLOWS.
9. PIPE DIAMETER CHANGES SHALL OCCUR IN A MANHOLE WITH AN INVERT OF THE LARGER PIPE LOWERED SUFFICIENTLY TO MAINTAIN THE SAME ENERGY GRADIENT.
10. ALL RESIDENTIAL SUBDIVISION LOTS SHALL BE SERVED BY GRAVITY SEWER UNLESS OTHERWISE APPROVED BY THE TOWN ENGINEER. IF A PUMP IS APPROVED, IT SHALL BE PRIVATELY MAINTAINED, MUST PUMP INTO A SERVICE CONNECTION PLACED ON THE RESIDENTIAL LOT, AND MUST HAVE A NOTE ON THE RECORDED PLAT INDICATING A PRIVATE PUMP MAY BE REQUIRED TO SERVE THAT LOT WITH SANITARY SEWER SERVICE.

INSTALLATION

1. SANITARY SEWER MAINS SHALL BE DEEP ENOUGH TO SERVE THE ADJOINING PROPERTY AND ALLOW FOR SUFFICIENT SLOPE IN LATERAL LINES. ALL SANITARY SEWER MAINS SHALL HAVE THE FOLLOWING MINIMUM COVERS:
 - a. FOUR (4) FEET FROM THE TOP OF THE PIPE TO THE FINISHED SUBGRADE WHEN UNDER A ROADWAY
 - b. THREE (3) FEET FROM THE TOP OF PIPE TO THE FINISHED GRADE WHEN OUTSIDE A ROADWAY

THE ABOVE REQUIREMENTS MAY BE WAIVED AT THE DIRECTION OF THE TOWN ENGINEER, IN WHICH CASE DUCTILE IRON PIPE SHALL BE INSTALLED.
2. ALL CONSTRUCTION RELATING TO THE UTILITY IMPROVEMENTS WHICH WILL MAINTAINED BY THE TOWN MUST BE PERFORMED BY A CONTRACTOR LICENSED FOR UTILITIES IN THE STATE OF NORTH CAROLINA..
3. SEWER MAINS FROM 14 TO 20 FEET DEEP SHALL REQUIRE SPECIAL BEDDING IN ACCORDANCE WITH STANDARD DETAILS.



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4. SEWERS OVER TWENTY (20) FEET DEEP SHALL REQUIRE DUCTILE IRON PIPE FOR THE ENTIRE RUN BETWEEN MANHOLES.
5. PIPE TRENCH EXCAVATION AND BACKFILLING SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 5.00 OF THESE SPECIFICATIONS.
6. TRANSITIONS OF PIPE MATERIAL SHALL OCCUR ONLY AT MANHOLES.
7. SANITARY SEWERS SHALL BE LAID TEN (10) FEET Laterally edge to edge from existing or proposed water mains unless the top of the sewer main is at least eighteen (18) inches below the bottom of the water main and there is a horizontal separation of at least three (3) feet from the closest edge of the pipe.
8. WHERE SANITARY SEWERS CROSS BENEATH WATER MAINS WITH A VERTICAL SEPARATION OF EIGHTEEN (18) INCHES, OR LESS, OR WHERE WATER MAINS CROSS UNDER SEWER MAINS, THE ENTIRE LEG OF SEWER LINE SHALL BE DUCTILE IRON PIPE. THE WATER LINE PIPE SHALL BE CENTERED AT THE POINT OF CROSSING AND SHALL CROSS SANITARY SEWER LINES AT AN APPROXIMATE NINETY (90) DEGREE ANGLE.
9. SANITARY SEWERS SHALL HAVE THE TOP OF THE PIPE AT LEAST TWELVE (12) INCHES BELOW THE BOTTOM OF THE STORM SEWER PIPE WHEN THE HORIZONTAL SEPARATION BETWEEN THE CLOSEST EDGES OF THE TWO PIPES IS THREE (3) FEET OR LESS. WHERE SANITARY AND STORM SEWERS CROSS WITH A VERTICAL SEPARATION OF LESS THAN TWELVE (12) INCHES THE ENTIRE LEG OF SANITARY SEWER SHALL BE DUCTILE IRON PIPE WITH JOINTS EQUIVALENT TO WATER MAIN STANDARDS.
10. THERE SHALL BE A MINIMUM FIVE (5) FOOT HORIZONTAL SEPARATION BETWEEN PARALLEL GRAVITY AND/OR FORCE MAINS.
11. SEWER LINE EASEMENTS SHALL BE GRADED SMOOTH, FREE FROM ROCKS, BOULDERS, ROOTS, STUMPS, AND OTHER DEBRIS AND SEEDED & MULCHED UPON THE COMPLETION OF CONSTRUCTION.
12. THE DOWNSTREAM MANHOLES OF A SANITARY SEWER LINE EXTENSION UNDER CONSTRUCTION SHALL BE PLUGGED TO PREVENT THE INTRUSION OF GROUNDWATER, RUNOFF AND SEDIMENT INTO THE SANITARY SEWER SYSTEM. ALL WATER UPSTREAM OF THE PLUG SHALL BE PUMPED OUT OF THE SANITARY SEWER LINE AND ALL SEDIMENT AND SOLIDS SHALL BE REMOVED AND PROPERLY DISPOSED OF BY THE CONTRACTOR. THE PLUG SHALL NOT BE REMOVED UNTIL THE LINE HAS BEEN INSPECTED BY THE TOWN TO ENSURE THAT ALL POSSIBLE POINTS OF INFLOW AND INFILTRATION HAVE BEEN SECURED.

MANHOLES

1. ALL MANHOLE CONE SECTIONS SHALL BE THE ECCENTRIC TYPE
2. MANHOLES SHALL BE SPACED AT A MAXIMUM DISTANCE OF 400 FEET APART FROM CENTER OF MANHOLE TO CENTER OF MANHOLE.
3. MANHOLES FOR SEWERS UNDER 21 INCHES IN DIAMETER SHALL BE A MINIMUM OF FOUR (4) FEET IN DIAMETER. MANHOLES FOR SEWERS LARGER THAN 21 INCHES IN DIAMETER SHALL BE FIVE (5) FEET IN DIAMETER. MANHOLES WITH INSIDE DROPS SHALL BE A MINIMUM OF FIVE (5) FEET IN DIAMETER.



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4. MANHOLES SHALL BE INSTALLED AT EACH DEFLECTION OF THE LINE AND/OR GRADE. THE FLOW CHANNEL THROUGH MANHOLES SHOULD BE SMOOTH AND SHALL CONFORM TO THE SHAPE AND SLOPE OF THE ENTERING SANITARY SEWER MAIN. CENTERLINE INVERTS OF THE FLOW CHANNEL SHALL BE PROVIDED WITH THE "INVERT IN" ELEVATION COMPUTED AS PER THE ENTERING SEWER LINE SLOPE. THERE SHALL BE A MINIMUM DROP OF 0.2' ACROSS THE MANHOLE TO THE EXITING SEWER LINE, OR "INVERT OUT". ANY DEVIATION FROM THIS DESIGN WILL NEED THE APPROVAL OF THE PUBLIC UTILITIES DIRECTOR.

MANHOLE FLOW PATHS SHALL BE CONSTRUCTED OF SLICK SIDED RED BRICK OR PRECAST CONCRETE. THE INVERT SHALL BE SMOOTH AND UNIFORM IN SHAPE ALONG THE ENTIRE LENGTH. MANHOLES SHALL HAVE A MINIMUM OF FOUR (4) FEET IN DIAMETER, UNLESS THERE IS AN INSIDE DROP. FOR INSIDE DROP MANHOLES, A MINIMUM DIAMETER OF FIVE(5) FEET SHALL BE USED.

FOR INSIDE DROP MANHOLES, THE LAST LEG OF THE INCOMING SEWER MAIN SHALL BE DUCTILE IRON.

5. MANHOLES NOT LOCATED IN ROADWAYS SHALL HAVE A TOP ELEVATION BETWEEN 18" AND 36" ABOVE FINISHED GRADE.
6. MANHOLE TOPS SHALL BE ELEVATED TWO (2) FEET ABOVE THE FUTURE 500-YEAR FLOOD PLAIN, PER NCDEQ REQUIREMENTS, OR SHALL BE EQUIPPED WITH WATERTIGHT FRAMES AND COVERS.
7. MANHOLES LOCATED WITHIN THE 100-YEAR FLOODPLAIN, OR IN AREAS OF HIGH GROUND WATER SHALL BE WATERPROOFED AT THE JOINTS.

B. MATERIALS

MATERIALS TO BE UTILIZED SHALL BE THOSE AS SPECIFIED HEREIN, UNLESS AN APPROVED EQUAL IS AUTHORIZED BY THE PUBLIC UTILITIES DIRECTOR.

EACH LENGTH OF PIPE TO BE USED SHALL HAVE PLAINLY AND PERMANENTLY MARKED THEREON THE FOLLOWING INFORMATION, AS WELL AS, ANY ADDITIONAL INFORMATION SPECIFICALLY NOTED IN THE SECTIONS BELOW:

- a) PIPE CLASS DESIGNATION
- b) MANUFACTURER'S NAME OR TRADEMARK
- c) NOMINAL PIPE SIZE

ALL NEW CONSTRUCTION FOR SEWER MAINS SHALL BE MADE OF EITHER DUCTILE IRON PIPE (DIP) OR POLYVINYL CHLORIDE PIPE (PVC). NO OTHER MATERIAL WILL BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE PUBLIC UTILITIES DIRECTOR.



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DUCTILE IRON PIPE (DIP)

DUCTILE IRON PIPE SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH AWWA C150 AND C151 FOR A LAYING CONDITION TYPE 2 AND A WORKING PRESSURE AS FOLLOWS:

3" - 12"	350 PSI
15" - 21"	250 PSI
24"	200 PSI
GREATER THAN 24"	150 PSI

PIPE JOINTS SHALL BE OF THE PUSH-ON TYPE AS PER AWWA CIII. PIPE LINING SHALL BE EPOXY COATED PROTECTO 401, OR APPROVED EQUAL, IN ACCORDANCE WITH AWWA C104.

POLYVINYL CHLORIDE PIPE (PVC)

PVC PIPE SHALL BE MADE OF PVC PLASTIC HAVING A CELL CLASSIFICATION OF 12454-B, 12454-C, OR 13364-B WITH MINIMUM TENSILE MODULUS OF 500,000 PSI. PVC PIPE SHALL HAVE INTEGRAL WALL BELL AND SPIGOT JOINTS FOR THE CONVEYANCE OF DOMESTIC SEWAGE. ALL FITTINGS SHALL BE MADE OF PVC PLASTIC. PVC FITTINGS MUST BE MANUFACTURED BY PIPE SUPPLIER, OR APPROVED EQUAL, AND HAVE BELL & SPIGOT CONFIGURATIONS COMPATIBLE WITH THAT OF THE PIPE.

ALL PIPE LESS THAN 18 INCHES IN DIAMETER SHALL HAVE A MAXIMUM STANDARD DIMENSION RATIO (SDR) OF 35. WHERE LAYING CONDITIONS SO WARRANT, AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, LOWER SDR VALUES (STRONGER PIPE) MAY BE REQUIRED.

PVC PIPE 18 INCHES IN DIAMETER AND LARGER MUST BE SPIRAL WOUND AS DEFINED IN ASTM F-794, SERIES 46. PIPE STRENGTH SHALL BE EQUAL TO OR EXCEED THAT REQUIRED FOR PIPE LESS THAN 18 INCHES IN SIZE.

INSTALLATION SHALL CONSIST OF CLASS I BEDDING MATERIAL PLACED 4 INCHES BELOW THE PIPE BARREL AND CONTINUING TO A MINIMUM OF THE PIPE SPRING LINE, AS PER ASTM D2321. IN ADDITION, THE INSTALLATION OF PVC PIPE SHALL INCLUDE A METALLIC LOCATION STRIP BURIED IN THE BACKFILL, IN ACCORDANCE WITH STANDARD DETAILS.

C. ADDITIONAL REQUIREMENTS FOR SEMI-RIGID PIPE (PVC)

THE INSTALLATION SHALL SATISFY THE REQUIREMENTS OF THE MANUFACTURER, AND/OR THE FOLLOWING, WHICHEVER IS MORE STRINGENT:

- 1) INSTALLATION OF PVC PIPE SHALL FOLLOW THE RECOMMENDATIONS OF ASTM D-2321 "UNDERGROUND INSTALLATION OF FLEXIBLE THERMOPLASTIC SEWER PIPE". FOR SEMI-RIGID PIPES BEDDING MATERIAL SHALL BE CLASS I. IN ANY AREA WHERE THE PIPE WILL BE INSTALLED BELOW EXISTING OR FUTURE GROUND WATER LEVELS OR WHERE THE TRENCH COULD BE SUBJECT TO UNDULATION, ADDITIONAL CLASS I MATERIAL SHALL BE USED FOR BEDDING. REFER TO STANDARD DETAILS FOR EMBEDMENT REQUIREMENTS.



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- 2) THE MANUFACTURER'S SPECIFICATIONS OR OTHERWISE APPROVED METHOD SHALL BE USED IN DETERMINING THE STIFFNESS CLASS OF THE PIPE TO BE INSTALLED SO AS TO ATTAIN THE REQUIRED DEFLECTION CONTROL. THE CLASS OF THE PIPE MUST BE APPROVED BY THE PUBLIC UTILITIES DIRECTOR.
- 3) THE MAXIMUM ALLOWABLE DEFLECTION AFTER INSTALLATION SHALL BE LESS THAN 3% FOR SEMI-RIGID PIPE. A MANDREL TEST ON TRUSS PIPE SHALL BE REQUIRED IF THE INSPECTOR FINDS A PROBLEM DURING VISUAL INSPECTION. THE MANDREL (GO/NO-GO) DEFLECTION TEST MUST BE PERFORMED ON EACH LINE PRIOR TO ACCEPTANCE, AND NO LESS THAN 30 DAYS AFTER INSTALLATION. THE CONTRACTOR SHALL SUPPLY THE MANDREL USED FOR THIS PERFORMANCE TEST. THE MANDREL DEVICE SHALL BE CYLINDRICAL IN SHAPE HAVING NINE (9) POSSIBLE CONTACT POINTS WITH THE PIPE. THE MANDREL'S LENGTH AND DIAMETER SHALL EQUAL THE DIMENSIONS IN THE FOLLOWING TABLE, AND SHALL BE SUBJECT TO THE INSPECTOR'S APPROVAL.

