

Standard Sewer Detail Drawings

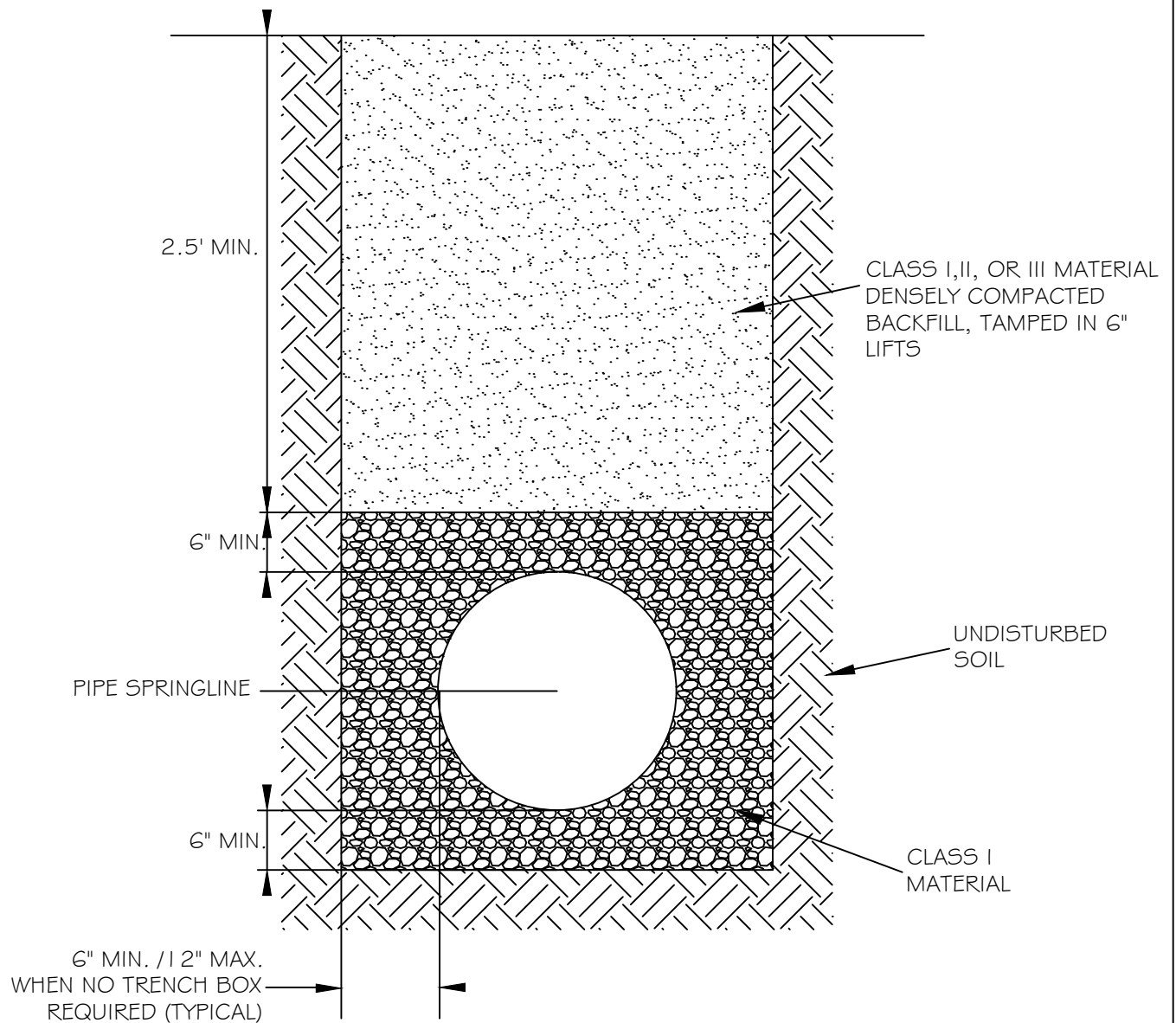
S-1	Standard Bedding for RCP
S-2	Standard Concrete Pavement Patch
S-3	Standard Asphalt Pavement Patch
S-4	Trench Bottom Dimensions & Backfilling Requirements for DIP and RCP
S-5	Trench Bottom Dimensions and Backfilling Requirements for PVC Gravity Sewer Main
S-6	Thrust Blocking Design Data for Sewer Force Main
S-6a	Thrust Blocking Design Data for PVC Sewer Force Main
S-7	Standard Thrust Blocking Views
S-8	Standard Main Marker for Sewer Force Mains In Easements
S-9	Standard Sewer Force Main Air Release Valve
S-10	Aerial Pipe Crossing General Notes
S-11	Aerial Pipe Crossing Typical Plans
S-12	Aerial Pipe Crossing Steel Casing Pipe Elevation
S-13	Aerial Pipe Crossing Typical Pipe Section & Elevation
S-14	Aerial Pipe Crossing Concrete Pier
S-15	Aerial Pipe Crossing Pile Cap
S-16	Aerial Pipe Crossing Pile Supported Pier
S-17	Aerial Pipe Crossing Concrete Pier on Bedrock
S-18	Aerial Pipe Crossing Casing Pipe
S-19	Aerial Pipe Crossing Concrete Support
S-20	Standard Pre-cast Sanitary Sewer Manhole
S-21	Extended Bases or Cast-in-Place Reinforced Concrete Base
S-22	Standard Manhole Installation over Existing Sewer Main
S-23	Standard High Velocity Manhole Invert
S-24	Standard Seal Tight Manhole w/ Vented Stack

Standard Sewer Detail Drawings

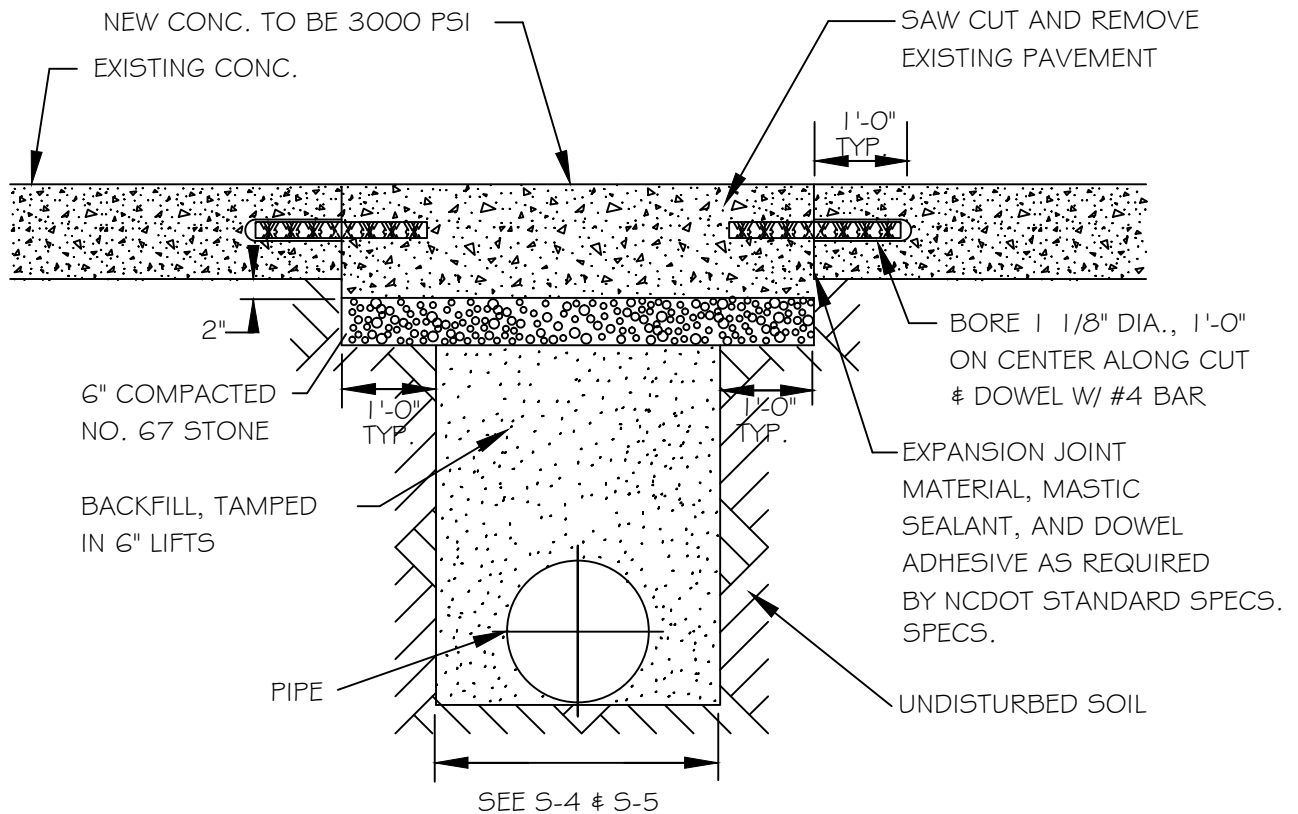
S-25	Standard Manhole Cover
S-25a	Flat Top Manhole Cover
S-26	Manhole Frame and Watertight Cover
S-27	Watertight Manhole Frame with Cam Lock Cover
S-28	Standard Slip Resistant Manhole Step Detail
S-29	Standard Slip Resistant Manhole Step Detail within Paved Surfaces
S-30	Typical Sanitary Sewer Lateral Connection
S-31	Lateral Saddle Installation Detail for PVC Pipe
S-32	Lateral Saddle Installation Detail for VCP and DIP
S-33	Main Extension to Tie into Tee Manhole
S-34	4" Cleanout Plug
S-35	Minimum Requirements for Pump Station (Layout)
S-36	Pump Station Electrical Panel
S-37	Weather Hood for Electrical Equipment Panel
S-38	Typical Sanitary Sewer Service Backwater Valve Installation
S-39	Pipe Alignment Guide (Spiders)
S-40	Oil and Grease Trap Sizing
S-40a	Oil and Water Separator
S-41	Oil and Grease Trap Dimensions
S-42	Typical Sewer Service Requiring Backwater Valve
S-43	8" & 10" Sanitary Sewer Easement Widths
S-44	Standard Odor Control Building Front Elevation
S-45	Standard Odor Control Building Side Elevation
S-46	Standard Odor Control Building Floor Elevation
S-47	Standard Odor Control Building Mechanical, Electrical

Standard Sewer Detail Drawings

S-48	Generator Pad
S-49	Concrete Cradle Protection for Sewer Line Crossings
S-50	Standard Vertical Bend
S-51	Aerial Sewer Service
S-52	Wooden Fence Gate
S-53	Inside Drop Manhole



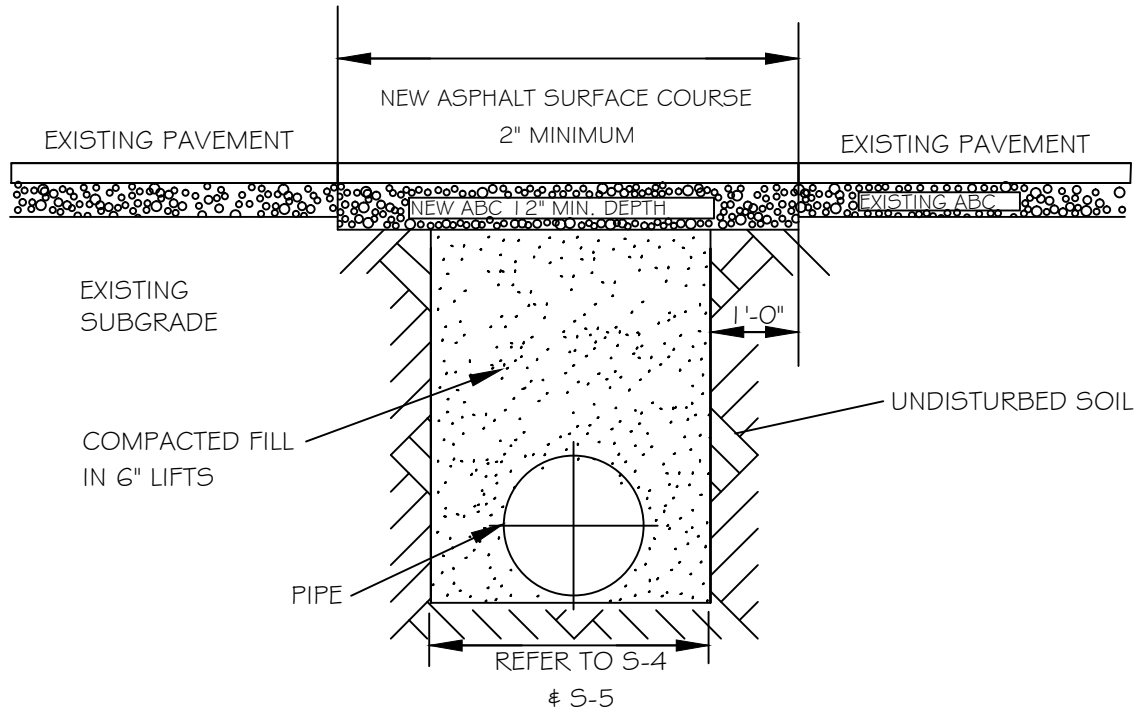
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD BEDDING DETAILS FOR CCFRPM PIPES				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-1	J.P.S	10-8-10		



NOTES:

1. See City of Raleigh standards for trenches and pipe bedding (S-4 & S-5) for additional details.
2. Pavement cuts over 5'-0" in width shall be reinforced to N.C.D.O.T. standards.
3. Pavement cuts shall be made with an appropriate saw cut machine.
4. Pavement cuts within NCDOT ROW shall conform to the approved on site encroachment permit.

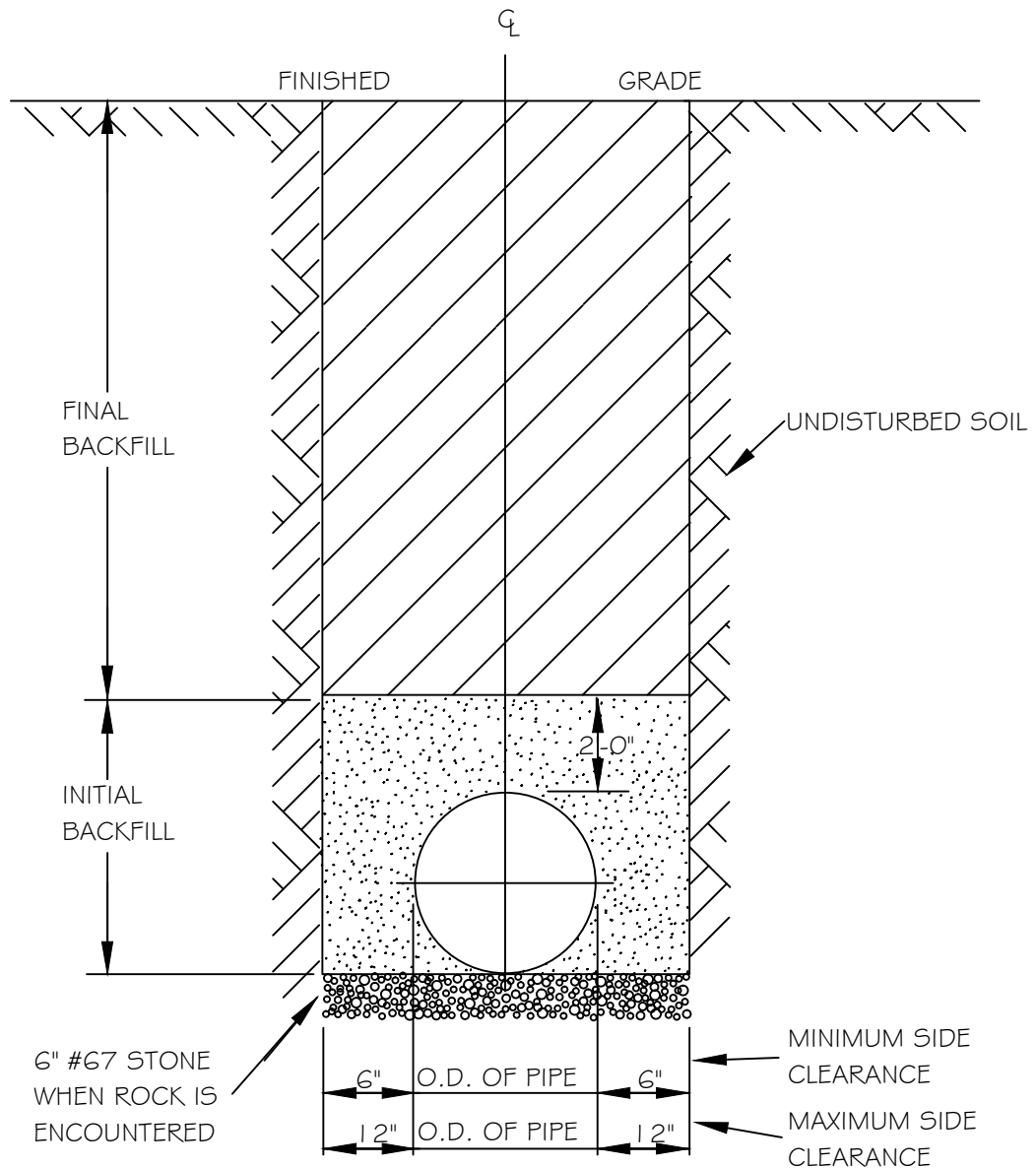
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD CONCRETE				
PAVEMENT PATCH DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-2	D.W.C.	6-23-99	A.B.B.	4-19-04
	RRH	3-30-00	J.P.S	10-8-10



NOTES:

1. IN NCDOT MAINTAINED ROADWAYS ENCROACHMENT PAVEMENT PATCH REQUIREMENTS SHALL TAKE PRECEDENCE.
2. THE PAVEMENT CUT SHALL BE DEFINED BY A STRAIGHT EDGE AND CUT WITH AN APPROPRIATE SAWCUT MACHINE.
3. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT.
4. THE FINAL 1' OF FILL SHALL CONSIST OF ABC MATERIAL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-80 AS MODIFIED BY NCDOT.
5. THE ENTIRE THICKNESS AND VERTICAL EDGE OF CUT SHALL BE TACKED.
6. THE SAME DEPTH OF PAVEMENT MATERIAL WHICH EXISTS SHALL BE REINSTALLED, BUT IN NO CASE SHALL THE ASPHALT BE LESS THAN 2" THICK.
7. THE ASPHALT PAVEMENT MATERIAL SHALL BE INSTALLED AND COMPACTED THOROUGHLY WITH A SMOOTH DRUM ROLLER TO ACHIEVE A SMOOTH LEVEL PATCH.
8. REFER TO CITY OF RALEIGH STANDARDS FOR TRENCHES AND PIPE BEDDING (S-4 & S-5) FOR ADDITIONAL DETAILS.
9. NO HAND PATCHING ALLOWED.
10. PAVEMENT CUTS WITHIN NCDOT ROW SHALL CONFORM TO THE APPROVED ON SITE ENCROACHMENT PERMIT.

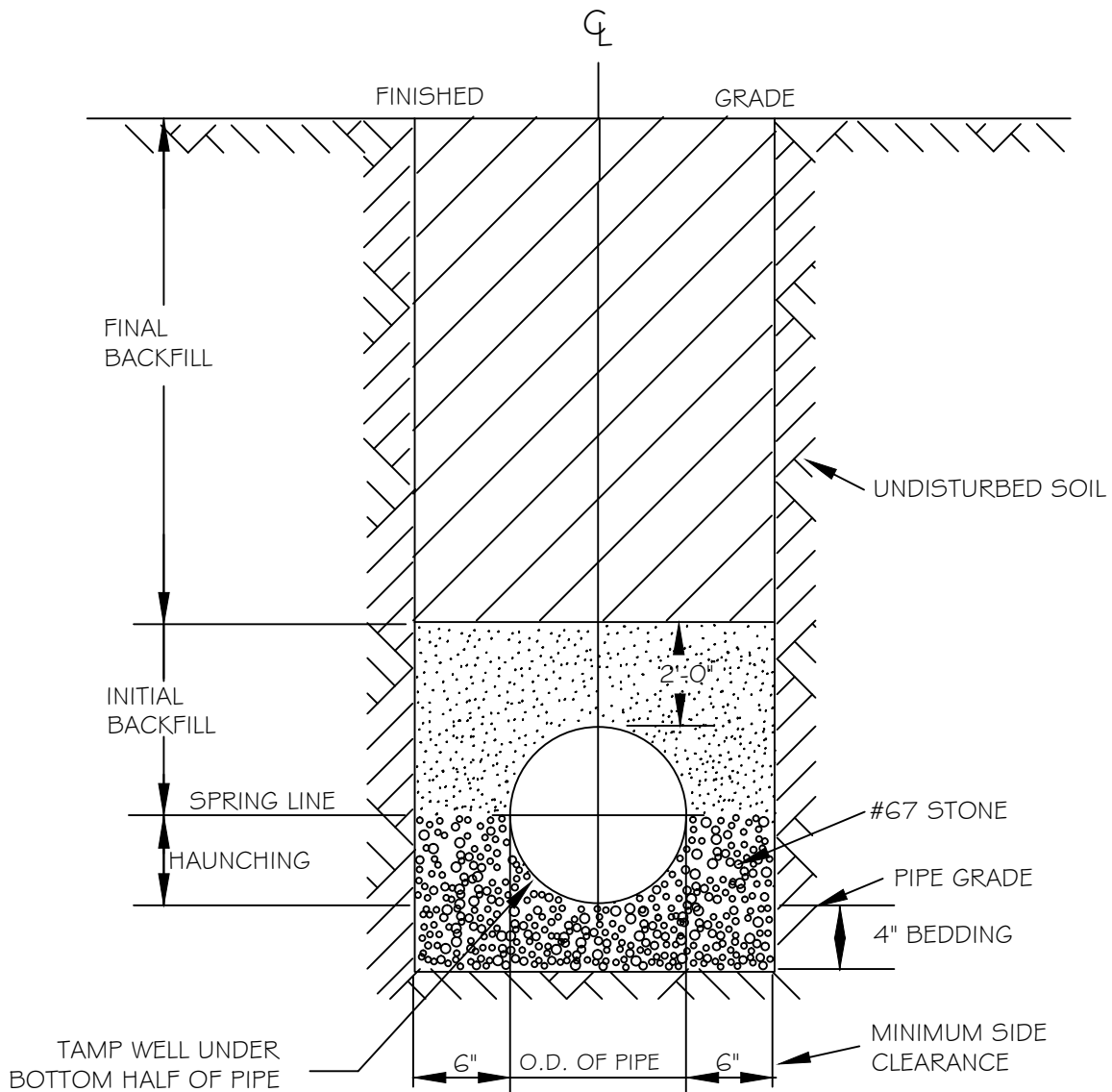
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD ASPHALT PAVEMENT PATCH DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-3	D.W.C.	11-1-99	A.B.B.	4-19-04
	RRH	3-30-00	J.P.S.	10-8-10



NOTES:

1. TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN INITIAL BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
4. BACKFILL SHALL BE TAMPED IN 6" LIFTS IN TRAFFIC AREAS, 12" IN NON-TRAFFIC AREAS.
5. ACHIEVE 80% COMPACTION IN NON-TRAFFIC AREAS, AND 95% COMPACTION IN TRAFFIC AREAS.
6. IF IN EASEMENT 4" TOPSOIL, AND 12" CLEAN SELECT FILL MAY BE REQUIRED.
7. NO BOULDERS 8" IN DIAMETER OR GREATER ALLOWED IN FINAL BACKFILL.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS & BACKFILLING REQUIREMENTS FOR DUCTILE IRON				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-4	D.W.C.	9-3-99		
	RRH	3-30-00		

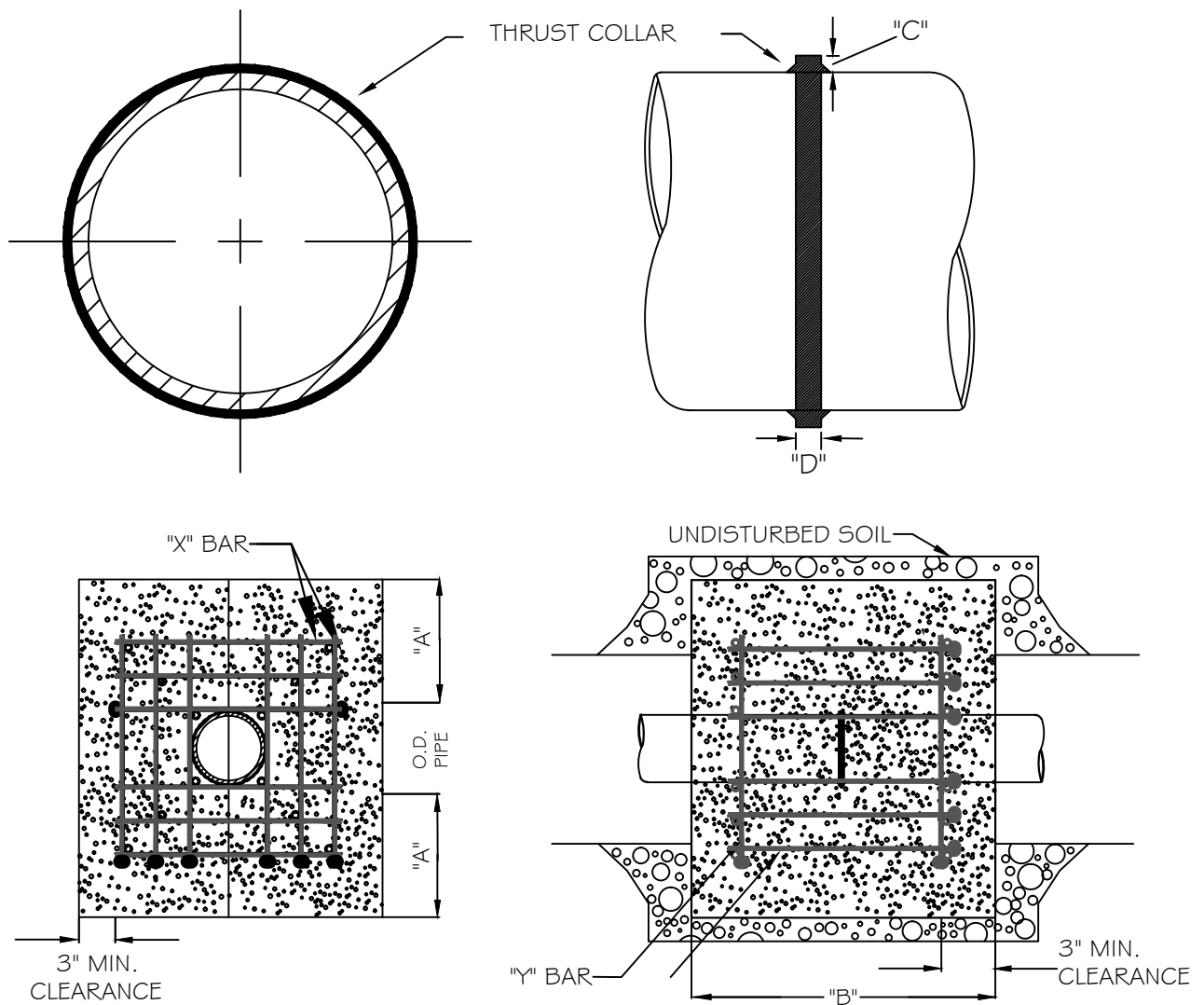


TYPICAL TRENCH BOTTOM DIMENSIONS FOR
SDR 35 PVC GRAVITY PIPE

NOTES:

1. FOR TRENCHES REQUIRING SHORING AND BRACING, DIMENSIONS SHALL BE TAKEN FROM THE INSIDE FACE OF THE SHORING AND BRACING.
2. NO ROCKS OR BOULDERS 4" OR LARGER TO BE USED IN INITIAL BACKFILL.
3. ALL BACKFILL MATERIAL SHALL BE SUITABLE NATIVE MATERIAL.
4. BACKFILL SHALL BE TAMPED IN 6" LIFTS IN TRAFFIC AREAS, 12" IN NON-TRAFFIC AREAS.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TRENCH BOTTOM DIMENSIONS AND BACKFILLING REQUIREMENTS FOR PVC GRAVITY SEWER MAIN				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-5	TO NOTES	3-1-87	D.W.C.	9-3-99
		7-2-82	RRH	3-30-00



REINFORCING REQUIREMENTS

I.D. PIPE	REBAR SIZE	"X" BAR LENGTH	"X" BAR WEIGHT	"Y" BAR LENGTH	"Y" BAR WEIGHT	NO. REQUIRED
6" - 36"	#5	2'-2" + O.D. PIPE	1.043 LBS/FT	1'-1"	1.1 LBS. EACH	X-24, Y-12
48" & greater	#6	3'-0" + O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS. EACH	X-24, Y-12

THRUST COLLAR, AND THRUST SCHEDULE

I.D. PIPE	"A"	"B"	"C"	"D"
6" - 16"	1'-4"	1'-7"	2"	3/8"
20" - 24"	1'-4"	1'-7"	3"	1/2"
30" - 36"	1'-4"	1'-7"	4"	5/8"
48" & greater	1'-8"	1'-9"	6"	7/8"

NOTES:

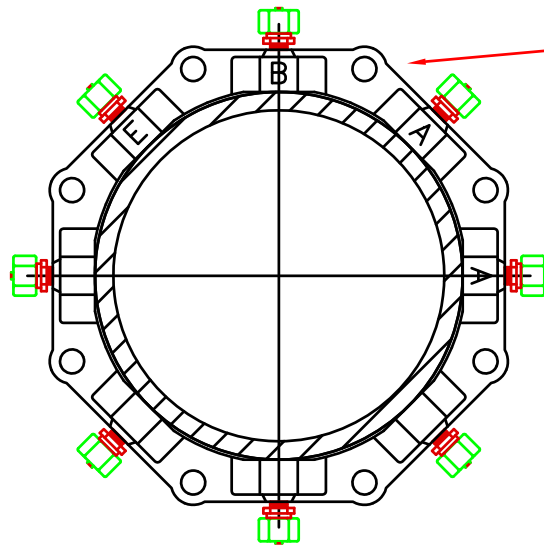
1. CONCRETE SHALL BE 3000 PSI AND TRANSIT MIXED.
2. REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
3. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK INSTALLATION SHALL BE THE MINIMUM WIDTH AS SHOWN ON STANDARD DETAIL W-3.
4. BACKFILL TAMPED IN 6" LIFTS PER STANDARD DETAIL W-3.
5. THRUST COLLAR MUST BE FACTORY WELDED ON BOTH SIDES ALONG BOTH EDGES OF COLLAR AROUND CIRCUMFERENCE.

