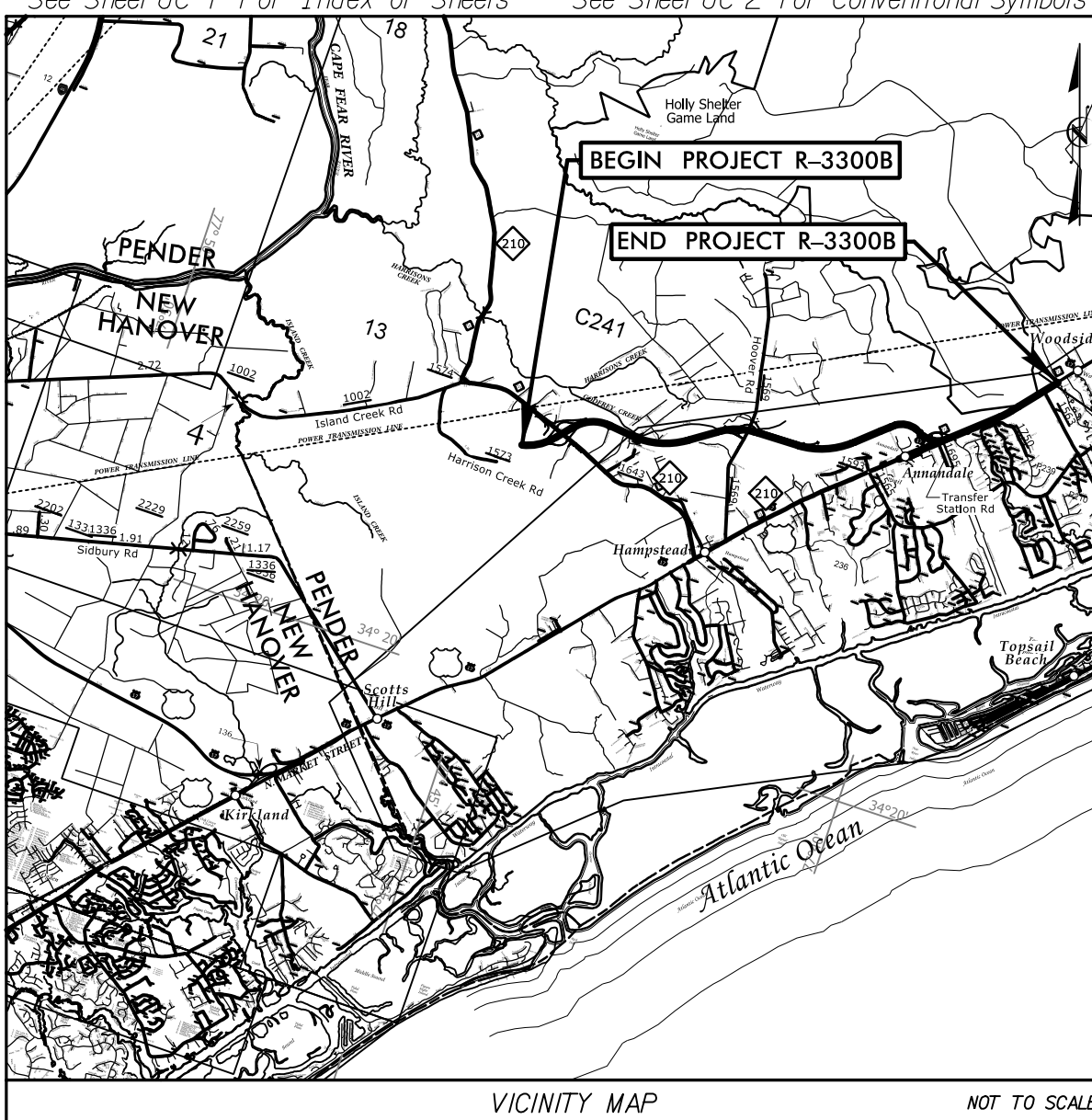


See Sheet UC-1 For Index of Sheets See Sheet UC-2 for Conventional Symbols



STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# UTILITY CONSTRUCTION PLANS PENDER COUNTY

LOCATION: NC 417 (HAMPSTEAD BYPASS) FROM SOUTH OF NC 210  
TO NORTH OF SR 1563 (SLOOP POINT LOOP ROAD).

TYPE OF WORK: WATER LINE AND FORCE MAIN SEWER RELOCATIONS

T.I.P. NO.	SHEET NO.
R-3300B	UC-1



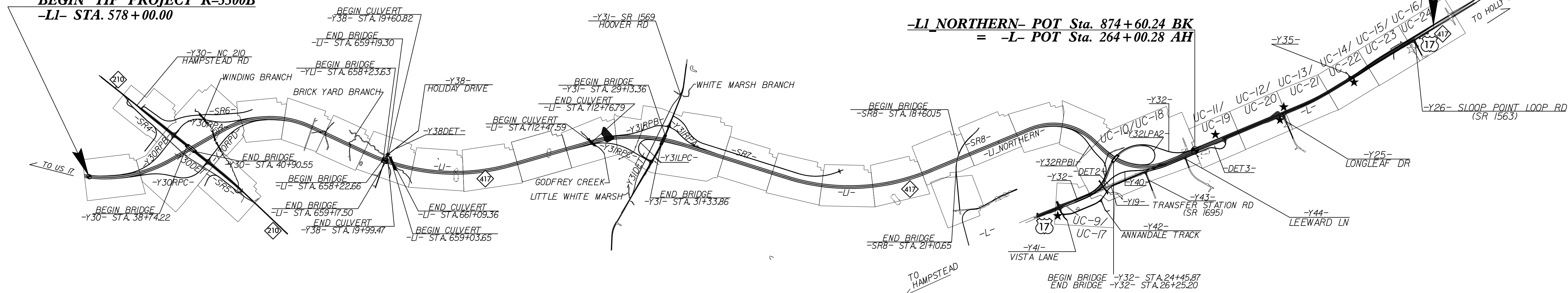
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TIP PROJECT: R-3300B

CONTRACT:

END TIP PROJECT R-3300A  
BEGIN TIP PROJECT R-3300B  
-LI- STA. 578 +00.00

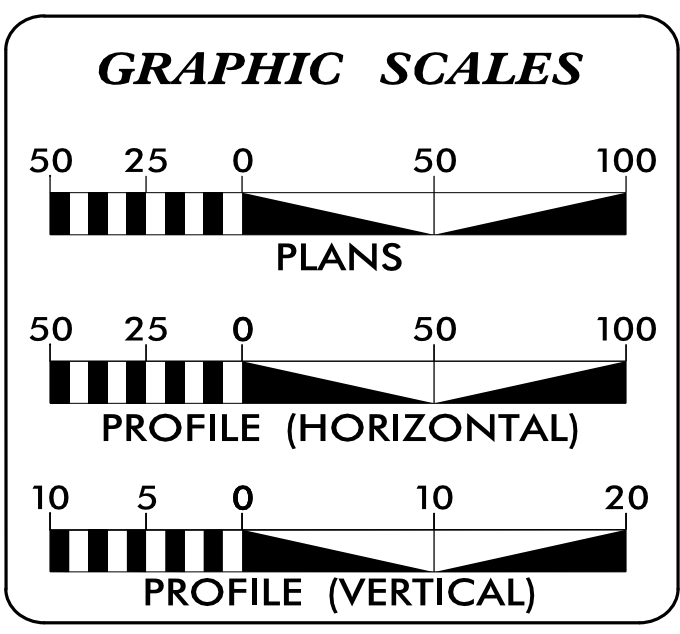
END TIP PROJECT R-3300B  
-L- STA. 332 +54.76  
US 17



-LI NORTHERN- POT Sta. 874 +60.24 BK  
= -L- POT Sta. 264 +00.28 AH

☆ UPDATE EXISTING SIGNAL    -THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.  
★ PROPOSED SIGNAL

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SHEET NO.:	DESCRIPTION:
UC-1	TITLE SHEET
UC-2	UTILITY PLAN SHEET SYMBOLS
UC-3 THRU UC-3A	UTILITY CONSTRUCTION NOTES
UC-3B THRU UC-3G	PROJECT TYPICAL DETAILS
UC-9 THRU UC-16	WATER LINE CONSTRUCTION SHEETS
UC-17 THRU UC-24	FORCE MAIN CONSTRUCTION SHEETS
UC-25 THRU UC-30	WATER LINE PROFILE SHEETS
UC-31 THRU UC-35	FORCE MAIN PROFILE SHEETS

**WATER AND SEWER OWNERS ON PROJECT**

(A) WATER - PENDER COUNTY UTILITIES  
(B) FORCE MAIN SEWER - PLURIS LLC

PREPARED IN THE OFFICE OF

**STV** 100 Years  
STV Engineers, Inc.  
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ANDREW VANE, PE    CONSULTANT CONTACT #1  
COLIN HUGHES, PE    CONSULTANT CONTACT #2  
-    CONSULTANT CONTACT #3

SEAL

ANDREW VANE, PE  
11/22/2021

**DIVISION OF HIGHWAYS UTILITIES UNIT**  
1555 MAIL SERVICES CENTER  
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BO HEMPHILL    UTILITIES REGIONAL ENGINEER  
LONNY SLEEPER    UTILITIES ENGINEER  
KYLE PLEASANT    UTILITIES AREA COORDINATOR  
-    UTILITIES COORDINATOR



# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJECT REFERENCE NO. <b>R-3300B</b>	SHEET NO. <b>UC-2</b>
<b>STV Engineers, Inc.</b> <small>900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991</small>	



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## UTILITIES PLAN SHEET SYMBOLS

### PROPOSED WATER SYMBOLS

Water Line (Sized as Shown) .....	
11¼ Degree Bend .....	
22½ Degree Bend .....	
45 Degree Bend .....	
90 Degree Bend .....	
Plug .....	
Tee .....	
Cross .....	
Reducer .....	
Gate Valve .....	
Butterfly Valve .....	
Tapping Valve .....	
Line Stop .....	
Line Stop with Bypass .....	
Blow Off .....	
Fire Hydrant .....	
Relocate Fire Hydrant .....	
Remove Fire Hydrant .....	REM FH
Water Meter .....	
Relocate Water Meter .....	
Remove Water Meter .....	REM WM
Water Pump Station .....	
RPZ Backflow Preventer .....	
DCV Backflow Preventer .....	
Relocate RPZ Backflow Preventer .....	
Relocate DCV Backflow Preventer .....	