NOMINAL DIAMETER	MIN. LENGTH	DIA. MANDREL
8"	8"	7.52"
10"	10"	9.45"
12"	10"	11.40"
15"	12"	14.31"

- 4) FOR PVC PIPE, THE PIPE SHALL BE PRODUCED WITH BELL AND SPIGOT END CONSTRUCTION. JOINING SHALL BE ACCOMPLISHED BY RUBBER GASKET, IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION, UNLESS OTHERWISE DIRECTED BY THE PUBLIC UTILITIES DIRECTOR. EACH PIPE LENGTH SHALL BE CLEARLY MARKED WITH INFORMATION INCLUDING PIPE SIZE, PROFILE NUMBER AND CLASS NUMBER.
- 5) A MINIMUM TRENCH WIDTH SHALL BE THREE (3) FEET
- 6) THE BEDDING (6" MINIMUM) AND EMBEDMENT MATERIALS SHALL BE PER ASTM D2321. THE EMBEDMENT MATERIALS SHALL BE INSTALLED FROM TRENCH WALL TO TRENCH WALL AND FROM FOUR (4) INCHES BELOW THE INVERT TO A MINIMUM OF SIX (6) INCHES ABOVE THE CROWN OF THE PIPE.
- 7) THE BEDDING AND EMBEDMENT MATERIAL SHALL BE COMPACTED TO A MINIMUM OF 90% STANDARD PROCTOR DENSITY FOR CLASS I MATERIALS.
- 8) IF HYDRAULIC JACK SHORING IS UTILIZED FOR TRENCH WALLS, WHERE SHORING IS USED, IT SHALL BE KEPT TO THE AREA JUST ABOVE THE TOP OF THE PIPE. THIS WILL ENSURE THE EMBEDMENT MATERIALS AND PIPE WILL NOT BE DISTURBED WHEN REMOVAL IS MADE.

BEDDING AND EMBEDMENT MATERIAL CLASSIFICATIONS SHALL BE DEFINED AS FOLLOWS:

CLASS I - ANGULAR, (1/4 TO 3/4 INCH) GRADED STONE, INCLUDING A NUMBER OF FILL MATERIALS THAT HAVE REGIONAL SIGNIFICANCE SUCH AS CRUSHED STONE AND CRUSHED GRAVEL.

CLASS II - COARSE SANDS AND GRAVEL WITH A MAXIMUM PARTICLE SIZE OF 1/2 INCH, INCLUDING VARIOUSLY GRADED SANDS AND GRAVELS CONTAINING SMALL PERCENTAGES OF FINES, GENERALLY GRANULAR AND NON-COHESIVE, EITHER WET OR DRY. SOIL TYPES GW, GP, SW AND SP ARE INCLUDED IN THIS CLASS.



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CLASS III – FINE SAND AND CLAYEY GRAVELS, INCLUDING FINE SANDS, SAND-CLAY MIXTURES, AND GRAVEL-CLAY MIXTURES, SOIL TYPES GM, GC, SM AND SC ARE INCLUDED IN THIS CLASS.

CLASS IV – SILT, SILTY CLAYS, AND CLAYS, INCLUDING INORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY AND LIQUID LIMITS. SOIL TYPES MH, ML, CH, AND CL ARE INCLUDED IN THIS CLASS. THESE MATERIALS ARE NOT RECOMMENDED FOR EMBEDMENT.

7.02 FORCE SEWER MAINS

A. MATERIALS

DUCTILE IRON PIPE SHALL BE DESIGNED AND MANUFACTURED IN ACCORDANCE WITH AWWA C150 AND C151 FOR ALL LAYING CONDITION TYPE 2 AND A WORKING PRESSURE AS FOLLOWS:

3" – 12"	350 PSI
14" – 20"	250 PSI
24"	200 PSI
> 24"	150 PSI

PIPE JOINTS SHALL BE PUSH-ON TYPE AS PER AWWA C111. PIPE LINING SHALL BE CEMENT MORTAR WITH A SEAL COAT OF BITUMINOUS MATERIAL, ALL IN ACCORDANCE WITH AWWA C104.

PVC PIPE SHALL MEET THE REQUIREMENTS OF AWWA C900. PIPE SHALL BE CLASS 150, SDR 18, INTEGRAL BELL WITH STRENGTH EQUAL TO THE PIPE WALL, CAST IRON O.C., 18 FOOT LENGTH, WITH A SOLID ELASTOMERIC RING

PVC PIPE FOR FORCE MAINS WITH A DIAMETER OF THREE (3) INCHES OR LESS SHALL BE SDR 21 OF SCHEDULE 40 IN ACCORDANCE WITH ASTM D1785.

PVC PIPE WILL REQUIRE THE INSTALLATION OF A DETECTOR TAPE PLACED A MAXIMUM OF TWO (2) FEET BELOW THE COVERING SURFACE. THE DETECTOR TAPE SHALL BE THREE (3) INCH WIDE TAPE.

PIPE FITTINGS SHALL BE DUCTILE IRON DESIGNED AND MANUFACTURED AS PER AWWA C110. SIZES OF FITTINGS UP TO AND INCLUDING 12 INCH SHALL BE DESIGNED FOR AN INTERNAL PRESSURE OF 250 PSI; LARGER SIZE FITTINGS SHALL BE DESIGNED FOR AN INTERNAL PRESSURE OF 150 PSI. JOINTS FOR FITTINGS SHALL BE MECHANICAL JOINT AND LINED WITH CEMENT MORTAR WITH A SEAL COAT OF BITUMINOUS MATERIAL, ALL IN ACCORDANCE WITH AWWA C104.

B. INSTALLATION

REACTION BLOCKING FOR ALL FITTINGS OR COMPONENTS SUBJECT TO HYDROSTATIC THRUST SHALL BE SECURELY ANCHORED BY THE USE OF CONCRETE THRUST BLOCKS POURED IN PLACE. THE REACTION AREAS ARE SHOWN IN STANDARD DETAILS. NO CONCRETE SHALL INTERFERE WITH THE REMOVAL OF FITTINGS. MATERIAL FOR REACTION BLOCKING SHALL BE 3000 PSI CONCRETE.

FORCE MAINS SHALL BE INSTALLED WITH A MINIMUM COVER OF THREE (3) FEET MEASURED FROM THE TOP OF THE PIPE TO THE FINISHED SUBGRADE.



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SEWAGE AIR RELEASE VALVES SHALL BE INSTALLED AT ALL THE HIGH POINTS OF THE FORCE MAINS IN ACCORDANCE WITH THE STANDARDS DETAILS. MANHOLES CONTAINING AIR RELEASE VALVES SHALL RECEIVE AN EPOXY COATING ON THE INSIDE. THE THICKNESS OF THE COATING SHALL BE DETERMINED BY THE PUBLIC UTILITIES DIRECTOR.

SEWER FORCE MAINS SHALL BE INSTALLED IN DEDICATED PUBLIC RIGHTS-OF-WAY OR IN DEDICATED UTILITY EASEMENTS. SEE SECTION 2.10 FOR LANDSCAPE PLANTING REQUIREMENTS WITHIN EASEMENTS. THE EASEMENTS SHALL HAVE THE FOLLOWING DIMENSIONS:

LINE SIZE	MINIMUM EASEMENT WIDTH
12" AND UNDER	30'
OVER 12"	30'

FORCE MAIN VALVES SHALL BE SPACED AT APPROPRIATE INTERVALS AS DETERMINED BY THE PUBLIC UTILITIES DIRECTOR, AND SHALL HAVE BOX CAPS MARKED "SEWER". FORCE MAIN VALVES SHALL BE RESILIENT WEDGE GATE TYPE.

THE RECEIVING MANHOLE FOR A FORCE MAIN SHALL RECEIVE AN INTERIOR EPOXY COATING WITH A THICKNESS OF 10 MILLS. THE FORCE MAIN SHALL DISCHARGE AT THE INVERT OF THE RECEIVING MANHOLE AND SHALL BE AS CLOSE AS POSSIBLE TO 180 DEGREES FROM THE OUTLET PIPE.

FORCE MAINS SHALL BE APPROPRIATELY IDENTIFIED UPON INSTALLATION SO THEY WILL NOT BE CONFUSED WITH POTABLE WATER LINES. THE PIPE MATERIAL SHALL BE DESIGNATED ON EACH JOINT OF PIPE AS "SEWER".

7.03 MANHOLES

MANHOLES SHALL BE PRECAST CONCRETE. ALL MANHOLES SHALL HAVE ECCENTRIC CONE SECTIONS.

PRECAST CONCRETE MANHOLES SHALL MEET ASTM C478 AS TO DESIGN AND MANUFACTURE. THE STANDARD JOINT SHALL BE SEALED WITH A PLASTIC CEMENT PUTTY MEETING FEDERAL SPECIFICATION SS-S-00210, SUCH AS RAM-NEK, OR A BUTYL RUBBER SEALANT. ALL LIFT HOLES MUST BE PLUGGED WITH NON-SHRINKING GROUT AFTER INSTALLATION. FOR PRECAST CONCRETE MANHOLES, SEE STANDARD DETAILS.

MANHOLE FRAMES AND COVERS SHALL BE CAST OR DUCTILE IRON WITH "SANITARY SEWER" STAMPED ON THE COVER AND TWO 1-INCH, PERFORATED HOLES. CASTINGS SHALL BE MACHINED TO GIVE EVEN AND CONTINUOUS BEARING TO THE FULL LENGTH OF THE FRAME. CASTINGS SHALL BE FREE OF POROSITY AND BLOW HOLES, AND SHALL RECEIVE ONE COAT OF EPOXY PAINT. PAINT SHALL BE KEPT OFF OF BOLT THREADS AND SURFACES SHALL BE THOROUGHLY WIRE BRUSHED BEFORE PAINTING. MANHOLE FRAMES SHALL BE BOLTED TO THE MANHOLE. ALL MANHOLE RINGS IN ROADWAYS SHALL BE ENCASED IN A CONCRETE COLLAR EIGHTEEN (18) INCHES BY SIX (6) INCHES OF 3000 PSI CONCRETE BENEATH THE ASPHALT, WITH THE COVER FLUSH TO THE TOP OF THE PAVEMENT, PER STANDARD DETAILS. MANHOLES LOCATED OUTSIDE OF THE PAVEMENT SHALL BE AT LEAST TWELVE (12) INCHES ABOVE THE FINISHED GRADE.



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WATERTIGHT MANHOLE FRAMES AND COVERS SHALL HAVE NEOPRENE GASKET, BRONZE TIGHTENING BOLT, MACHINED BEARING SURFACES AND CHANNEL IRON LOCKING BAR. BOLTS SHALL BE STANDARD HEXAGONAL-HEAD, COUNTERSUNK SUCH THAT WHEN FULLY TIGHTENED BOLT HEAD IS FLUSH WITH THE TOP OF THE COVER. CASTINGS SHALL BE FREE OF POROSITY AND BLOW HOLES, AND SHALL RECEIVE ONE COAT OF EPXOY PAINT. PAINT SHALL BE KEPT OFF OF THE BOLT THREADS AND SURFACES SHALL BE THOROUGHLY WIRE BRUSHED BEFORE PAINTING.

MANHOLE STEPS SHALL BE FURNISHED WITH THE PRECAST SECTIONS. STEPS SHALL BE OF POLYPROPYLENE MATERIAL. REINFORCED WITH A 1/2" REINFORCING ROD. MANHOLE STEPS SHALL BE DESIGNED FOR A VERTICAL LOAD OF 400 POUNDS AND A HORIZONTAL PULL OUT LOAD OF 1,000 POUNDS. STEPS SHALL BE SET SIXTEEN (16) INCHES APART ON CENTER. HOLES FOR THE INSTALLATION OF MANHOLE STEPS SHALL NOT PROJECT THROUGH THE MANHOLE WALL. THERE SHALL BE A MINIMUM OF ONE (1) INCH WALL THICKNESS FORM THE DEEPEST PENETRATION OF THE STEP INSTALLATION HOLE AND THE OUTSIDE WALL. STEPS SHALL BE AT LEAST TEN (10) INCHES CLEAR WIDTH AND SHALL PROJECT AT LEAST FOUR (4) INCHES FROM THE WALL INTO WHICH IT IS EMBEDDED. STEPS SHALL NOT BE LOCATED OVER THE INFLUENT OR EFFLUENT PIPES AND SHALL BE INSTALLED ALONG A VERTICAL MANHOLE WALL FORM THE SHELF TO THE TOP OF THE CONE.

ALL MANHOLES SHALL HAVE 6 INCH, 3,000 PSI CONCRETE BOTTOMS RESTING ON A MINIMUM OF 6 INCHES OF #57 STONE. SEWER MAINS SHALL ENTER AND EXIT RADIALLY THROUGH THE MANHOLES. INVERTS SHALL BE CONSTRUCTED WITH A WIDTH AND HEIGHT EQUAL TO 1/2 THAT OF THE EFFLUENT PIPE AND SHALL BE SO BRUSHED AND TROWELED THAT A MINIMUM ENERGY LOSS OCCURS IN THE MANHOLE. AT EACH INLET AND OUTLET OF LINE EIGHT (8) INCHES, OR GREATER, WASTEWATER LINES ARE TO BE CONNECTED TO THE MANHOLES BY MEANS OF COMPRESSION CONNECTORS (FLEXIBLE SLEEVES) CAST INTO THE MANHOLE SECTION. FLEXIBLE CONNECTORS ARE TO BE MANUFACTURED OF HIGH QUALITY RUBBER OR SYNTHETIC RUBBER AND ALL STRAP CLAMPS OR DRAW BOLTS ARE TO BE MANUFACTURED FROM STAINLESS STEEL.

7.03 SERVICE CONNECTIONS

A. MATERIALS

PVC PIPE SHALL BE SCHEDULE 40 OR GREATER SUPPLIED IN EIGHTEEN (18) FEET LENGTHS. THE PIPE MAY BE JOINED BY ELASTOMERIC GASKETS.