CITY OF RALEIGH

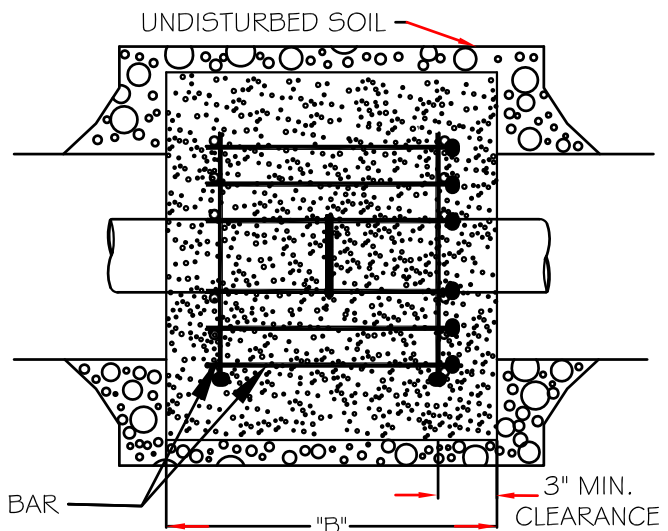
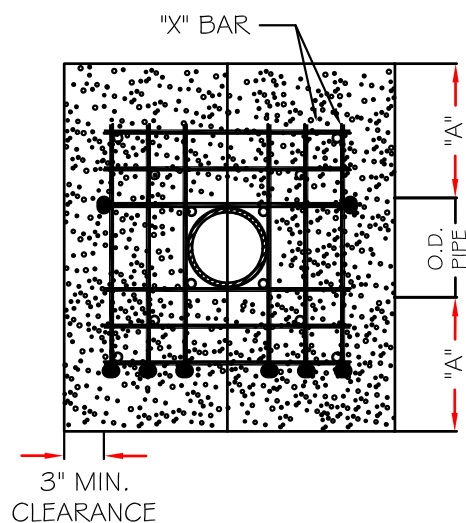
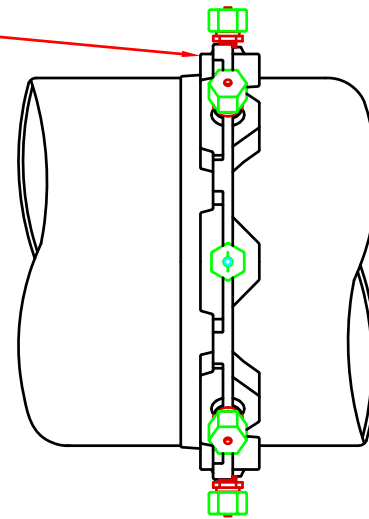
DEPARTMENT OF PUBLIC UTILITIES

RESTRAINING COLLAR DESIGN DATA
FOR SEWER FORCE MAIN

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-6	RRH	1-21-00		
	D.H.L.	6-18-08		



MECHANICAL
RESTAINING
COLLAR



REINFORCING REQUIREMENTS

I.D. PIPE	REBAR SIZE	"X" BAR LENGTH	"X" BAR WEIGHT	"Y" BAR LENGTH	"Y" BAR WEIGHT	NO. REQUIRED
6" - 36"	#5	2'-2" + O.D. PIPE	1.043 LBS/FT	1'-1"	1.1 LBS. EACH	X-24, Y-12
48" & greater	#6	3'-0" + O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS. EACH	X-24, Y-12

THRUST COLLAR, AND THRUST SCHEDULE

I.D. PIPE	"A"	"B"	"C"	"D"
6" - 16"	1'-4"	1'-7"	2"	3/8"
20" - 24"	1'-4"	1'-7"	3"	1/2"
30" - 36"	1'-4"	1'-7"	4"	5/8"
48" & greater	1'-8"	1'-9"	6"	7/8"

NOTES:

1. CONCRETE SHALL BE 3000 PSI AND TRANSIT MIXED.
2. REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
3. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK INSTALLATION SHALL BE THE MINIMUM WIDTH AS SHOWN ON STANDARD DETAIL S-4, S-5.
4. BACKFILL TAMPED IN 6" LIFTS PER STANDARD DETAIL S-4, S-5.
5. MECHANICAL RESTAINING COLLAR SHALL BE AS MANUFACTURED BY MEGA-LUG OR EQUAL.

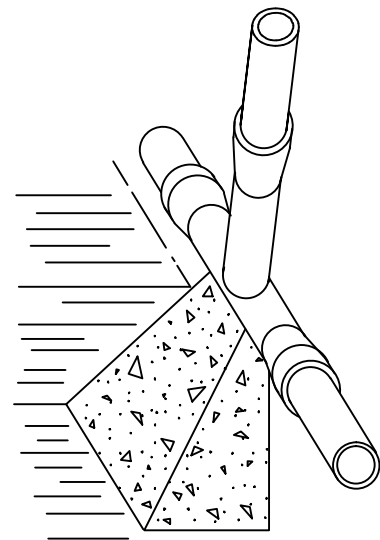
CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

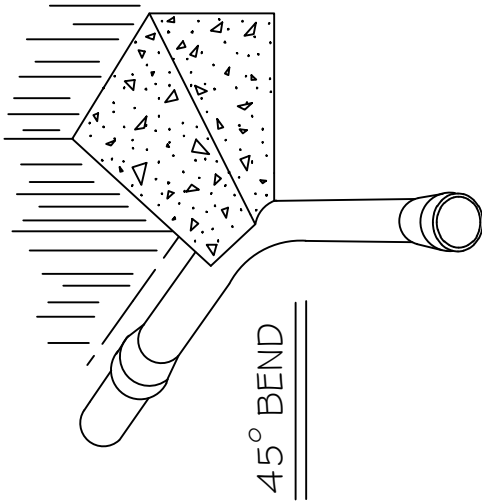
RESTRAINING COLLAR DESIGN DATA
FOR PVC FORCE MAINS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-6a	RRH	1-21-00	J.P.S.	10-8-10
	D.H.L.	6-18-08		

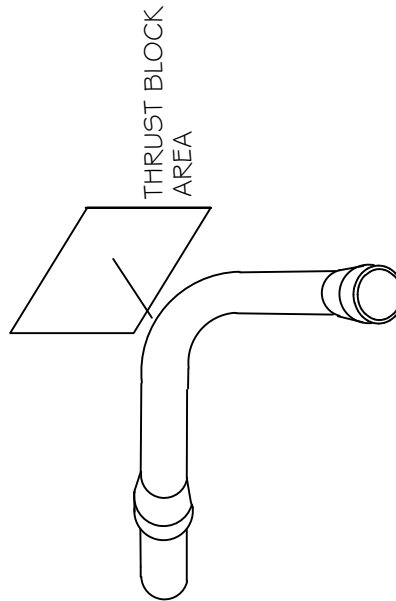
THRUST BLOCKING



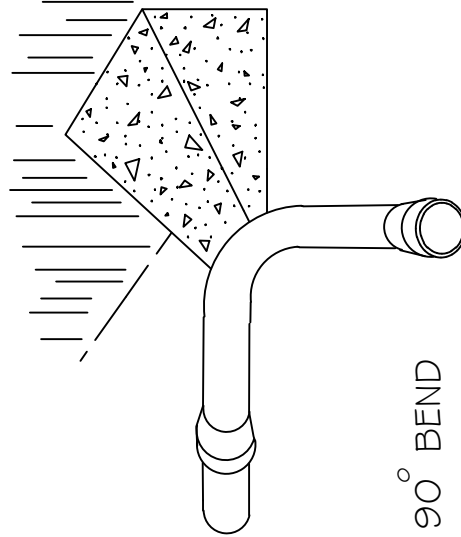
TEE INTERSECTION



45° BEND



THRUST BLOCK
AREA



90° BEND

NOTES:

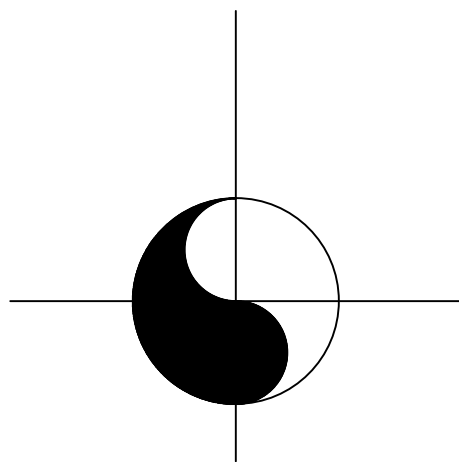
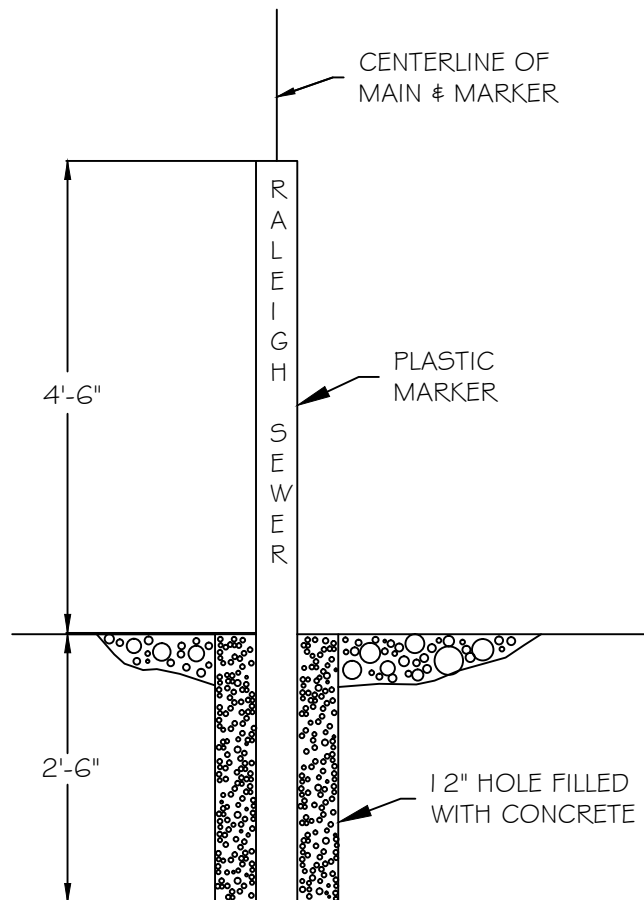
1. CONCRETE SHALL BE 3000 PSI
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. TRENCHES SHALL CONFORM TO STANDARD DETAIL W-3.
4. SEE STANDARD THRUST BLOCK TABLES, W-10 THRU W-11, FOR AREA OF CONCRETE REQUIRED.
5. ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

STANDARD THRUST BLOCKING VIEWS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-7		3-1-87	RRH	3-31-00
	D.W.C.	9-7-99	D.H.L.	6-18-08



SEWER FORCE MAIN

NOTES:

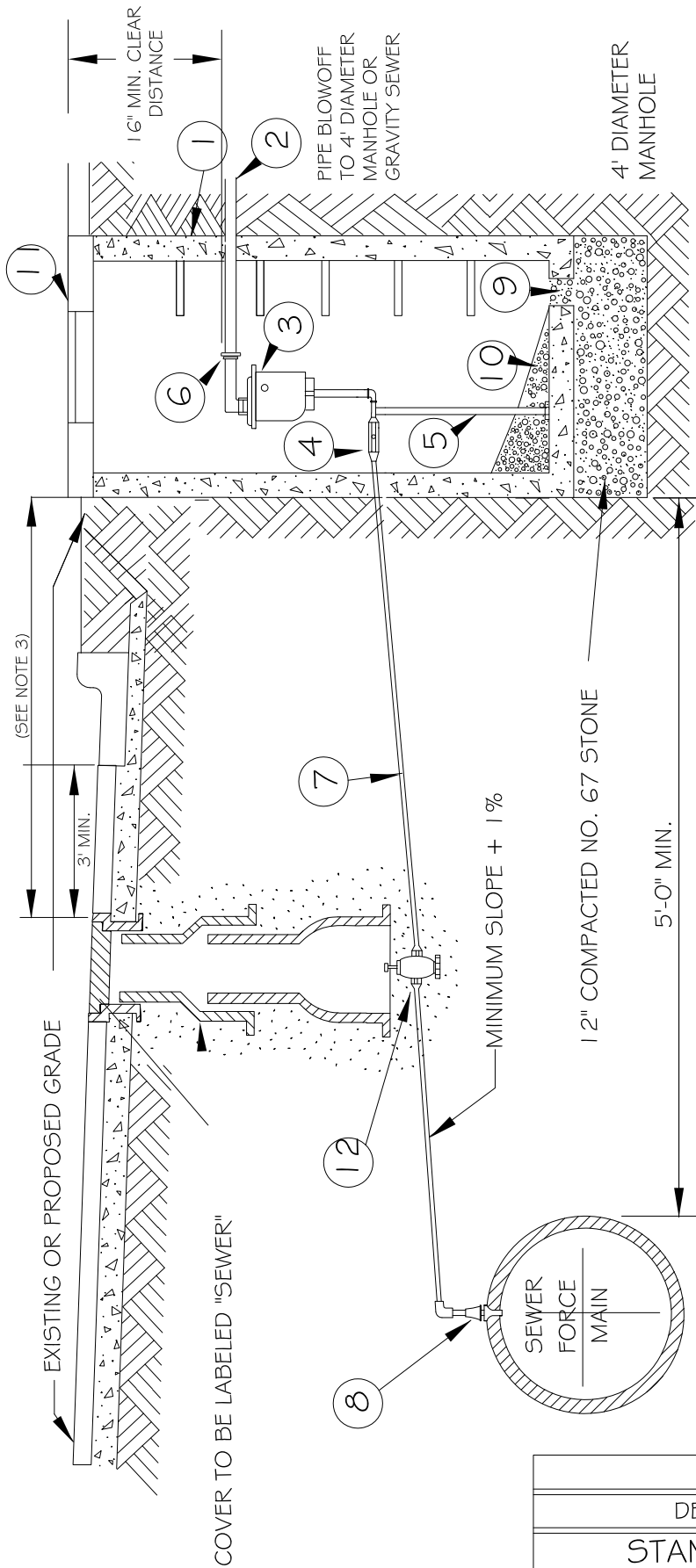
1. PLASTIC MARKER SHALL BE GREEN IN COLOR.
2. MARKERS SHALL BE LABELED "RALEIGH SEWER"
3. TO BE SPACED EVERY 300 FEET ON EACH SIDE OF ANY ROADWAY OR JUNCTION.
4. MARKERS SHALL BE ROUND 4" IN DIAMETER.

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

STANDARD MAIN MARKER FOR
SEWER FORCE MAINS IN EASEMENTS

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-8	RRH	1-21-00		
	DHL	6-18-08		



NOTE:

1. AIR RELEASE/VACUUM VALVE TO BE A.R.I. FLOW CONTROL MODEL SAAR SHORT VERSION D-025 SS (STAINLESS STEEL)
2. THE AIR RELEASE MANHOLE SHALL BE INSTALLED IN THE SHOULDER OR AS DIRECTED BY THE ENGINEER.
3. FOR MAINS LOCATED OUTSIDE OF STREET RIGHT-OF-WAYS THE MAXIMUM DISTANCE BETWEEN THE MANHOLE AND THE VALVE BOX SHOULD BE THREE (3) FEET.
4. MAIN SHALL BE DEEP ENOUGH TO ACCOMMODATE INSTALLATION AS SHOWN

BILL OF MATERIALS

1	PRECAST MANHOLE W/ FLAT TOP
2	BLOW OFF PIPE SCD 80 PVC
3	2" AIR RELEASE VALVE
4	2"-SS BALL VALVE
5	PIPE STAND SUPPORT SS
6	2" UNION SCD 80 PVC
7	2" TYPE "K", SOFT COPPER WITH FLARED ELBOW
8	CORPORATION COCK
9	6" DIAMETER DRAIN
10	GROUT, 1/8" TO 1'-0" MIN. SLOPE TO DRAIN
11	36" x 30" HALLIDAY HATCH, ALUM.
12	2"-GATE VALVE

SEE STANDARD DETAIL S-4 & S-5 TO INSURE PROPER BACKFILL.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD SEWER FORCE MAIN AIR RELEASE VALVE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-9		7-14-82		12-31-91
	LBN	9-30-04	RRH	3-30-00

AERIAL PIPE CROSSING

GENERAL NOTES:

1. ALL MATERIALS UTILIZED ON THESE DETAIL SHEETS SHALL CONFORM TO THE APPROPRIATE SECTIONS OF THE CITY OF RALEIGH PUBLIC UTILITIES HANDBOOK UNLESS NOTED OTHERWISE HEREIN.
2. RESTRAINED JOINT PIPE AND FITTINGS SHALL CONSIST OF BOLTED RETAINER RINGS AND WELDED RETAINER BARS OR BOLTLESS TYPE WHICH INCLUDE DUCTILE IRON LOCKING SEGMENTS AND RUBBER RETAINERS. BOLTS FOR RESTRAINED JOINTS (IF APPLICABLE) SHALL CONFORM TO ANSI B18.2. RESTRAINED PIPE AND FITTINGS SHALL BE FLEX-RING OR LOK-RING TYPE JOINTS AS MANUFACTURED BY AMERICAN CAST IRON PIPE CO.; TR FLEX AS MANUFACTURED BY US PIPE, SUPER-LOCK AS MANUFACTURED BY CLOW, BOLT-LOK OR SNAP-LOK AS MANUFACTURED BY GRIFFIN PIPE PRODUCTS, OR EQUAL.
3. CONCRETE PROPERTIES SHALL BE AS FOLLOWS:
CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
NOMINAL SLUMP = 4 INCHES
WATER/CEMENTITIOUS MATERIALS RATIO = 0.45 (MAX)
AIR CONTENT = $6\% \times 1.5\%$
CONCRETE SHALL BE COMPOSED OF CEMENT, WATER, COARSE AGGREGATES, FINE AGGREGATES AND AIR. CEMENT SHALL BE TYPE I/II OR II IN ACCORDANCE WITH ASTM C-150. MATERIAL REQUIREMENTS FOR ALL FINE AND COARSE AGGREGATES SHALL CONFORM TO ASTM C-33. COARSE AGGREGATE SHALL BE SIZE No. 57 OR 67. AN APPROVED CLASS 'F' FLYASH MAY BE SUBSTITUTED FOR AN EQUAL AMOUNT OF CEMENT BY WEIGHT UP TO 25%.
4. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4".
5. CONVENTIONAL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60 AND SHALL BE PLACED IN ACCORDANCE WITH "RECOMMENDED PRACTICE FOR PLACING REINFORCING BARS" (LATEST EDITION) AS PUBLISHED BY THE CONCRETE REINFORCING INSTITUTE. SPLICES SHALL BE CLASS 'B' CONFORMING TO THE PROVISIONS OF ACI 318 - "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
6. NEOPRENE BEARING PADS SHALL BE FORMED FROM PREVIOUSLY UNVULCANIZED, 100% VIRGIN NEOPRENE, WITH DUROMETER HARDNESS = 50.
7. PILES SHALL BE STRUCTURAL STEEL HP12x53 PILES AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM A36. PILES SHALL BE DRIVEN TO DEPTHS REQUIRED TO OBTAIN AN ULTIMATE BEARING CAPACITY OF NOT LESS THAN TWO TIMES THE DESIGN LOADING OF 30 TONS. PILES SHALL PENETRATE A MINIMUM OF FIFTEEN FEET INTO UNDISTURBED SOIL. IN DRIVING PILES, A METHOD APPROVED BY THE ENGINEER SHALL BE USED WHEREBY THE HEAD OF THE PILE IS NOT DAMAGED. IF REQUESTED BY THE ENGINEER, PILES SHALL BE TESTED TO DETERMINE THE ULTIMATE CAPACITY OF THE PILES. THE METHOD OF LOAD TESTING SHALL CONFORM TO ASTM D1143 AND THE NORTH CAROLINA STATE BUILDING CODE. WHERE PILES ARE EXPOSED, PILES SHALL BE PAINTED AND/OR COATED IN ACCORDANCE WITH THE CITY SPECIFICATIONS.

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING GENERAL NOTES

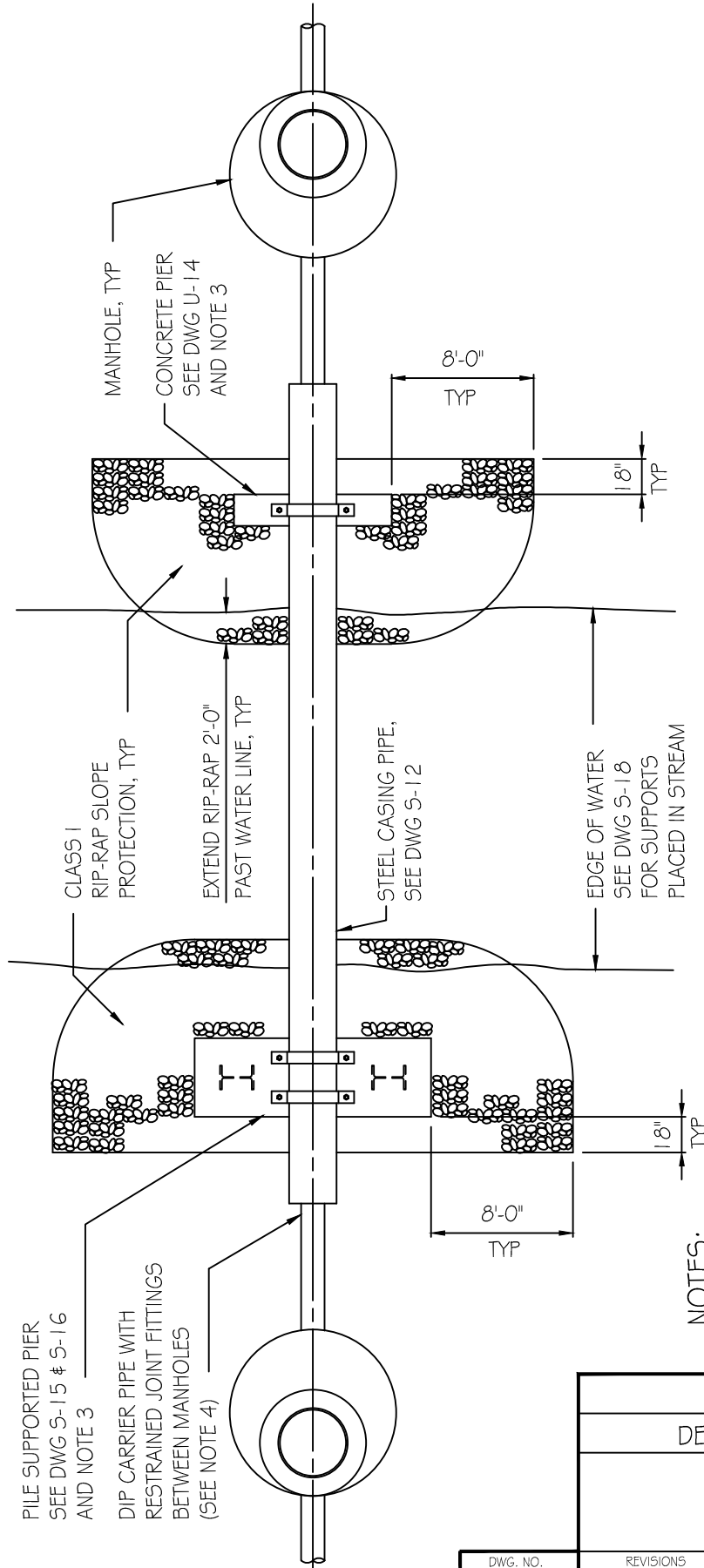
DWG. NO.
5-10

REVISIONS
D.H.L.

DATE
6/16/08

REVISIONS

DATE



NOTES:

1. RIP RAP FOR SLOPE PROTECTION SHALL BE CLASS 1 RIP RAP IN ACCORDANCE WITH SECTION 868 OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION'S "STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES".
2. RIP RAP SHALL BE PLACED IN ACCORDANCE WITH DRAWING 868.01 OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION'S "ROADWAY STANDARD DRAWINGS".
3. SUPPORT TYPE FOR PIERS SHALL BE DETERMINED BY ENGINEER BASED ON SUBGRADE CONDITIONS AT SITE. SEE DRAWING S-14 FOR SUBGRADE PARAMETERS FOR EACH TYPE OF FOUNDATION.

4. WHERE DUCTILE IRON PIPE IS USED FOR CARRIER PIPE, DUCTILE IRON CARRIER PIPE SHALL BE INSTALLED UTILIZING 2 PIPE ALIGNMENT GUIDES PER JOINT ONE FOURTH OF THE PIPE JOINT LENGTH IN FROM BOTH THE BELL AND SPIGOT ENDS.

CITY OF RALEIGH DEPARTMENT OF PUBLIC UTILITIES AERIAL PIPE CROSSING TYPICAL PLAN

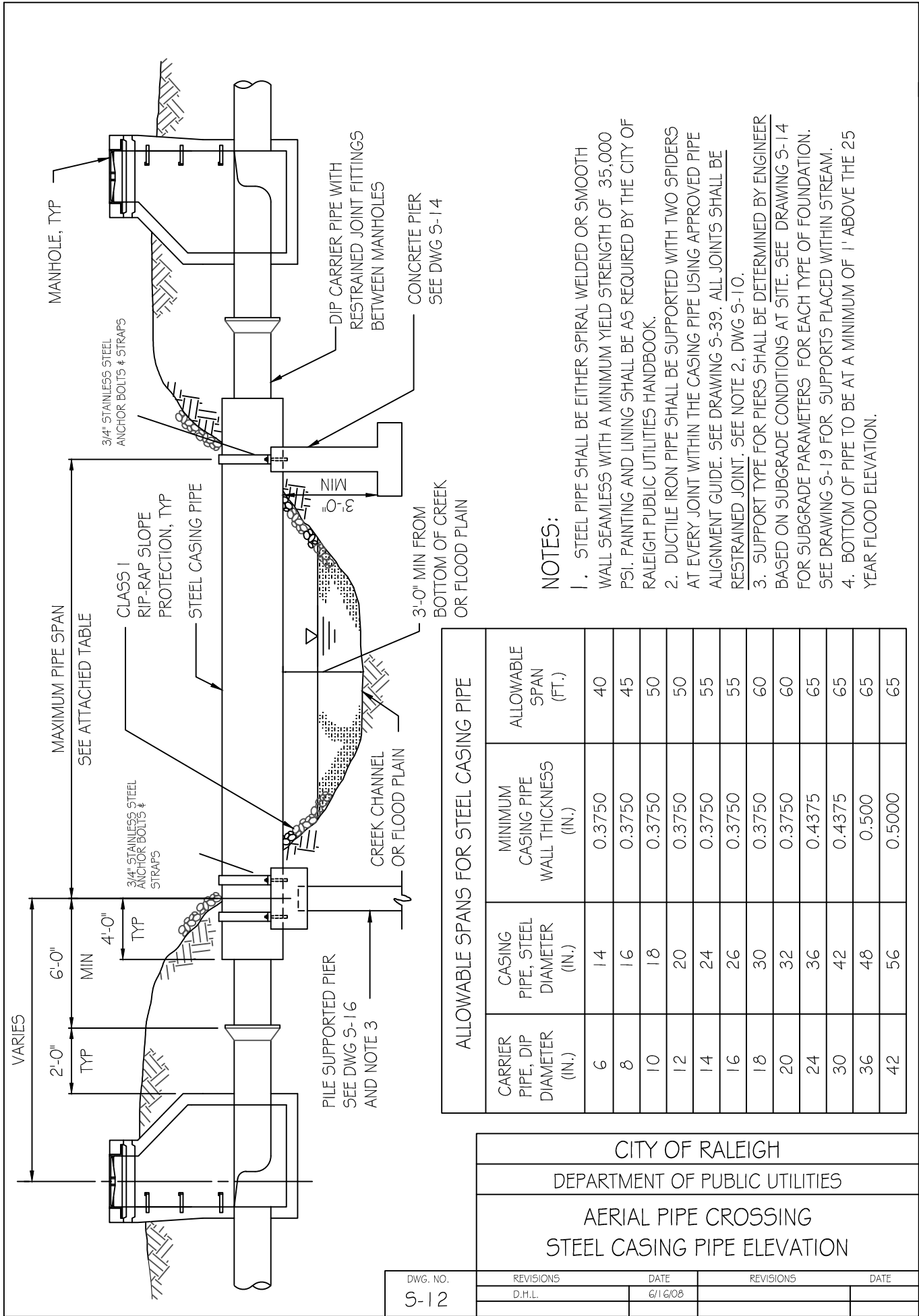
DWG. NO.
S-11

REVISIONS
A.B.B.
D.H.L.