### PROPOSED SEWER SYMBOLS

Gravity Sewer Line (Sized as Shown) .....	
Force Main Sewer Line (Sized as Shown) .....	
Manhole (Sized per Note) .....	
Sewer Pump Station .....	

### PROPOSED MISCELLANEOUS UTILITIES SYMBOLS

Power Pole .....	
Telephone Pole .....	
Joint Use Pole .....	
Telephone Pedestal .....	
Utility Line by Others (Type as Shown) .....	
Trenchless Installation .....	
Encasement by Open Cut .....	
Encasement .....	

Thrust Block .....	
Air Release Valve .....	
Utility Vault .....	
Concrete Pier .....	
Steel Pier .....	
Plan Note .....	
Pay Item Note .....	

NOTE  
PAY ITEM

### EXISTING UTILITIES SYMBOLS


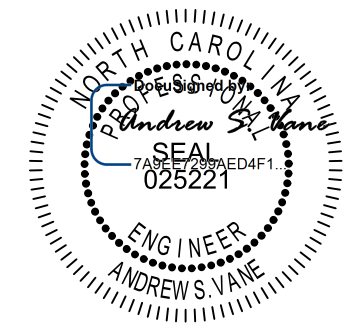

Power Pole .....		*Underground Power Line .....	
Telephone Pole .....		*Underground Telephone Cable .....	
Joint Use Pole .....		*Underground Telephone Conduit .....	
Utility Pole .....		*Underground Fiber Optics Telephone Cable .....	
Utility Pole with Base .....		*Underground TV Cable .....	
H-Frame Pole .....		*Underground Fiber Optics TV Cable .....	
Power Transmission Line Tower .....		*Underground Gas Pipeline .....	
Water Manhole .....		Aboveground Gas Pipeline .....	
Power Manhole .....		*Underground Water Line .....	
Telephone Manhole .....		Aboveground Water Line .....	
Sanitary Sewer Manhole .....		*Underground Gravity Sanitary Sewer Line .....	
Hand Hole for Cable .....		Aboveground Gravity Sanitary Sewer Line .....	
Power Transformer .....		*Underground SS Force Main Line .....	
Telephone Pedestal .....		Underground Unknown Utility Line .....	
CATV Pedestal .....		SUE Test Hole .....	
Gas Valve .....		Water Meter .....	
Gas Meter .....		Water Valve .....	
Located Miscellaneous Utility Object .....		Fire Hydrant .....	
Abandoned According to Utility Records .....	AATUR	Sanitary Sewer Cleanout .....	
End of Information .....	E.O.I.		

\*For Existing Utilities  
 Utility Line Drawn from Record .....

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 REV: 2/1/2012



# UTILITY CONSTRUCTION NOTES

 STV Engineers, Inc. 800 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	PROJECT REFERENCE NO.	SHEET NO.
	R-3300B	UC-3
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	DESIGNED BY: CTH	 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION 11/22/2021 UTILITY CONSTRUCTION PLANS ONLY
	DRAWN BY: CTH	
	CHECKED BY: ASV	
	APPROVED BY:	
	REVISED:	
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## GENERAL NOTES:

1. THE PROPOSED UTILITY CONSTRUCTION SHALL MEET THE APPLICABLE REQUIREMENTS OF THE NC DEPARTMENT OF TRANSPORTATION'S "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 2018.

2. THE EXISTING WATER UTILITIES BELONG TO PENDER COUNTY UTILITIES. KENNY KEEL, (910) 259-0212, UTILITIES DIRECTOR OF PENDER COUNTY UTILITIES, WILL SERVE AS THE UTILITY OWNER CONTACT.

THE EXISTING FORCE MAIN UTILITIES BELONG TO PLURIS, LLC. RANDY HOFFER OF PLURIS, LLC (910) 327-2880 WILL SERVE AS THE UTILITY OWNER CONTACT.

3. ALL WATER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER RESOURCES AND PUBLIC WATER SUPPLY SECTION. ALL SEWER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER RESOURCES AND WATER QUALITY SECTION. PERFORM ALL WORK IN ACCORDANCE WITH THE APPLICABLE PLUMBING CODES.

4. THE UTILITY OWNER OWNS THE EXISTING UTILITY FACILITIES AND WILL OWN THE NEW UTILITY FACILITIES AFTER ACCEPTANCE BY THE DEPARTMENT. THE DEPARTMENT OWNS THE CONSTRUCTION CONTRACT AND HAS ADMINISTRATIVE AUTHORITY. COMMUNICATIONS AND DECISIONS BETWEEN THE CONTRACTOR AND UTILITY OWNER ARE NOT BINDING UPON THE DEPARTMENT OR THIS CONTRACT UNLESS AUTHORIZED BY THE ENGINEER. AGREEMENTS BETWEEN THE UTILITY OWNER AND CONTRACTOR FOR THE WORK THAT IS NOT PART OF THIS CONTRACT OR IS SECONDARY TO THIS CONTRACT ARE ALLOWED, BUT ARE NOT BINDING UPON THE DEPARTMENT.

5. PROVIDE ACCESS FOR THE DEPARTMENT PERSONNEL AND THE OWNER'S REPRESENTATIVES TO ALL PHASES OF CONSTRUCTION. NOTIFY DEPARTMENT PERSONNEL AND THE UTILITY OWNER TWO WEEKS PRIOR TO COMMENCEMENT OF ANY WORK AND ONE WEEK PRIOR TO SERVICE INTERRUPTION. KEEP UTILITY OWNERS' REPRESENTATIVES INFORMED OF WORK PROGRESS AND PROVIDE OPPORTUNITY FOR INSPECTION OF CONSTRUCTION AND TESTING.

6. THE PLANS DEPICT THE BEST AVAILABLE INFORMATION FOR THE LOCATION, SIZE, AND TYPE OF MATERIAL FOR ALL EXISTING UTILITIES. MAKE INVESTIGATIONS FOR DETERMINING THE EXACT LOCATION, SIZE, AND TYPE MATERIAL OF THE EXISTING FACILITIES AS NECESSARY FOR THE CONSTRUCTION OF THE PROPOSED UTILITIES AND FOR AVOIDING DAMAGE TO EXISTING FACILITIES. REPAIR ANY DAMAGE INCURRED TO EXISTING FACILITIES TO THE ORIGINAL OR BETTER CONDITION AT NO ADDITIONAL COST TO THE DEPARTMENT.

7. MAKE FINAL CONNECTIONS OF THE NEW WORK TO THE EXISTING SYSTEM WHERE INDICATED ON THE PLANS, AS REQUIRED TO FIT THE ACTUAL CONDITIONS, OR AS DIRECTED.

8. MAKE CONNECTIONS BETWEEN EXISTING AND PROPOSED UTILITIES AT TIMES MOST CONVENIENT TO THE PUBLIC, WITHOUT ENDANGERING THE UTILITY SERVICE, AND IN ACCORDANCE WITH THE UTILITY OWNER'S REQUIREMENTS. MAKE CONNECTIONS ON WEEKENDS, AT NIGHT, AND ON HOLIDAYS IF NECESSARY.

9. ALL UTILITY MATERIALS SHALL BE APPROVED PRIOR TO DELIVERY TO THE PROJECT. SEE 1500-7, "SUBMITTALS AND RECORDS" IN SECTION 1500 OF THE STANDARD SPECIFICATIONS.

## PROJECT SPECIFIC NOTES:

1. ALL PROPOSED WATER LINES, UNLESS OTHERWISE INDICATED ON PLANS, ARE TO BE MINIMUM DUCTILE IRON CLASS 50 PIPE. DUCTILE IRON WATER LINES WITH MORE THAN 16 FEET OF COVER SHALL BE MINIMUM CLASS 51. PIPE WITHIN A CASING SHALL BE DIP.

2. FOR SECTIONS OF WATER PIPE TO BE INSTALLED BY HORIZONTAL DIRECTIONAL DRILLING, WATER LINE SHALL BE 18" HDPE, DIPS, DR 11, 200 PSI. HDPE PIPE SHALL MEET THE REQUIREMENTS, AS DEFINED IN ASTM D-3350, WITH A MINIMUM CELL CLASSIFICATION OF PE 445574. THE MATERIAL SHALL BE TESTED AND APPROVED FOR POTABLE WATER IN ACCORDANCE WITH NSF/ANSI 61. MINIMUM PIPE WALL THICKNESS SHALL BE BASED ON A DR OF 11. CONTRACTOR AND PIPE MANUFACTURER SHALL MUTUALLY DETERMINE ACTUAL WALL THICKNESS REQUIRED, BASED ON STATIC AND DYNAMIC LOADS, WITH AN APPLIED FACTOR OF SAFETY OF 2.5.

3. THE CONTRACTOR SHALL USE EROSION CONTROL MEASURES, AS DIRECTED.

4. IN ADVANCE OF BEGINNING UTILITY WORK, SOFT DIGS SHALL BE PERFORMED BY CONTRACTOR TO VERIFY ACTUAL WATER LINE DEPTH AND LOCATION AT PROPOSED TIE-IN LOCATIONS.