DUCTILE IRON PIPE SHALL BE USED FOR SANITARY SEWER WITH SERVICES WITH LESS THAN THREE (3) FEET OF COVER OR WITH GREATER THAN FIFTEEN (15) FEET OF COVER.

SERVICE SADDLES FOR PVC SERVICES SHALL BE OF THE SAME MATERIAL AS THE MAIN; SOLVENT WELDED AND FASTENED WITH DOUBLE STAINLESS STEEL BANDS AS SHOWN IN THE STANDARD DETAILS.



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B. INSTALLATION

INDIVIDUALLY OWNED STRUCTURES SHALL REQUIRE INDIVIDUAL SEWER TAPS TO PUBLIC SEWER. ALL SERVICE CONNECTIONS TO EXISTING SANITARY SEWER MAINS SHALL BE MADE BY, OR UNDER THE SUPERVISION OF THE TOWN OF SMITHFIELD PUBLIC UTILITIES DEPARTMENT. SERVICE CONNECTIONS TO NEW LINES ARE THE RESPONSIBILITY OF THE DEVELOPER/OWNER AND SHALL BE MADE BY A NORTH CAROLINA LICENSED UTILITY CONTRACTOR. SERVICE TAPS INTO MAINS SHALL BE MADE ON THE TOP QUARTER OF THE MAIN WITH THE WYE SADDLE ANGLED WITH THE DIRECTION OF FLOW IN THE MAIN.

SERVICE LINES BETWEEN THREE (3) AND TWELVE (12) FEET IN DEPTH DO NOT REQUIRE SPECIAL BEDDING. ALL SERVICE LINES BETWEEN TWELVE (12) AND FIFTEEN (15) FEET IN DEPTH SHALL REQUIRE CLASS I BEDDING FROM FOUR (4) INCHES BELOW THE PIPE TO FOUR (4) INCHES ABOVE THE PIPE. SERVICE LINES GREATER THAN FIFTEEN (15) FEET, OR LESS THAN THREE (3) FEET IN DEPTH SHALL BE DUCTILE IRON PIPE.

SERVICE CONNECTIONS TO THE MAIN LINES SHALL BE PERPENDICULAR TO THE MAIN LINE TO THE EDGE OF THE RIGHT-OF-WAY OR EASEMENT LINE. FOUR (4) INCH LINES SHALL HAVE A MINIMUM SLOPE OF 1.0 FT./100 FT. AND SIX (6) INCH LINES SHALL HAVE A MINIMUM SLOPE OF 0.60 FT./100 FT. CLEANOUTS SHALL BE REQUIRED ON ALL SEWER SERVICES WITH A MAXIMUM SPACING OF 75 FEET ON FOUR (4) INCH SERVICES AND 100 FEET ON SIX (6) INCH SERVICES. A CLEANOUT SHALL BE PLACED ON ALL SERVICE LINES AT THE RIGHT-OF-WAY OR AT THE EDGE OF THE EASEMENT. ALL CLEANOUTS SHALL EXTEND A MINIMUM OF SIX (6) INCHES ABOVE FINISHED GRADE OR MEET THE OPTIONAL CLEANOUT METHOD REQUIREMENTS IN ACCORDANCE WITH STANDARD DETAILS. SEWER CLEANOUTS LOCATED IN PAVED AREAS MUST HAVE CAST IRON RISERS, CAST IRON FITTINGS AND BRASS CAPS.

ALL SIX (6) INCH, OR GREATER, SERVICE CONNECTIONS SHALL BE INTO A MANHOLE UNLESS OTHERWISE APPROVED BY THE PUBLIC UTILITIES DIRECTOR.

ALL SERVICE LINES WHICH ARE CONNECTED INTO MANHOLES SHALL BE INSTALLED ON THE MANHOLE BENCH, OR HAVE LESS THAN THIRTY (30) INCHES OF CLEARANCE TO THE INVERT OF THE FLOW LINE. SERVICE LINE CONNECTIONS SHALL NOT BE INSTALLED THROUGH MANHOLE CONE SECTIONS OR AT MANHOLE JOINTS. THE USE OF WYES IN THE LINE IS PREFERRED OVER THE USE OF SERVICE SADDLES.

7.05 TESTING AND INSPECTION

ALL MATERIALS USED MUST HAVE PRELIMINARY INSPECTION BY THE CONSTRUCTION INSPECTOR BEFORE MATERIALS ARE USED FOR THE CONSTRUCTION PURPOSES. REJECTION OF MATERIAL NOT MEETING THESE SPECIFICATIONS WILL BE ORDERED AND SUCH MATERIALS SHALL BE IMMEDIATELY REMOVED FROM THE JOB.

SANITARY SEWER LINES SHALL BE FREE AND CLEAN FROM OBSTRUCTIONS AND SHALL BE VISUALLY INSPECTED FROM EVERY MANHOLE TO ENSURE ALL LINES EXHIBIT A FULLY CIRCULAR PATTERN. LINES WHICH DO NOT EXHIBIT A TRUE LINE AND GRADE OR HAVE STRUCTURAL DEFECTS SHALL BE CORRECTED. SANITARY SEWER SERVICE CONNECTIONS SHALL BE VISUALLY INSPECTED PRIOR TO BACK FILLING.



**STANDARD DETAIL AND
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THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, AND EQUIPMENT TO PERFORM ALL TESTING TO THE SATISFACTION OF THE CONSTRUCTION INSPECTOR. WATER FOR TESTING WILL BE PROVIDED BY THE TOWN OF SMITHFIELD.

SEE SECTION 7.01C FOR ADDITIONAL TESTING REQUIREMENTS FOR SEMI-RIGID PIPE.

THE LOW-PRESSURE AIR TESTING SHALL BE PERFORMED BEFORE ALL LATERALS OR STUBS ARE INSTALLED ON THE LINE AND AFTER THE MAIN HAS BEEN BACKFILLED TO FINISHED GRADE. PLUGS SHALL BE INSTALLED AT EACH MANHOLE TO SEAL OFF THE TEST SECTION. THE LINE WILL BE PRESSURIZED WITH A SINGLE HOSE AND MONITORED BY A SEPARATE HOSE CONNECTION FROM THE PLUG. AIR THEN SHALL BE SLOWLY INTRODUCED INTO THE SEALED LINE UNTIL THE INTERNAL AIR PRESSURE REACHES 4.0 PSIG. THE AIR PRESSURE SHALL THEN BE ALLOWED TO STABILIZE FOR A MINIMUM OF 2 MINUTES AT NO LESS THAN 3.5 PSIG. WHEN THE PRESSURE REACHES 3.5 PSIG, THE TIME REQUIRED FOR THE PRESSURE TO DROP 1.0 PSI WILL BE OBSERVED AND RECORDED. THE LINE SHALL BE TERMED "ACCEPTABLE" IF THE PRESSURE DOES NOT DROP MORE THAN FOR THE TEST IN THE TOWN OF SMITHFIELD STANDARD DETAILS FOR AIR TEST TABLE.

IF THE SECTION FAILS TO MEET THESE REQUIREMENTS, THE SOURCE OF LEAKAGE SHALL BE DETERMINED AND REPAIRED. THE PIPE SECTION SHALL BE RETESTED AND MEET THE SPECIFIED REQUIREMENTS.

7.06 REPAIR OF SANITARY SEWER LINES

THE REPAIR OF DAMAGED SANITARY SEWER LINES SHALL BE AS FOLLOWS:

VC PIPE – REPLACE DAMAGED SECTION WITH PVC PIPE AND INSTALL A FERNCO COUPLING AT EACH END.

PVC PIPE – REPLACE DAMAGED SECTION WITH PVC PIPE AND INSTALL A FERNCO COUPLING AT EACH END.

DIP PIPE – REPLACE DAMAGED SECTION WITH DIP PIPE AND INSTALL A FERNCO COUPLING AT EACH END.

ALL OTHER TYPES OF PIPE SHALL BE REPLACED FROM MANHOLE TO MANHOLE (ENTIRE RUN) WHEN DAMAGE OCCURS. THE REPLACEMENT PIPE SHALL BE EITHER DIP OR PVC, AS CONDITIONS WARRANT.

ALL REPAIRS TO ABANDONED SANITARY SEWER LINES SHALL BE BACKFILLED WITH ABC STONE (CRUSHER RUN) TO A DENSITY OF 95 PERCENT STANDARD PROCTOR.

7.07 WASTEWATER PUMP STATIONS

SIZING, DESIGN, AND APPROVED MANUFACTURERS OF WASTEWATER PUMP STATIONS WHICH ARE TO BE MAINTAINED BY THE TOWN SHALL BE AS DETERMINED BY THE PUBLIC UTILITIES DIRECTOR. ALL PUMP STATIONS THAT WILL BE PRIVATELY OPERATED AND MAINTAINED MUST MEET THE NORTH CAROLINA BUILDING CODE IN ADDITION TO ANY OTHER SPECIFICATIONS REQUIRED BY THE TOWN.

7.08 STEP SYSTEM

SEPTIC TANK EFFLUENT PUMP SYSTEMS SHALL BE APPROVED ON A CASE BY CASE BASIS BY THE PUBLIC UTILITIES DIRECTOR.

END OF SECTION 7.00



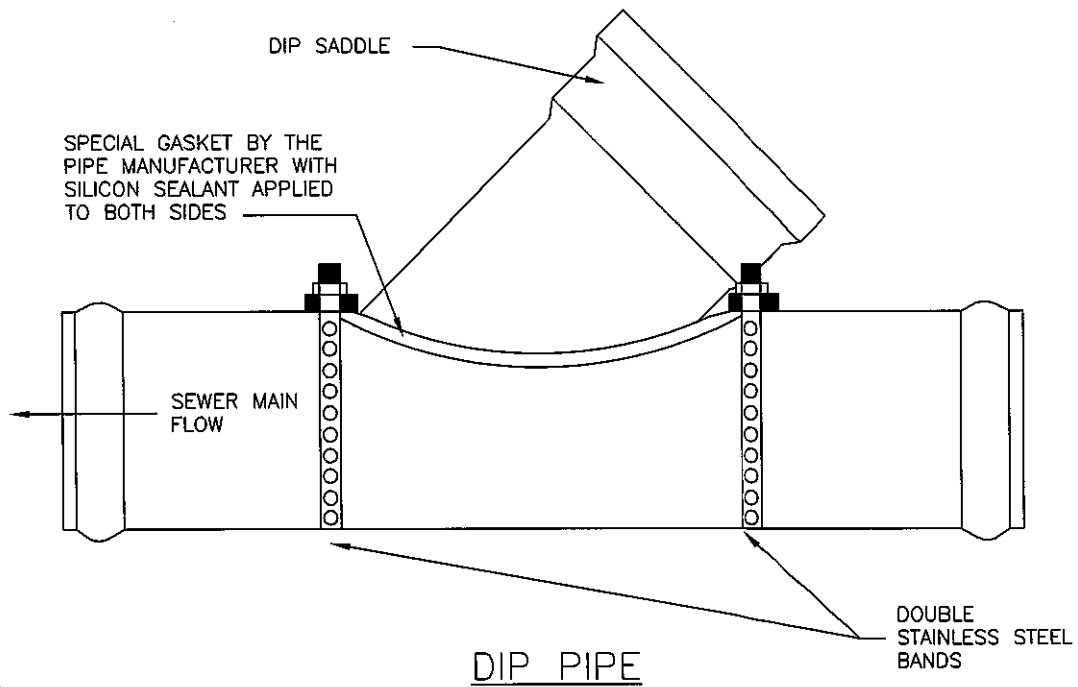
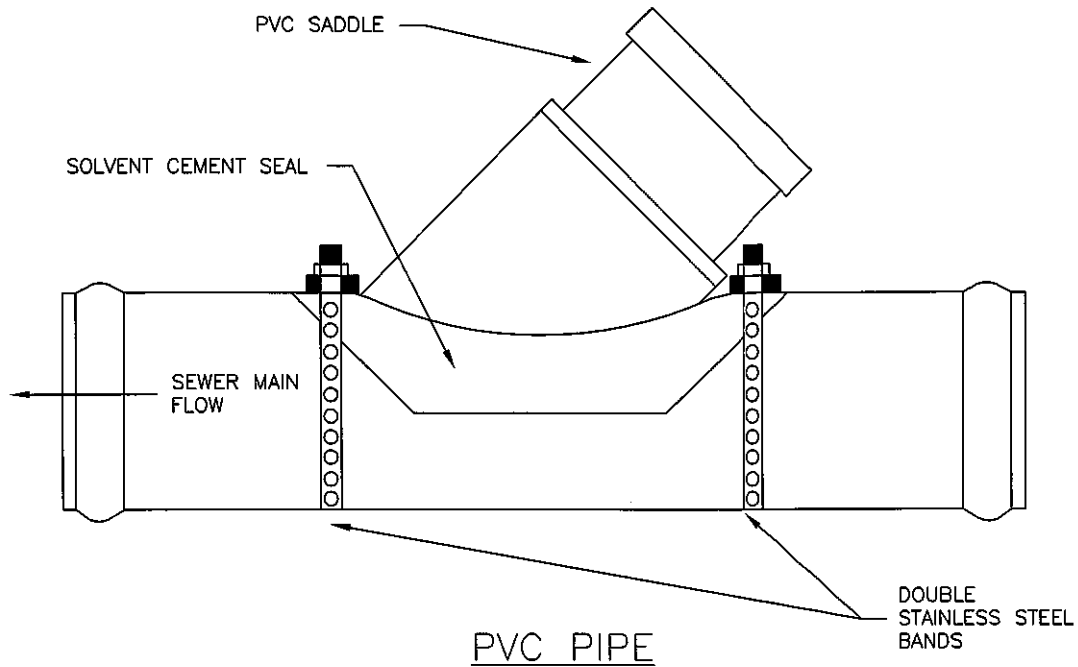
STANDARD DETAIL AND SPECIFICATIONS MANUAL

SMITHFIELD, NORTH CAROLINA
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NOTES:

1. IN LINE WYE'S TO BE USED WHERE POSSIBLE ON NEW CONSTRUCTION AND REPAIR PROJECTS
2. PVC SOLVENT CEMENT SHALL BE USED FOR PVC SADDLES
3. ALL BANDS SHALL BE STAINLESS STEEL