DATE
4-16-04
6/16/08

REVISIONS

DATE

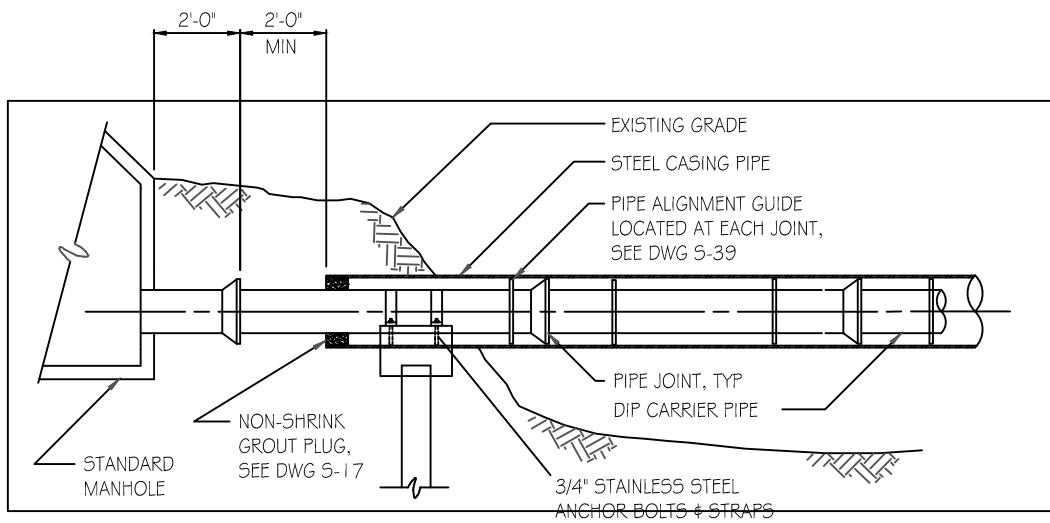


NOTES:

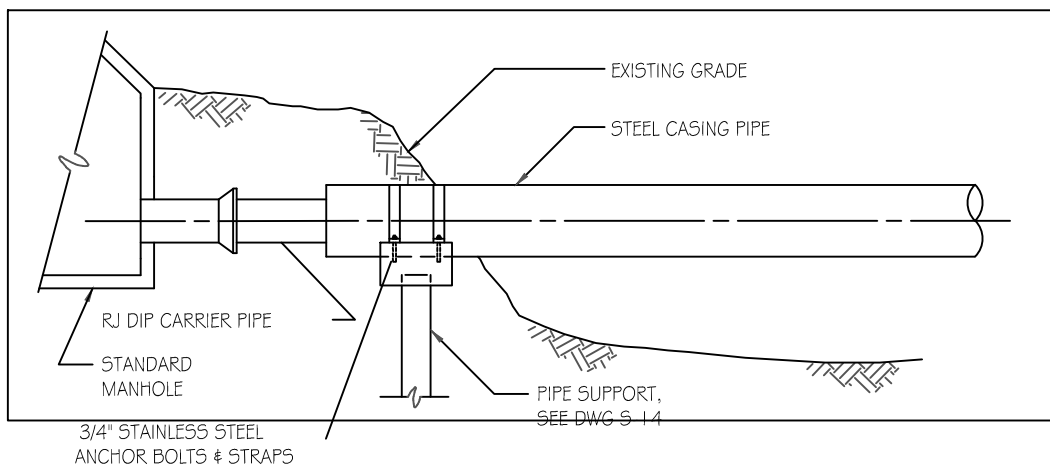
- 1. STEEL PIPE SHALL BE EITHER SPIRAL WELDED OR SMOOTH WALL SEAMLESS WITH A MINIMUM YIELD STRENGTH OF 35,000 PSI. PAINTING AND LINING SHALL BE AS REQUIRED BY THE CITY OF RALEIGH PUBLIC UTILITIES HANDBOOK.
- 2. DUCTILE IRON PIPE SHALL BE SUPPORTED WITH TWO SPIDERS AT EVERY JOINT WITHIN THE CASING PIPE USING APPROVED PIPE ALIGNMENT GUIDE. SEE DRAWING S-39. ALL JOINTS SHALL BE RESTRAINED JOINT. SEE NOTE 2, DWG S-10.
- 3. SUPPORT TYPE FOR PIERS SHALL BE DETERMINED BY ENGINEER BASED ON SUBGRADE CONDITIONS AT SITE. SEE DRAWING S-14 FOR SUBGRADE PARAMETERS FOR EACH TYPE OF FOUNDATION. SEE DRAWING S-19 FOR SUPPORTS PLACED WITHIN STREAM.
- 4. BOTTOM OF PIPE TO BE AT A MINIMUM OF 1' ABOVE THE 25 YEAR FLOOD ELEVATION.

ALLOWABLE SPANS FOR STEEL CASING PIPE			
CARRIER PIPE, DIP DIAMETER (IN.)	CASING PIPE, STEEL DIAMETER (IN.)	MINIMUM CASING PIPE WALL THICKNESS (IN.)	ALLOWABLE SPAN (FT.)
6	14	0.3750	40
8	16	0.3750	45
10	18	0.3750	50
12	20	0.3750	50
14	24	0.3750	55
16	26	0.3750	55
18	30	0.3750	60
20	32	0.3750	60
24	36	0.4375	65
30	42	0.4375	65
36	48	0.500	65
42	56	0.5000	65

CITY OF RALEIGH			
DEPARTMENT OF PUBLIC UTILITIES			
AERIAL PIPE CROSSING STEEL CASING PIPE ELEVATION			
DWG. NO. S-12	REVISIONS	DATE	REVISIONS
	D.H.L.	6/16/08	

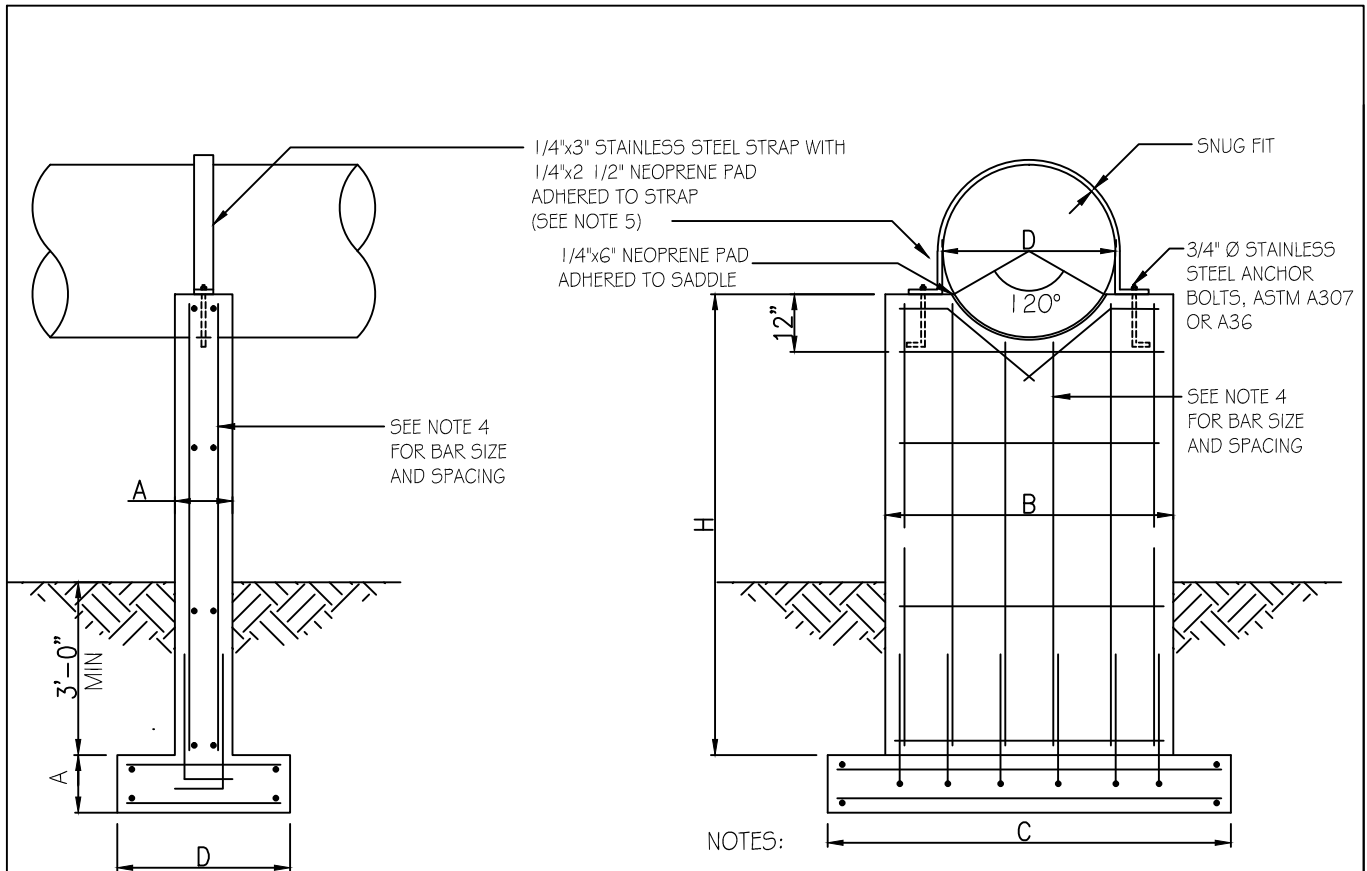


SECTION



ELEVATION

CITY OF RALEIGH			
DEPARTMENT OF PUBLIC UTILITIES			
AERIAL PIPE CROSSING			
TYPICAL PIPE SECTION & ELEVATION			
DWG. NO. S-13	REVISIONS	DATE	REVISIONS
	D.H.L.	6/16/08	



CASING PIPE DIA. "D" (IN.)	"H" (FT.)	THICKNESS "A" (IN.)	PIER WIDTH "B" (FT.)	FOOTING LENGTH "C" (FT.)	FOOTING WIDTH "D" (FT.)
6-12	≤ 6	12	2'-4"	5'-6"	3'-0"
	8	12	2'-4"	6'-3"	3'-0"
	10	12	2'-4"	6'-8"	3'-0"
	12	12	2'-4"	7'-2"	3'-0"
14-20	≤ 6	12	3'-0"	8'-0"	3'-0"
	8	12	3'-0"	9'-0"	3'-0"
	10	12	3'-0"	9'-10"	3'-0"
	12	14	3'-0"	10'-6"	3'-0"
22-28	≤ 6	14	3'-8"	8'-9"	4'-0"
	8	14	3'-8"	10'-0"	4'-0"
	10	14	3'-8"	11'-0"	4'-0"
	12	14	3'-8"	11'-10"	4'-0"
30-36	≤ 6	18	4'-4"	9'-0"	4'-0"
	8	18	4'-4"	10'-6"	4'-0"
	10	18	4'-4"	11'-6"	4'-0"
	12	18	4'-4"	12'-4"	4'-0"
38-48	≤ 6	18	5'-4"	9'-6"	5'-0"
	8	18	5'-4"	11'-0"	5'-0"
	10	18	5'-4"	12'-0"	5'-0"
	12	18	5'-4"	12'-10"	5'-0"
51-56	≤ 6	18	6'-4"	9'-10"	5'-0"
	8	18	6'-4"	11'-4"	5'-0"
	10	18	6'-4"	12'-4"	5'-0"
	12	18	6'-4"	13'-2"	5'-0"

NOTES:

- SHALLOW FOUNDATION DESIGN SHOWN ON THIS DETAIL IS BASED ON THE FOLLOWING PARAMETERS:
ALLOWABLE SOIL BEARING CAPACITY = 2000 PSF
CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
GRADE 60 REINFORCING STEEL
MAXIMUM STREAM VELOCITY = 10 FT/SEC
MAXIMUM SUPPORT HEIGHT (H) = 12'-0"
IF FIELD CONDITIONS REQUIRE ANY DEVIATION FROM THESE PARAMETERS, THE FOUNDATION DESIGN SHALL BE REVIEWED BY THE ENGINEER.
- IF SUBGRADE AT LOCATION OF SUPPORTS IS DEEMED UNABLE TO WITHSTAND 2000 PSF BEARING PRESSURE, A PILE SUPPORTED FOUNDATION SHALL BE UTILIZED AS PER DRAWING S-15.
- IF BEDROCK IS ENCOUNTERED WHICH WILL PREVENT 3-FEET MINIMUM COVER OVER FOOTING, DOWELS SHALL BE DRILLED INTO BEDROCK PRIOR TO PLACING FOUNDATION. SEE DRAWING S-17.
- TWELVE-INCH AND FOURTEEN-INCH THICK PIERS AND FOOTINGS SHALL BE REINFORCED WITH #5 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE. EIGHTEEN-INCH WIDE PIERS AND FOOTINGS SHALL BE REINFORCED WITH #7 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE.
- EIGHTEEN-INCH THICK PIERS SHALL REQUIRE TWO STRAPS OVER THE PIPE INSTEAD OF ONE (AS SHOWN).
- WHEN CONCRETE SUPPORTS ARE REQUIRED TO BE LOCATED WITHIN A STREAM AND ARE NOT COVERED WITH BACKFILL, SEE DRAWING S-19 FOR MODIFICATIONS TO UPSTREAM FACE OF SUPPORT.

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

AERIAL PIPE CROSSING
CONCRETE PIER DETAIL

DWG. NO.

S-14

REVISIONS

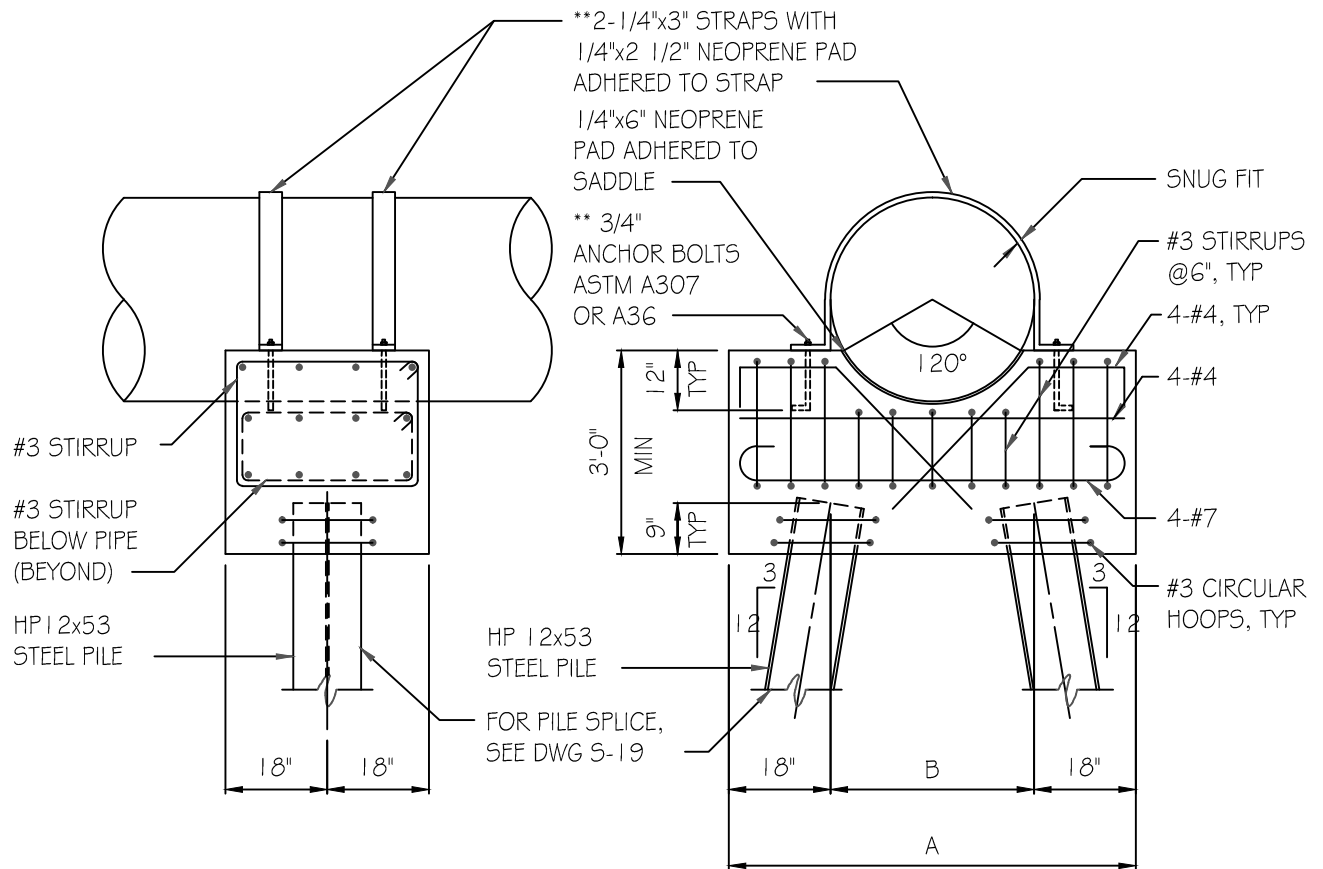
DATE

REVISIONS

DATE

D.H.L.

6/16/08



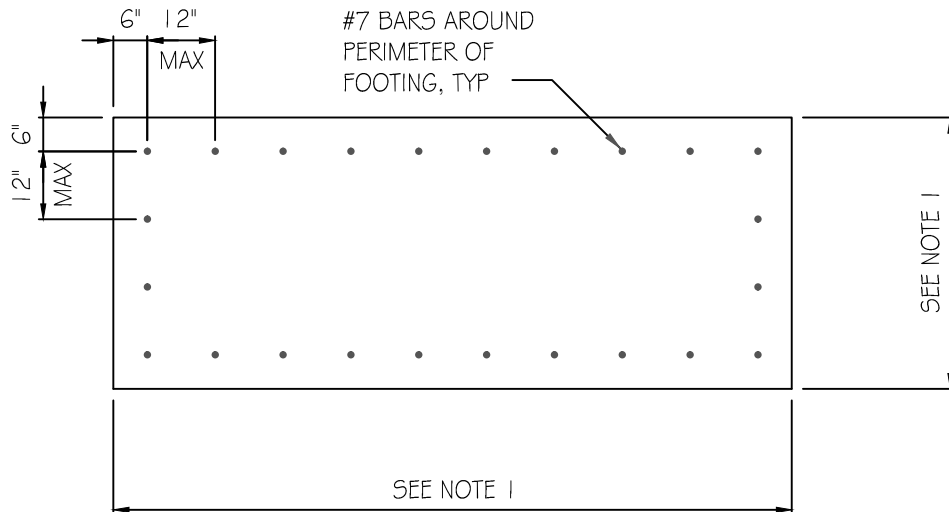
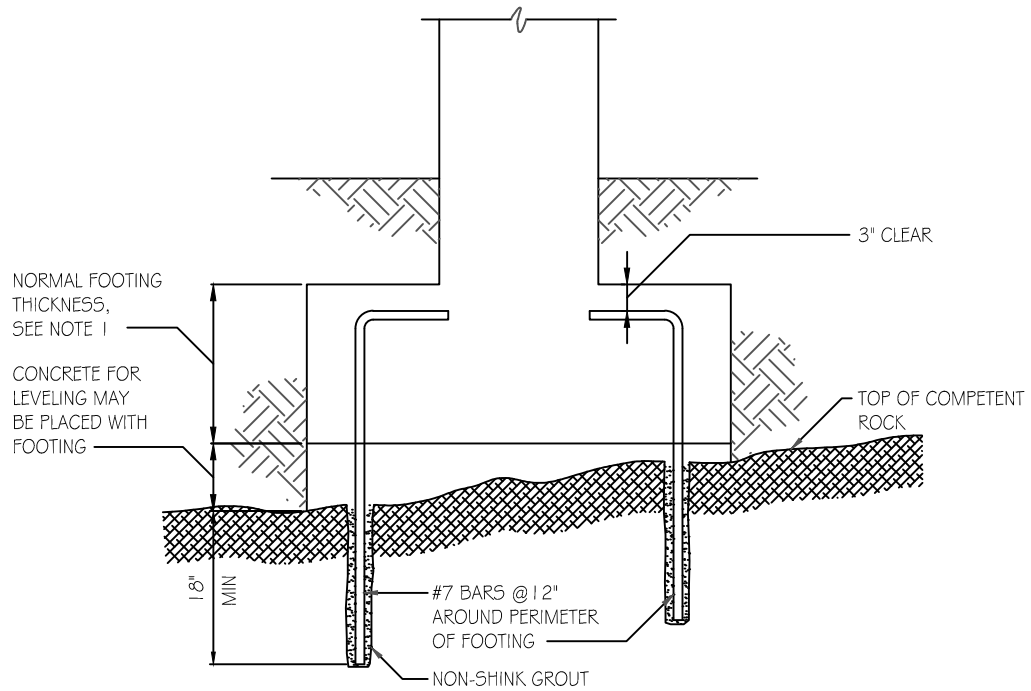
WIDTH OF PILE CAP		
CASING PIPE DIAMETER (IN.)	TOTAL WIDTH "A" (FT.)	PILE SPACING "B" (FT.)
≤ 36	6'-0"	3'-0"
38-42	6'-6"	3'-6"
45-51	7'-3"	4'-3"
54-60	8'-0"	5'-0"

NOTES:

- PILE SUPPORTED FOUNDATION DESIGN SHOWN ON THIS DETAIL IS BASED UPON THE FOLLOWING PARAMETERS:
 MINIMUM CAPACITY OF HP 12x53 PILE = 30 TONS
 CONCRETE COMPRESSIVE STRENGTH = 4000 PSI
 GRADE 60 REINFORCING STEEL
 MAXIMUM STREAM VELOCITY = 10 FT/SEC
 IF FIELD CONDITIONS REQUIRE ANY DEVIATION FROM THESE PARAMETERS, FOUNDATION DESIGN SHALL BE REVIEWED BY THE PROJECT ENGINEER.
- LENGTH OF PILES SHALL BE AS REQUIRED TO DEVELOP 30 TON CAPACITY BY EITHER END BEARING, FRICTION OR A COMBINATION OF END BEARING AND FRICTION. AS A MINIMUM, PILES SHALL BE DRIVEN AT LEAST 15 FEET INTO UNDISTURBED SOIL.

**3. ANCHOR BOLTS AND STRAPS SHALL BE STAINLESS STEEL.

CITY OF RALEIGH			
DEPARTMENT OF PUBLIC UTILITIES			
AERIAL PIPE CROSSING PILE CAP DETAIL			
DWG. NO.	REVISIONS	DATE	REVISIONS
S-15	D.H.L.	6/16/08	

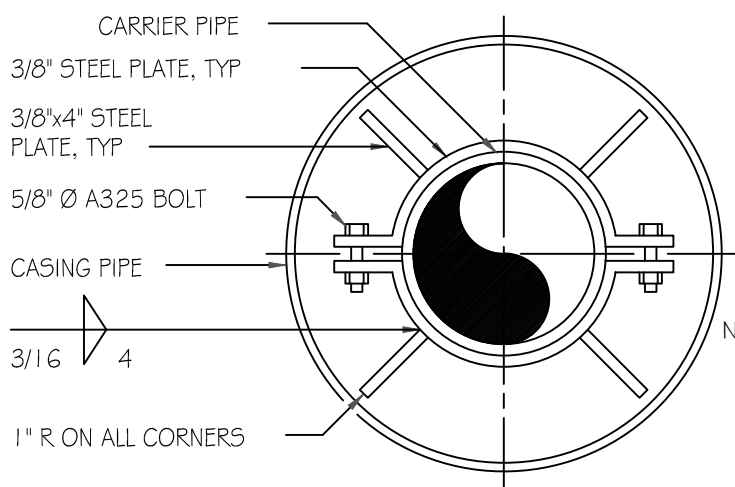
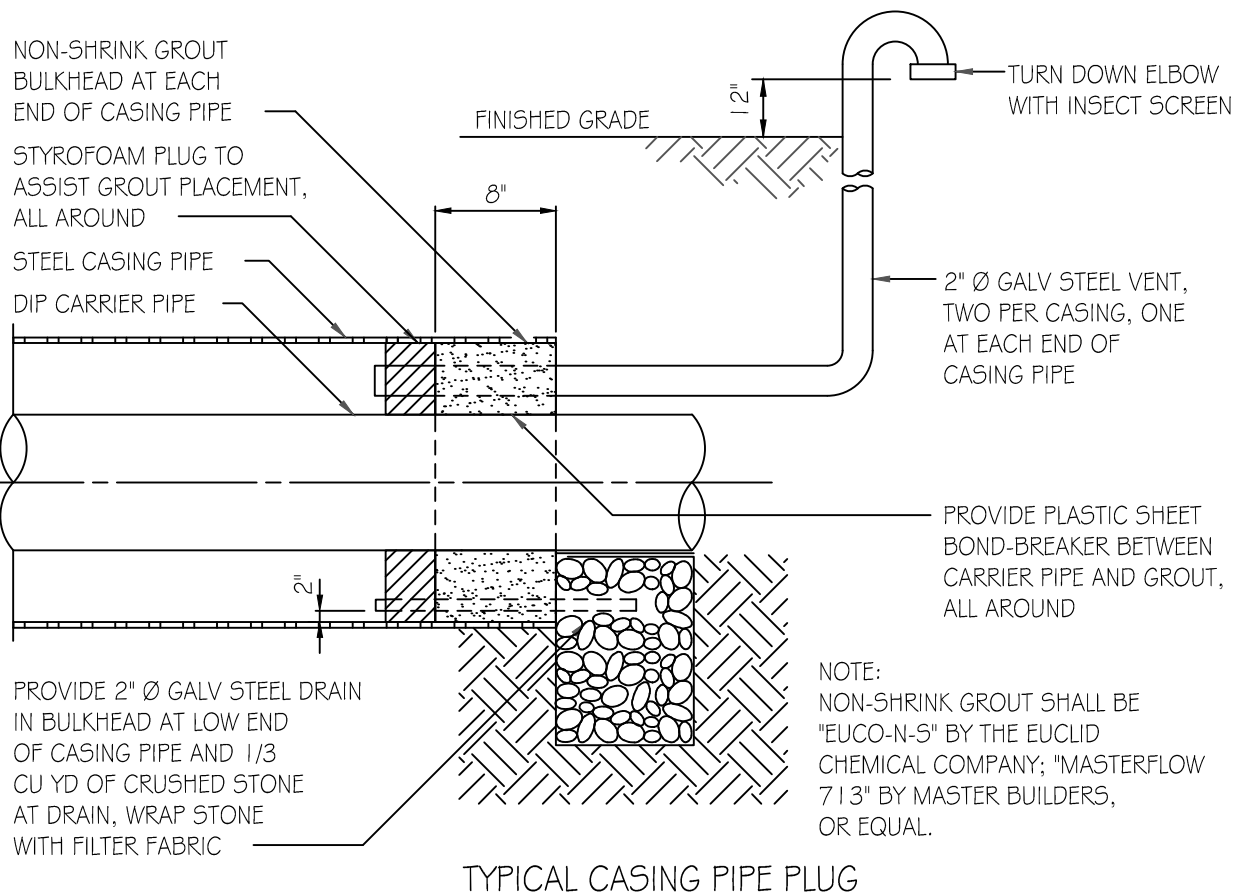


NOTES:

1. GEOMETRY OF FOOTING SHALL MATCH GEOMETRY OF CONCRETE PIERS WITH HEIGHT OF 6 FEET OR LESS AS PER DRAWING S-14.
2. NON-SHRINK GROUT SHALL BE "EUCCO-N-5" BY THE EUCLID CHEMICAL COMPANY; "MASTERFLOW 713" BY MASTER BULDERS, OR EQUAL.

DWG. NO.
S-17

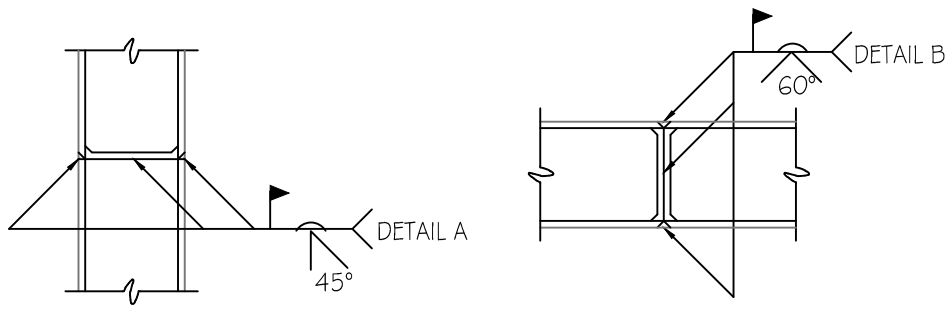
CITY OF RALEIGH			
DEPARTMENT OF PUBLIC UTILITIES			
AERIAL PIPE CROSSING CONCRETE PIER ON BEDROCK			
REVISIONS	DATE	REVISIONS	DATE



NOTE:
USE A MINIMUM OF 2 SPIDERS PER JOINT PLACED ONE FOURTH OF THE PIPE JOINT LENGTH IN FROM BOTH THE BELL AND SPIGOT.