5. THE LOCATION OF EXISTING UTILITIES SHOWN ON THE PLANS IS FOR THE USE OF THE CONTRACTOR IN PROVIDING PROTECTION FOR THE UTILITIES DURING CONSTRUCTION OPERATIONS. DESIGN CONSULTANT WILL NOT BE HELD RESPONSIBLE FOR THE ACCURACY OF LOCATION, SIZE, DEPTH, OR COMPLETENESS OF THE INFORMATION. THE CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

6. THE CONTRACTOR SHALL TEMPORARILY SUPPORT AND PROTECT ANY EXISTING UNDERGROUND UTILITIES ENCOUNTERED DURING TRENCH EXCAVATION AND/OR PIPE INSTALLATION.

7. UTILITY LINE INSTALLATION MAY NECESSITATE EXCAVATING AROUND AND BENEATH RELOCATED TELECOMMUNICATION LINES FOR UTILITY LINE RELOCATION.

8. IF THE PROPOSED WATER OR SEWER MAIN IS INSTALLED WITHIN 12" IN ANY DIRECTION (VERTICALLY OR HORIZONTALLY) OF A GAS MAIN THEN THE CONTRACTOR SHALL CALL THE GAS COMPANY AND INFORM THEM.

9. ALL NEW WATER LINES SHALL BE INSTALLED MINIMUM OF 18" BELOW EXISTING AND PROPOSED STORM DRAINS AND STREAMS, OR AS INDICATED ON DRAWINGS.

10. MINIMUM PIPE SEPARATION: 10 FEET HORIZONTAL SEPARATION OR 18" VERTICAL SEPARATION SHALL BE MAINTAINED BETWEEN WATER MAINS OVER SEWER MAINS. WHEN WATER MAINS ARE BELOW SEWER MAINS OR THE ABOVE MINIMUM SEPARATIONS CANNOT BE MAINTAINED, DUCTILE IRON PIPE SHALL BE USED FOR BOTH MAINS TO 10 FEET ON EITHER SIDE OF THE CROSSINGS, AND ALL ALONG THE LENGTH OF MAINS WHERE MINIMUM SEPARATION CANNOT BE MAINTAINED.

11. KENNY KEEL, UTILITIES DIRECTOR OF PENDER COUNTY UTILITIES, WILL SERVE AS THE UTILITY OWNER CONTACT ON THIS PROJECT. CONTRACTOR, AS REQUIRED BY STANDARD SPECIFICATION SECTION 1500-2, SHALL CONTACT HIM AT (910) 259-0212.

12. PRIOR TO THE START OF UTILITY WORK, CONTRACTOR SHALL CONTACT KENNY KEEL OF PENDER COUNTY UTILITIES AT (910) 259-0212 AND RANDY HOFFER OF PLURIS, LLC AT (910) 327-2880 TO SCHEDULE A PRECONSTRUCTION MEETING ONE WEEK IN ADVANCE. ATTENDEES MUST INCLUDE PCU, THE SELECTED PLURIS REPRESENTATIVE CONTRACTOR'S SUPERINTENDENT AND NCDOT. PENDER COUNTY MAY INSPECT THE WORK AT ANY TIME.




13. THE LATEST EDITION AT TIME OF BID OF THE PENDER COUNTY UTILITIES TECHNICAL SPECIFICATIONS AND DETAIL DRAWINGS FOR WATER LINE CONSTRUCTION WILL GOVERN ALL WATER CONSTRUCTION ONLY WHEN MORE STRINGENT THAN NCDOT STANDARDS AND INSTALLATION IN COMPLIANCE WITH THE RULES AND REGULATIONS OF THE NCDEQ, DIVISION OF WATER RESOURCES, WATER QUALITY SECTION, AND APPLICABLE PLUMBING CODES, UNLESS NCDOT STANDARDS AND SPECIFICATIONS ARE MORE CONSERVATIVE.

14. EXISTING WATER VALVES ARE TO BE OPERATED BY PENDER COUNTY UTILITIES STAFF ONLY. EXISTING SEWER VALVES ARE TO BE OPERATED BY PLURIS STAFF ONLY. PROVIDE A MINIMUM OF 3 BUSINESS DAYS NOTICE FOR BOTH CASES.

15. NO INTERRUPTION OF EXISTING WATER OR SEWER SERVICE SHALL BE MADE DURING CONSTRUCTION UNTIL AUTHORIZED BY THE DIRECTOR OF PENDER COUNTY UTILITIES OR PLURIS, RESPECTIVELY.



# UTILITY CONSTRUCTION NOTES

 <b>STV</b> 100 Years STV Engineers, Inc. 800 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991	PROJECT REFERENCE NO.	SHEET NO.
	R-3300B	UC-3A
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	DESIGNED BY: CTH	 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION 11/22/2021 UTILITY CONSTRUCTION PLANS ONLY
	DRAWN BY: CTH	
	CHECKED BY: ASV	
	APPROVED BY:	
	REVISED:	
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## PROJECT SPECIFIC NOTES:

- NO INTERRUPTION TO EXISTING WATER OR SEWER SERVICE SHALL TAKE PLACE UNTIL ALL CUSTOMERS HAVE BEEN NOTIFIED A MINIMUM OF 48 HOURS IN ADVANCE. NOTICE OF INTERRUPTION SHALL BE PREPARED BY THE UTILITY OWNERS OFFICE ON OFFICIAL LETTERHEAD. DISTRIBUTION TO EACH CUSTOMER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNDER THE APPLICABLE DIRECTION OF THE UTILITY OWNERS OFFICE.
- ABSOLUTELY NO SHUTDOWNS OF EXISTING WATER SYSTEM SHALL OCCUR AT ANY TIME BETWEEN MEMORIAL DAY AND LABOR DAY IN ANY GIVEN YEAR UNLESS GIVEN APPROVAL BY OWNER. CONTRACTOR SHALL PLAN SHUTDOWNS TO TIE-IN TO EXISTING WATER LINES OUTSIDE OF THESE DATES.
- MAXIMUM SHUTDOWN PERIOD FOR WATER TIE-INS SHALL BE 6 HOURS BETWEEN 10 P.M. AND 4 A.M. THIS SHALL BE AT NO COST TO OWNER. DURING SHUTDOWN CONTRACTOR SHALL WORK CONTINUOUSLY UNTIL TIE-IN IS COMPLETE.
- LAY PIPE STRAIGHT IN ALIGNMENT AND GRADIENT OR FOLLOW TRUE CURVES AS NEARLY AS POSSIBLE. DO NOT DEFLECT ANY JOINT MORE THAN THE MAXIMUM DEFLECTION RECOMMENDED BY THE MANUFACTURER.
- JOINTS OF HDPE PIPE SEGMENTS SHALL BE BUTT-WELDED FLUSH TO THE OUTSIDE DIAMETER OF THE PIPE. PRIOR TO PERFORMING THE FINAL HYDROSTATIC TEST, THE ENDS OF PIPE SHALL BE PROVIDED WITH A DUCTILE IRON BLIND FLANGE, WITH A FLANGE CONNECTION TO THE HDPE PIPE. FLANGED JOINTS SHALL MEET THE REQUIREMENTS OF ANSI B16.1, CLASS 125.
- TRACER WIRE MUST BE ATTACHED TO ALL NEWLY INSTALLED PIPE AS REQUIRED BY NC GENERAL STATUTES CHAPTER 87-121G. DO NOT USE STRANDED WIRE. CONTRACTOR WILL CONDUCT A CONTINUITY TEST ON ALL TRACER WIRE AFTER INSTALLATION WITNESSED BY OWNER AND PROVIDE A REPORT TO UTILITY OWNER.
- THE CONTRACTOR SHALL INSTALL THE HDPE PIPE BY THE HORIZONTALLY DRILLED, DIRECTIONALLY-CONTROLLED METHOD OF CONSTRUCTION WHERE INDICATED. PIPE SHALL BE FILLED WITH POTABLE WATER AND NOT BE CONNECTED TO ANY OTHER PIPE OR FITTINGS FOR ONE WEEK FROM TIME OF INSTALLATION.
- THE CONTRACTOR SHALL EMPLOY EXPERIENCED PERSONNEL TO OPERATE THE DIRECTIONAL DRILLING EQUIPMENT AND THE POSITION MONITORING AND STEERING EQUIPMENT. THE CONTRACTOR SHALL USE CERTIFIED FUSING PERSONNEL APPROVED BY THE PIPE MANUFACTURER.

- THE CONTRACTOR SHALL AT ALL TIMES PROVIDE AND MAINTAIN INSTRUMENTATION THAT WILL ACCURATELY LOCATE THE PILOT HOLE POSITION IN THE X, Y, AND Z AXES RELATIVE TO THE GROUND SURFACE. DRILL FLUID FLOW RATE AND PRESSURE SHALL ALSO BE MONITORED. THE CONTRACTOR SHALL MAINTAIN AND PROVIDE TO THE ENGINEER ACCESS TO THE DATA GENERATED BY THE DOWNHOLE SURVEY TOOLS.
- THE CONTRACTOR SHALL HAVE ACCURATE WORKING GAUGES THAT REGISTER TENSILE FORCE BEING USED TO PULL THE PIPELINE BACK THROUGH THE REAMED BOREHOLE.
- DEVIATIONS FROM, AND CORRECTIONS TO, THE DESIGN CENTERLINE SHALL NOT EXCEED 2 FEET OF THE DEPTH PER 100 FEET AND 2 FEET HORIZONTALLY PER 100 FEET. CONTRACTOR TO ENSURE NEWLY CONSTRUCTED UTILITIES ARE ENTIRELY WITHIN RIGHT-OF-WAY OR UTILITY EASEMENT.
- THE HORIZONTAL DIRECTIONAL DRILLING OPERATION SHALL BE CONDUCTED IN A MANNER TO ELIMINATE THE DISCHARGE OF WATER, DRILLING MUD, AND CUTTINGS TO AREAS NOT INVOLVED IN THE CONSTRUCTION PROCESS. THE CONTRACTOR SHALL IMMEDIATELY CONTAIN AND CLEAN UP ANY INADVERTENT RETURNS. THE CONTRACTOR SHALL ALSO PROVIDE EQUIPMENT AND PROCEDURES TO MAXIMIZE THE RECIRCULATION OR REUSE OF DRILLING MUD TO MINIMIZE WASTE DISPOSAL.
- AFTER INSTALLING VIA DIRECTIONAL DRILL AND TESTING, CONTRACTOR TO DIG DOWN, CUT PIPE AND INSTALL FITTINGS REQUIRED TO COMPLETE CONNECTION.
- CONTRACTOR SHALL ADHERE TO SECTION 1530 "ABANDON OR REMOVE UTILITIES" FOR ABANDONMENT OF EXISTING UTILITY PIPES.
- WHEN ABANDONING VALVES, CLOSE VALVE BEFORE REMOVING VALVE BOX.
- REMOVED FIRE HYDRANTS SHALL BE TURNED OVER TO PENDER COUNTY.
- PENDER COUNTY SHALL INSPECT CASING INSTALLATIONS PRIOR TO BACKFILL. PENDER COUNTY SHALL WITNESS ALL PRESSURE TESTS AND WITHDRAWAL OF BACTERIOLOGICAL SAMPLES.
- CLOSE-OUT DOCUMENTS WHICH MUST BE RECEIVED PRIOR TO PCU SIGNING THE NCDEQ PWS APPLICANT CERTIFICATION INCLUDE BACTERIOLOGICAL TESTS, PRESSURE TESTS, DEED OF DEDICATION (IF APPLICABLE), AFFIDAVIT/RELEASE OF LIENS FOR UTILITY WORK, WARRANTY, AND AS-BUILT RECORD DRAWINGS (PDF AND CAD).