STANDARD LATERAL
CONNECTION

SMITHFIELD, NORTH CAROLINA
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07.02

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MANHOLE RING AND COVER
(DETAIL# 7.07)

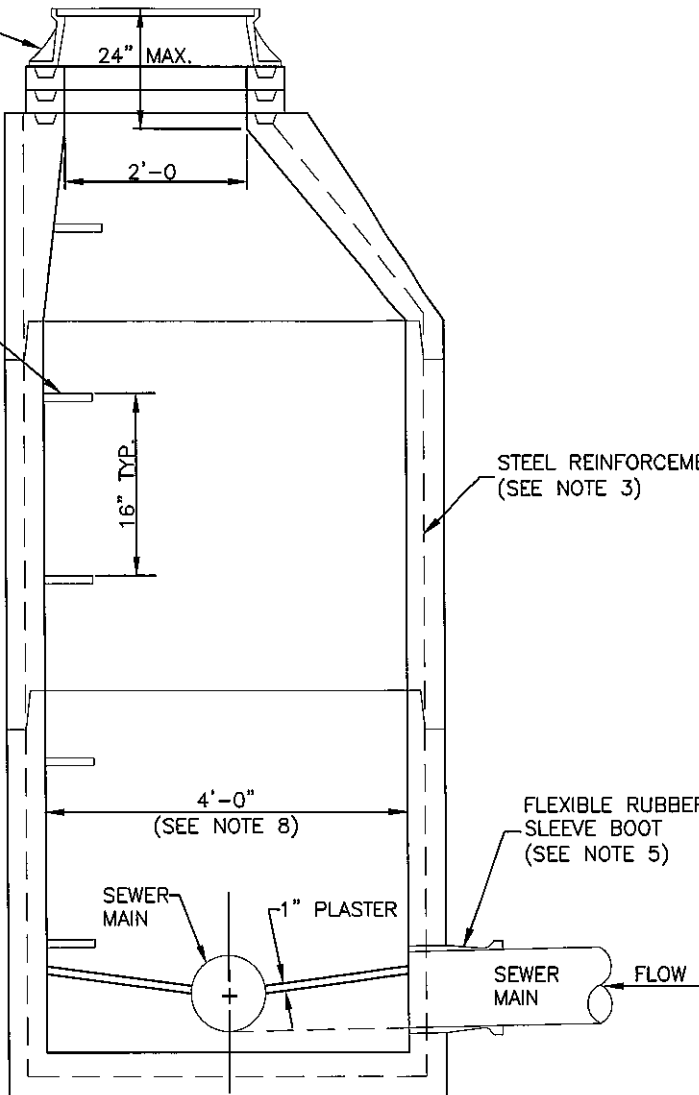
MANHOLE STEP
(DETAIL# 7.04)

STEEL REINFORCEMENT
(SEE NOTE 3)

FLEXIBLE RUBBER
SLEEVE BOOT
(SEE NOTE 5)

RIM NOTES

1. RIM ELEVATIONS SHALL BE AT GRADE IN STREETS & PARKING LOTS.
2. RIM ELEVATIONS ALONG OUTFALLS SHALL BE A MINIMUM OF 3' ABOVE EXISTING GROUND ELEVATION. IF THE OUTFALL IS LOCATED WITHIN THE FLOOD PLAIN, RIM ELEVATIONS SHALL BE 2' ABOVE THE 100-YEAR FLOOD ELEVATION (WHILE STILL MAINTAINING THE 3' ABOVE THE EXISTING GROUND ELEVATION MINIMUM REQUIREMENT). THE 100-YEAR FLOOD ELEVATION SHALL BE NOTED ON THE CONSTRUCTION DRAWINGS.



GENERAL NOTES

1. ALL PRE CAST CONCRETE MANHOLES SHALL CONFORM TO THE LATEST REVISION OF ASTM C478.
2. CONCRETE SHALL BE 4000 PSI AT 28 DAYS MINIMUM.
3. STEEL REINFORCEMENT SHALL BE GRADE 40 BILLET STEEL CONFORMING TO THE LATEST REVISION OF ASTM-A-185 FOR WALL REINFORCEMENT, AND THE LATEST REVISION OF ASTM-A615 FOR THE BASE REINFORCEMENT.
4. STANDARD JOINTS SHALL BE; SEALED WITH PUTTY TYPE PLASTIC CEMENT PER FED. SPEC. SS-C-153 OR AN O-RING TYPE JOINT CONFORMING TO THE LATEST REVISION OF ASTM-C443.
5. MANHOLE INLETS AND OUTLETS SHALL BE CAST IN PLACE FLEXIBLE RUBBER SLEEVES BOOTS PER THE LATEST REVISION OF ASTM-C923.
6. INVERTS TO BE CONSTRUCTED OF BRICK WITH A CONCRETE BENCH (DETAIL# 07.xx).
7. THE MAXIMUM SEPARATION OR INVERT IN TO INVERT OUT WITHIN A MANHOLE IS 0.50 FEET.
8. MANHOLES GREATER THAN 18 FEET IN DEPTH SHALL HAVE AN INSIDE DIAMETER OF 5'-0". FOR SANITARY SEWER MAINS GREATER THAN EIGHTEEN INCHES (18") IN DIAMETER, MANHOLES SHALL BE A MINIMUM OF 5'-0" IN DIAMETER.



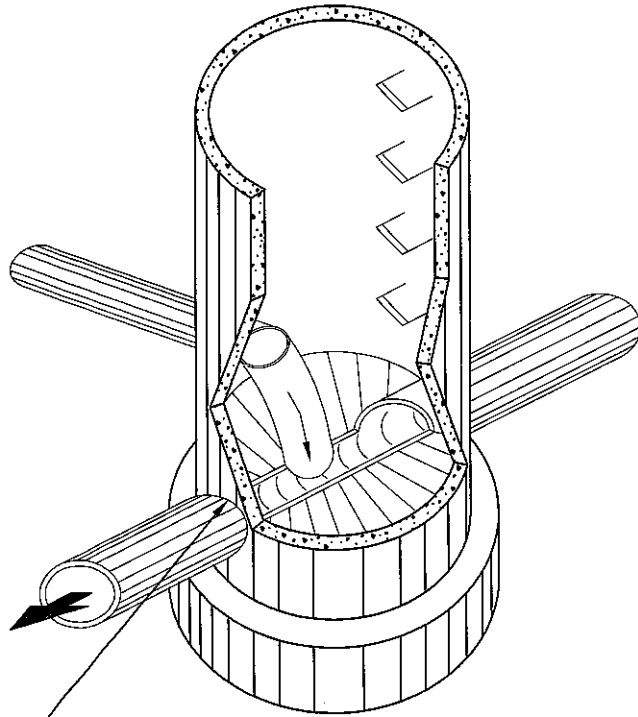
STANDARD SANITARY SEWER MANHOLE

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE:
NTS

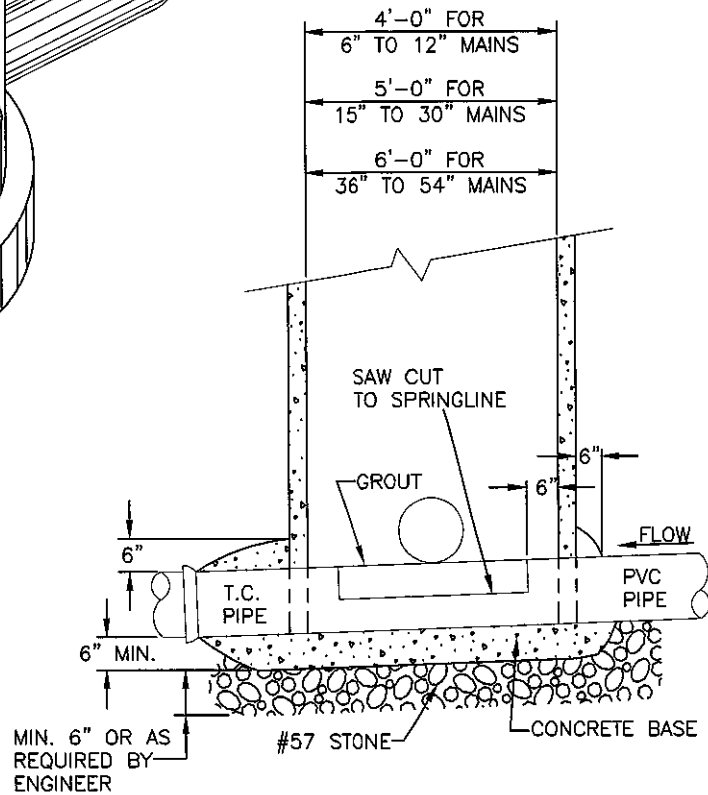
DETAIL NO.
07.03

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WATER TIGHT SEAL AROUND
EXISTING SEWER MAIN

ISOMETRIC VIEW



CROSS-SECTION

NOTES:

1. MANHOLE TO BE SET ON CONCRETE BASE AND BASE TO BE ONE POUR.
2. FOR VITRIFIED CLAY PIPE, CONCRETE SHALL BE POURED TO NEXT EXISTING JOINT (BOTH SIDES OF MANHOLE).
3. PIPE OPENING SHALL BE PRECAST BY MANUFACTURER.
4. FLOW SHALL BE MAINTAINED DURING CONSTRUCTION.
5. MINIMUM OF 4000 PSI CONCRETE REQUIRED.
6. THE CONTRACTOR SHALL PROVIDE A MINIMUM 6" COMPACTED #57 STONE BASE.
7. INVERT TO BE BUILT FROM PROPOSED PIPE TO EFFLUENT PIPE, ACCORDING TO DETAIL ON INVERTS.



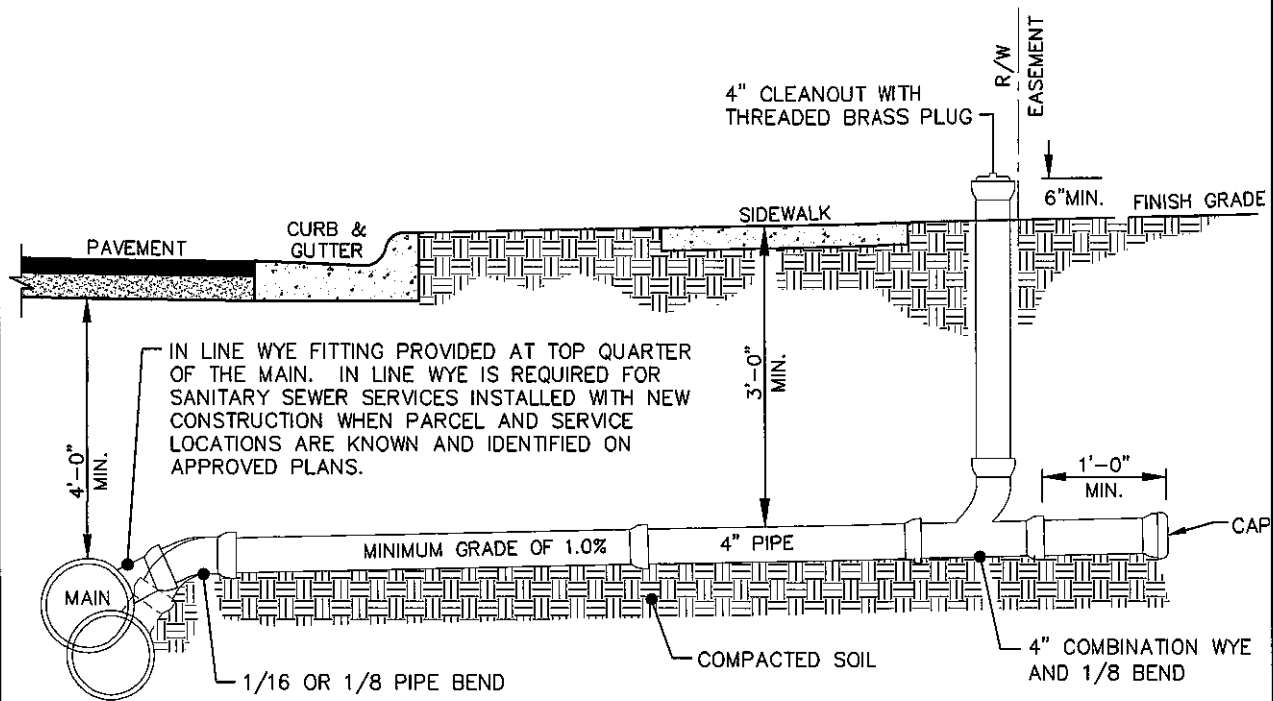
DOGHOUSE MANHOLE INSTALLED
OVER EXISTING SEWER MAIN

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

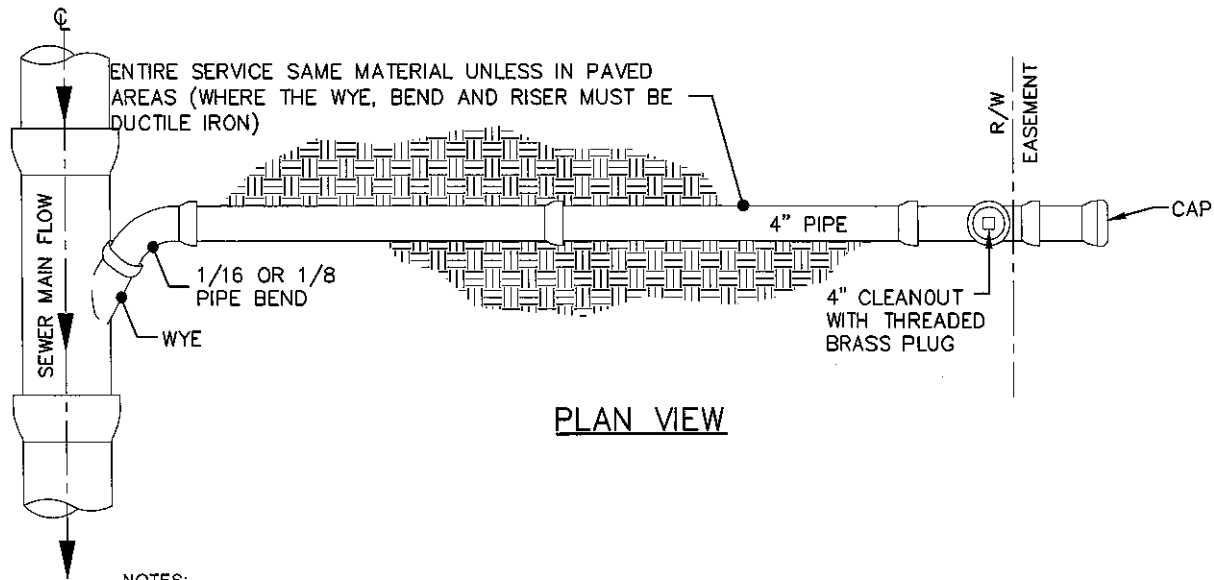
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DETAIL NO.
07.04

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SECTION VIEW



PLAN VIEW

NOTES:

1. CLEANOUT SHALL BE PLACED AT RIGHT-OF-WAY OR EDGE OF EASEMENT.
2. DO NOT INSTALL CLEANOUT INSIDE A FENCE.
3. CONNECTIONS TO 15 INCH OUTFALLS AND GREATER MUST BE MADE INTO MANHOLE.
4. MARKING TAPE SHALL BE INSTALLED FOR ALL SERVICE CONNECTIONS FROM THE MAIN LINE TO THE CLEANOUT FOR ALL NEW CONSTRUCTION OR RETROFIT INSTALLATIONS USING OPEN TRENCH METHODS.