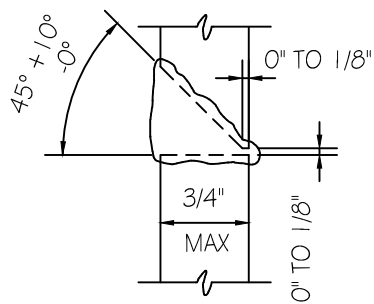
PIPE ALIGNMENT GUIDE

CITY OF RALEIGH			
DEPARTMENT OF PUBLIC UTILITIES			
AERIAL PIPE CROSSING			
CASING PIPE DETAILS			
DWG. NO.	REVISIONS	DATE	REVISIONS
S-18	A.B.B.	4-16-04	
	D.H.L.	6-18-08	

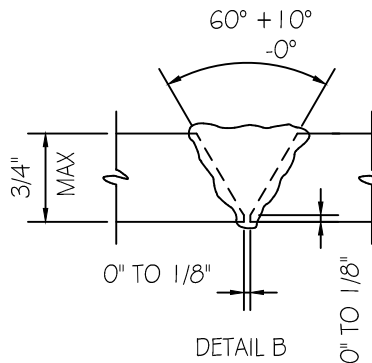


COLUMN VERTICAL

* COLUMN HORIZONTAL OR VERTICAL



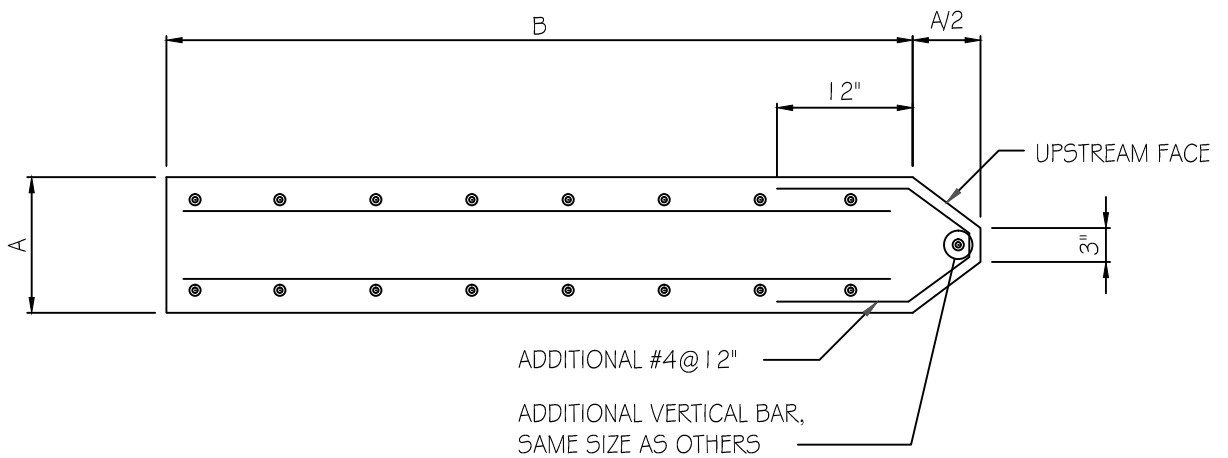
DETAIL A



DETAIL B

* POSITION OF COLUMN DURING WELDING

STEEL PILE SPlice



PLAN - CONCRETE SUPPORT NOSING

(WHEN EXPOSED TO STREAM FLOW)

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
AERIAL PIPE CROSSING
CONCRETE SUPPORT DETAILS

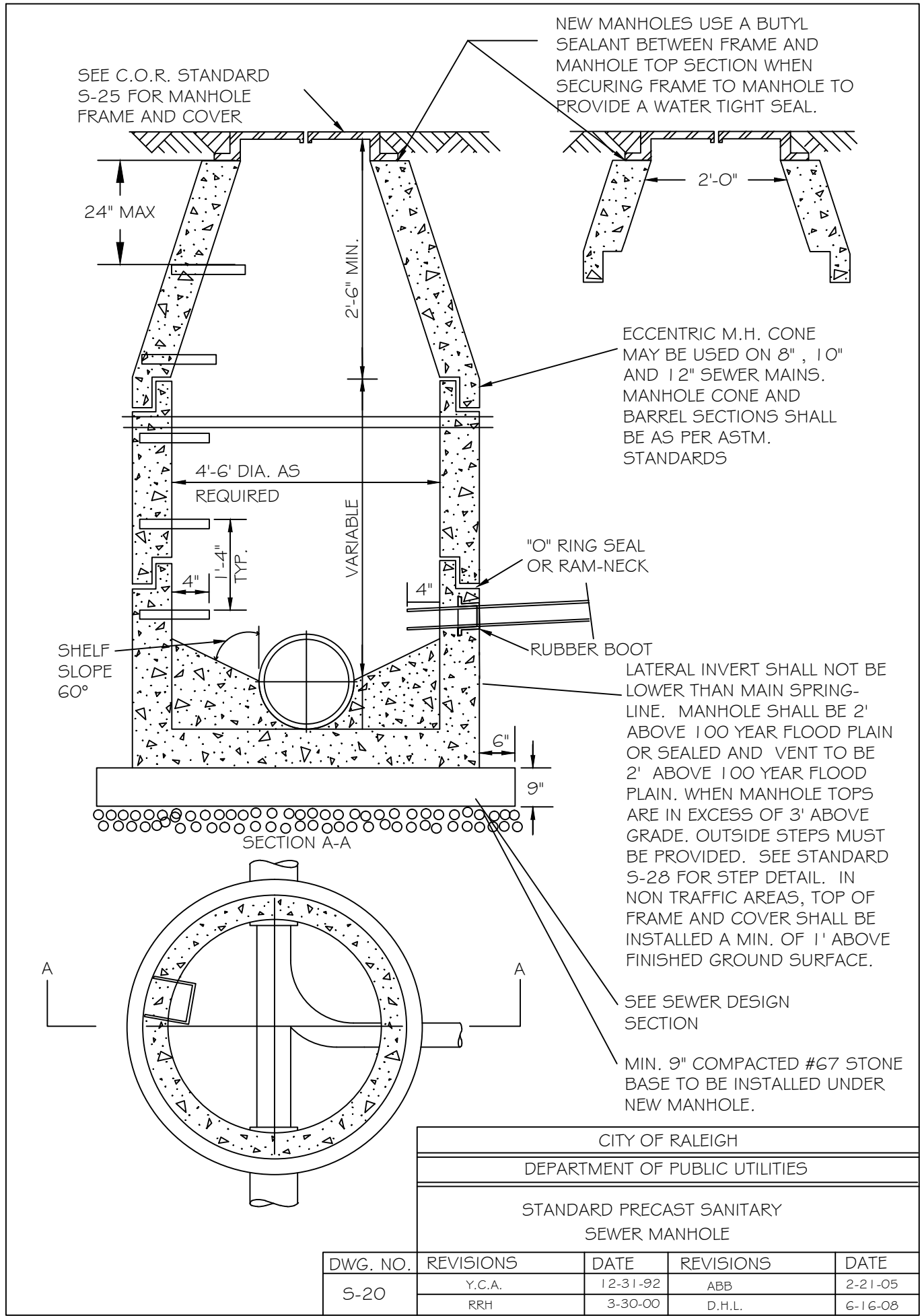
DWG. NO.
S-19

REVISIONS
D.H.L.

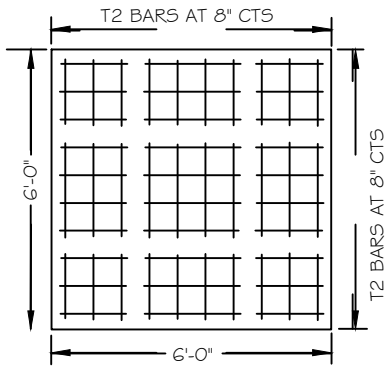
DATE
6/16/08

REVISIONS

DATE

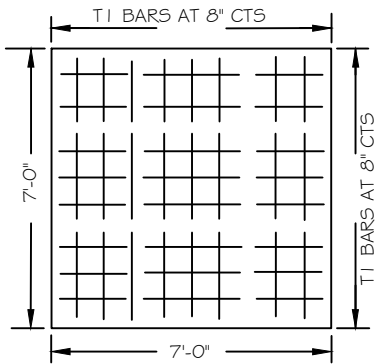


CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD PRECAST SANITARY SEWER MANHOLE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-20	Y.C.A.	12-31-92	ABB	2-21-05
	RRH	3-30-00	D.H.L.	6-16-08



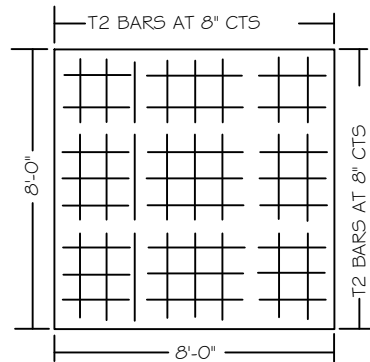
REINFORCED CONC. FOOTING FOR
4' PRECAST MANHOLE

BILL OF MATERIAL FOR 4' MANHOLE				
BAR	SIZE	LENGTH	NO.	WT. LBS.
T2	#5	5'-6"	18	103
CL. "A" CONCRETE TOTAL CU. YDS.				,000



REINFORCED CONC. FOOTING FOR
5' PRECAST MANHOLE

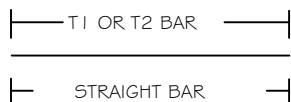
BILL OF MATERIAL FOR 4' MANHOLE				
BAR	SIZE	LENGTH	NO.	WT. LBS.
T1	#5	6'-6"	20	136
CL. "A" CONCRETE TOTAL CU. YDS.				,361



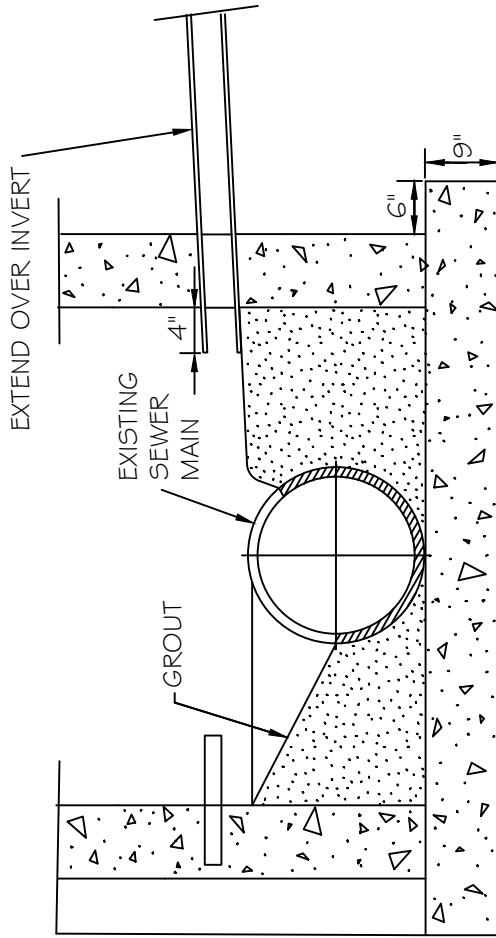
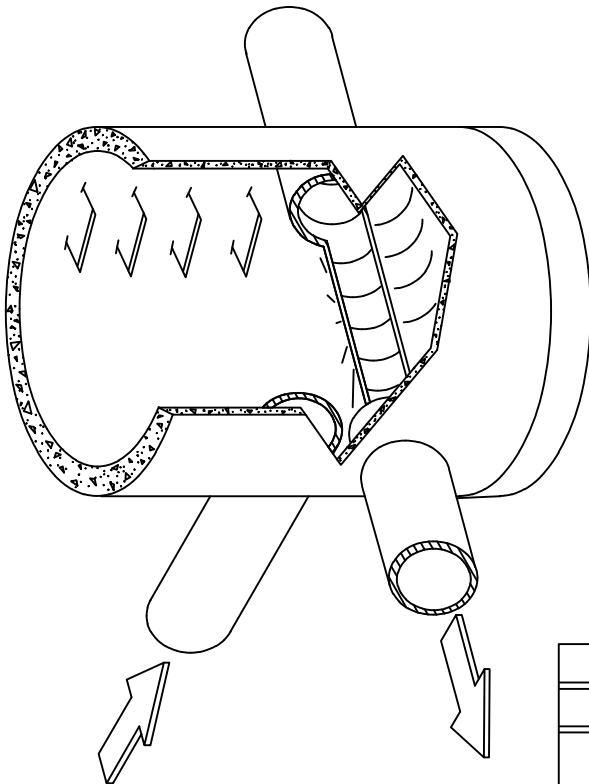
REINFORCED CONC. FOOTING FOR
6' PRECAST MANHOLE

BILL OF MATERIAL FOR 4' MANHOLE				
BAR	SIZE	LENGTH	NO.	WT. LBS.
T2	#5	7'-6"	24	165
CL. "A" CONCRETE TOTAL CU. YDS.				,778

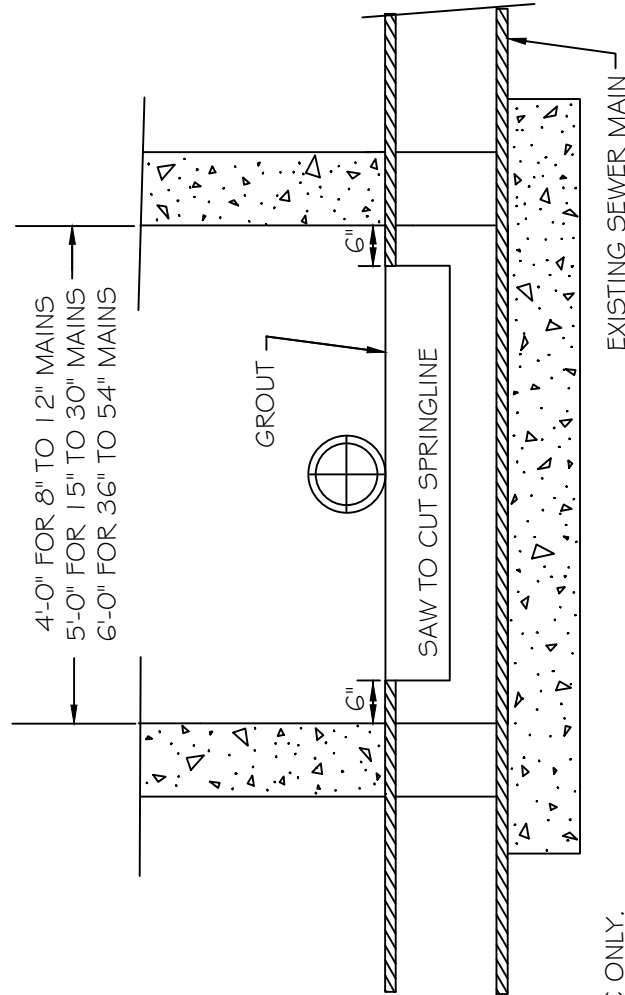
* ALL BASES ARE MINIMUM 9" THICK



CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
EXTENDED BASE OR CAST-IN-PLACE REINFORCED CONCRETE BASE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-21		3-1-87	ABB	2-9-05
	RRH	3-30-00		



SECTION AT RIGHT ANGLE TO EXISTING MAIN

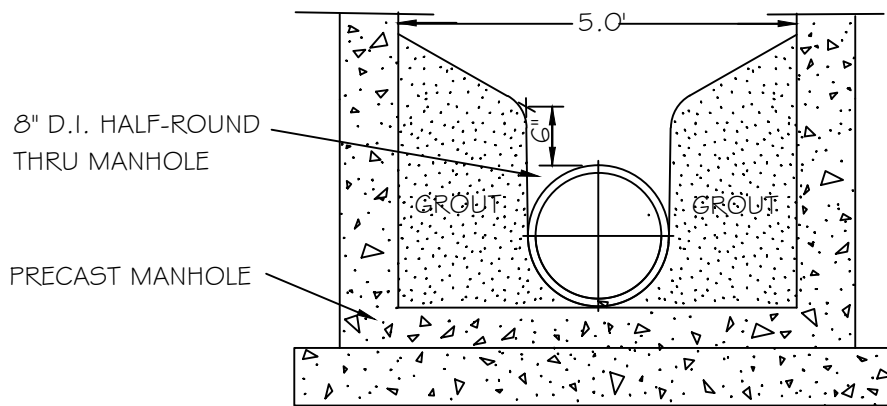


SECTION ALONG CENTERLINE OF EXISTING MAIN

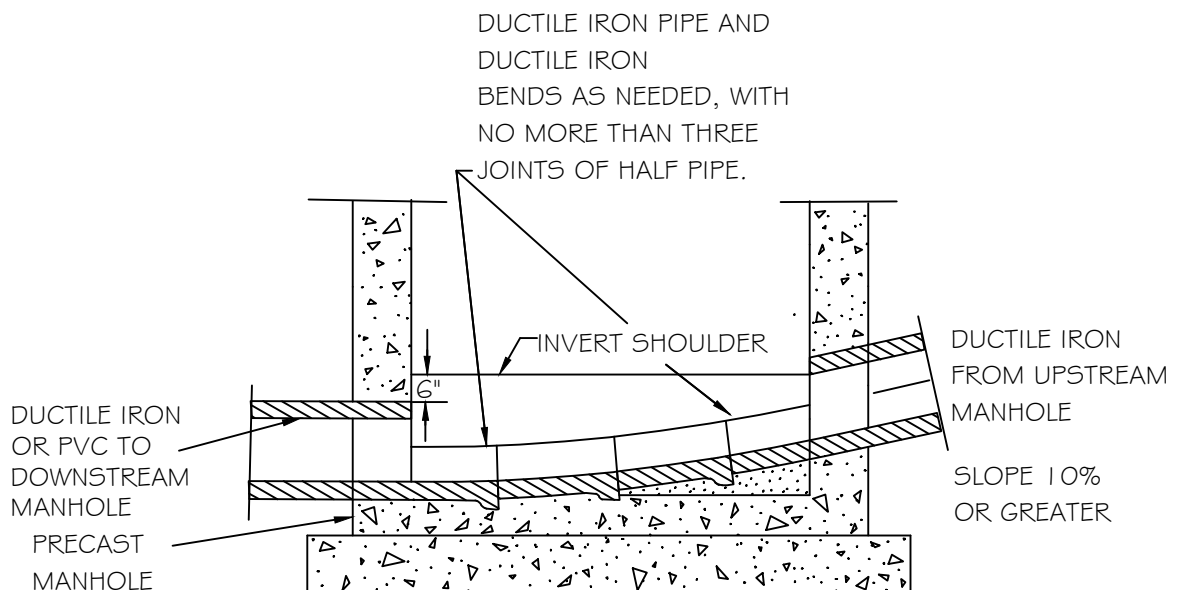
NOTES:

1. FLOW SHALL BE MAINTAINED DURING CONSTRUCTION.
2. THIS DETAIL TO BE USED WHEN A 6" OR LARGER LATERAL NECESSITATES CONSTRUCTION OF A NEW MANHOLE.
3. SEE STANDARD DETAIL S-20, FOR PRECAST MANHOLES.
4. THE CONTRACTOR SHALL PROVIDE A MINIMUM 9" COMPACTED # 67 STONE BASE.
5. FOR USE ON DIP, CONCRETE, AND PVC ONLY. (NOT ALLOWED ON VCP)
6. SEE DETAIL S-21 FOR REINFORCING OF POURED IN-PLACE BASE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MANHOLE INSTALLATION OVER EXISTING SEWER MAIN				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-22	Y.C.A.	12-31-91	A.B.B.	1-19-05
	RRH	3-30-00	D.H.L.	6/16/08



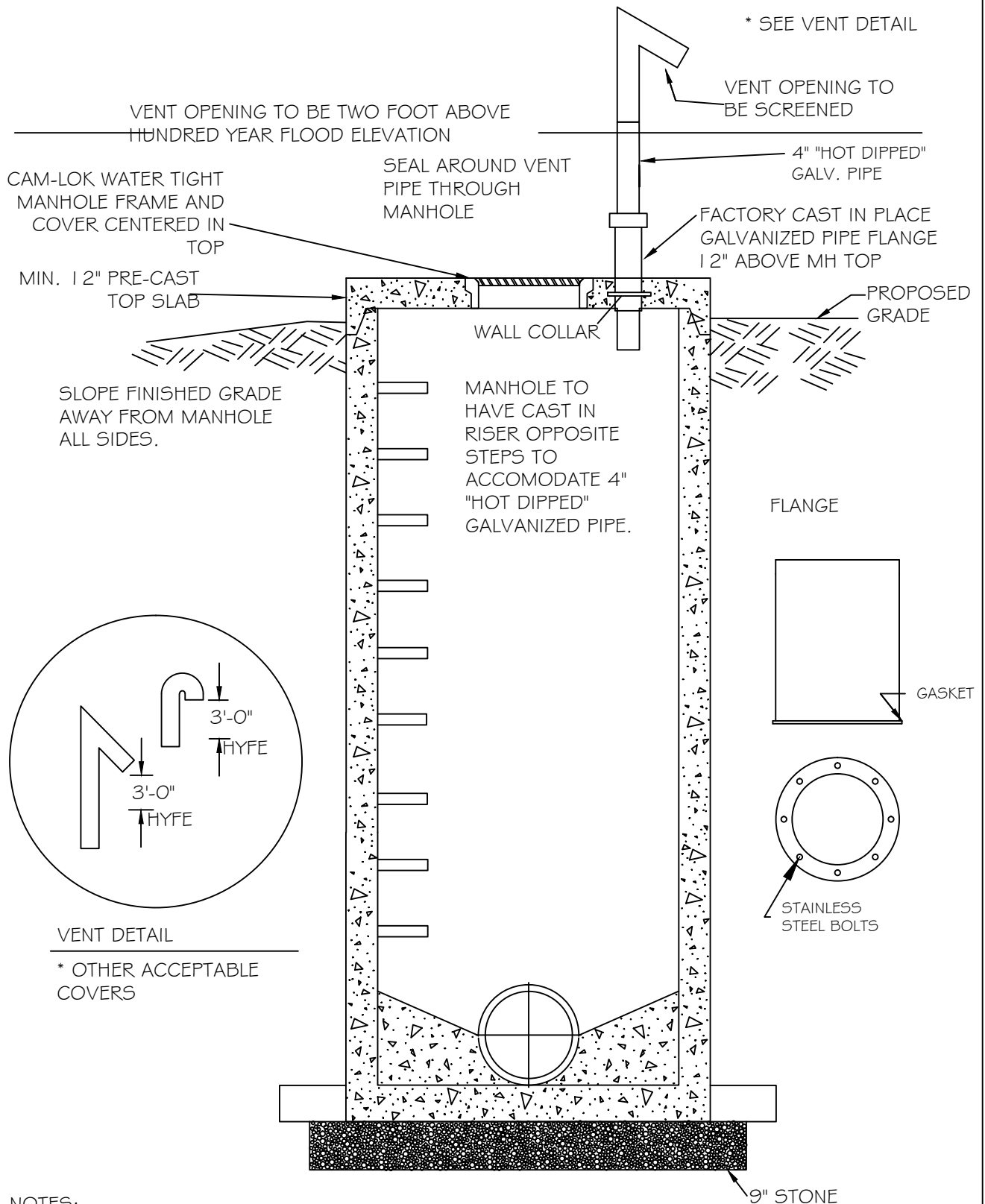
SECTION AT RIGHT ANGLE TO CENTER LINE OF PIPE



SECTION ALONG CENTER LINE OF PIPE

NOTE:
NO HORIZONTAL ALIGNMENT CHANGE
CAN BE MADE WITH IN THIS MANHOLE
TYPE. USE ON GRADES 1.0% OR GREATER.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD HIGH VELOCITY MANHOLE INVERT				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-23		3-1-87	RRH	3-30-00
	Y.C.A.	12-31-91		



VENT DETAIL

* OTHER ACCEPTABLE
COVERS

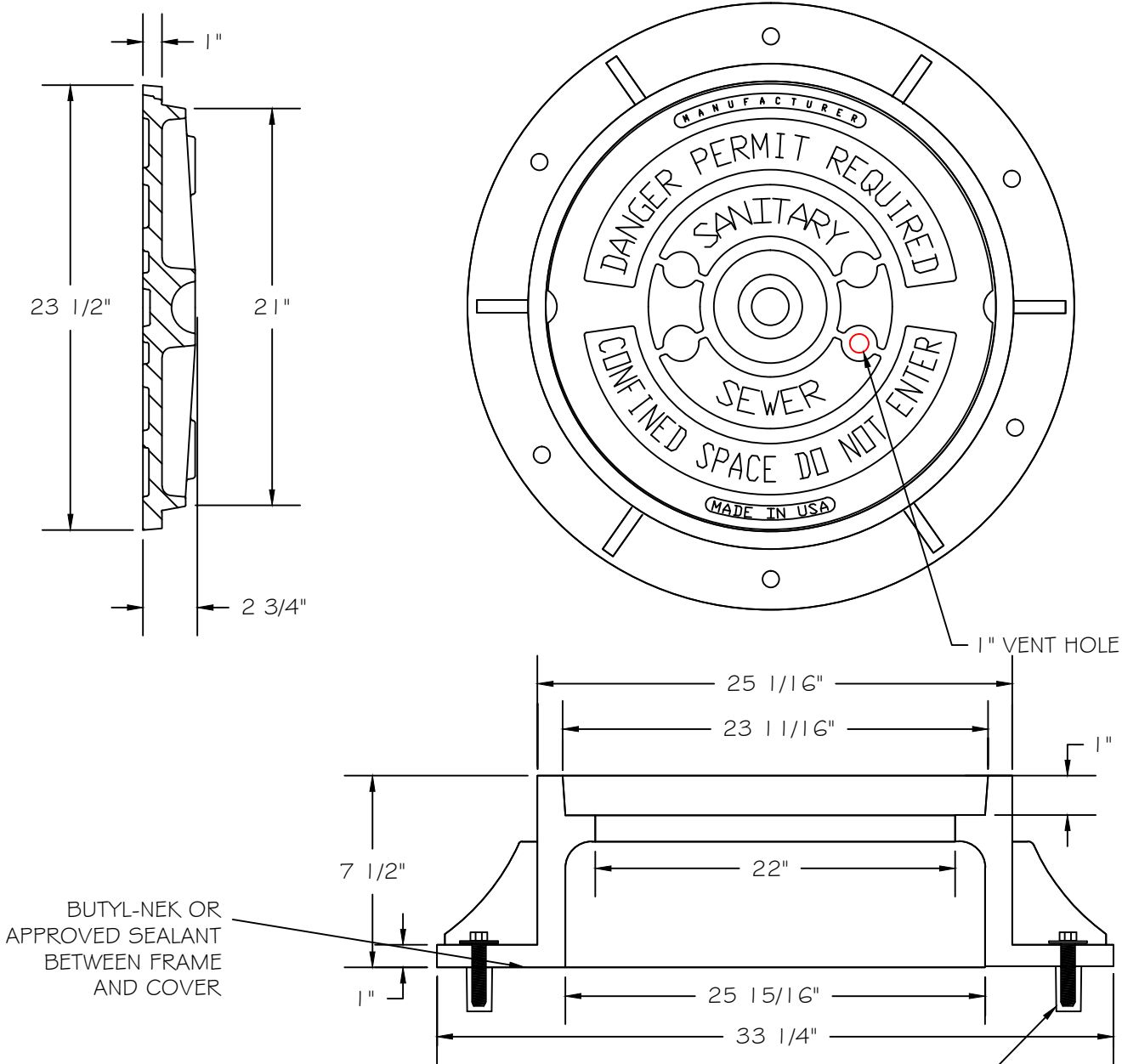
NOTES:

1. VENT MUST BE FACTORY WELDED
FABRICATED AND "HOT DIPPED"
GALVANIZED.
2. HYFE- Hundred Year Flood
elevation

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD SEAL TIGHT MANHOLE WITH VENTED STACK				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-24	D.W.C.	6-7-99	A.B.B.	4-15-04
	RRH	3-30-00	D.H.L.	6/16/08

COVER 120 LBS. MINIMUM

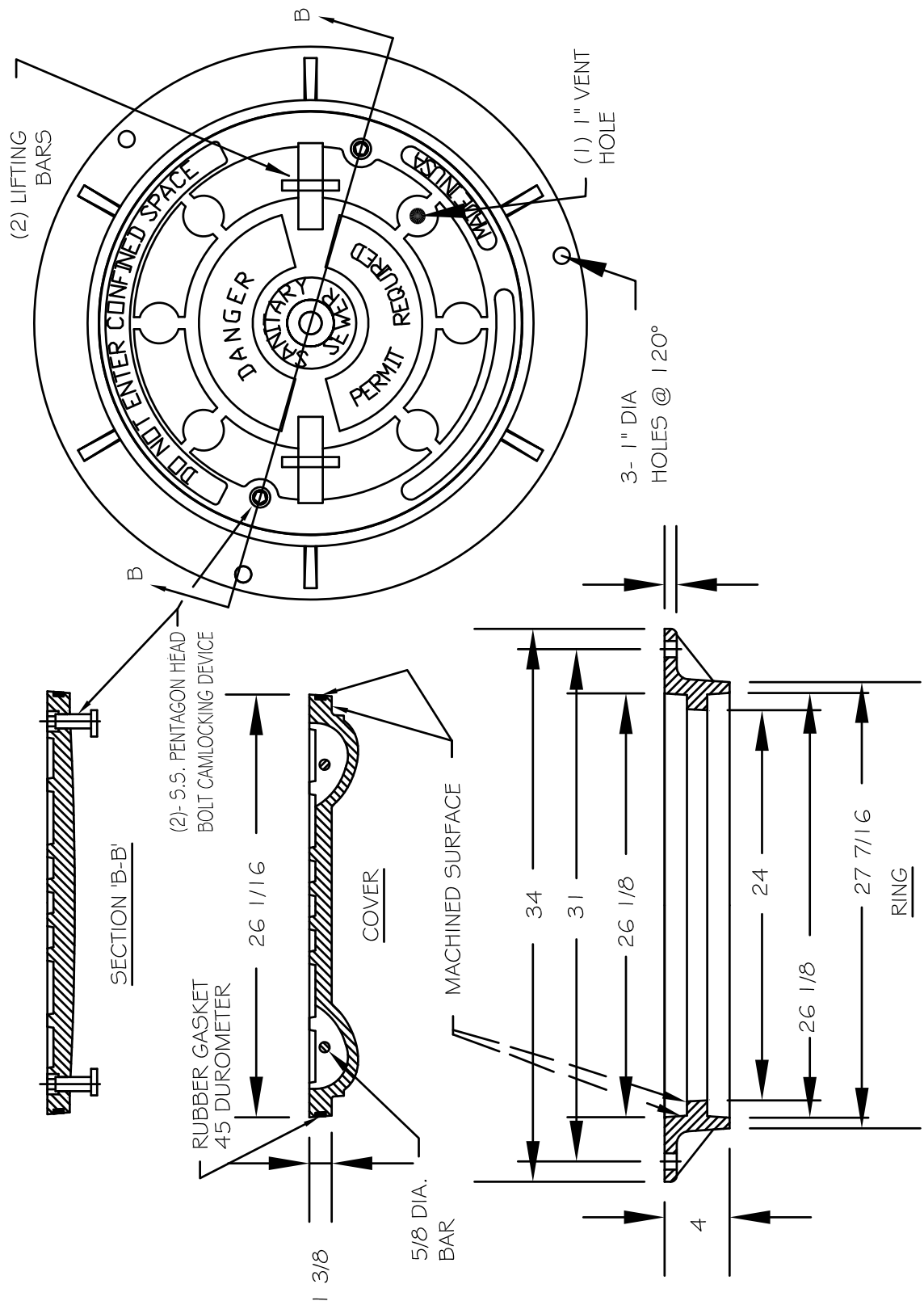
MANHOLE FRAME AND COVER



- NOTES:
- 1) ALL MANHOLE FRAMES SHALL BE DOMESTICALLY CAST.
 - 2) FRAME SHALL BE A MINIMUM WEIGHT OF 182 LBS. WITHIN PUBLIC ROW AND 160 LBS. WITHIN EASEMENTS.
 - 3) COVER SHALL WEIGH A MIN. OF 120 LBS.
 - 4) ALL MANHOLE FRAMES OUTSIDE OF PAVED SURFACES SHALL BE BOLTED TO THE CONE SECTION OR RING WITH A MINIMUM OF 4 BOLTS PER FRAME.