## WATER LINE TYPICAL SEQUENCE OF CONSTRUCTION:

- INSTALL NEW WATER LINE(S) ALONG ALIGNMENT TO A POINT SHORT OF TIE-INS.
- SUCCESSFULLY PRESSURE TEST AND CHLORINATE NEW WATER LINES. CHLORINATED WATER WILL BE TREATED PRIOR TO RELEASE INTO ENVIRONMENT.
- PROVIDE RESULTS OF ALL TESTS TO PENDER COUNTY AND NCDOT. TIE-INS TO EXISTING WATER SYSTEM TO BE PERFORMED WITHIN 5 BUSINESS DAYS OF SUCCESSFUL BACTERIOLOGICAL TEST.
- CONTACT PENDER COUNTY MINIMUM OF 3 BUSINESS DAYSN IN ADVANCE OF SHUTTING DOWN EXISTING WATER LINES FOR SCHEDULING TIE-INS.
- UPON APPROVAL BY PENDER COUNTY, TAKE EXISTING WATER LINE OUT OF SERVICE USING EXISTING VALVES AND PROPOSED LINE STOPS AND CONNECT NEW WATER LINES.
- OBSERVE CONNECTION PIPING FOR SIGNS OF VISIBLE LEAKAGE AND CORRECT IMMEDIATELY.
- PLACE NEW WATER LINE(S) INTO OPERATION.
- SEQUENCE SHALL BE UTILIZED FOR EACH WATER LINE SEGMENT.

## FORCED SANITARY SEWER TYPICAL SEQUENCE OF CONSTRUCTION:

- INSTALL NEW FORCED SANITARY SEWER(S) ALONG ALIGNMENT TO A POINT SHORT OF TIE-INS.
- SUCCESSFULLY PRESSURE TEST NEW FORCED SANITARY SEWER.
- PROVIDE RESULTS OF ALL TESTS TO PLURIS, LLC AND NCDOT. TIE-INS TO EXISTING SEWER TO BE PERFORMED WITHIN 20 BUSINESS DAYS OF SUCCESSFUL PRESSURE TEST.
- CONTACT PLURIS, LLC MINIMUM OF 3 BUSINESS DAYS IN ADVANCE OF CONNECTING TO EXISTING FORCED SANITARY SEWER FOR SCHEDULING TIE-INS.
- INSTALL LINE STOPS WITH BYPASS PIPING. BYPASS PIPING DIAMETER SHALL BE AT LEAST DIAMETER OF EXISTING PIPING. TEMPORARY BYPASS PIPING MAY BE USED FOR MAXIMUM OF 72 CONTINUOUS HOURS ONCE IN OPERATION.
- UPON APPROVAL BY PLURIS, LLC, CLOSE LINE STOPS AND BEGIN USING TEMPORARY BYPASS LINES AT TIE-INS.
- OBSERVE CONNECTION PIPING FOR SIGNS OF VISIBLE LEAKAGE AND CORRECT IMMEDIATELY.
- COMPLETE CONNECTIONS AND PLACE NEW FORCED SANITARY SEWER INTO OPERATION.
- CLOSE VALVES AND ABANDON EXISTING FORCED SANITARY SEWER WHERE INDICATED.