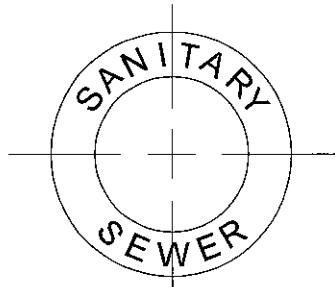
STANDARD SANITARY SEWER
TAP AND SERVICE

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE:
NTS

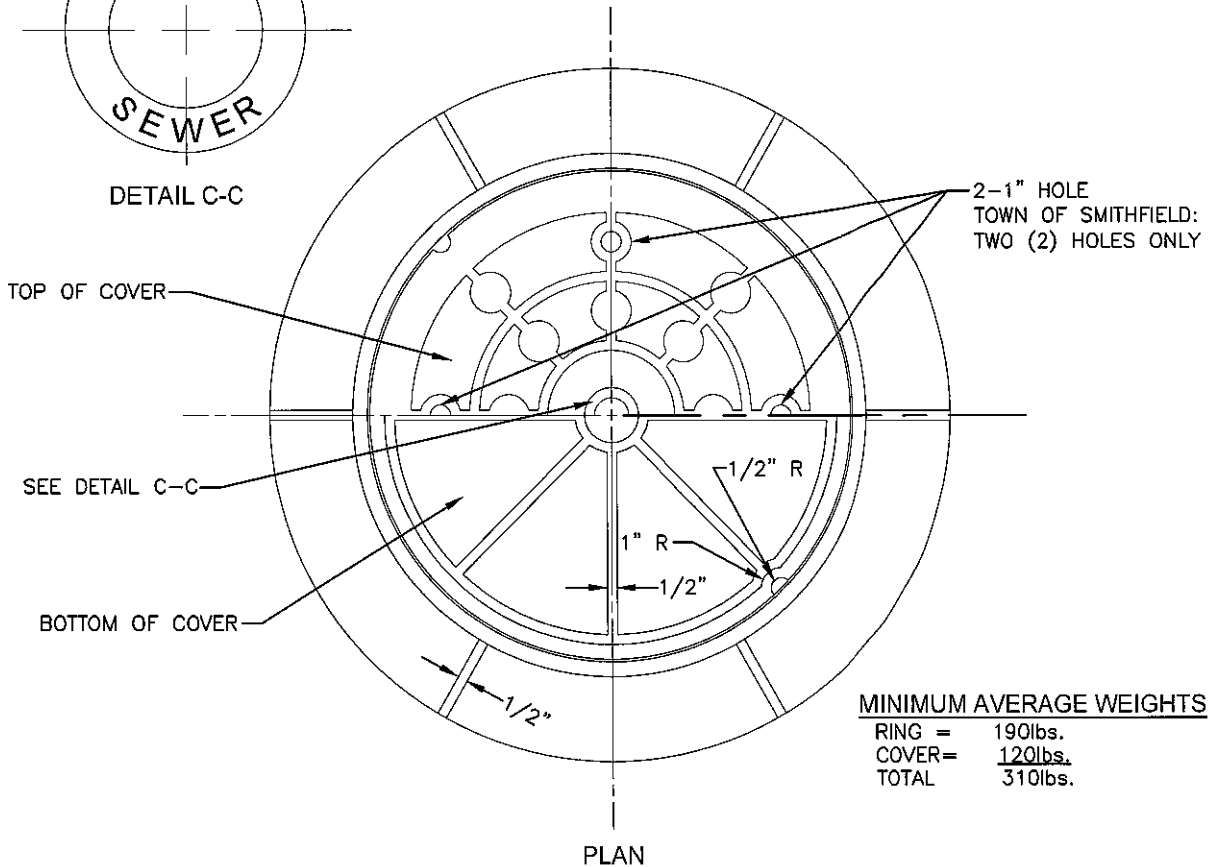
DETAIL NO.
07.05

DATE: 04/03/2018



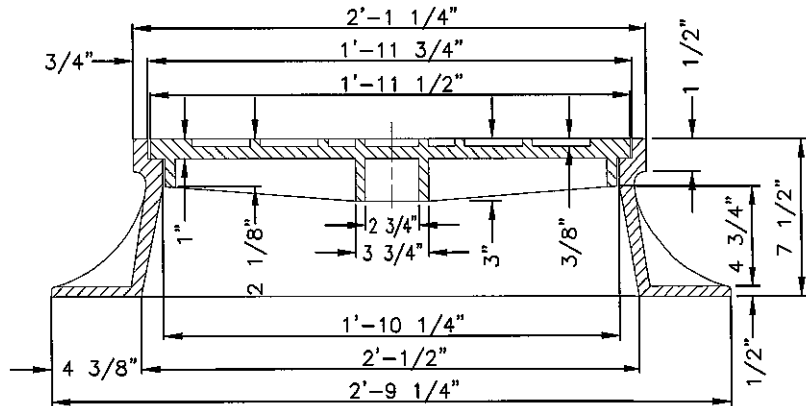
DETAIL C-C

SOLID COVER MAY BE REQUIRED
DEPENDING ON FIELD CONDITIONS



MINIMUM AVERAGE WEIGHTS

RING =	190lbs.
COVER =	120lbs.
TOTAL	310lbs.



SECTION

PROVIDE MANHOLE INSERTS MANUFACTURED FROM HIGH DENSITY POLYETHYLENE, MEETING THE REQUIREMENTS OF ASTM D-1248, CLASS A, CATEGORY 5, TYPE III. INSERTS SHALL BE EQUIPPED WITH 1 GAS RELIEF VALVE, 1 VACUUM RELIEF VALVE, A CROSS-LINKED POLYETHYLENE GASKET AND ONE HEAVY WEIGHT POLYPROPYLENE LIFTING STRAP.



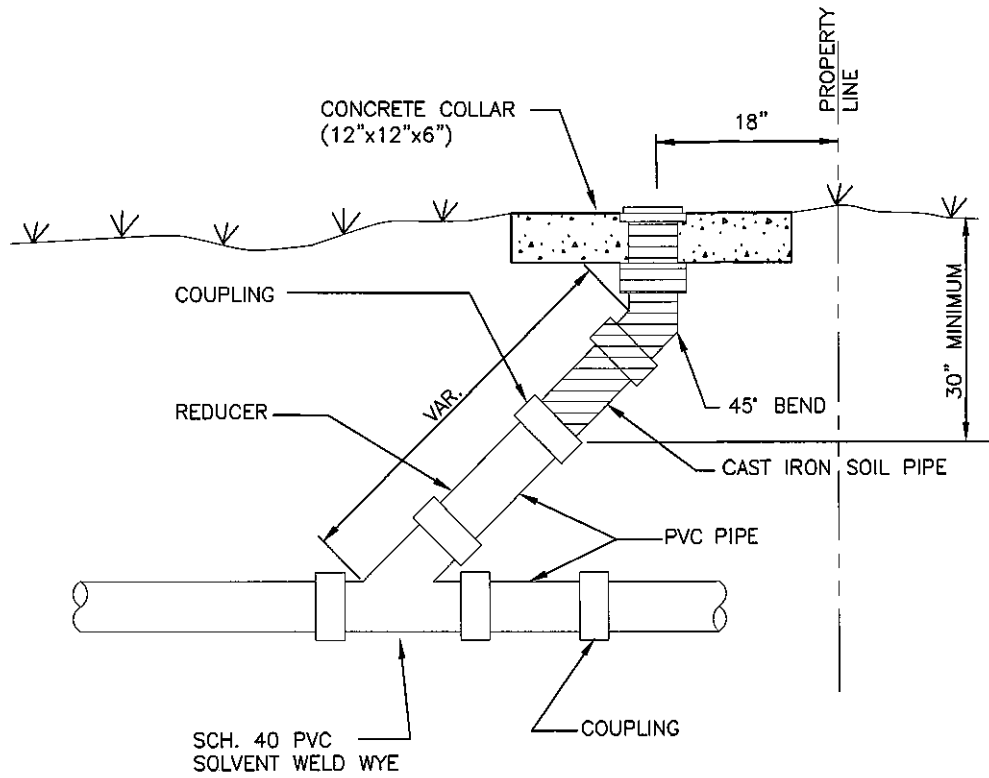
STANDARD MANHOLE
RING & COVER

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE:
NTS

DETAIL NO.
07.06

DATE: 04/03/2018



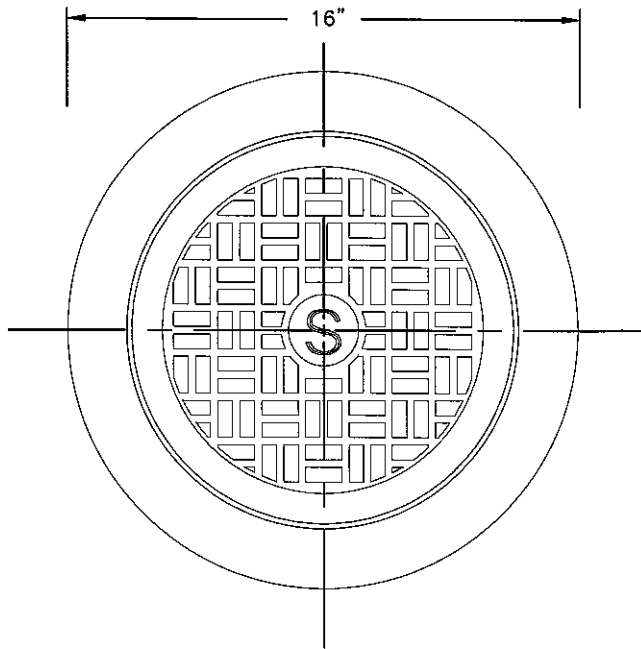
STANDARD
CLEAN OUT

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

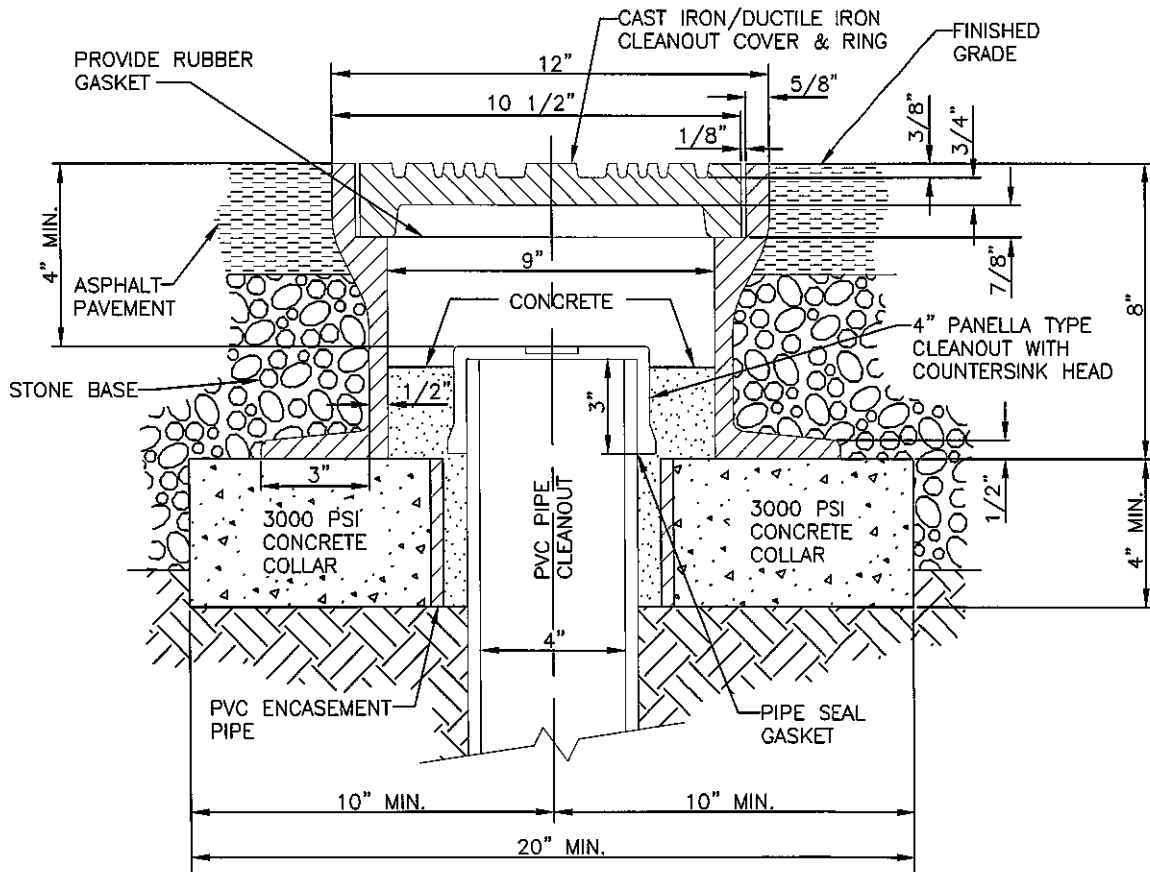
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07.07