5/8"x3" LAGSHIELD IN HOLE DRILLED INTO CONE OR RING WITH ANCHOR SUNK TO DESIGN DEPTH, AND 3/8"x3" HOT DIPPED GALVANIZED LAG BOLT AND WASHER.

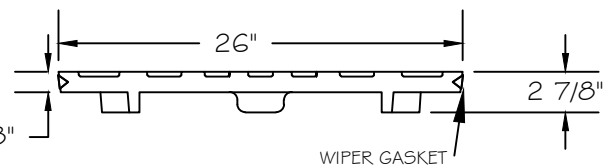
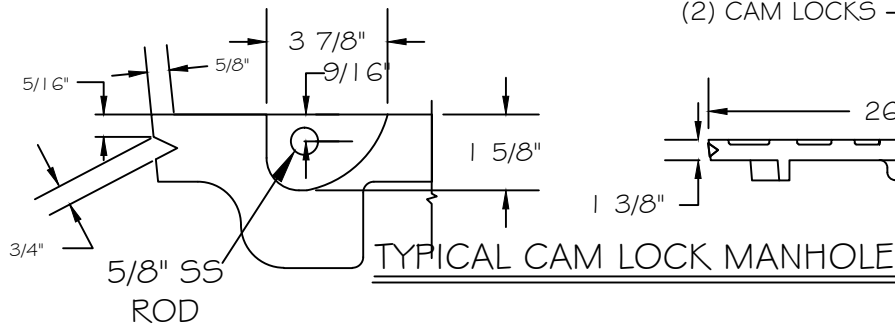
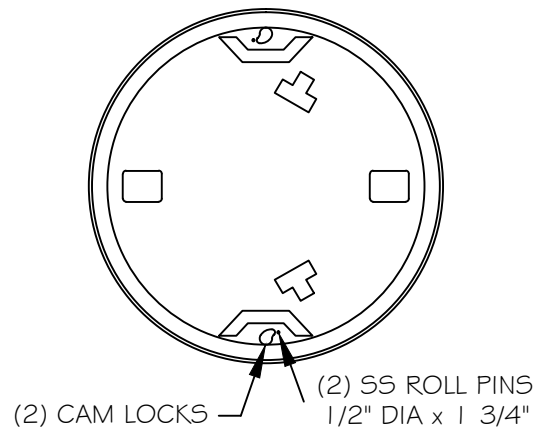
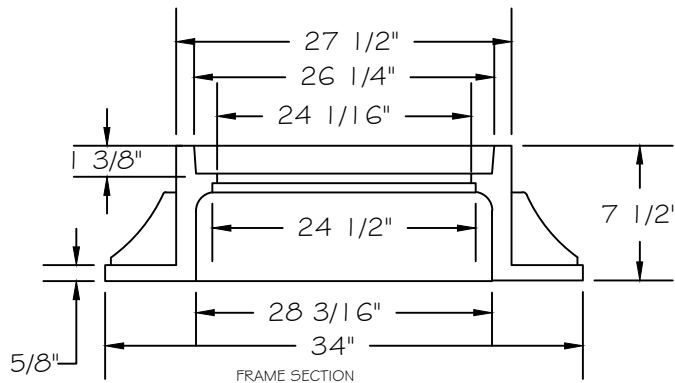
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD MANHOLE COVER				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-25	3-1-87	3-1-87	A.B.B.	2-9-05
	RRH	3-30-00	D.H.L.	6-18-08



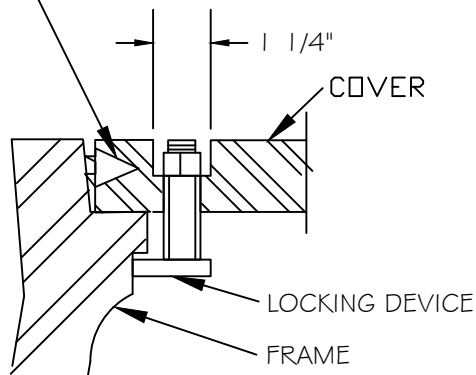
Note: solid cover required when water tight manhole specified.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
FLAT TOP MANHOLE COVER				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-25a	3-1-87	3-1-87	A.B.B.	2-9-05
	RRH	3-30-00	D.H.L.	6-18-08

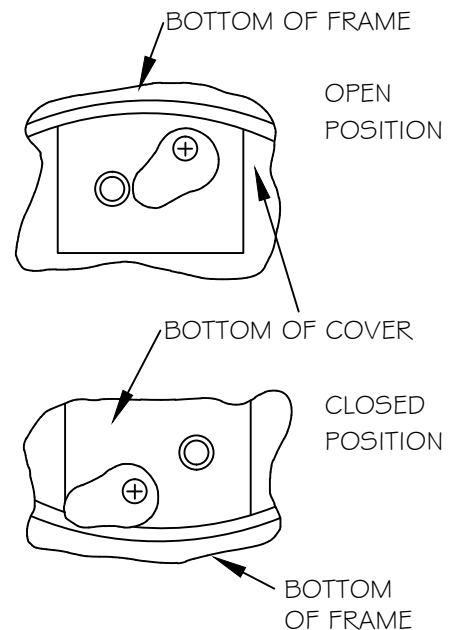
NOTE: WHEN WATERTIGHT NOT SPECIFIED, TOP SHALL
SHALL HAVE ONE 1" VENT HOLE.



FINNED GASKET IN VERTICAL FACE
OF COVER TO MAKE WATERTIGHT.



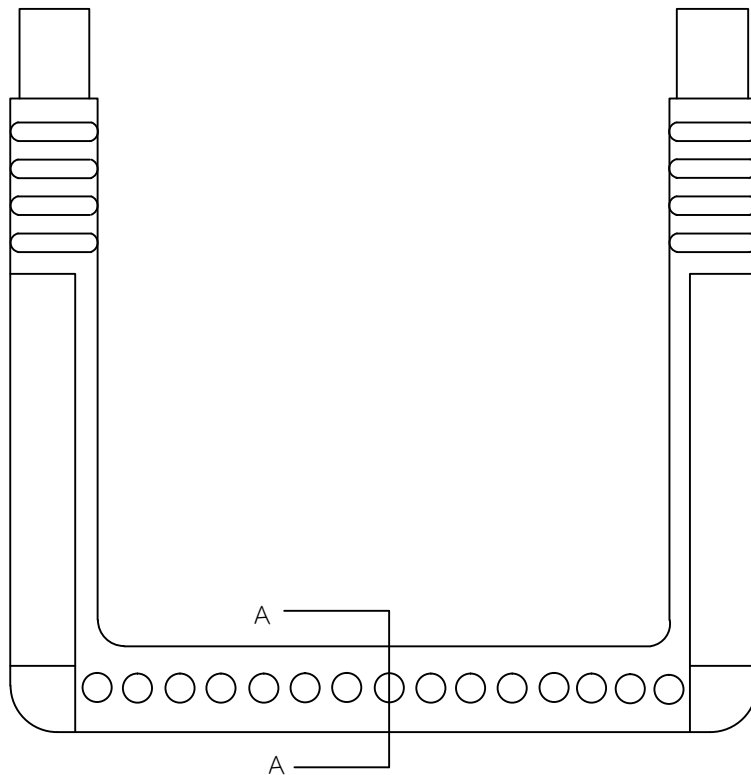
STANDARD - PENTAGON HEAD S.S.
OPTIONAL - S.S. HEX HEAD BOLT



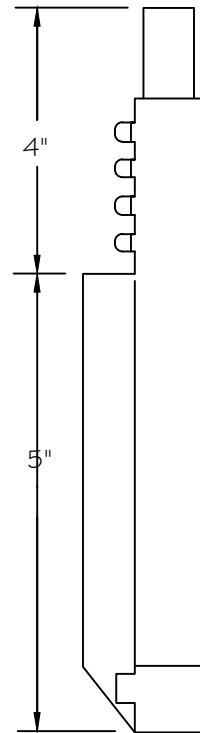
TYPICAL LOCKING DEVICE

RING MUST BE ANCHORED
IN ACCORDANCE WITH S-25

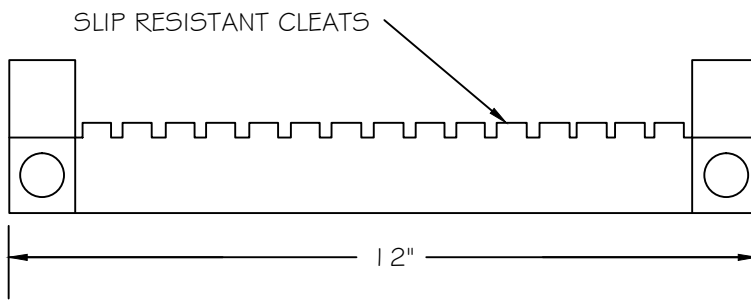
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
WATER-TIGHT MANHOLE FRAME WITH CAM LOCK COVER				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-27	RRH	3-30-00		
	DHL	6-18-08		



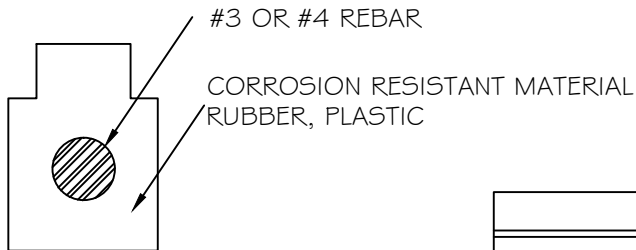
PLAN



SIDE
ELEVATION

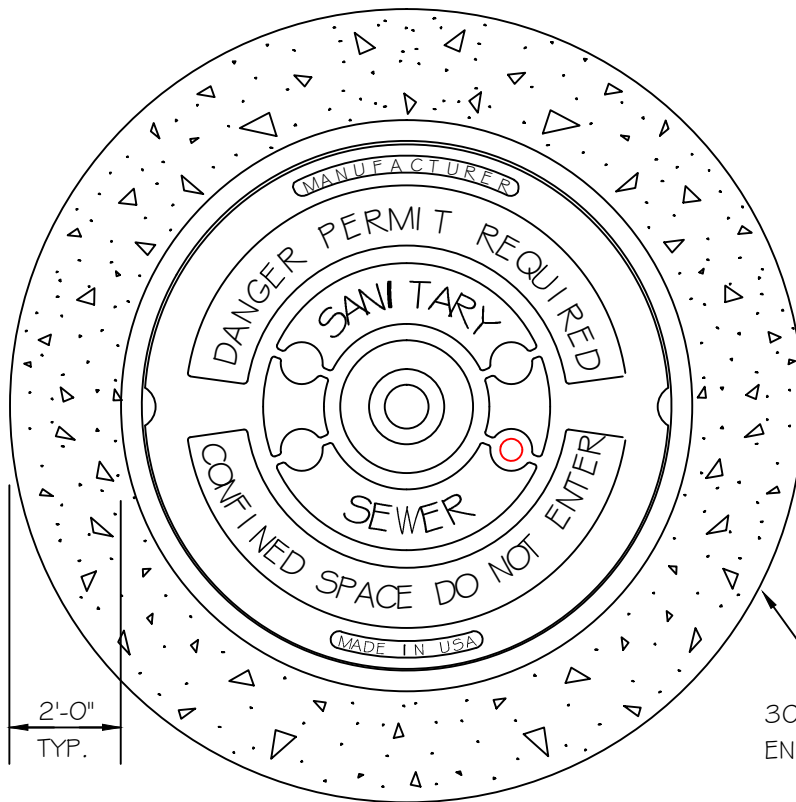


ELEVATION



SECTION A - A

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD SLIP RESISTANT MANHOLE STEP DETAIL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-28	RRH	3-30-00		



3000 P.S.I. CONCRETE
ENCASEMENT

PLAN

ADJUST FLUSH
WITH FINAL GRADE

STANDARD MANHOLE
FRAME AND COVER

2"

A.B.C.

STANDARD
MANHOLE

8" Min.

COMPACTED
BACKFILL

TOTAL
CHIMNEY NOT
TO EXCEED 11"

SECTION

PRECAST CONCRETE SPACER
(DONUT RINGS) IN TRAFFIC
AREAS ONLY. DONUT RINGS
NOT ALLOWED IN
EASEMENTS.

CITY OF RALEIGH

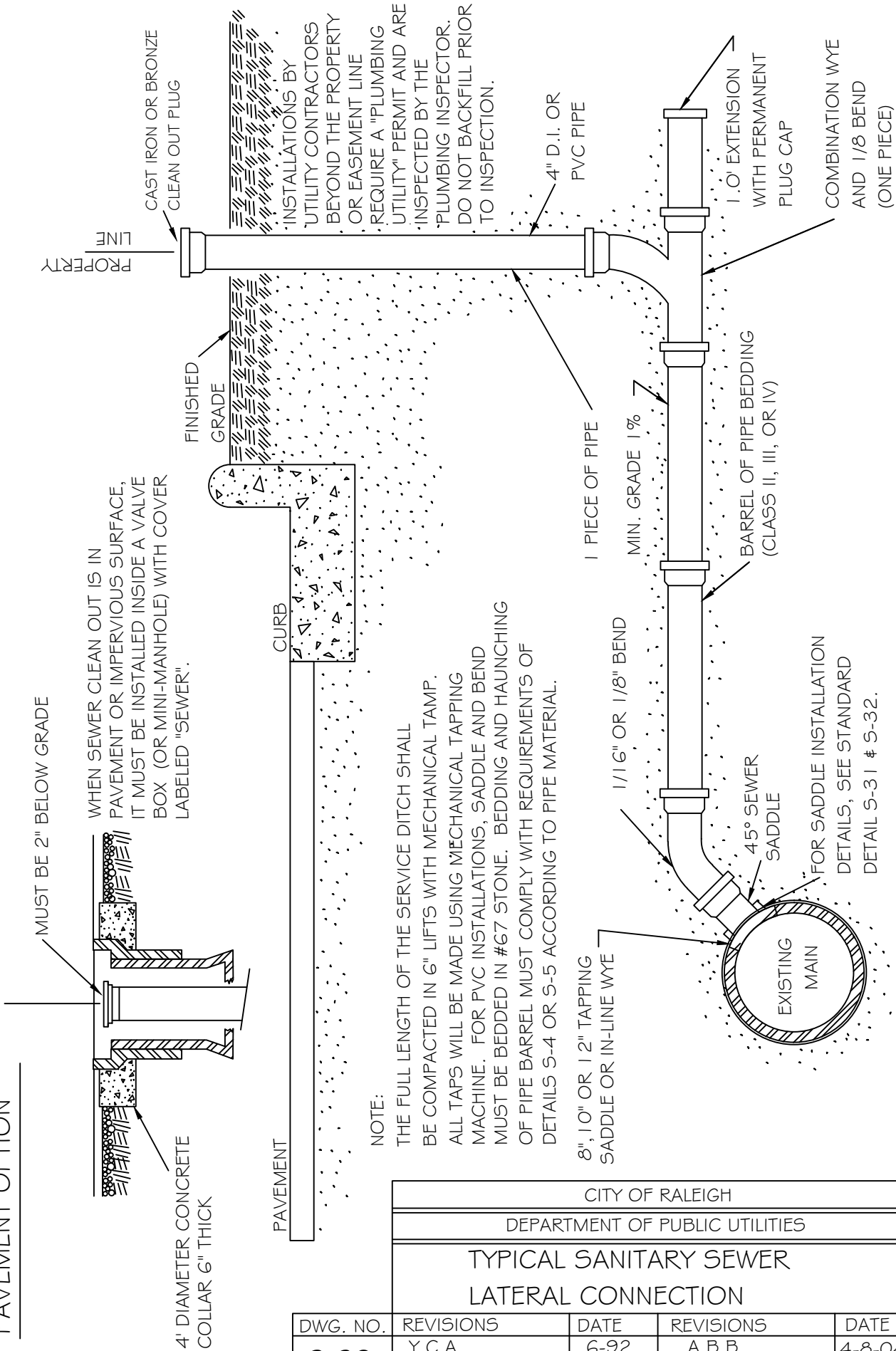
DEPARTMENT OF PUBLIC UTILITIES

STANDARD MANHOLE FRAME AND COVER DETAIL WITHIN PAVED SURFACES

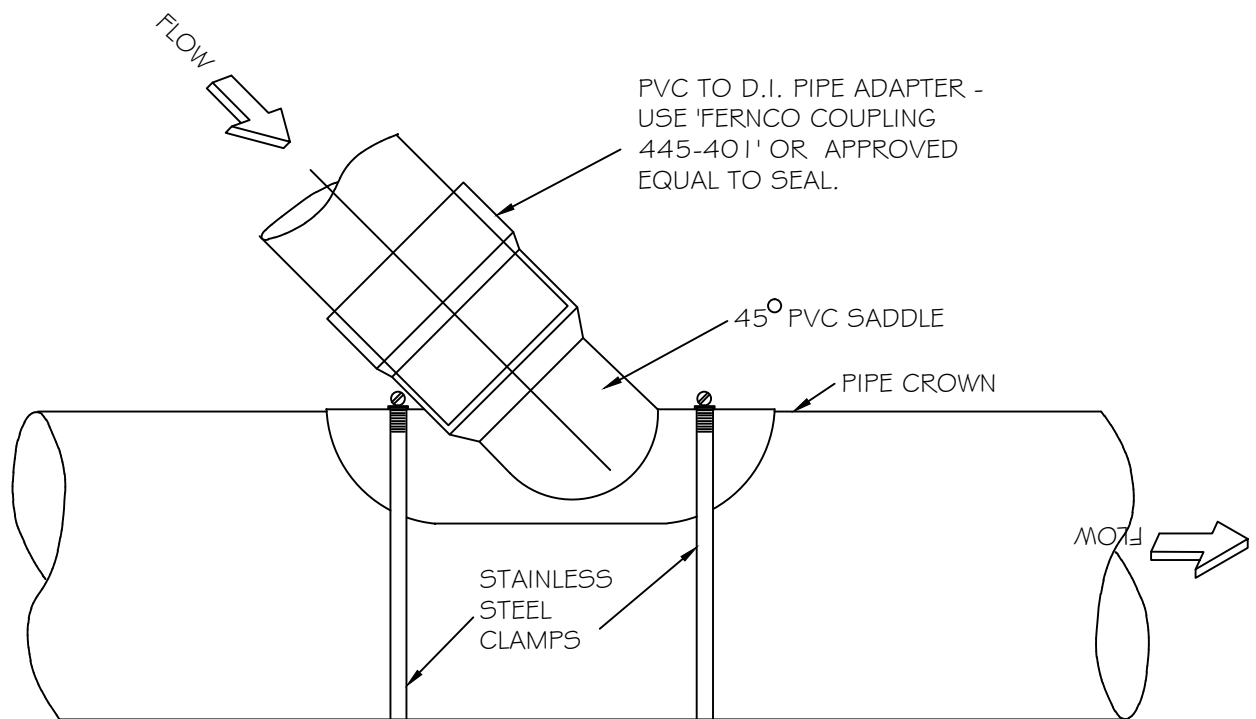
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-29	Y.C.A.	12-31-91	ABB	9-20-04
	RRH	3-30-00	DHL	11-29-07

*SERVICE LATERAL MATERIAL AS REQUIRED

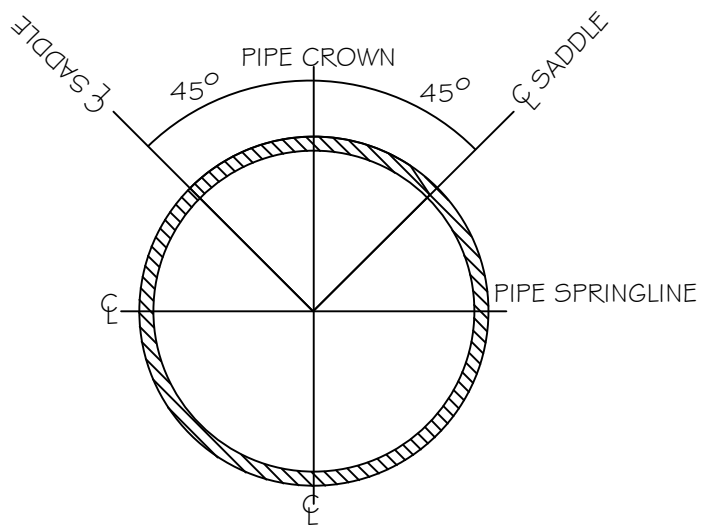
PAVEMENT OPTION



CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL SANITARY SEWER LATERAL CONNECTION				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-30	Y.C.A.	6-92	A.B.B.	4-8-04
	RRH	3-30-00	D.H.L.	6-18-08

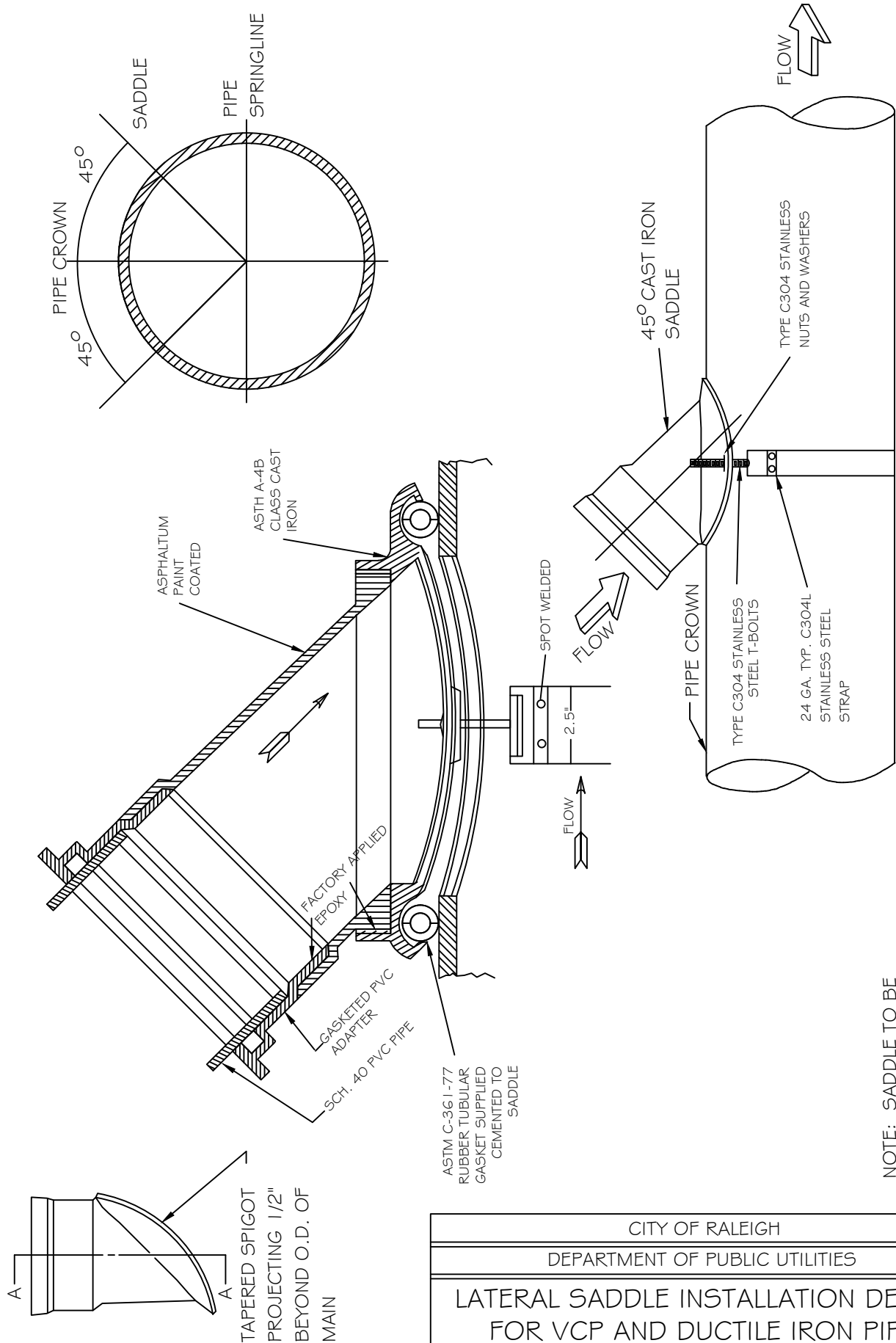


BACKFILL UNDER PVC SADDLE, ADAPTOR, AND CAST IRON BEND WITH #67 STONE AS SHOWN ON S-4.