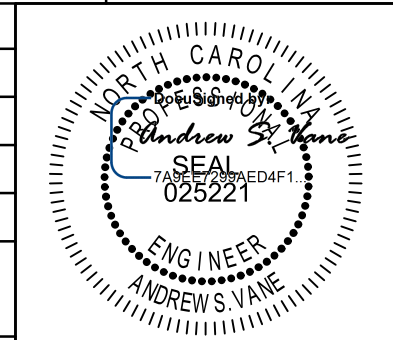


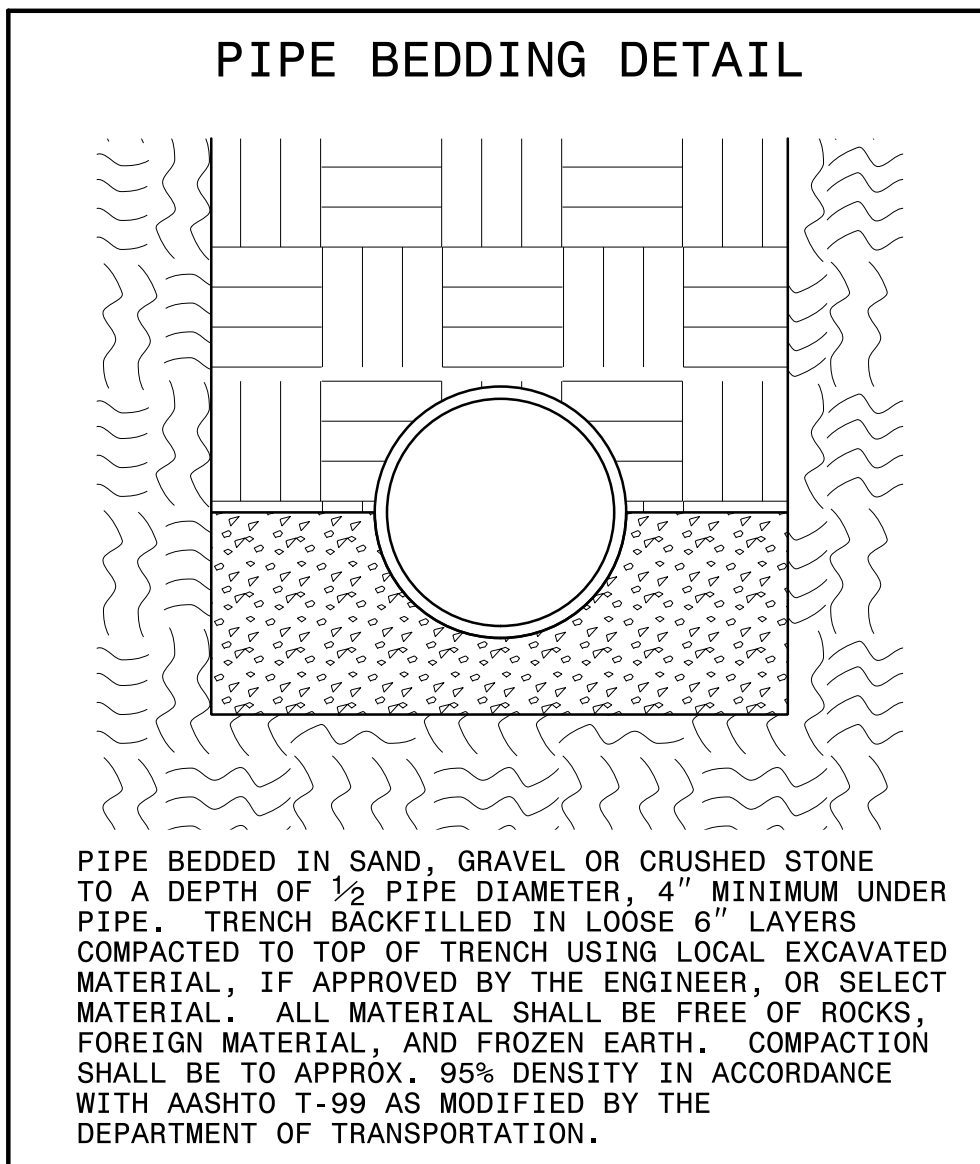
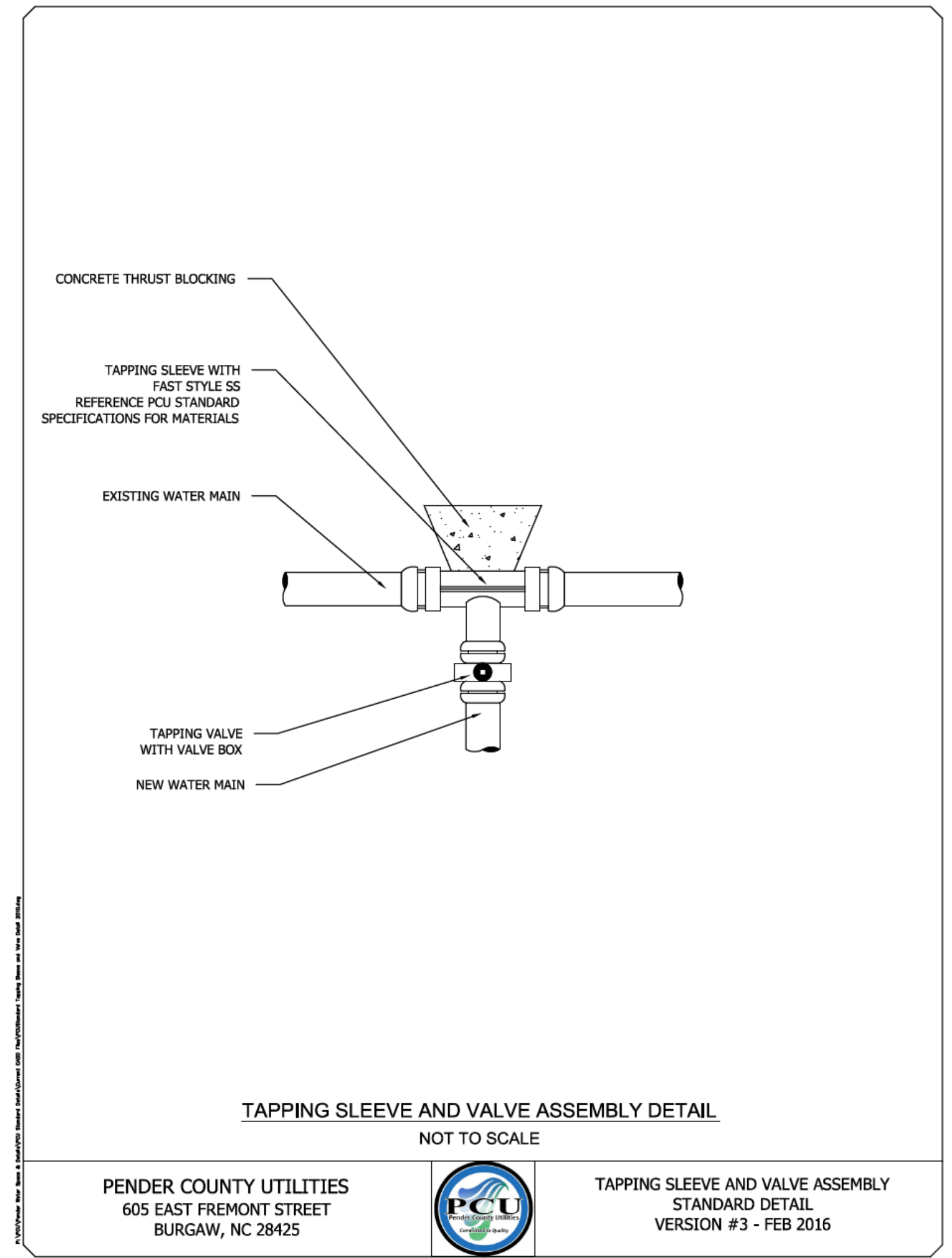
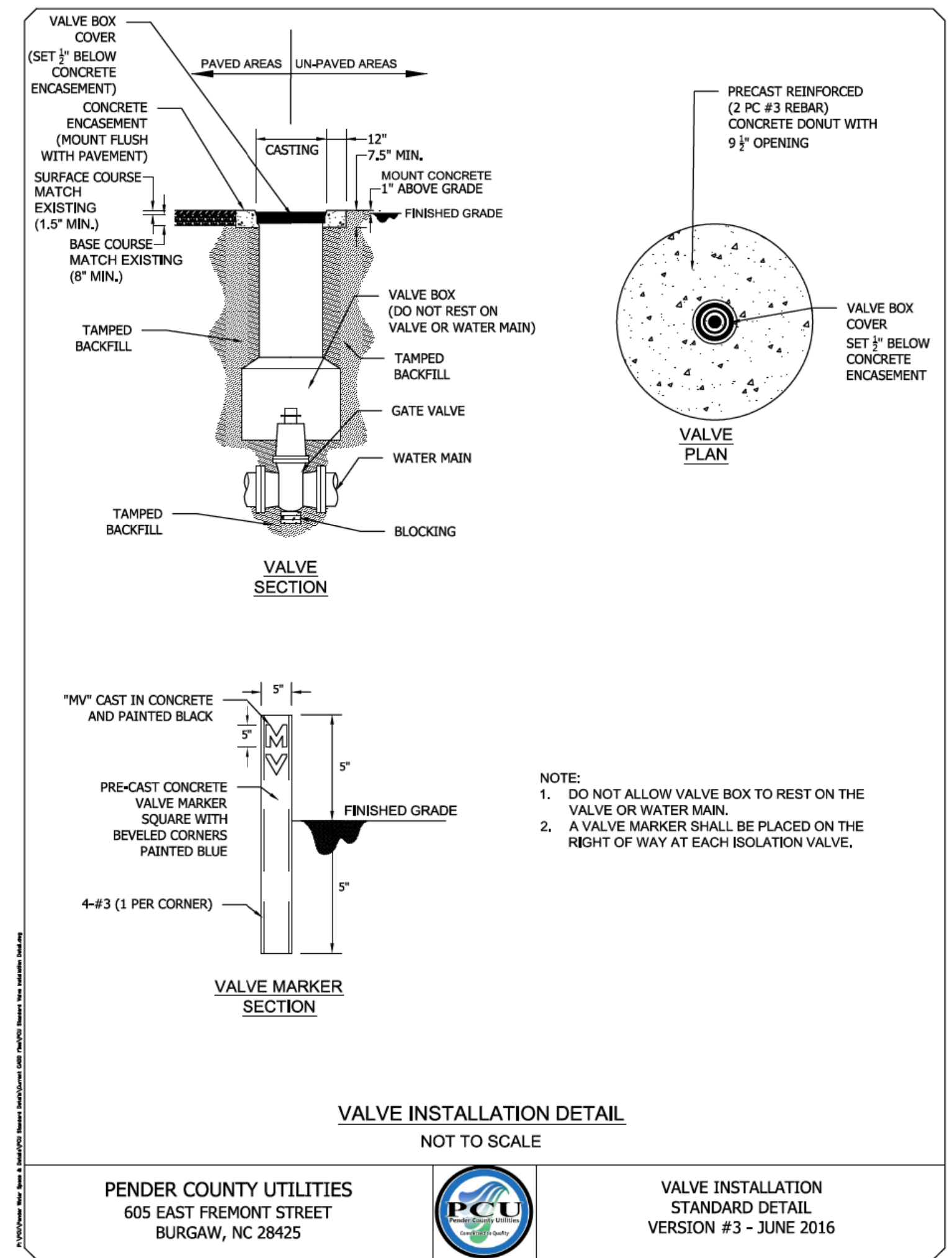
# PROJECT TYPICAL DETAILS

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PROJECT REFERENCE NO. <b>R-3300B</b>	SHEET NO. <b>UC-3B</b>
DESIGNED BY: <b>CTH</b>	
DRAWN BY: <b>CTH</b>	
CHECKED BY: <b>ASV</b>	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	11/22/2021 UTILITY CONSTRUCTION PLANS ONLY
<b>UTILITY CONSTRUCTION</b>	



MAXIMUM TRENCH WIDTH AT TOP OF PIPE

NOMINAL PIPE SIZE (INCHES)	TRENCH WIDTH (INCHES)	NOMINAL PIPE SIZE (INCHES)	TRENCH WIDTH (INCHES)
4	28	20	44
6	30	24	48
8	32	30	54
10	34	36	60
12	36	42	66
14	38	48	72
16	40	54	78
18	42		



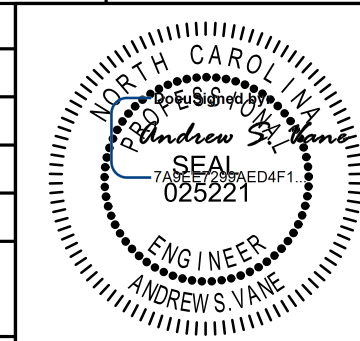




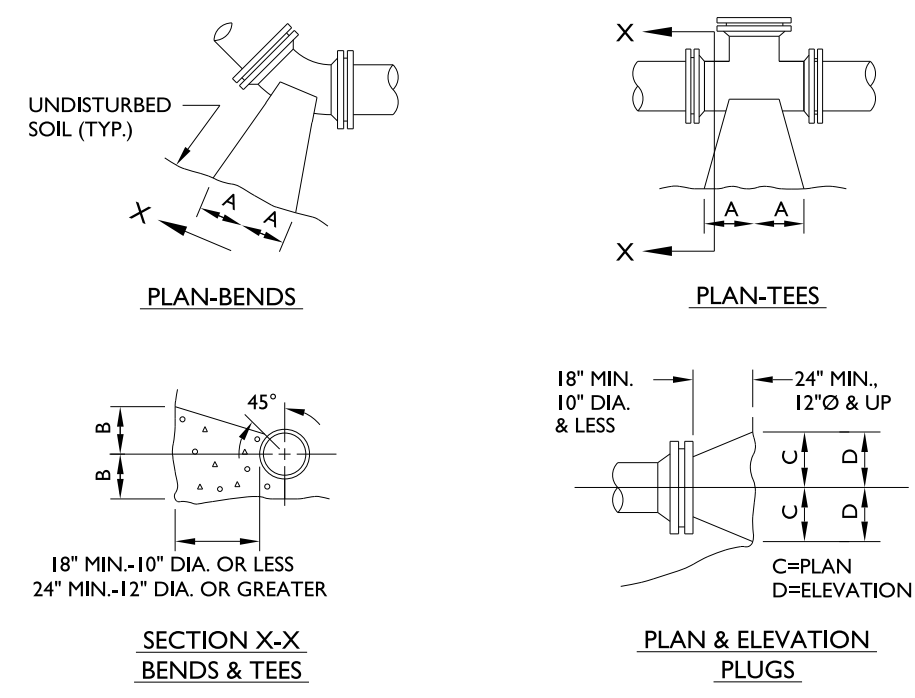
**STV** 100 Years  
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PROJECT REFERENCE NO. <b>R-3300B</b>	SHEET NO. <b>UC-3D</b>
DESIGNED BY: <b>CTH</b>	
DRAWN BY: <b>CTH</b>	
CHECKED BY: <b>ASV</b>	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SECTION PHONE: (919) 707-6690 FAX: (919) 250-4151	
11/22/2021 UTILITY CONSTRUCTION PLANS ONLY	