DATE: 04/03/2018



PLAN VIEW



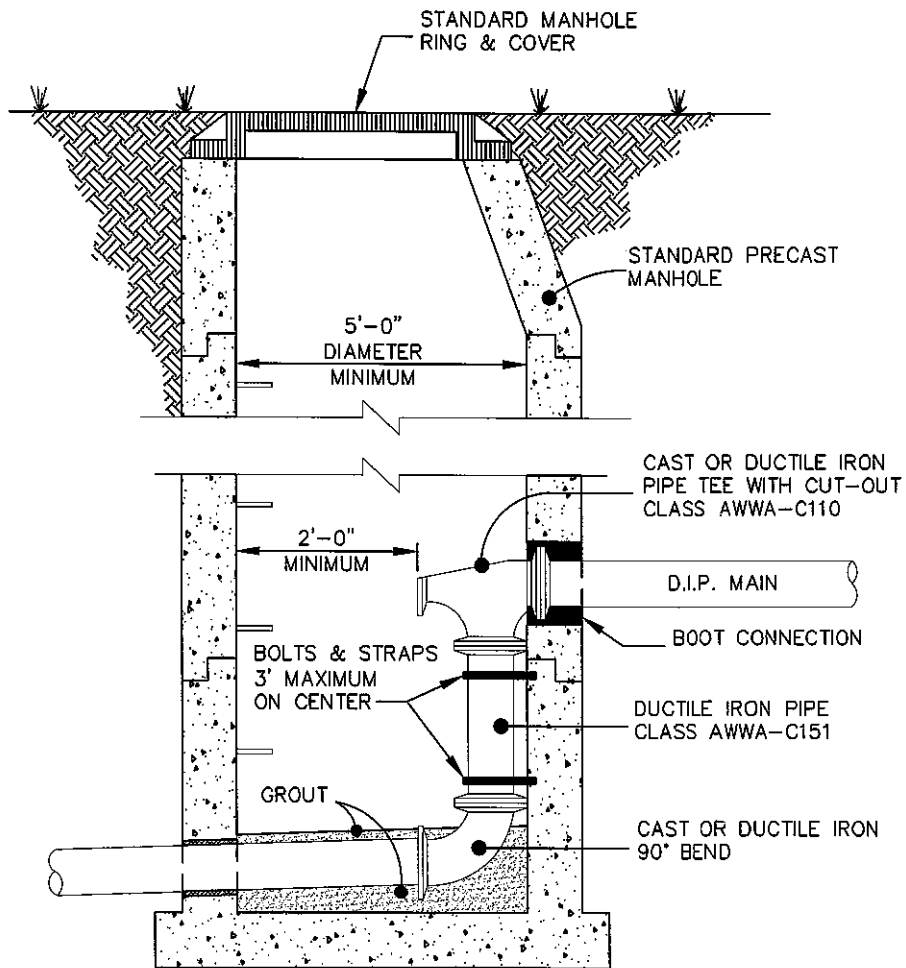
STANDARD TRAFFIC
BEARING CLEAN OUT

SMITHEFIELD, NORTH CAROLINA
PUBLIC UTILITIES

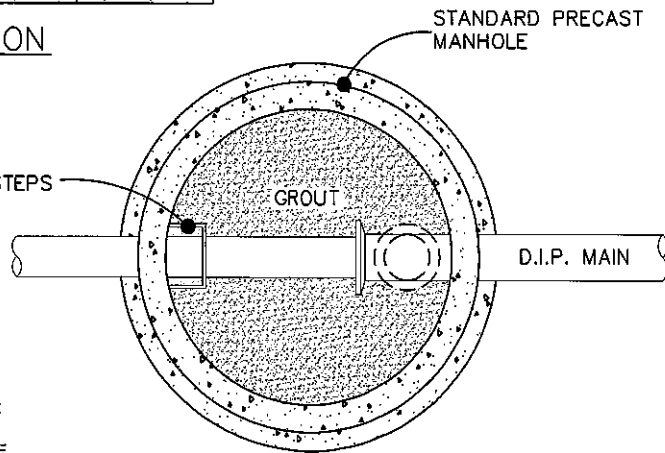
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DETAIL NO.
07.08

DATE: 04/03/2018



SECTION



PLAN VIEW

NOTES:

1. ONE INSIDE DROP ALLOWED FOR 5' MANHOLE. A LARGER MANHOLE WILL BE REQUIRED FOR MORE.
2. PIPE SIZE FOR DROP TO EQUAL INFLOW SEWER PIPE SIZE.
3. MECHANICAL JOINT OR PUSH-ON FITTINGS, ALL BELL, TO BE USED.
4. SAW-CUT OR DRILL ALL HOLES FOR PIPE AND BOLTS.
5. DROP MANHOLE MANDATORY WHEN DIFFERENTIAL BETWEEN INVERTS IS GREATER THAN 20 INCHES.
6. STAINLESS STEEL STRAPS SHALL BE USED ON ALL DROPS GREATER THAN 5 FEET AT 18 INCH INTERVALS.



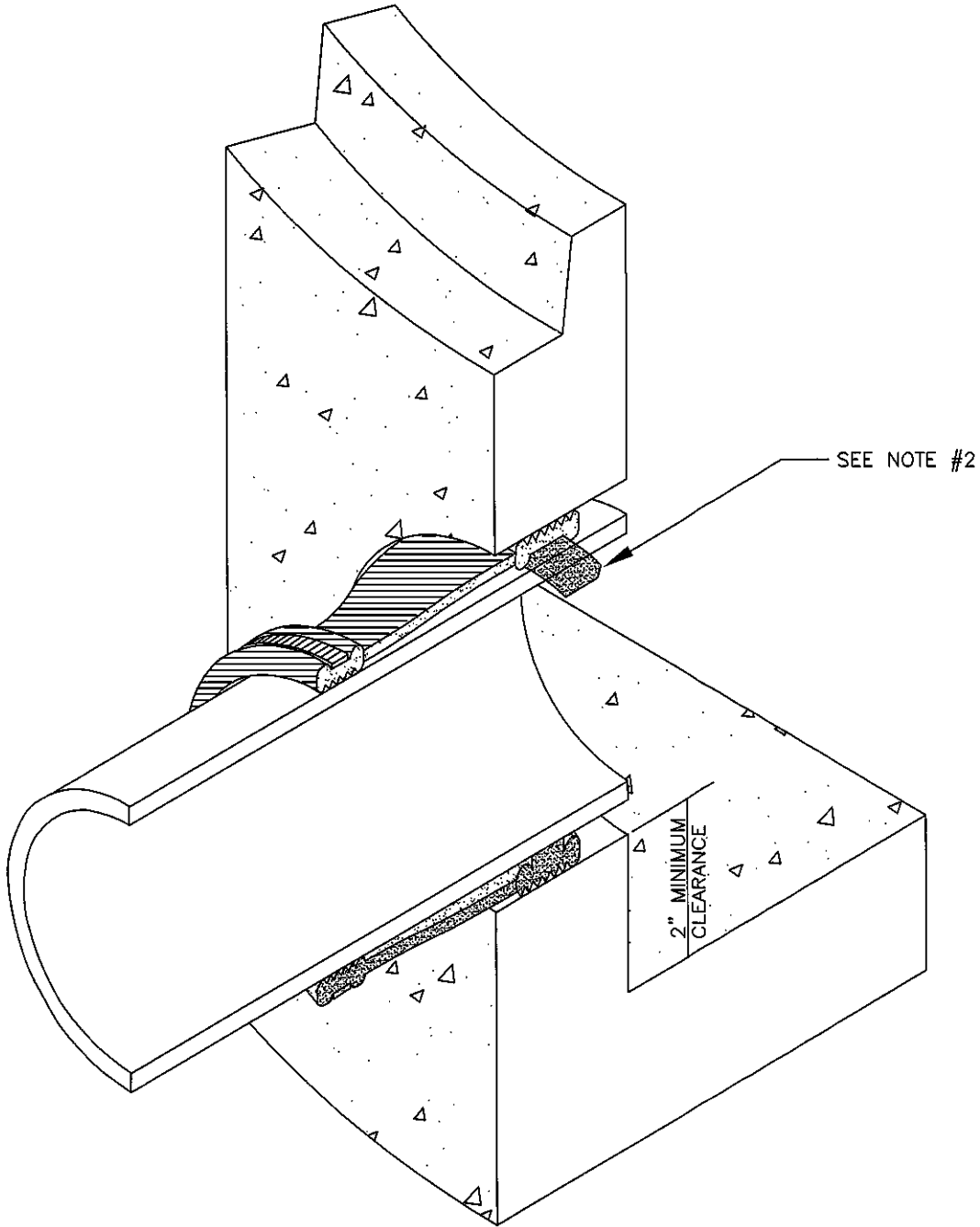
INSIDE DROP MANHOLE

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE:
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07.09

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NOTES:

1. PIPE CONNECTION DETAIL USED SHALL BE CONSISTENT WITH THE SPECIFIC PIPE SIZE, PIPE MATERIAL AND STRUCTURE.
2. FLEXIBLE CONNECTORS SHALL MEET THE REQUIREMENTS OF ASTM C923 SPECIFICATIONS FOR RESILIENT CONNECTORS BETWEEN REINFORCED CONCRETE MANHOLE STRUCTURES, PIPES AND LATERALS.



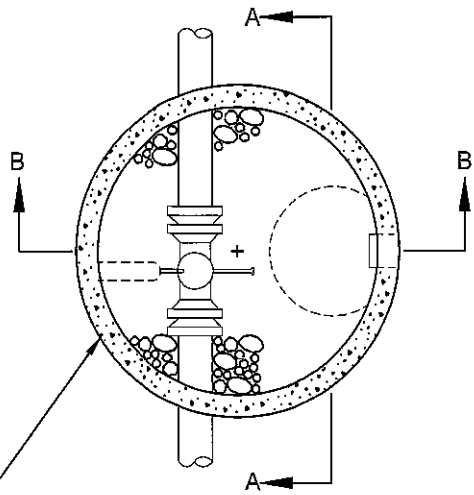
STANDARD CORE
& BOOT DETAIL

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE:
NTS

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07.11

DATE: 04/03/2018



PLAN

5'-0" I.D. PRECAST DOGHOUSE
CONCRETE MANHOLE W/FLAT TOP.
SEE SPECS. FOR MANUFACTURE
REQUIREMENTS

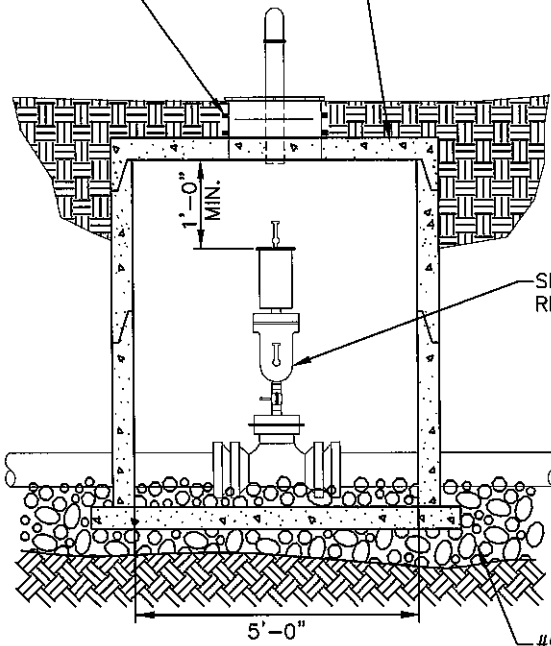
GRADE RINGS OR
ADJUST TO GRADE
W/BRICK AND
MORTAR - 8" MAX.