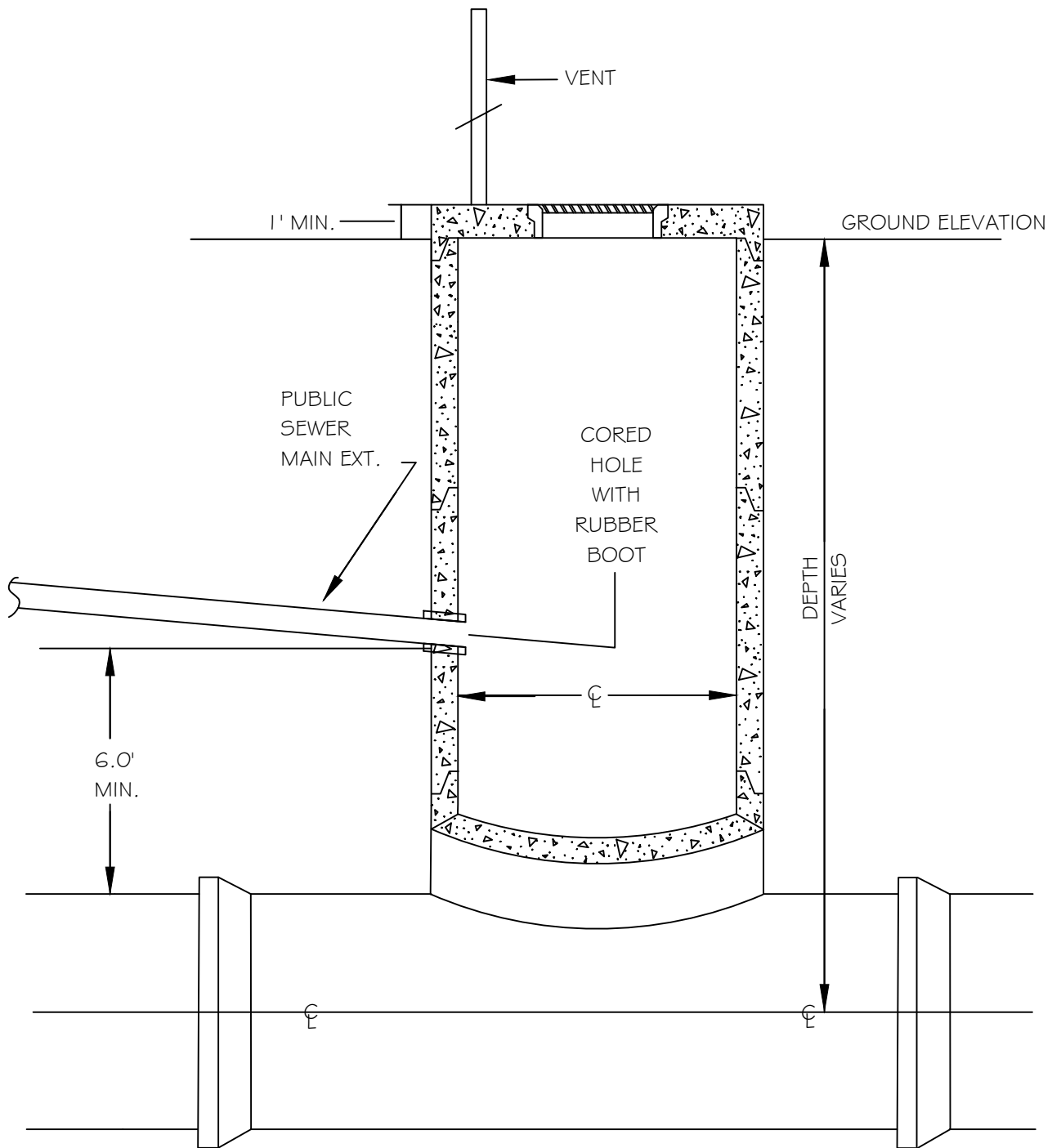
SADDLE INSTALLATION LIMITS

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
LATERAL SADDLE INSTALLATION DETAIL FOR PVC PIPE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-31		3-1-87		
	RRH	3-30-00		



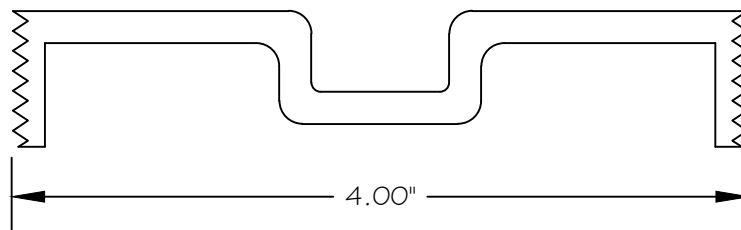
NOTE: SADDLE TO BE
GENECO E40 OR EQUAL

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
LATERAL SADDLE INSTALLATION DETAIL FOR VCP AND DUCTILE IRON PIPE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-32	3-1-87	3-1-87		
	RRH	3-30-00		

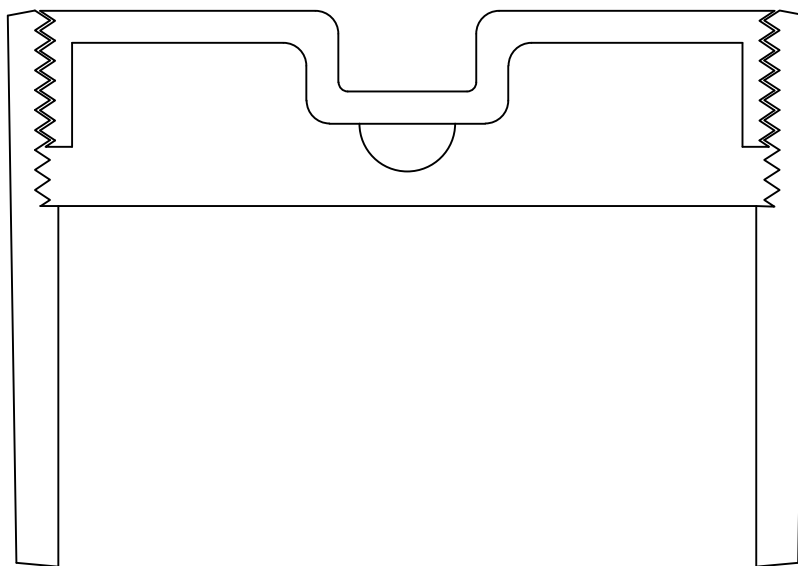


1. HOLE SHALL BE CORED IN RISER SECTION FOR PUBLIC SERVICE MAIN EXTENSION.
2. RUBBER BOOT SHALL BE UTILIZED ON ALL CORES
3. CORES SHALL BE IN CENTER OF RISER SECTION
4. CONNECTION TO TEE MANHOLE MUST BE MADE BY CONTRACTOR APPROVED BY CITY OF RALEIGH PUBLIC UTILITIES DEPARTMENT

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
MAIN EXTENSION TO TIE INTO TEE MANHOLE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-33	D.W.C.	6-99	ABB	2-14-05
	RRH	3-30-00	D.H.L.	6-18-08



STANDARD 4" BRONZE CLEANOUT PLUG

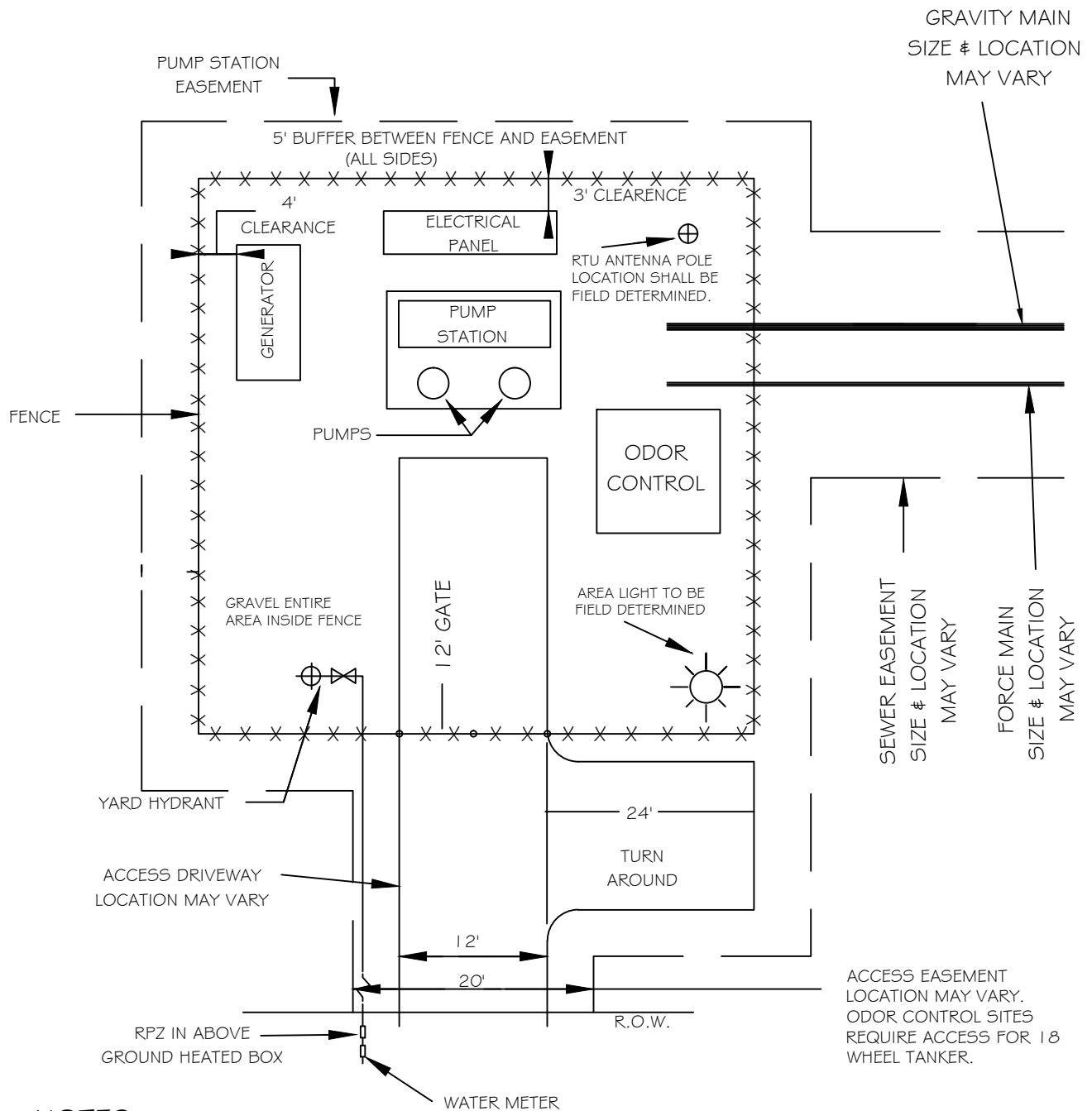


CLEANOUT FERRULE WITH PLUG

STYLES ACCEPTED:

INVERTED NUT
RAISED NUT

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
4" CLEANOUT PLUG				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-34		3-1-87	RRH	3-30-00
	D.W.C.	3-27-98		

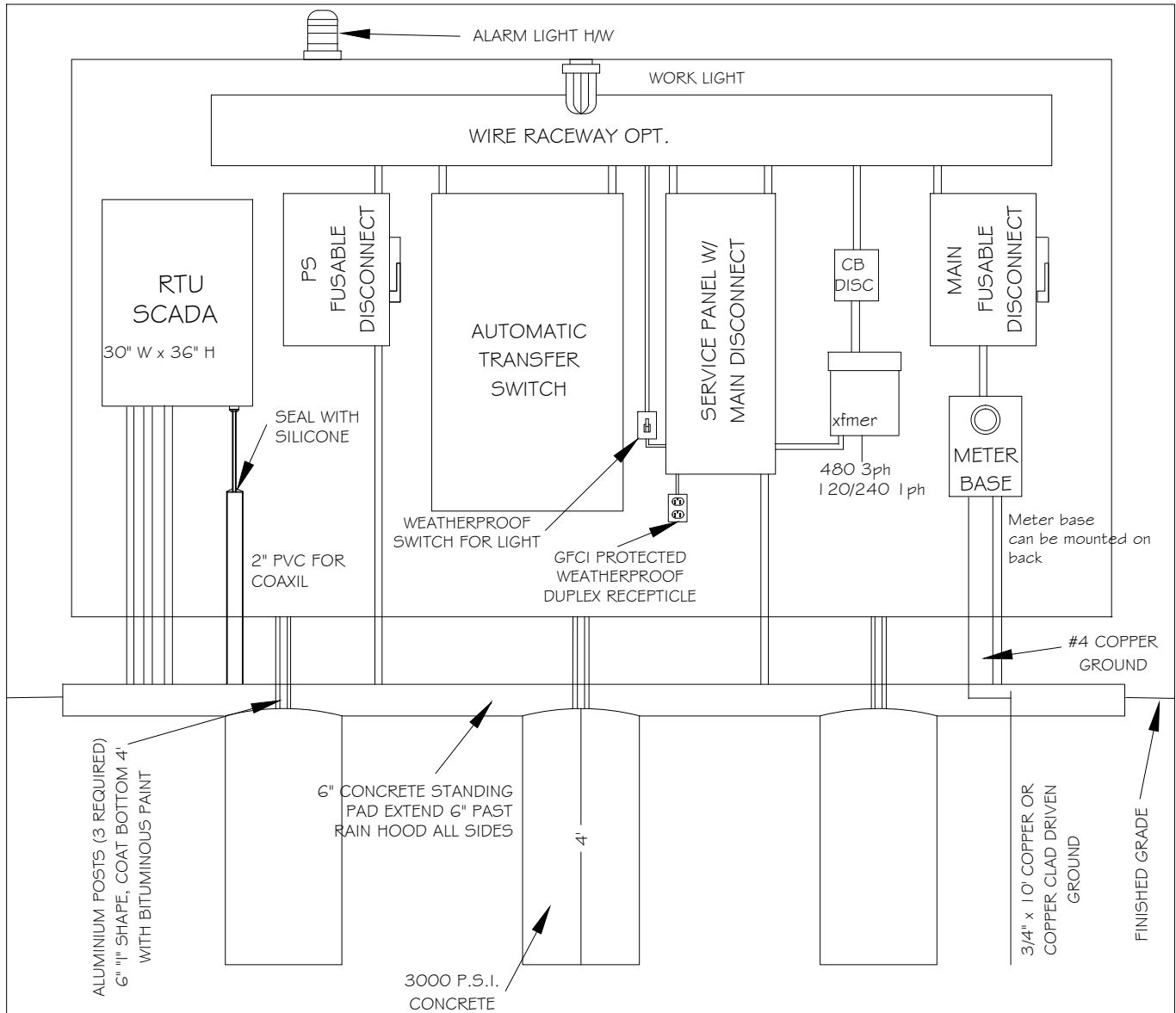


NOTES:

1. PUMP STATION MUST MEET ALL ZONING SET-BACK REQUIREMENTS
2. PUMP STATION MUST MEET ALL LANDSCAPING REQUIREMENTS
3. WATER SERVICE FOR YARD HYDRANT MUST HAVE RPZ BACKFLOW PROTECTION. SIZE OF SERVICE MAY VARY
4. PUMP STATION EASEMENT TO BE 60'x 60' MINIMUM
5. EQUIPMENT LOCATIONS MAY VARY
6. 5' BUFFER SHALL BE REQUIRED BETWEEN FENCE AND EASEMENT LINE.

* FOR ELECTRICAL PANEL
REFER TO DETAILS S-36 & S-37

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
MINIMUM REQUIREMENTS FOR PUMP STATIONS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-35	D.W.C.	10-1-99	A.B.B.	2-16-05
	RRH	3-30-00		

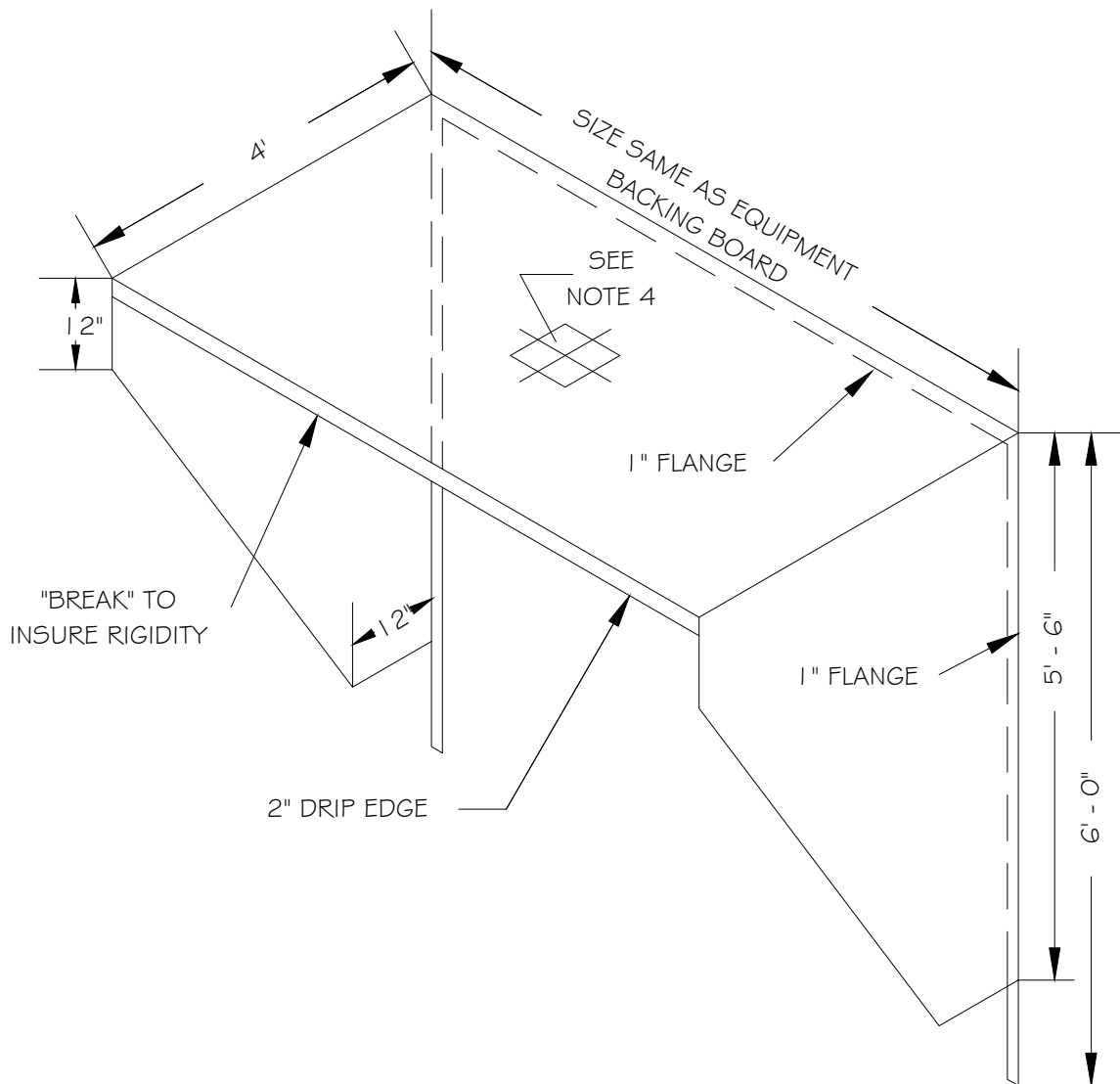


NOTES

1. BACKING PLATE TO BE 1/4" ALUMINUM. MOUNT TO "I" BEAM POSTS WITH STAINLESS STEEL NUT, BOLTS, AND WASHERS.
2. ALL ELECTRICAL WORK SHALL CONFORM TO LATEST NATIONAL, STATE AND LOCAL CODES AND REQUIREMENTS.
3. SHOW CONDUIT SIZE AND RUNS WITH WIRE SIZE AND NUMBER ON PUMP STATION PLANS.
4. PANEL LAYOUT IS SCHEMATIC ONLY. ADJUST AS NEEDED TO ACCOMMODATE EQUIPMENT. MAINTAIN 4" MIN. CLEARANCE BETWEEN PANELS AND SIDE SHIELDS.
5. ALL ENCLOSURES SHALL BE NEMA 4X RATED AND LOCKABLE.
6. ENCLOSURES SHALL BE MOUNTED TO ALUMINUM BACKING PLATE WITH NYLON SPACERS & STAINLESS STEEL NUTS, BOLTS & WASHERS.
7. CONDUIT SHALL BE RIDGID ALUMINUM OR GALVANIZED. MEYERS HUBS SHALL BE USED AT ALL PANEL CONNECTIONS.
8. NO EQUIPMENT SHALL BE MOUNTED LESS THAN 36" ABOVE FINISHED GRADE. MIN. CLEARANCE FROM WORK LIGHT TO STANDING PAD SHALL BE 6' 6".

* FOR WEATHER HOOD REFER TO DETAIL S-37

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
PUMP STATION ELECTRICAL PANEL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-36	D.W.C.	10-7-99	LBN	10-19-04
	RRH	3-30-00		

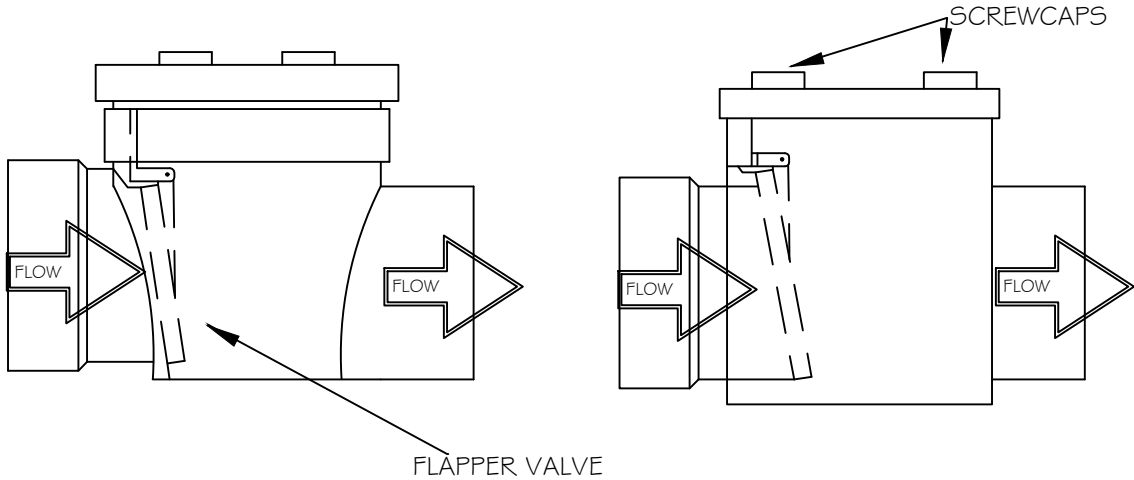


NOTES:

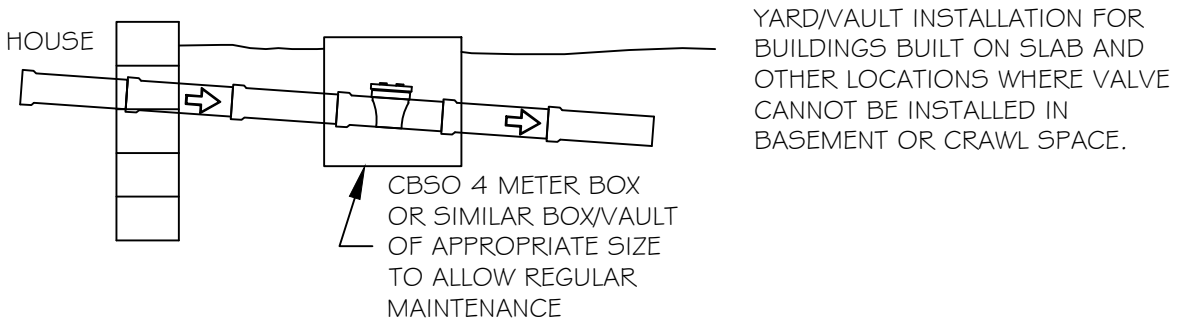
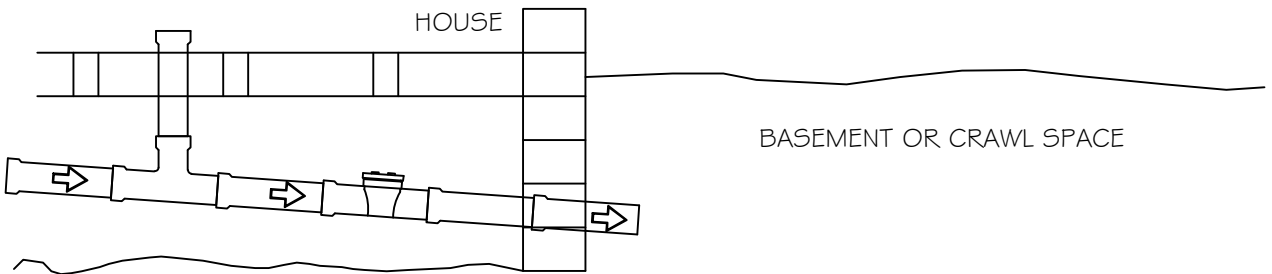
1. HOOD TO 1/2 Ga. MILL FINISH ALUMINIUM
2. HOOD TO BE HELIARC "STITCH" WELDED TO 1/4" ALUMINIUM PLATE EQUIPMENT BACKING BOARD
3. HOOD SHALL BE SAME WIDTH AS ALUMINIUM PLATE EQUIPMENT BACKING BOARD
4. PROVIDE MOUNTING TABS FOR WORK LIGHT BOX

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
WEATHER HOOD FOR ELECTRICAL EQUIPMENT PANEL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-37	D.W.C.	10-7-99	LBN	9-30-04
	RRH	3-31-00		

TYPICAL SANITARY SEWER SERVICE BACKWATER VALVE STYLES:



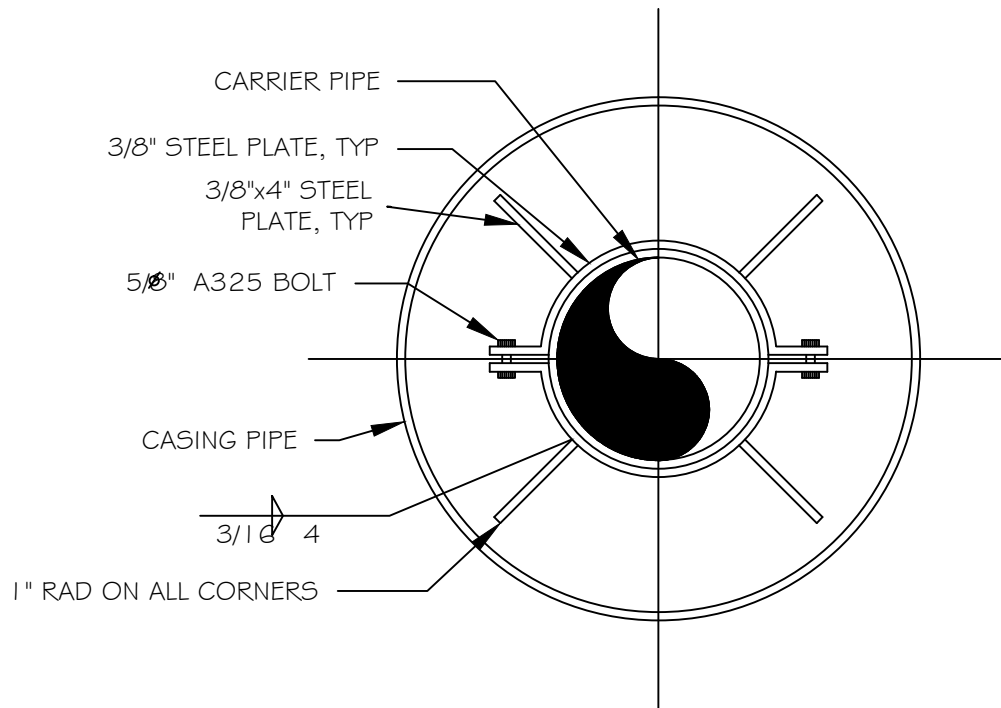
TYPICAL BACKWATER VALVE INSTALLATIONS:



NOTES:

1. INSTALLATIONS OF GREATER THAN 4' IN DEPTH MAY REQUIRE MANHOLE.
2. VALVES MUST BE INSTALLED IN A LOCATION AT WHICH THEY CAN BE CLEANED AND SERVICED REGULARLY.

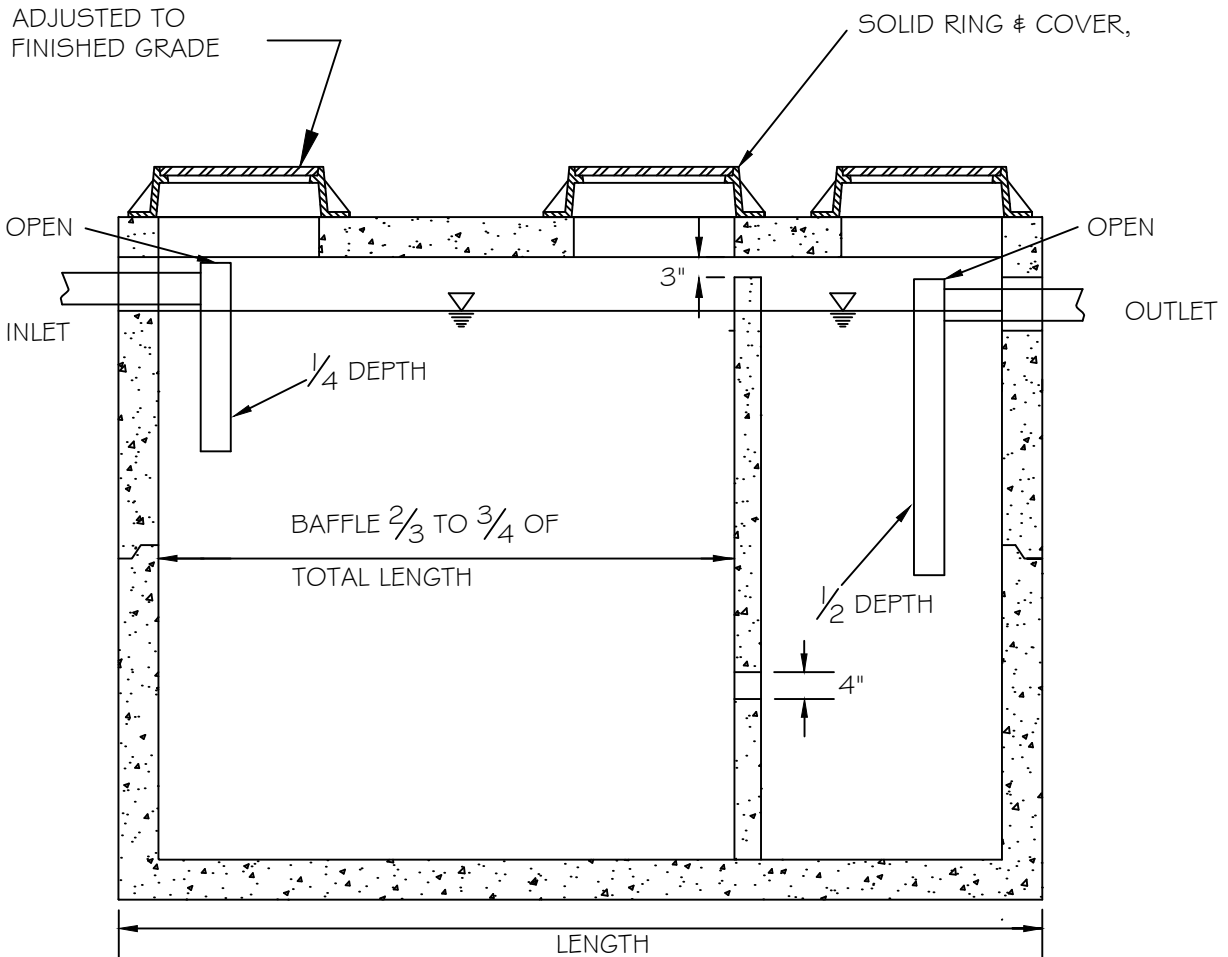
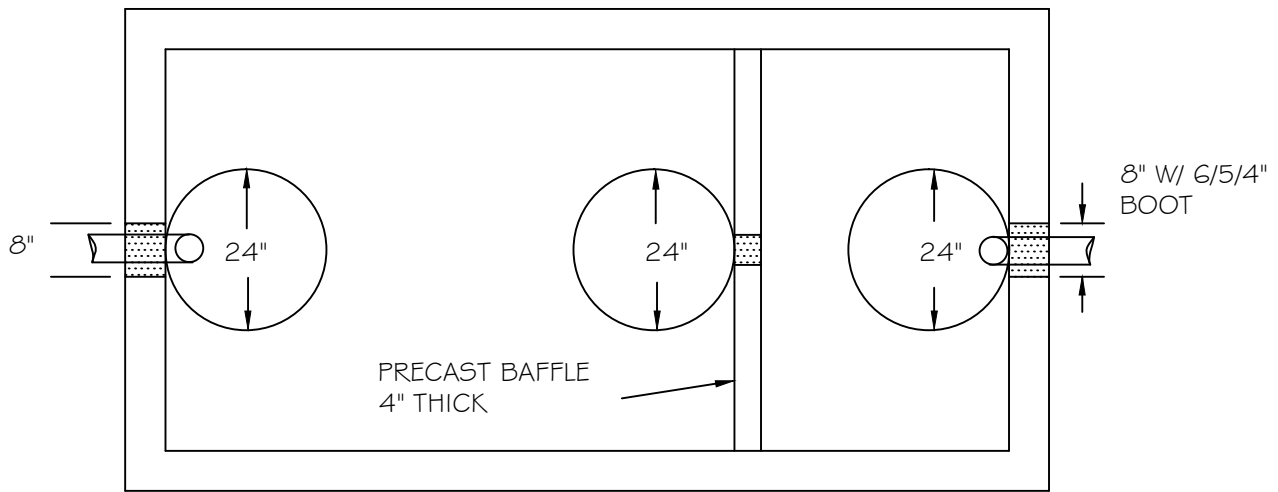
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL SANITARY SEWER SERVICE BACK- WATER VALVE INSTALLATION				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-38	RRH	3-31-00		



NOTE:

1) USE A MINIMUM OF TWO SPIDERS PER PIPE JOINT ONE FOURTH OF THE PIPE JOINT LENGTH IN FROM BOTH THE BELL AND SPIGOT ENDS.