# PROJECT TYPICAL DETAILS



PIPE SIZE	90° BEND		45° BEND		22-1/2° BEND		11-1/4° BEND		TEE		PLUG	
	A	B	A	B	A	B	A	B	A	B	C	D
4"	18"	12"	10"	13"	7"	10"	7"	10"	12"	14"	13"	6"
6"	18"	12"	10"	13"	7"	10"	7"	10"	12"	14"	19"	9"
8"	24"	18"	13"	18"	10"	12"	10"	12"	16"	18"	25"	11"
10"	28"	22"	15"	22"	12"	15"	12"	15"	20"	22"	31"	14"
12"	32"	28"	19"	28"	14"	18"	14"	18"	22"	28"	37"	17"
16"	54"	38"	30"	36"	18"	36"	18"	36"	42"	54"	24"	

- ASSUME 2000 PSF SOIL (SAND & GRAVEL WITH CLAY)
- NOTES:**
- BASED ON 200 PSI STATIC PRESSURE PLUS AWWA WATER HAMMER ALLOWANCE.
  - ALL BEARING SURFACES TO BE CARRIED TO UNDISTURBED GROUND.
  - THRUST BLOCKS TO BE USED AT ALL LINES OPERATING UNDER PRESSURE.
  - CONCRETE SHALL NOT CONTACT BOLTS OR MECHANICAL FITTINGS.
  - CONCRETE SHALL BE 3000 PSI.
  - TRENCHES SHALL CONFORM WITH STANDARD EMBEDMENT DETAIL.
  - ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.
  - SEE STD. THRUST BLOCK SHEET 2 OF 4 FOR OTHER SOILS.

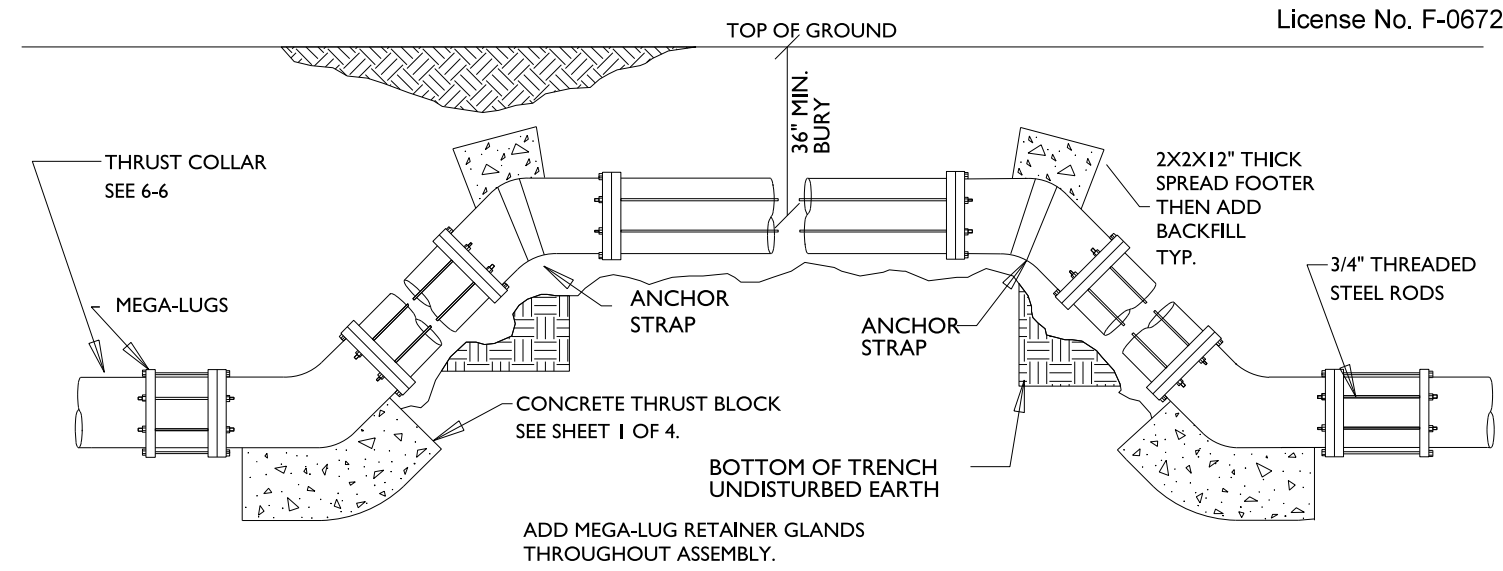
## REACTION BEARING AREAS FOR HORIZONTAL WATER/SEWER PIPE BENDS

BASED ON TEST PRESSURE OF 200 P.S.I.  
 ALL AREAS GIVEN IN SQUARE FEET.

SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	MODERATELY LOOSE CLAY 400 LB/FT <sup>2</sup>	SOFT CLAY 200 LB/FT <sup>2</sup>	GRAVEL COARSE SAND 100 LB/FT <sup>2</sup>	DRY CLAY 800 LB/FT <sup>2</sup>	SAND CONTACT FIRM 800 LB/FT <sup>2</sup>	SAND CLEAN DRY 400 LB/FT <sup>2</sup>	QUICKSAND - VERY POOR SOIL 100 LB/FT <sup>2</sup>	ROCK - POOR 1000 LB/FT <sup>2</sup>
<b>6"</b>									
11 1/4 °	1,108	1	1	1	1	1	1	2	1
22 1/2 °	2,207	1	2	2	1	1	1	3	1
45 °	4,328	2	3	3	1	1	2	5	1
90 °	7,996	2	4	5	1	1	2	8	1
PLUG	5,655	2	3	4	1	1	2	6	1
<b>8"</b>									
11 1/4 °	1,970	1	1	2	1	1	1	2	1
22 1/2 °	3,922	1	2	3	1	1	1	4	1
45 °	7,694	2	4	5	1	1	2	8	1
90 °	14,215	4	8	9	2	2	4	15	2
PLUG	10,053	3	5	6	2	2	3	10	1
<b>12"</b>									
11 1/4 °	4,433	2	3	3	1	1	2	5	1
22 1/2 °	8,826	3	5	6	2	2	3	9	1
45 °	17,312	5	9	11	3	3	5	18	2
90 °	31,983	8	16	19	4	4	8	32	4
PLUG	22,619	6	12	14	3	3	6	23	3
<b>16"</b>									
11 1/4 °	7,881	2	4	5	1	1	2	8	1
22 1/2 °	15,691	4	8	10	2	2	4	16	2
45 °	30,779	8	16	19	4	4	8	31	4
90 °	56,861	15	29	35	8	8	15	57	6
PLUG	40,213	10	21	25	5	5	10	41	5

REACTION BEARING AREAS ARE IN SQUARE FEET MEASURED IN A VERTICAL PLANE IN THE TRENCH SIDE AT AN ANGLE OF 90° TO THE THRUST VECTOR.

USE 4° - 90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR.

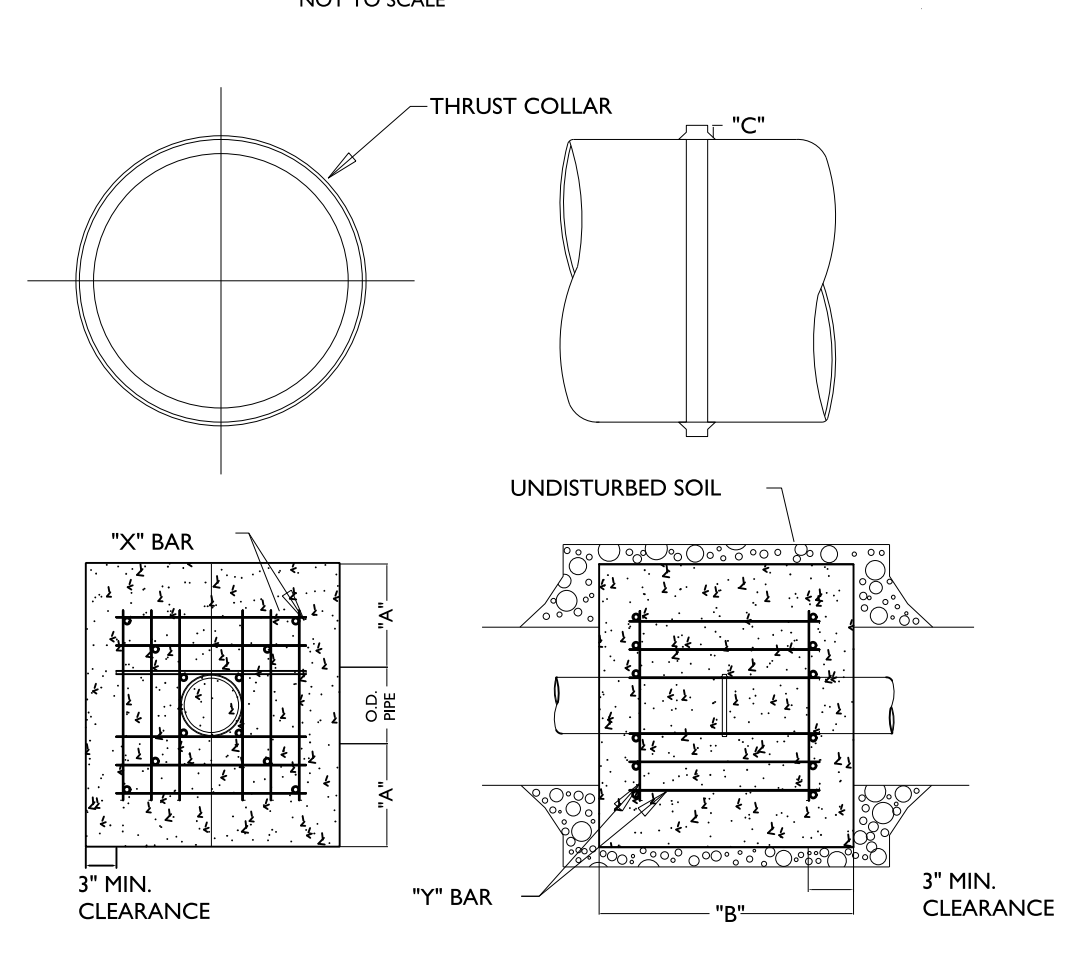


**ROD REQUIREMENTS**

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

- GENERAL NOTES:**
- STEEL RODS AND BOLTS SHALL BE 3/4" HOT OR COLD DIPPED GALVANIZED.
  - CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT BENDS.
  - MEGA-LUGS TO BE USED AT ALL FITTINGS.
  - MUST USE DUCTILE IRON EYE BOLTS WHERE NECESSARY.