DUCTILE IRON
RETURN BEND
W/INSECT SCREEN

ADD 4" STATIC AIR
VENT WHERE REQ.D

GROUT AS REQUIRED

MANHOLE COVER
AND FRAME



SECTION A-A

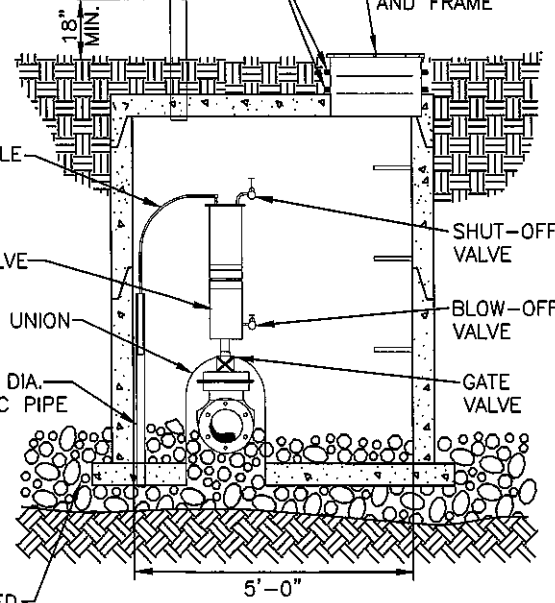
FLEXIBLE
HOSE

SEWAGE AIR
RELEASE VALVE

UNION

3" DIA.
PVC PIPE

#57 CRUSHED
STONE



SECTION B-B

SHUT-OFF
VALVE

BLOW-OFF
VALVE

GATE
VALVE



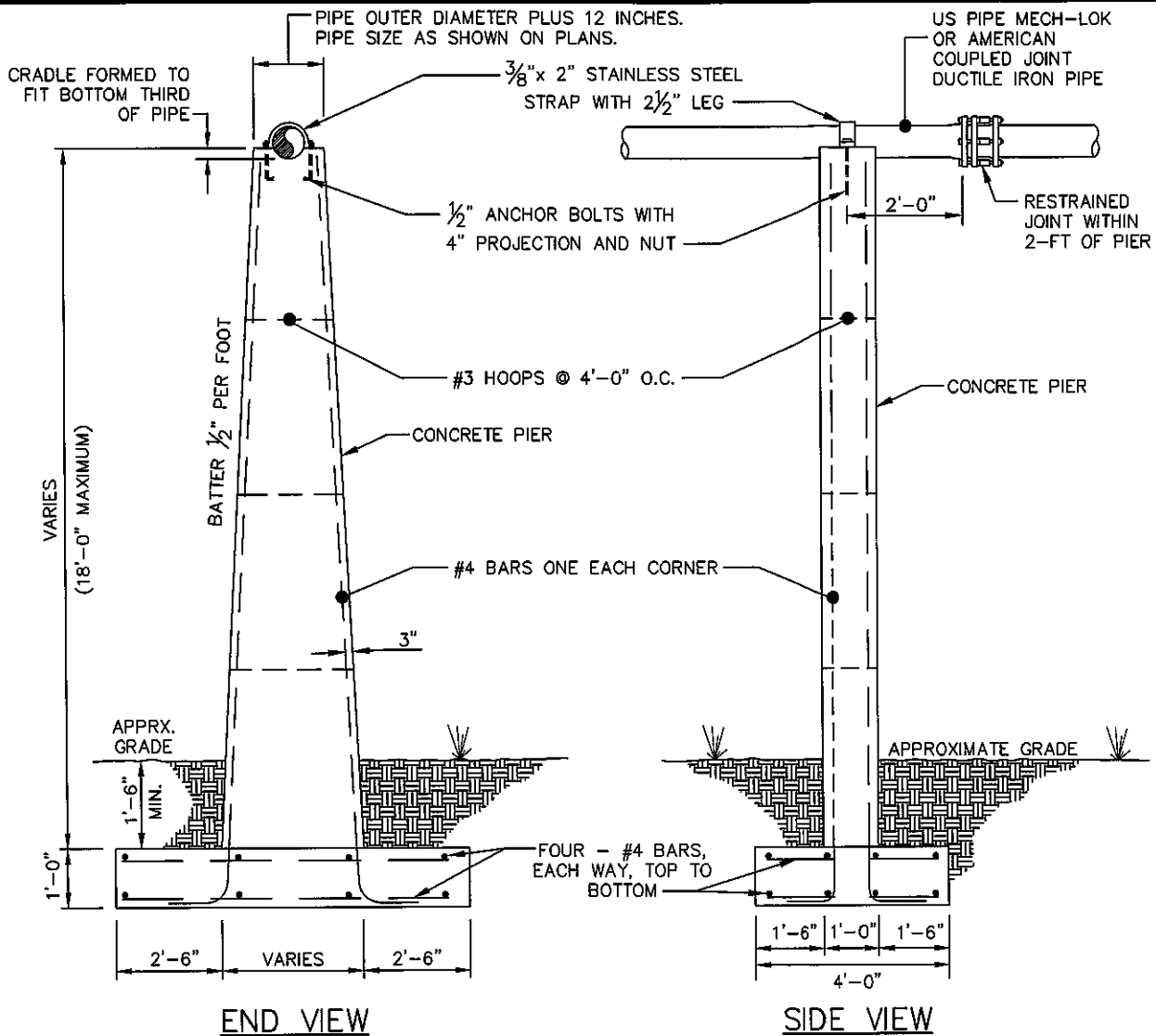
AIR RELEASE VALVE

SMITHEFIELD, NORTH CAROLINA
PUBLIC UTILITIES

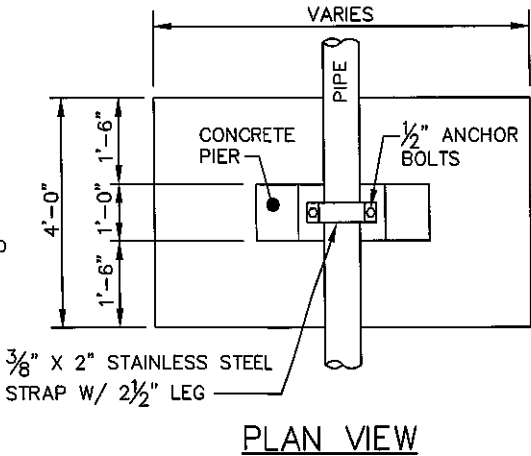
SCALE:
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DATE: 04/03/2018



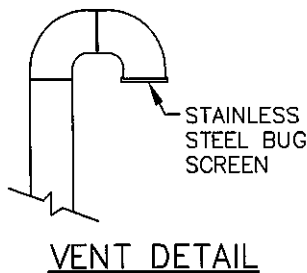
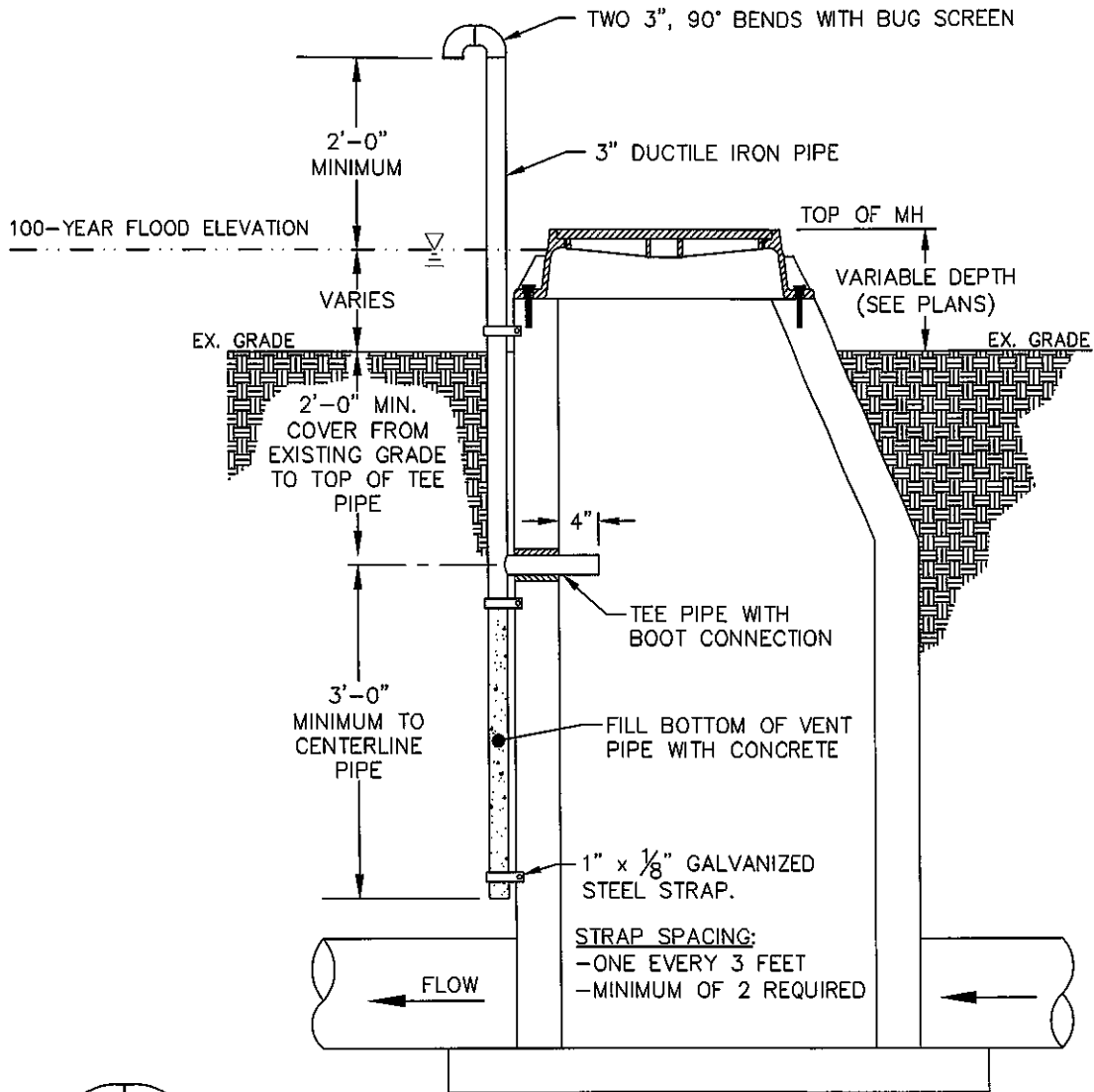
- NOTES:**
1. PIERS OVER 3 FEET IN HEIGHT TO BE REINFORCED.
 2. BOTTOM OF PIPE MUST BE A MINIMUM OF 24 INCHES ABOVE NORMAL WATER LEVEL BUT NO LOWER THAN THE 25-YEAR FLOOD ELEVATION.
 3. CAST-IN-PLACE CONCRETE SHALL BE FIELD TESTED.
 4. AT A MINIMUM, ONE PIER MUST BE INSTALLED EVERY 20 FEET OR AS DIRECTED BY THE TOWN ENGINEER.
 5. FOOTING DESIGN SHALL BE CONFIRMED BY LICENSED N.C. PROFESSIONAL ENGINEER.
 6. SUBSURFACE CONDITIONS SHALL BE CONFIRMED BY LICENSED N.C. GEOTECH ENGINEER TO VERIFY LOADING.
 7. PRECAST PIERS REVIEWED ON CASE BY CASE BASIS
 8. PIPE SHALL BE PROTECTO 401 LINED FROM MANHOLE TO MANHOLE.
 9. STEEL SHALL BE GRADE 40.
 10. CONCRETE SHALL BE 3,000 PSI OR GREATER



**STANDARD AERIAL
CROSSING**

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE: NTS
DETAIL NO. 07.14
DATE: 04/03/2018



NOTES:

1. VENT PIPE OPENING IN PRECAST CONCRETE MANHOLE WALL SHALL BE CORED WITH A CONCRETE CORING MACHINE.
2. LOCATION OF VENT PIPE SHALL BE AS DIRECTED BY THE UTILITY DIRECTOR OR W/S SUPERINTENDENT WITH WATERTIGHT RING AND COVER VENT TOP TO BE ELEVATED AT LEAST 24 INCHES ABOVE THE 100 YEAR FLOOD PLAIN ELEVATION.



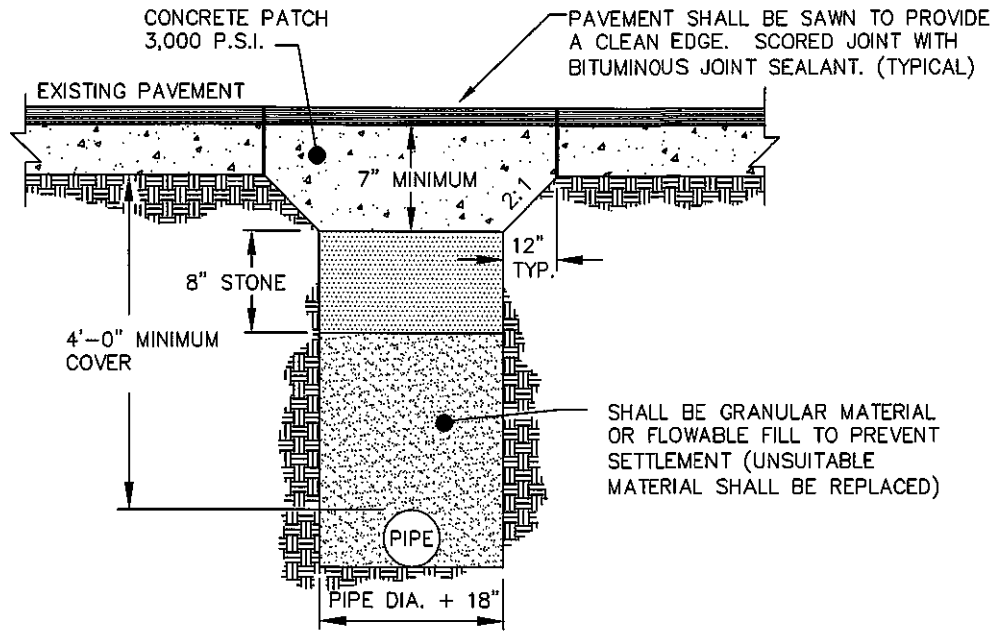
TYPICAL MANHOLE
VENTING DETAIL

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

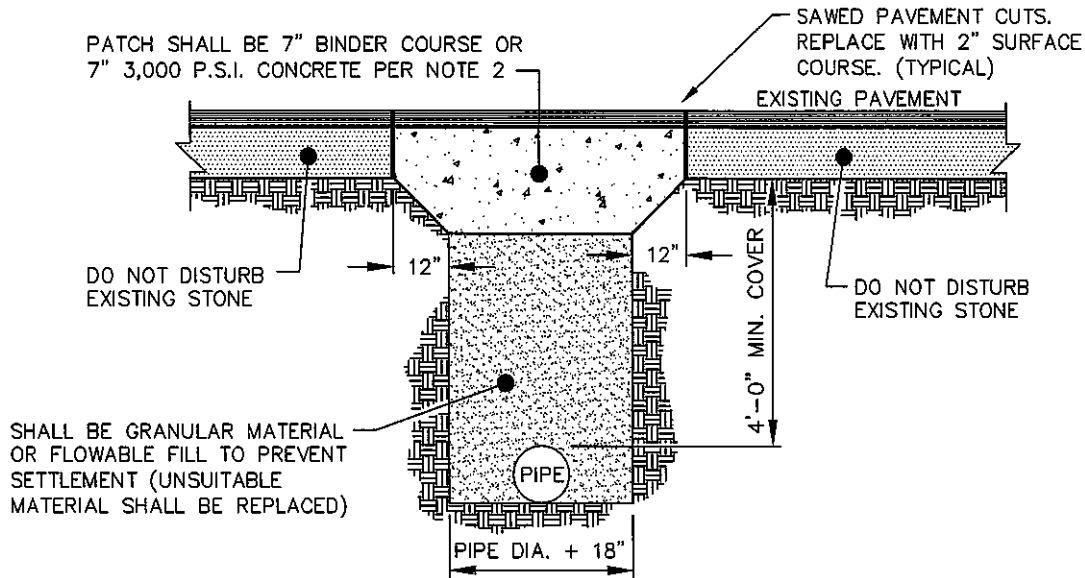
SCALE:
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DETAIL NO.
07.15

DATE: 04/03/2018



CONCRETE PAVEMENT



ASPHALT PAVEMENT

NOTES:

1. ALL PAVEMENT CUTS SHALL BE REPAIRED WITHIN A MAXIMUM OF THREE (3) DAYS FROM THE DATE THE CUT IS MADE.
2. CONCRETE TRENCH CAP ON ASPHALT STREETS SHALL BE USED ONLY DURING INCLEMENT WEATHER WHEN ASPHALT PLANTS ARE NOT OPERATING.
3. IN ALL OPEN TRENCHES, BACKFILL SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING COMPACTION REQUIREMENTS BY SOILS TESTING CERTIFIED BY A LICENSED PROFESSIONAL GEOTECHNICAL ENGINEER.
4. BACKFILL WITH A HIGH CLAY CONTENT, HIGH SHRINK-SWELL POTENTIAL, OR HIGH MOISTURE CONTENT THAT CANNOT MEET COMPACTION REQUIREMENTS SHALL BE DEEMED UNSUITABLE AND SHALL BE REPLACED WITH SUITABLE BACKFILL MATERIAL.
5. ALL PAVEMENT PATCHES SHALL PROVIDE A UNIFORM AND SMOOTH DRIVING SURFACE.