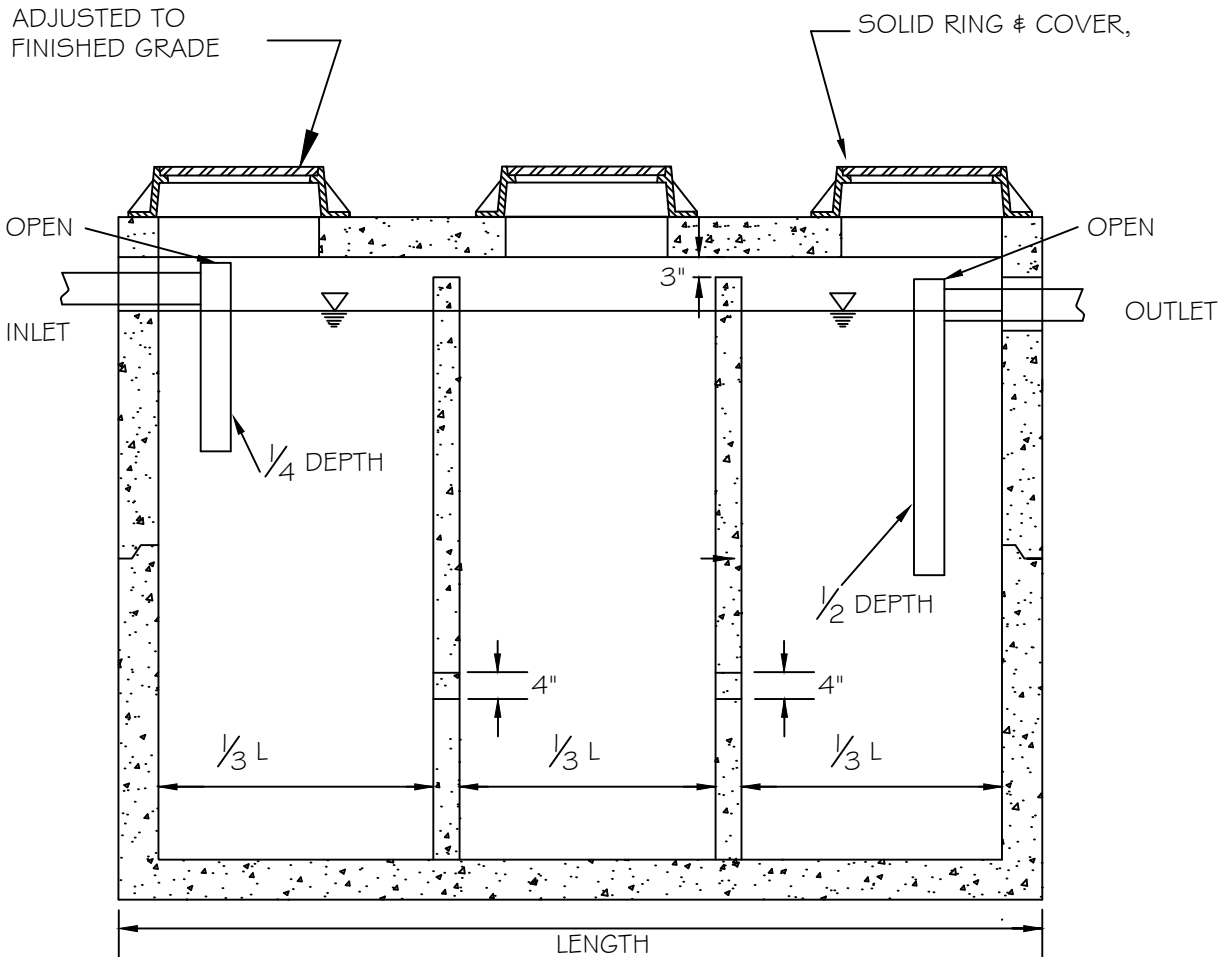
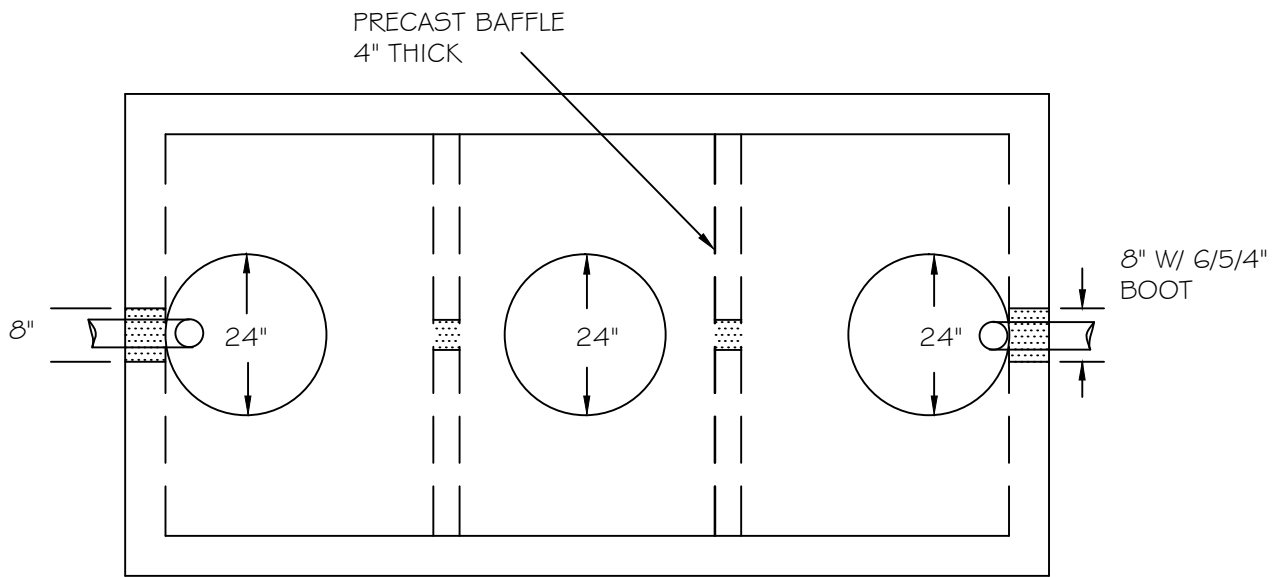
CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
PIPE ALIGNMENT GUIDE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-39	RRH	3-31-00		
	A.B.B.	4-16-04		



NOTES:

1. REINFORCEMENT: H-20 BRIDGE LOADING (TRAFFIC RATED)
2. CONCRETE: 4000 PSI @28 DAYS
3. EARTHCOVER: 0' TO 5' MAX.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
1000 GALLON GREASE INTERCEPTOR				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-40	RRH	3/9/00	D.H.L.	6/18/08
	ABB	3/19/04		



NOTES:

1. REINFORCEMENT: H-20 BRIDGE LOADING (TRAFFIC RATED)
2. CONCRETE: 4000 PSI @28 DAYS

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
1000 GALLON OIL-WATER-SAND SEPARATOR				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-40a	RRH	3/9/00	D.H.L.	6/18/08
	ABB	3/19/04		

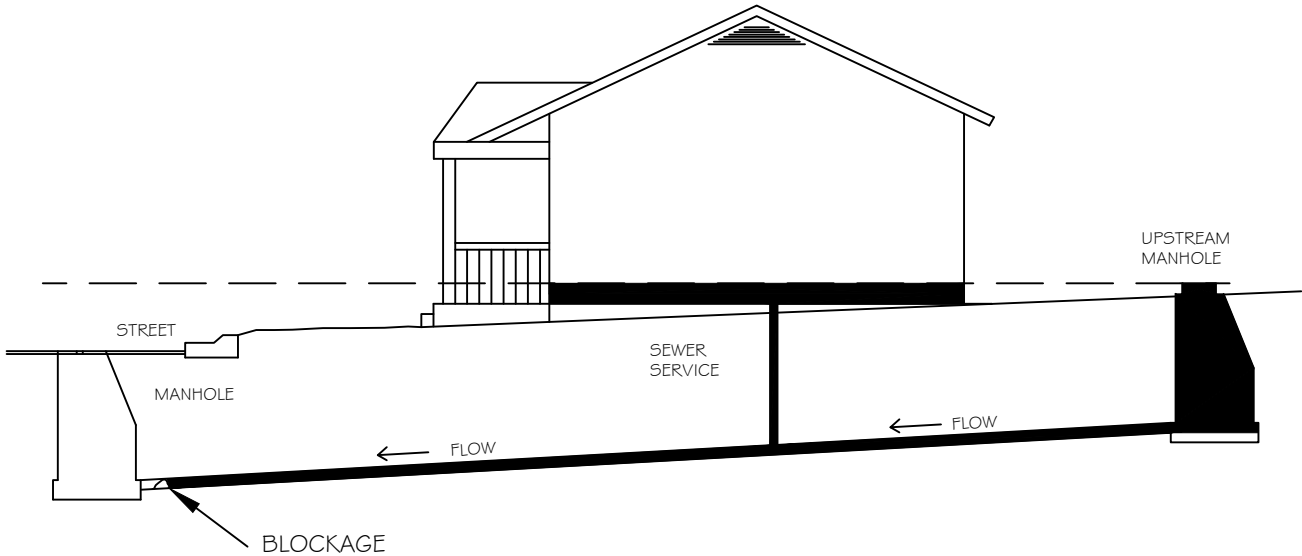
LOCALLY AVAILABLE SIZES	
INTERCEPTORS CAPACITY (GAL.)	SEPARATORS CAPACITY (GAL.)
300	1 000
550	1 200
750	1 600
1 000	
1 200	
1 500	
2000	
2500	
3000	
4000	
5000	
6000	
8000	

NOTES:

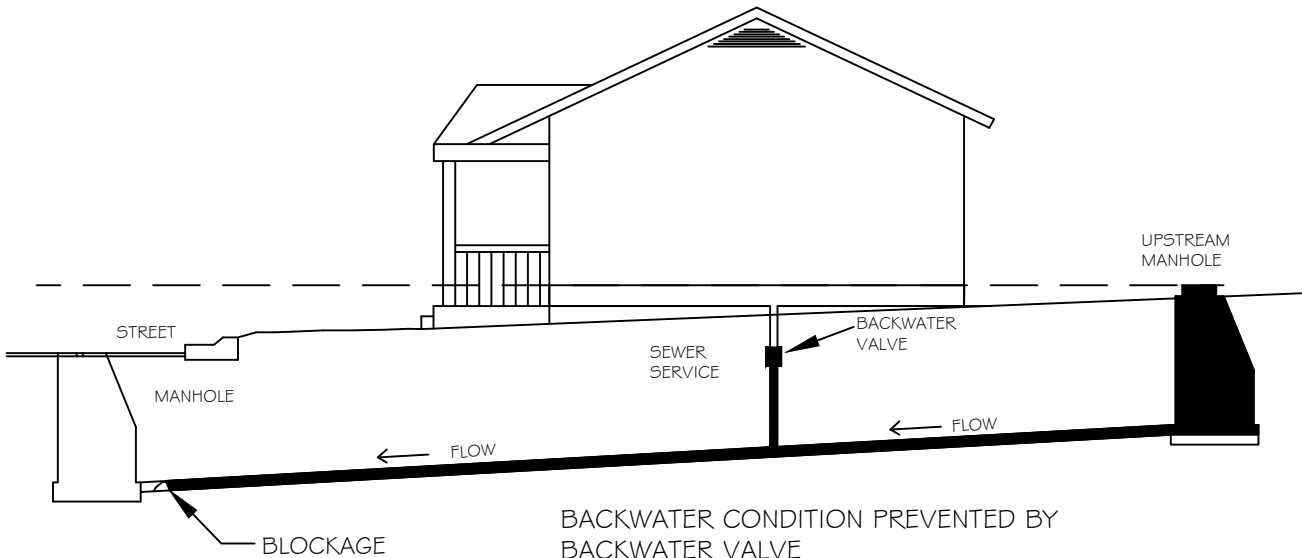
1. BAFFLE WALL LOCATED AT A DISTANCE FROM INLET WALL $\frac{2}{3}$ TO $\frac{3}{4}$ OF THE TOTAL LENGTH OF THE INTERCEPTOR OR SEPARATOR AS SHOWN ON DETAIL S-40.
BAFFLE WALLS LOCATED AT A DISTANCE APPROXIMATELY OF $\frac{1}{3}$ OF THE TOTAL LENGTH OF THE SEPARATOR AS SHOWN ON DETAIL S-40.01.
2. EACH INTERCEPTOR OR SEPARATOR SHALL HAVE INLET AND OUTLET TEES. THE OUTLET TEE SHALL EXTEND 50% INTO THE LIQUID DEPTH. THE INLET TEE SHALL EXTEND 25% INTO THE LIQUID DEPTH. INLET AND OUTLET TEES MUST BE OPEN TO ALLOW THE COLLECTION OF F.O.G. SAMPLE.
3. ACCESS OPENINGS OVER EACH COMPARTMENT WITHIN THE INTERCEPTOR OR SEPARATOR SHALL BE 24 INCHES IN DIAMETER AND CONTAIN PICK HOLES. ALL COVERS SHALL BE CONSTRUCTED OF CAST IRON OR EQUIVALENT TRAFFIC BEARING MATERIAL. MANHOLE COVERS MUST EXTEND TO FINISH GRADE AND BE INSTALLED TO EXCLUDE THE ENTRANCE OF STORMWATER INTO THE INTERCEPTOR OR SEPARATOR.
4. FULL SIZE DUAL SWEEP CLEANOUTS SHALL BE INSTALLED ON THE INLET AND OUTLET SIDES OF THE INTERCEPTOR OR SEPARATOR.
5. INTERCEPTORS AND SEPARATORS MUST BE VENTED IN ACCORDANCE WITH THE NC STATE PLUMBING CODE.
6. CONCRETE: 4000 PSI @ 28 DAYS.
7. DESIGN: ACI 318 BUILDING CODE
ASTM C1613-06 FOR GREASE INTERCEPTORS
ASTM C913-02 FOR WATER AND WASTEWATER STRUCTURES
ASTM C890-06 FOR MINIMAL STRUCTURAL DESIGN LOADING
8. INTERCEPTORS AND SEPARATORS SHALL BE DESIGNED TO WITHSTAND AN H-20 WHEEL LOAD.
9. INTERCEPTORS OR SEPARATORS MADE OF POLYETHYLENE OR FIBERGLASS SHALL INCLUDE A MINIMUM 12,000 PSI TENSILE STRENGTH, 19,000 PSI FLEXURAL STRENGTH, AND 800,000 PSI FLEXURAL MODULUS.
10. ALL INTERCEPTORS AND SEPARATORS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS.

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
DIMENSIONS: GREASE INTERCEPTORS OIL-WATER-SAND SEPARATORS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-41	RRH	3/9/00	D.H.L.	6/18/08
	ABB	3/19/04		

BUILDING WITH NEXT UPSTREAM MANHOLE HIGHER THAN
THE LOWEST DRAIN AND BLOCKAGE IN SEWER MAIN

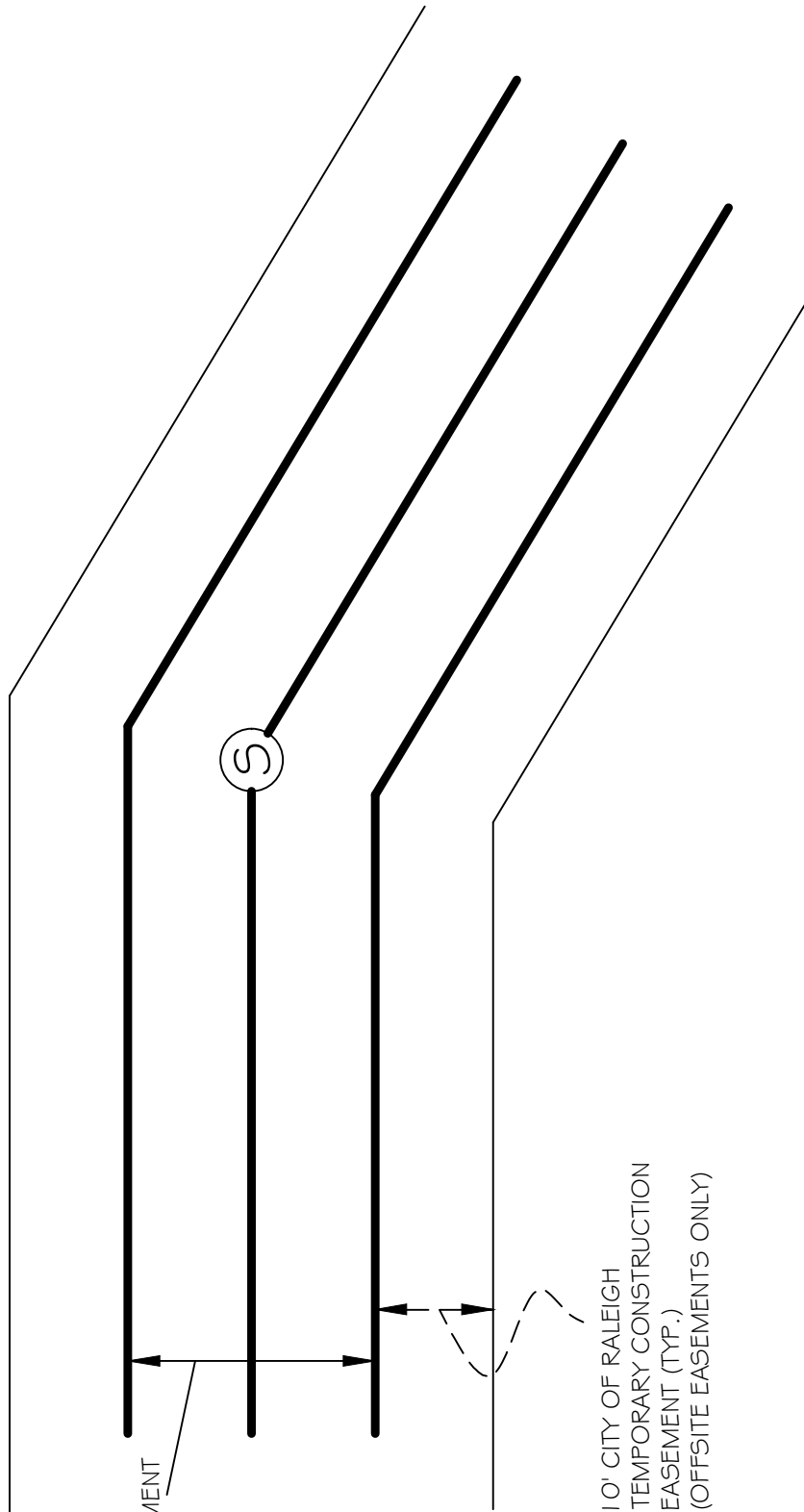


BACKWATER CONDITION INTO BUILDING
WITHOUT BACKWATER VALVE



BACKWATER CONDITION PREVENTED BY
BACKWATER VALVE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
TYPICAL SEWER SERVICE REQUIRING BACKWATER VALVE				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-42	RRH	3-31-00		



30' CITY OF RALEIGH
SANITARY SEWER EASEMENT

10' CITY OF RALEIGH
TEMPORARY CONSTRUCTION
EASEMENT (TYP.)
(OFFSITE EASEMENTS ONLY)

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
8" & 10" SANITARY SEWER EASEMENT WIDTHS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-43	A.B.B.	1-27-05		
	D.H.L.	6-18-08		

CONTINUOUS RIDGE VENT

25 YR. ASPHALT
SHINGLES, BLDG
FELT, 1/2" CDX
PLYWOOD

GABLE RIDGE
VENT
EACH END

VINYL SIDING
AND TRIM

12
8

CONTINUOUS
SOFFIT
VENT

8" CMU
FILL WITH
INSULATION

9' HIGH x 10' WIDE
INSULATED OVERHEAD DOOR

NOT TO SCALE

THIS IS A
RENDERING ONLY.
BUILDING PLANS
MUST BE
APPROVED.

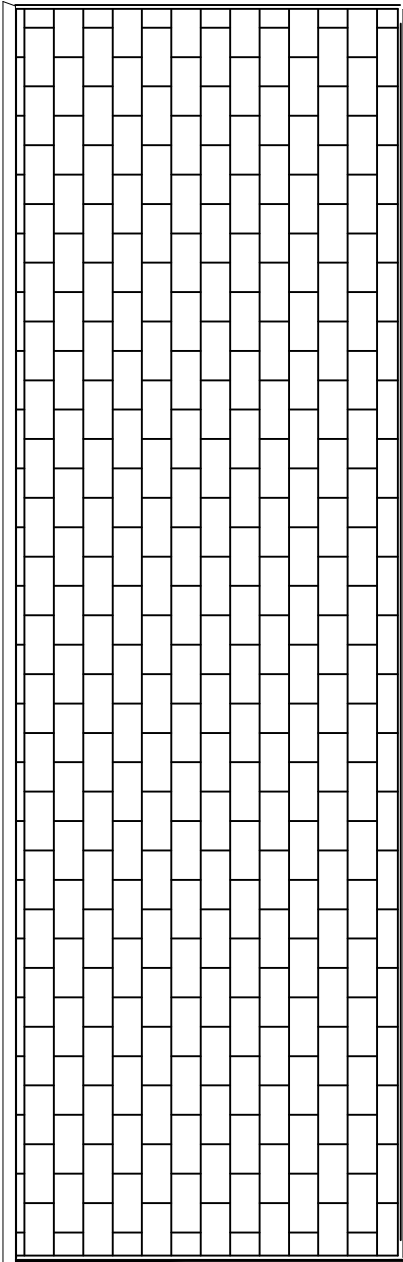
CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

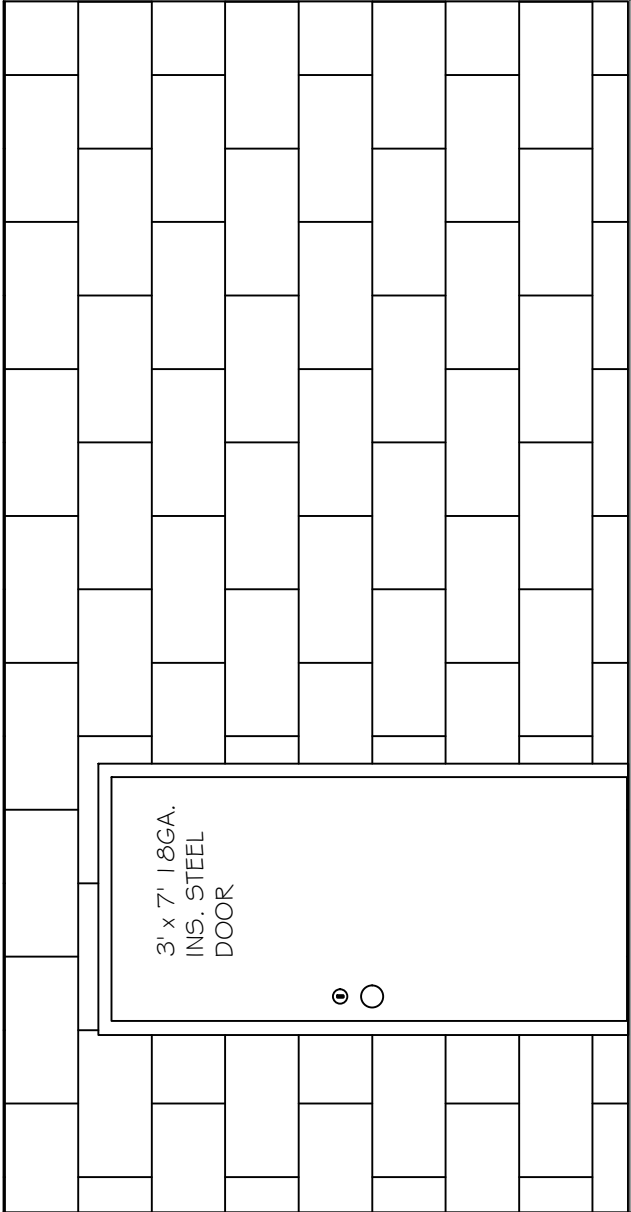
STANDARD ODOR CONTROL BLDG.
FRONT ELEVATION