## PSD NO. 1 - THRUST BLOCKING DETAIL



**REINFORCING REQUIREMENTS**

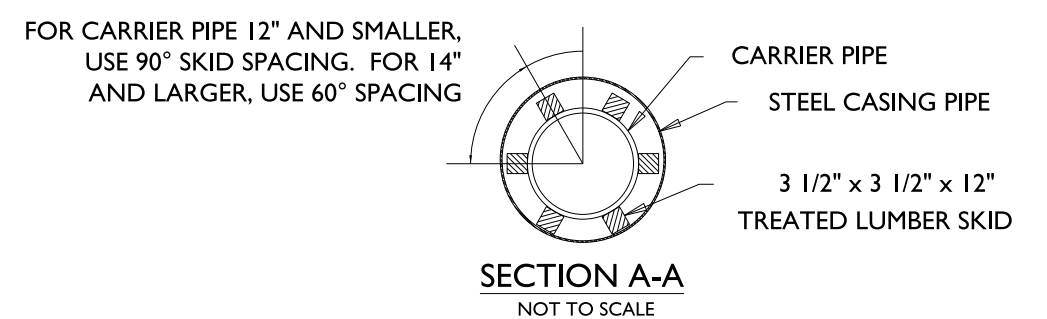
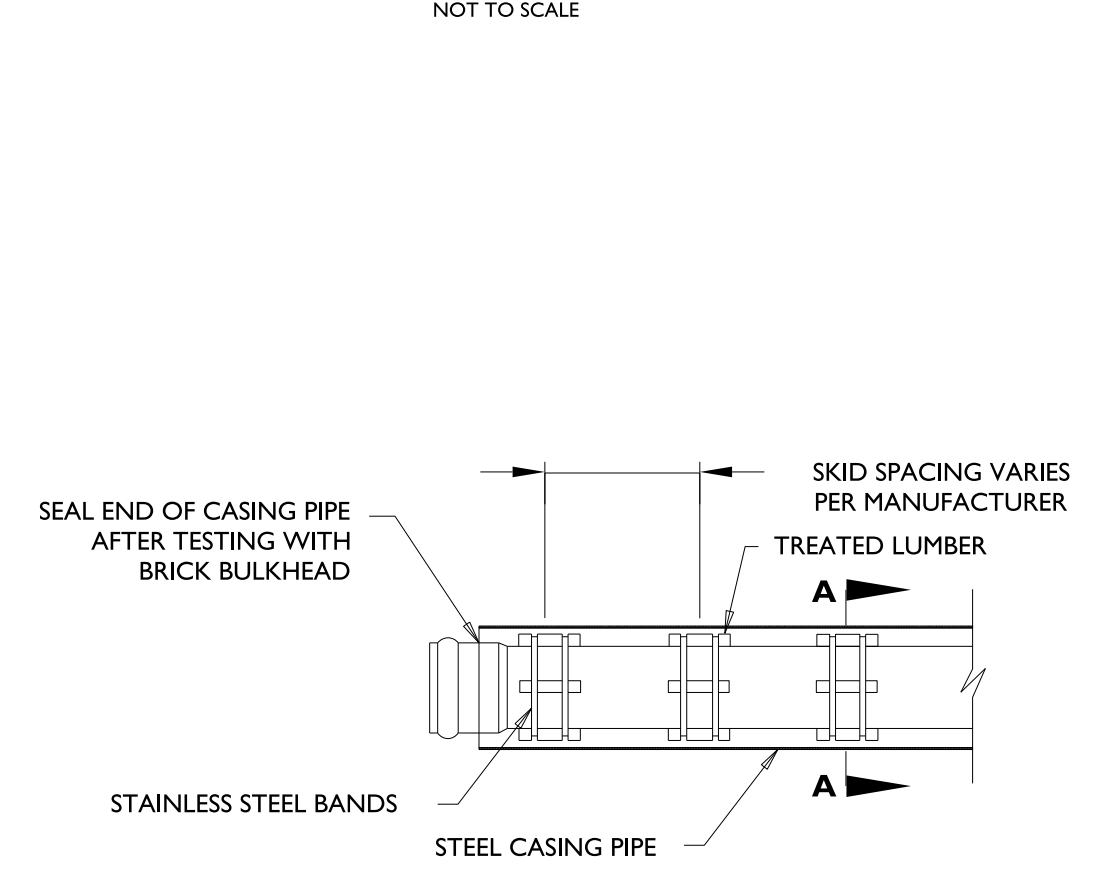
ID. PIPE	REBAR SIZE	"X" BAR LENGTH	"X" BAR WEIGHT	"Y" BAR LENGTH	"Y" BAR WEIGHT	NO. REQUIRED
6" - 36"	#5	2'-2" O.D. PIPE	1.043 LBS/FT	1'-1"	1.1 LBS. EACH	X-24, Y-12
48" & greater	#6	3'-0" O.D. PIPE	1.502 LBS/FT	1'-3"	1.9 LBS. EACH	X-24, Y-12

**THRUST COLLAR, AND THRUST SCHEDULE**

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

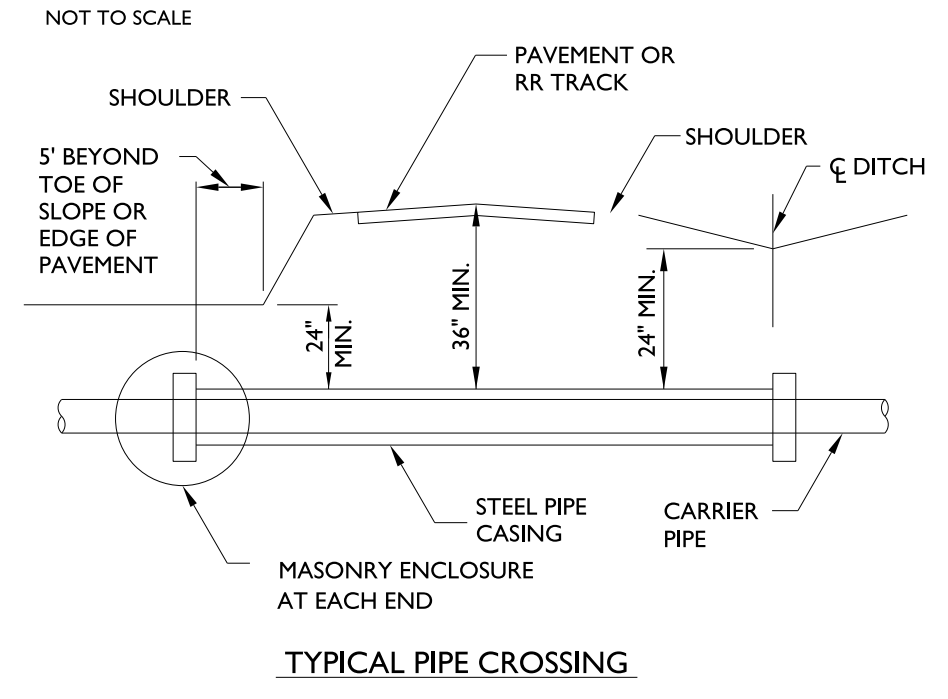
- NOTES:**
- CONCRETE SHALL BE 3000 PSI AND TRANSIT MIXED.
  - REINFORCING BARS SHALL BE DEFORMED AND TIED TOGETHER.
  - TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK INSTALLATION SHALL BE THE MINIMUM WIDTH AS SHOWN ON STANDARD EMBEDMENT DETAIL.
  - BACKFILL TAMPED IN 6" LIFTS PER STANDARD EMBEDMENT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

## PSD NO. 2 - THRUST BLOCKING DESIGN QUANTITY TABLE



- NOTES:**
- SKID TO BE PLACED TO PROVIDE PROPER SUPPORT, ALIGNMENT, AND GRADE AS SPECIFIED. CONTINUOUS SKIDS MAY BE USED AS ALTERNATIVE. 2. OIL, GREASE, OR PETROLEUM PRODUCT MAY NOT BE USED AS LUBRICANT.
  - CASING PIPE TO BE OF FERROUS METAL AND HAVE A MINIMUM DIAMETER TWICE THAT OF THE CARRIER PIPE.
  - CASING PIPE TO HAVE A MINIMUM THICKNESS OF .25".
  - FOR ALL BORES UNDER NCDOT RIGHT OF WAYS FOLLOW ALL NCDOT GUIDELINES FOR PIPE SIZE AND THICKNESS.

## PSD NO. 3 - VERTICAL BEND DETAIL



**CASING PIPE SIZE (O.D.) WALL THICKNESS**

4" - 12 3/4"	0.250"
16"	0.250"
18"	0.250"
20"	0.250"
24"	0.250"
30"	0.312"
36"	0.375"
48"	0.500"

ENCASEMENTS SHALL EXTEND FROM DITCH LINE TO DITCH LINE IN CUT SECTIONS, FIVE (5) FEET BEYOND THE TOE OF SLOPES IN FILL SECTIONS, AND TEN (10) FEET BEYOND EDGE OF PAVEMENT IN SECTIONS WITH NO DITCH OR FILL AREA.