**BEDDING FOR SANITARY
SEWER PIPE**

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

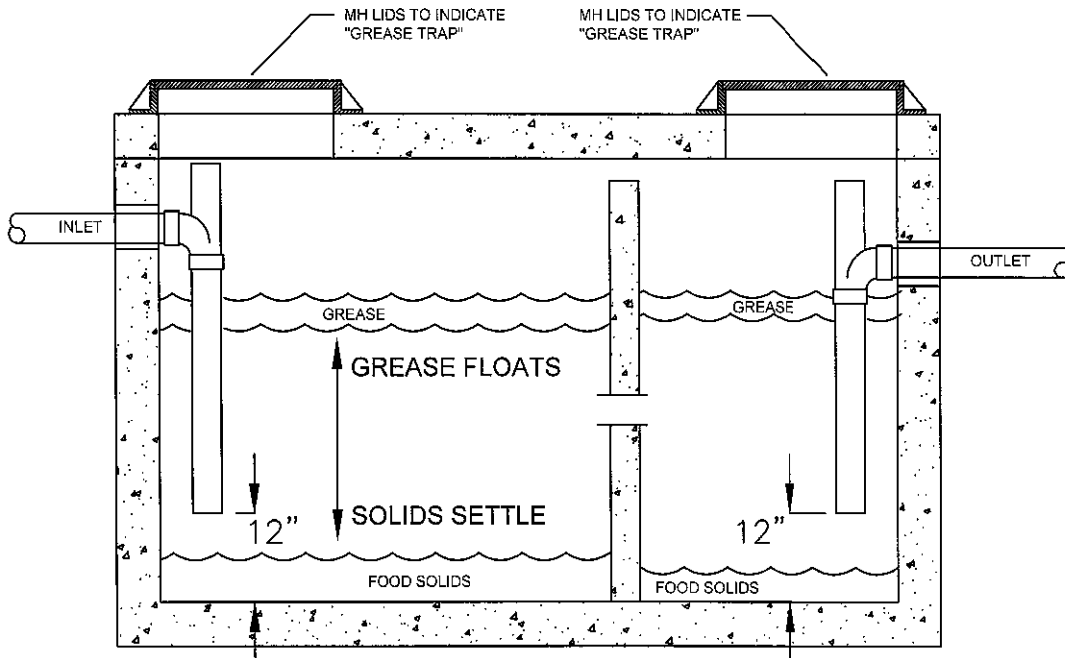
SCALE:
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DETAIL NO.
07.16

DATE: 04/03/2018

NOTES:

1. A 1,000 GALLON GREASE TRAP FOR ALL NEW FOOD ESTABLISHMENTS. PLEASE REFER TO THE TOWN OF SMITHFIELD CODE OF ORDINANCES SECTION 18-135.
2. CONTRACTOR TO BRING RINGS & COVERS TO GRADE
3. THE GREASE TRAP SHALL BE PLUMBED TO RECEIVE WASTE ASSOCIATED WITH FOOD HANDLING ONLY. NO TOILET WASTE. THE FOLLOWING SHALL NOT BE DISCHARGED INTO ANY FATS, OIL, AND GREASE REMOVAL SYSTEM, UNLESS SPECIFICALLY AUTHORIZED IN WRITING BY THE POTW DIRECTOR:
 - a. WASTE THAT DOES NOT CONTAIN FATS, OIL, GREASE, OR THAT OTHERWISE DOES NOT REQUIRE TREATMENT;
 - b. WASTEWATER FROM DISHWASHING MACHINES OR WASTEWATER WITH TEMPERATURE EXCEEDING 150° F;
 - c. GROUND RESIDUE FROM FOOD WASTE GRINDERS AND GARBAGE DISPOSAL; OR
 - d. SANITARY WASTE
4. THE GREASE TRAP MUST CONTAIN THE FOLLOWING (SEE FIGURE BELOW):
 - a. INLET AND OUTLET SANITARY TEES MUST EXTEND WITHIN 12 INCHES OF THE BOTTOM OF THE TRAP AND ABOVE THE WATER SURFACE TO PROVIDE AIR RELIEF.
 - b. THE OUTLET TEE MUST BE AT LEAST 6 INCHES IN DIAMETER.
 - c. ACCESS MANHOLES, WITH A MINIMUM DIAMETER OF 24 INCHES, SHALL BE PROVIDED OVER EACH CHAMBER AND SANITARY TEE. THE ACCESS MANHOLES SHALL EXTEND AT LEAST TO FINISHED GRADE AND BE DESIGNED AND MAINTAINED TO PREVENT SURFACE WATER INFILTRATION. THE MANHOLES SHALL ALSO HAVE READILY REMOVABLE COVERS TO FACILITATE INSPECTION AND GREASE REMOVAL.
5. MANHOLE LIDS TO BE MANUFACTURED BY A FOUNDRY LOCATED IN THE UNITED STATES. LIDS WILL BE LABELED TO INDICATE "GREASE TRAP".
6. USE 1" Ø BUTYL RUBBER SEALANT IN JOINT.



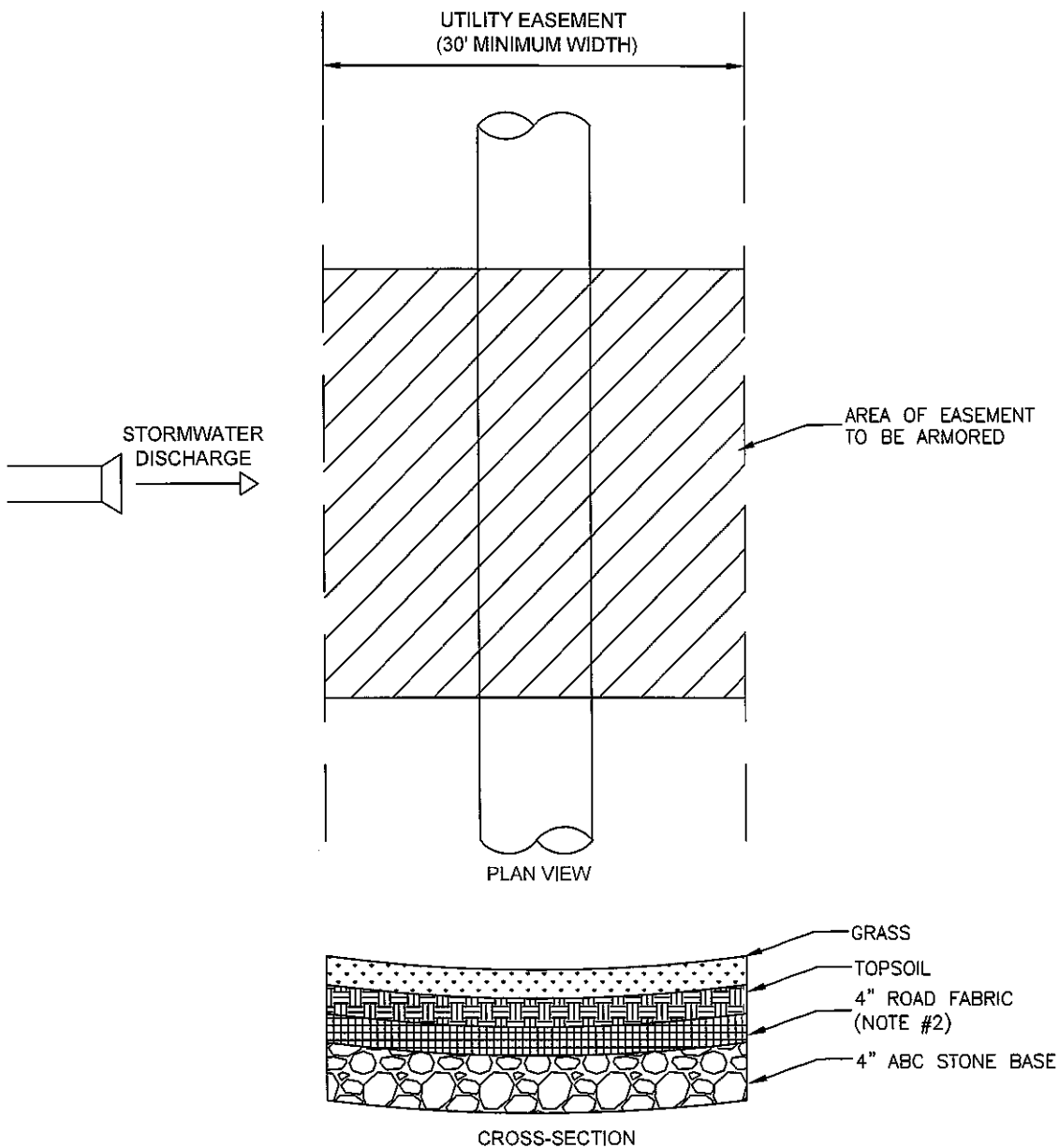
STANDARD GREASE
INTERCEPTOR

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE:
NTS

DETAIL NO.
07.50

DATE: 04/03/2018



NOTES:

1. THE ARMOR FOR THE EASEMENT SHALL BE WIDE ENOUGH TO ENCOMPASS THE ENTIRE FLOW ACROSS THE EASEMENT.
2. PROVIDE MIRAFI X-SERIES WOVEN POLYPROPYLENE GEOTEXTILES (500X PRODUCT) ROAD FABRIC OR APPROVED EQUAL.
3. ARMOR FOR THE EASEMENT SHALL BE INSTALLED EVEN IF LEVEL SPREADERS ARE INSTALLED FOR THE STORM DRAINAGE DISCHARGE.



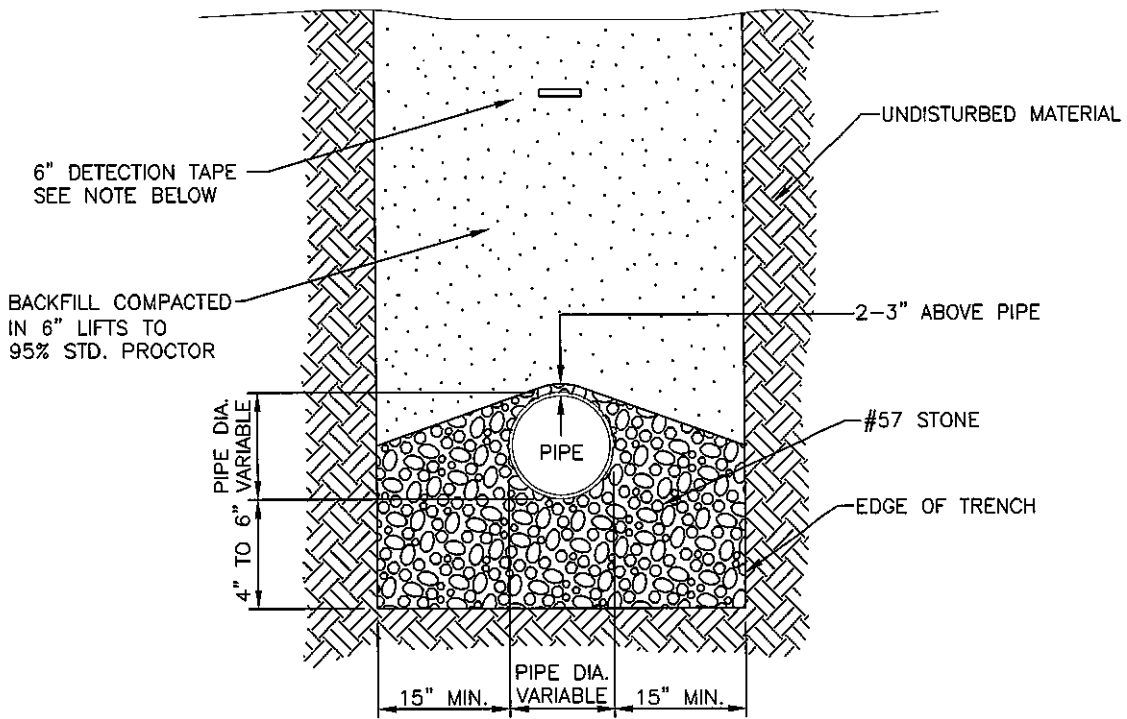
UTILITY EASEMENT ARMORING

SMITHFIELD, NORTH CAROLINA
PUBLIC UTILITIES

SCALE:
NTS

DETAIL NO.
07.57

DATE: 04/03/2018



NOTE:
 ALL SANITARY SEWER LATERALS SHALL BE MARKED BY 6" MAGNATEC DETECTABLE TAPE, LABELED "CAUTION SEWER LINE BELOW" (OR APPROVED EQUAL). DETECTION TAPE TO BE CENTERED ABOVE PIPE AND BURIED BETWEEN 6" AND 12" BELOW FINAL GRADE.



DETECTION OF UNDERGROUND
 LATERALS

SMITHFIELD, NORTH CAROLINA
 PUBLIC UTILITIES

SCALE:
 NTS

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 07.58

DATE: 04/03/2018