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-44	LBN	10-6-04		

CONTINUOUS RIDGE VENT



25 YR. ASPHALT
SHINGLES, BLDG.
FELT, 1/2 CDX
PLYWOOD



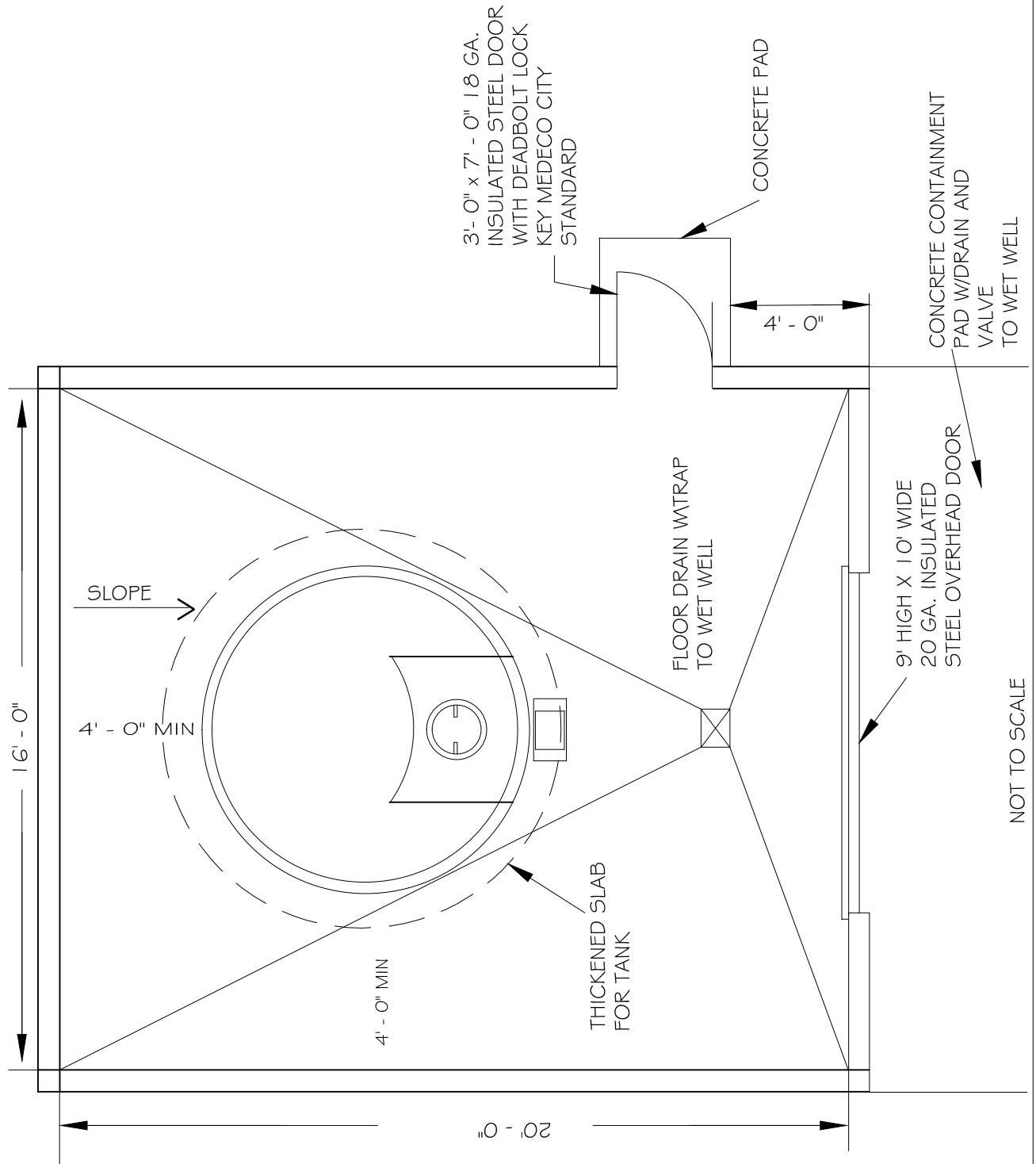
8" CMU
FILL WITH
INSULATION

3' x 7' 18GA.
INS. STEEL
DOOR

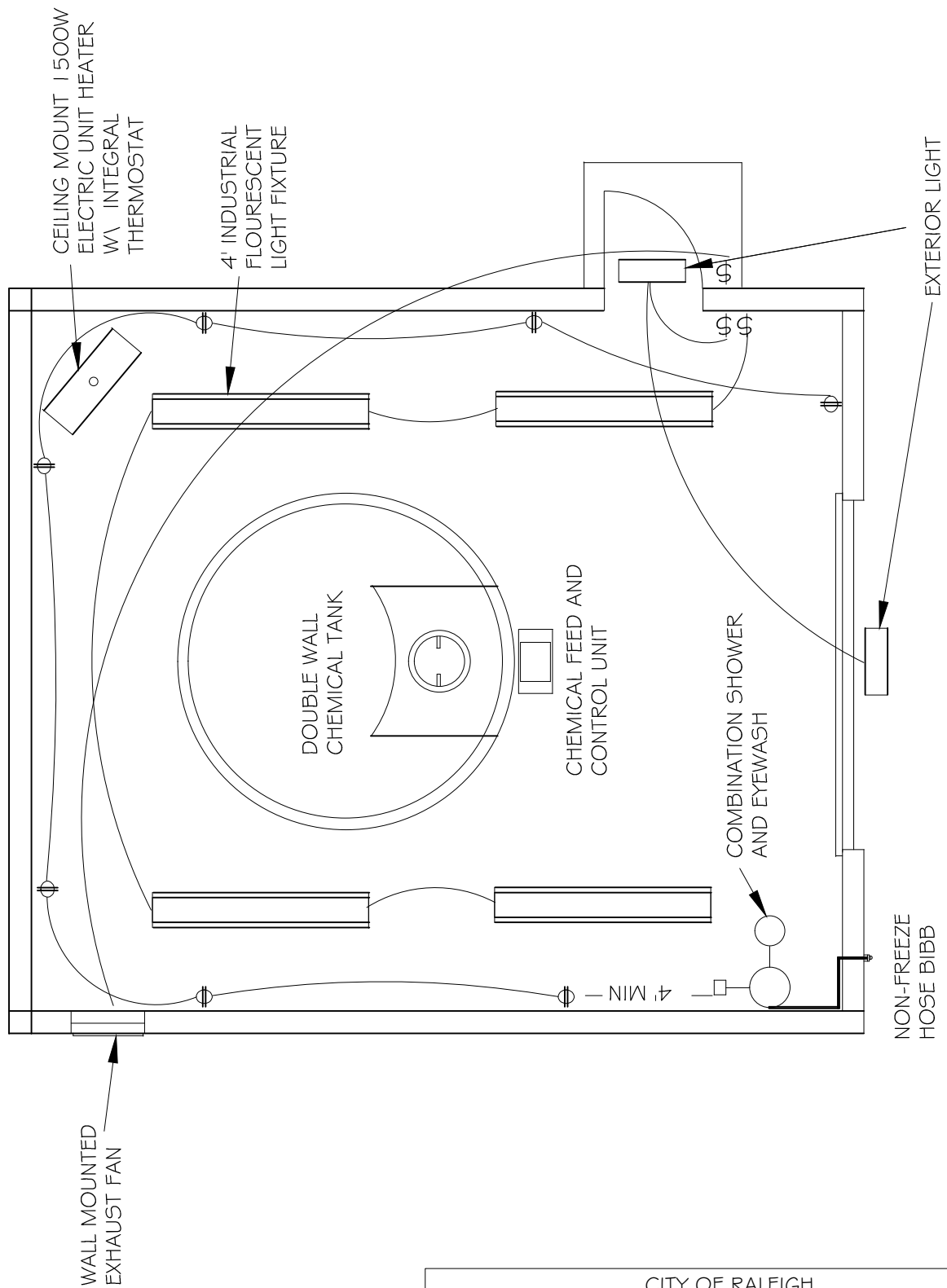


CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES
STANDARD ODOR CONTROL BLDG.
SIDE ELEVATION

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-45	LBN	10-6-04		

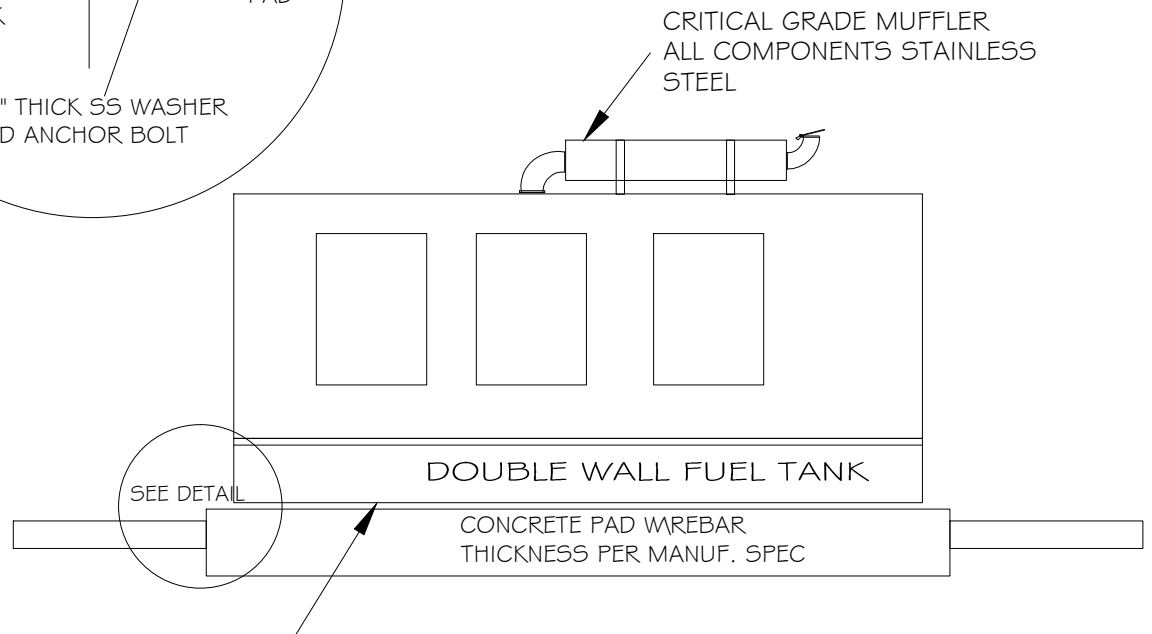
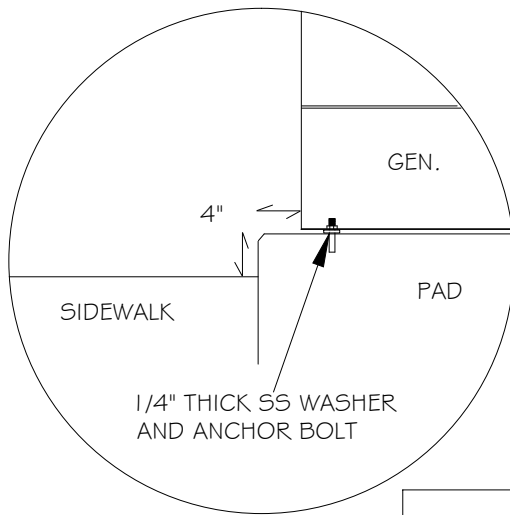


CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD ODOR CONTROL BLDG. FLOOR ELEVATION				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-46	LBN	10-6-04		

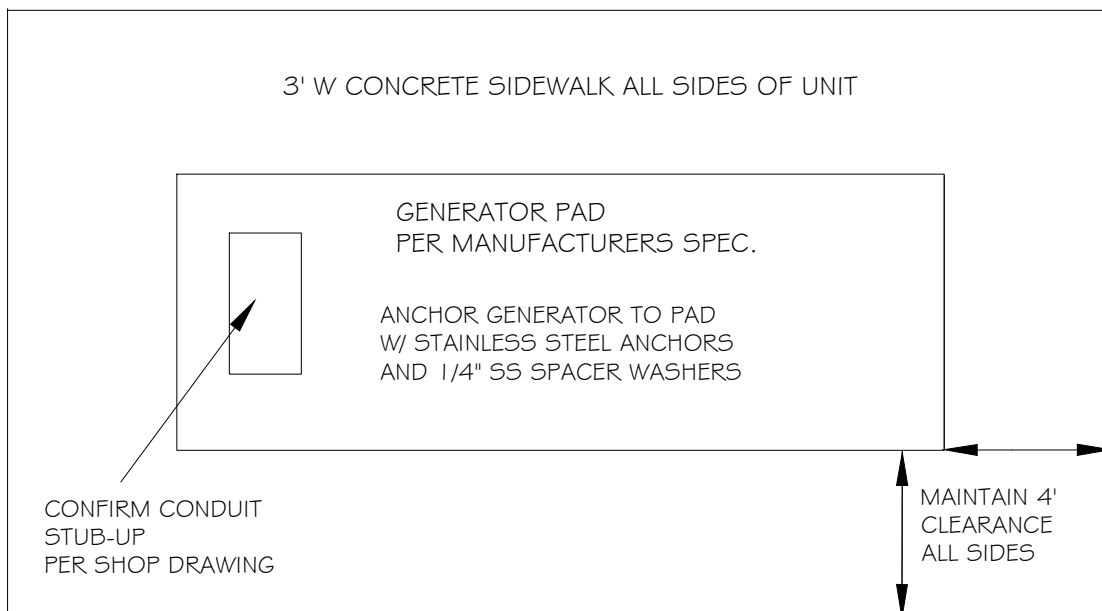


NOT TO SCALE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
STANDARD ODOR CONTROL BLDG. MECHANICAL, ELECTRICAL				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-47	LBN	10-6-04		

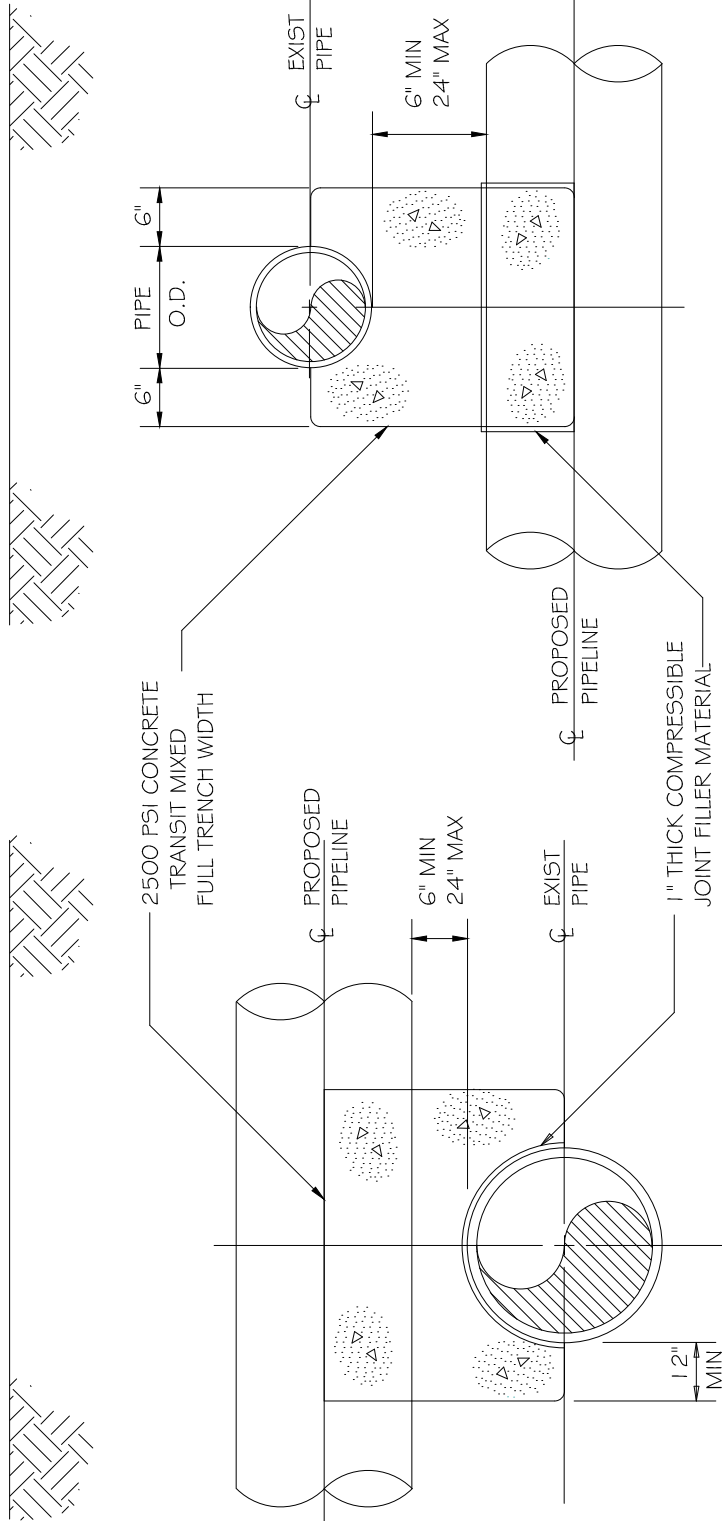


ADD 1/4 " THICK SS WASHERS AT EACH ANCHOR BOLT LOCATION TO PROVIDE SPACE BETWEEN BASE AND CONCRETE



CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
GENERATOR PAD				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-48	L.B.N.	11-19-04		

NOTE: NO ENCASEMENT REQUIRED FOR
SPACE GREATER THAN 24" FOR SEWER LINES

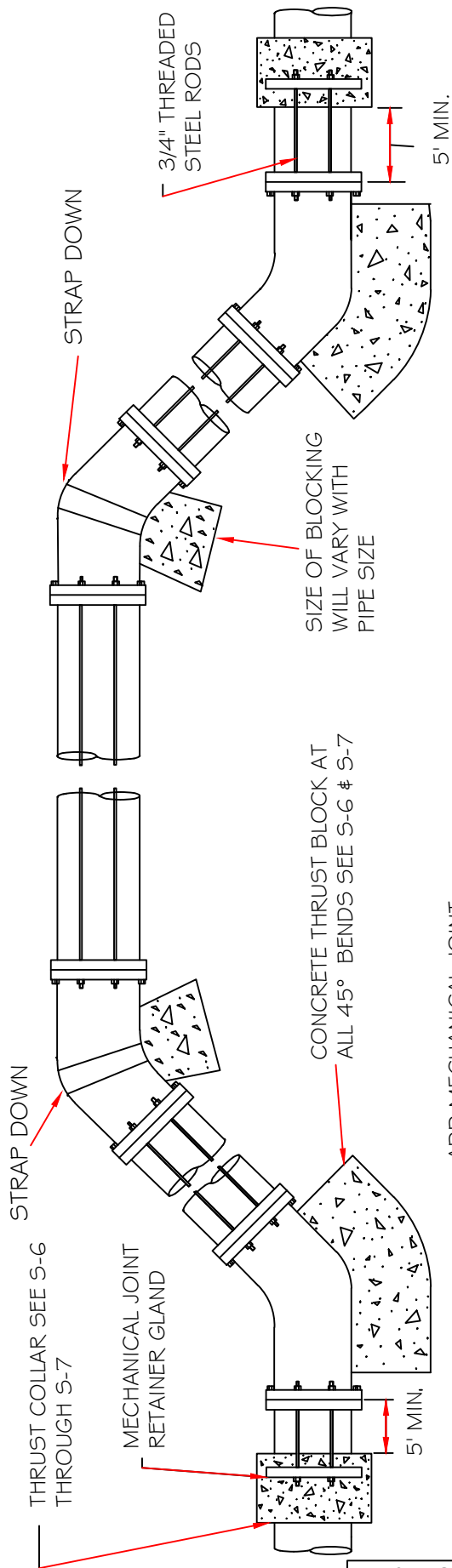


PROPOSED PIPELINE UNDER EXISTING PIPE

PROPOSED PIPELINE OVER EXISTING PIPE

CITY OF RALEIGH				
DEPARTMENT OF PUBLIC UTILITIES				
CONCRETE CRADLE PROTECTION FOR SEWER LINE CROSSINGS				
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-49	DHL	2-20-08		

TOP OF GROUND



ADD MECHANICAL JOINT
RETAINER GLANDS
THROUGHOUT ASSEMBLY.

ROD REQUIREMENTS

SIZE OF 45° BEND	STATIC THRUST IN POUNDS	NO. OF RODS REQUIRED
6"	4,328	2
8"	7,694	4
12"	17,312	4
16"	30,779	8
24"	69,252	8

GENERAL NOTES:

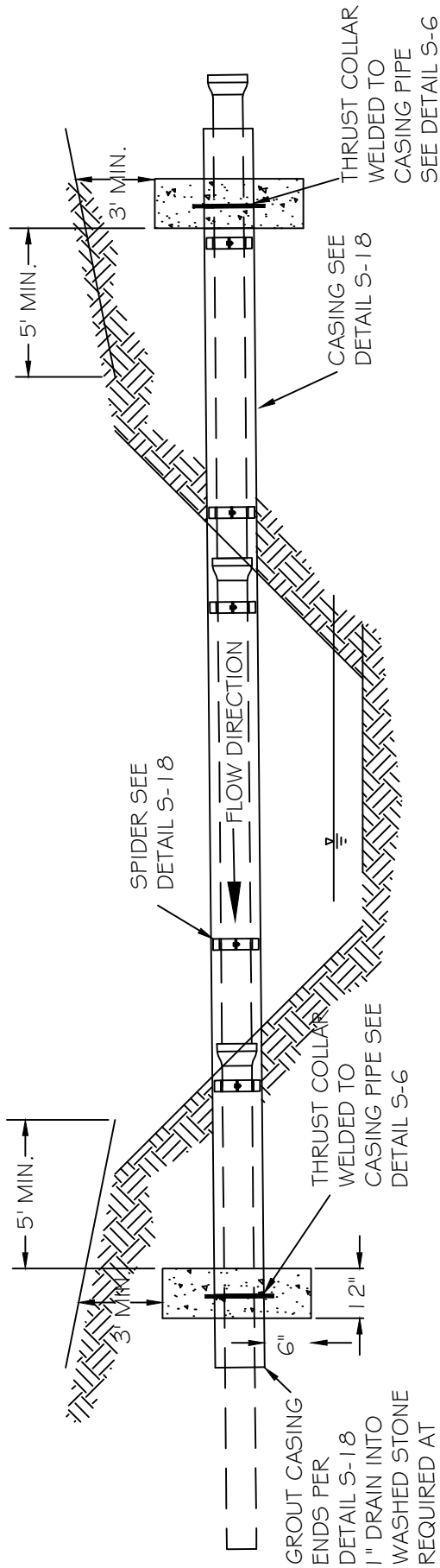
1. STEEL RODS AND BOLTS SHALL BE 3/4" HOT DIPPED GALVANIZED.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT BENDS.
3. RESTRAINED MECHANICAL GLANDS TO BE USED AT ALL FITTINGS.
4. MUST USE DUCTILE IRON EYE BOLTS WHERE NECESSARY.
5. ALL PIPING IN VERTICAL BENDS MUST BE DUCTILE IRON.
6. PIPE SHALL BE DUCTILE IRON A MINIMUM OF ONE JOINT IN EACH DIRECTION.
7. 3' MINIMUM COVER MUST BE MAINTAINED ON ALL FORCE MAINS

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

STANDARD VERTICAL BEND

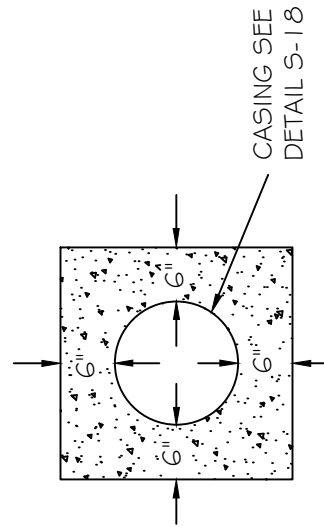
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-50	ABB	4-6-04	J.P.S.	10-19-10
	D.H.L.	6-18-08		



PROFILE VIEW

NOTES:

1. FOR CROSSINGS OF LESS THAN 10' NO CASING IS REQUIRED IF THE JOINT OF PIPE IS CENTERED ON THE CROSSING.
2. THRUST COLLAR MAY BE FIELD WELDED ON STEEL CASING PIPE. IF NO CASING IS REQUIRED THE THRUST COLLAR MUST BE FACTORY WELDED ON DIP CARRIER PIPE.



CONCRETE COLLAR

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-51	J.P.S.	10-28-10		

CITY OF RALEIGH
DEPARTMENT OF PUBLIC UTILITIES

AERIAL SEWER SERVICE

INSTALL 1 x 6 BOARDS
VERTICALLY, 2 x 6'S MAY SLOPE
OR BE HORIZONTAL TO ACCOUNT
FOR GRADE CHANGES. SPACE 1
x 6 BOARDS EQUALLY (3/8" MAX.)

GATE OPENING = 12'

LEAF = 6'

HEAVY DUTY WROUGHT STEEL T-HINGE (TYP.)

HEAVY DUTY DOOR SECURITY SURFACE BOLT

8" (TYP.)

1 x 6 TREATED
WOOD PICKET (TYP.)

OUTSIDE VIEW
N.T.S.

1/8" TENSION WIRE WITH A 3" "EYE & EYE"
TURNBUCKLE, WIRE ROPE THIMBLES AND CLAMPS.
SECURE EACH END OF WIRE WITH SCREW EYEBOLTS.

2x4 TREATED WOOD
STRINGER AND BRACE (TYP.)

TOENAIL BRACE TO
STRINGER

6 x 6 TREATED WOOD POST (TYP.)

2 x 6 TREATED WOOD
CROSS BRACE (TYP.)

GRADE

1/2" SLOPE

COMPACTED SUBGRADE, TYP.

6" GRAVEL BASE

PLACE LOWER END OF BRACE TOWARDS
THE HINGE, NOT THE LATCH
CONCRETE FOUNDATION, TYP.

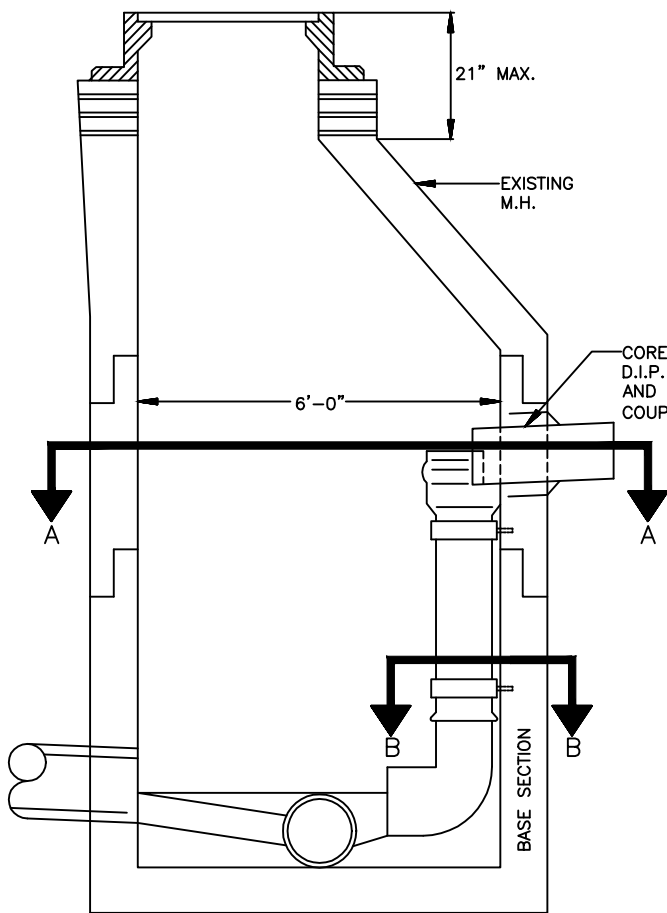
INSIDE VIEW
N.T.S.

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

WOODEN FENCE GATE

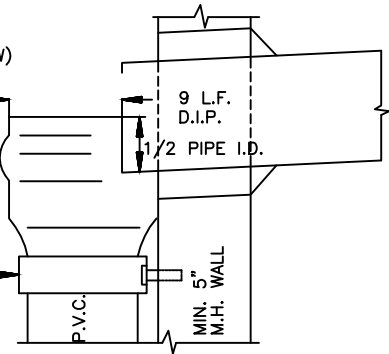
DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-52	J.P.S.	3-14-11		



4" MIN. CLEAR FROM JOINT (ABOVE OR BELOW)

CUT TO FIT

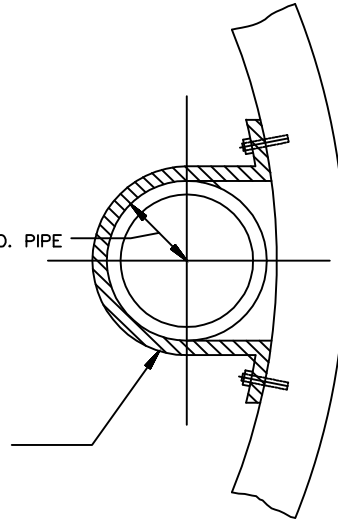
1/4"x2" STAINLESS STEEL STRAP WITH 2 ANCHOR BOLTS



ENLARGED DETAIL

R=1/2 O.D. PIPE BARREL

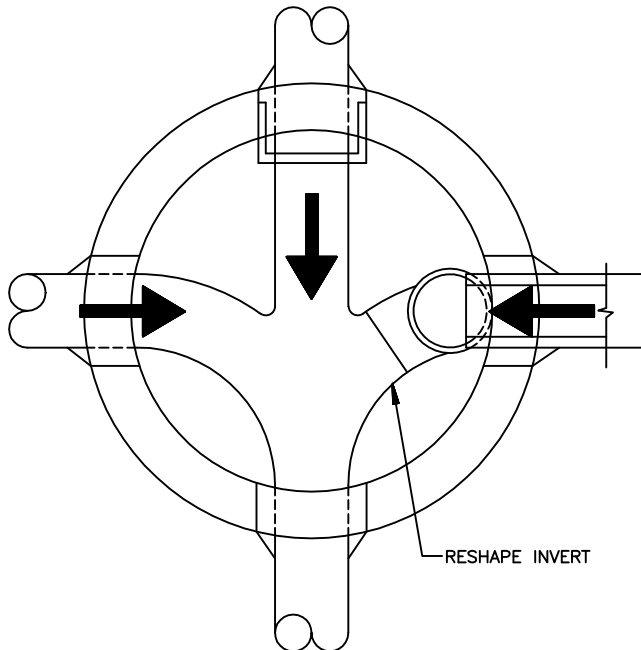
1/4"x2" STAINLESS STEEL STRAP WITH 2 ANCHOR BOLTS



SECTION B-B

NOTES:

1. PIPE FOR INSIDE DROP SHALL BE SDR 35 PVC CONFORMING TO ASTM SPECIFICATION 03034.
2. BOTTOM BEND TO BE 90° SHORT BEND, BELL SPIGOT, OF SDR 35 PVC. SPIGOT OF BEND TO REST DIRECTLY ON EXISTING SHELF. CONSTRUCT MASONRY TROUGH FROM DROP EFFLUENT TO MAIN CHANNEL.
3. NOTCH BELL OF PVC DROP TO ACCEPT D.I.P. SPIGOT AS SHOWN.
4. LOCATE STRAPS AT PIPE BELL AND ABOVE BELL OF 90° BEND AS SHOWN. ADD EXTRA STRAPS AS NECESSARY TO MAINTAIN MAXIMUM SPACING OF TEN FEET.
5. HOLE IN MANHOLE WALL TO BE MADE WITH A CORING MACHINE. INSTALL FLEXIBLE RUBBER COUPLING.
6. CORE HOLE SHALL NOT ENTER CONE SECTION.
7. STEPS SHALL BE RELOCATED IF THEY CONFLICT WITH INSIDE DROP.



SECTION A-A

CITY OF RALEIGH

DEPARTMENT OF PUBLIC UTILITIES

INSIDE DROP MANHOLE

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
S-53	MAB	11-6-13		