- NOTES:**
- STEEL ENCASUREMENT PIPE SHALL CONFORM TO ASTM A-139 WITH WALL THICKNESS AND GRADE AS DEFINED IN THE SPECIFICATIONS. MINIMUM ALLOWABLE YIELD STRENGTH IS 35,000 PSI.
  - CARRIER PIPE SHALL BE ADEQUATELY SUPPORTED THE ENTIRE LENGTH WITHIN THE CASING BY USING "SPIDER" STEEL SUPPORTS AT A MAXIMUM OF 9 FOOT CENTERS (ONE AT EACH JOINT AND ONE INTERMEDIATE). OTHER METHODS MUST MEET APPROVAL OF THE ENGINEER.
  - NO EXCAVATED MATERIAL SHALL BE PLACED IN ANY STREAM, DITCH OR DRAINAGE WAY.
  - THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES PRIOR TO THE START OF CONSTRUCTION.
  - THE CONTRACTOR IS RESPONSIBLE FOR ANY SEDIMENT AND EROSION CONTROL PRACTICES REQUIRED DURING CONSTRUCTION.
  - THE CONTRACTOR IS RESPONSIBLE FOR ALL LAY DOWN AND STOCKPILE AREAS.
  - FOR BORES ON THE NCDOT RIGHT OF WAY, NO WORK WILL BEGIN UNTIL THE CONTRACTOR HAS A COPY OF THE NCDOT ENCROACHMENT PERMIT FOR THE PROJECT.

## PSD NO. 4 - THRUST COLLAR DETAIL

NOT TO SCALE

## PSD NO. 5 - PIPE CASING DETAIL

NOT TO SCALE

## PSD NO. 7 - BORE DETAIL DETAIL

NOT TO SCALE


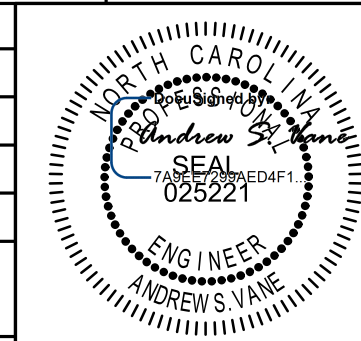




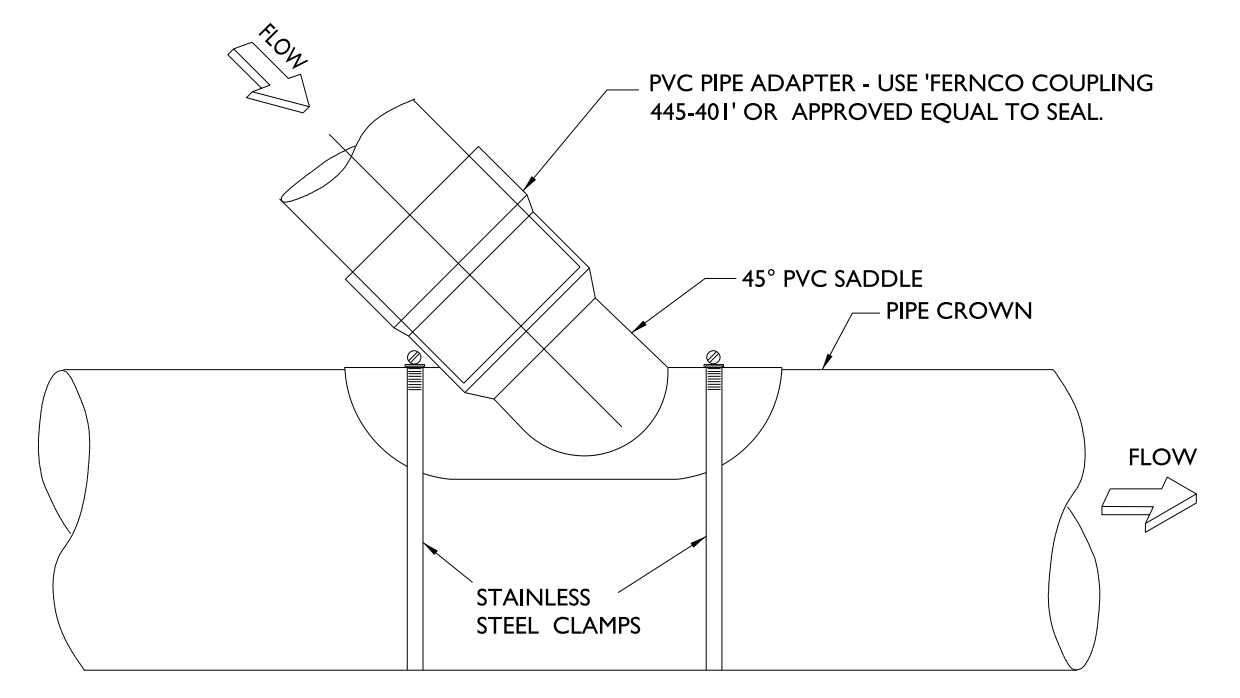


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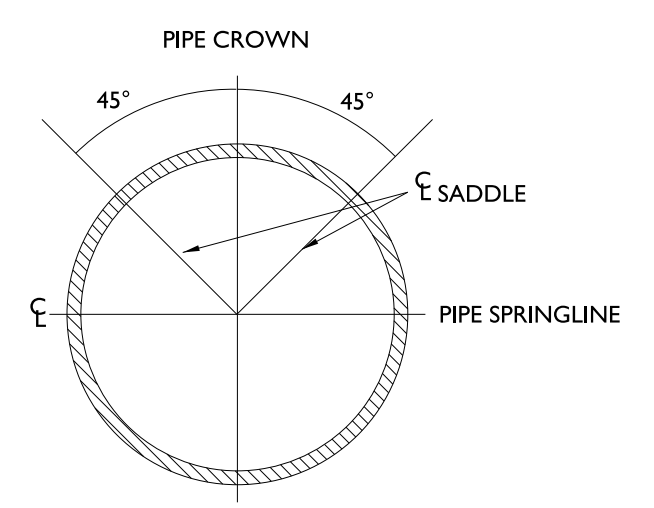
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	R-3300B	UC-3F
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	DESIGNED BY: CTH	
	DRAWN BY: CTH	
	CHECKED BY: ASV	
	APPROVED BY:	
	REVISED:	
Stantec Consulting Services Inc. 801 Jones Franklin Road Suite 300 Raleigh, NC 27606 Tel. (919) 851-8866 Fax. (919) 851-7024 www.stantec.com License No. F-0672	NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	11/22/2021 UTILITY CONSTRUCTION PLANS ONLY
<b>UTILITY CONSTRUCTION</b>		

# PROJECT TYPICAL DETAILS



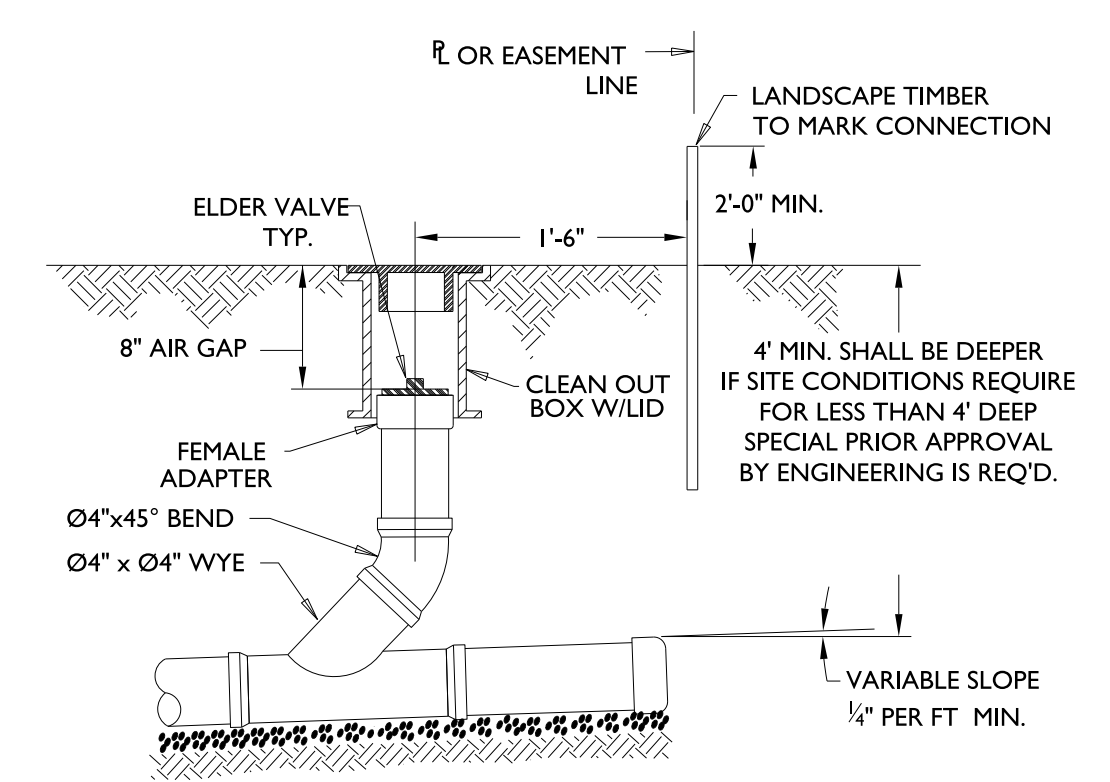
BACKFILL UNDER PVC SADDLE, ADAPTOR, AND PIPE BEND WITH #67 STONE AS SHOWN ON PIPE EMBEDMENT DETAIL.



SADDLE INSTALLATION LIMITS

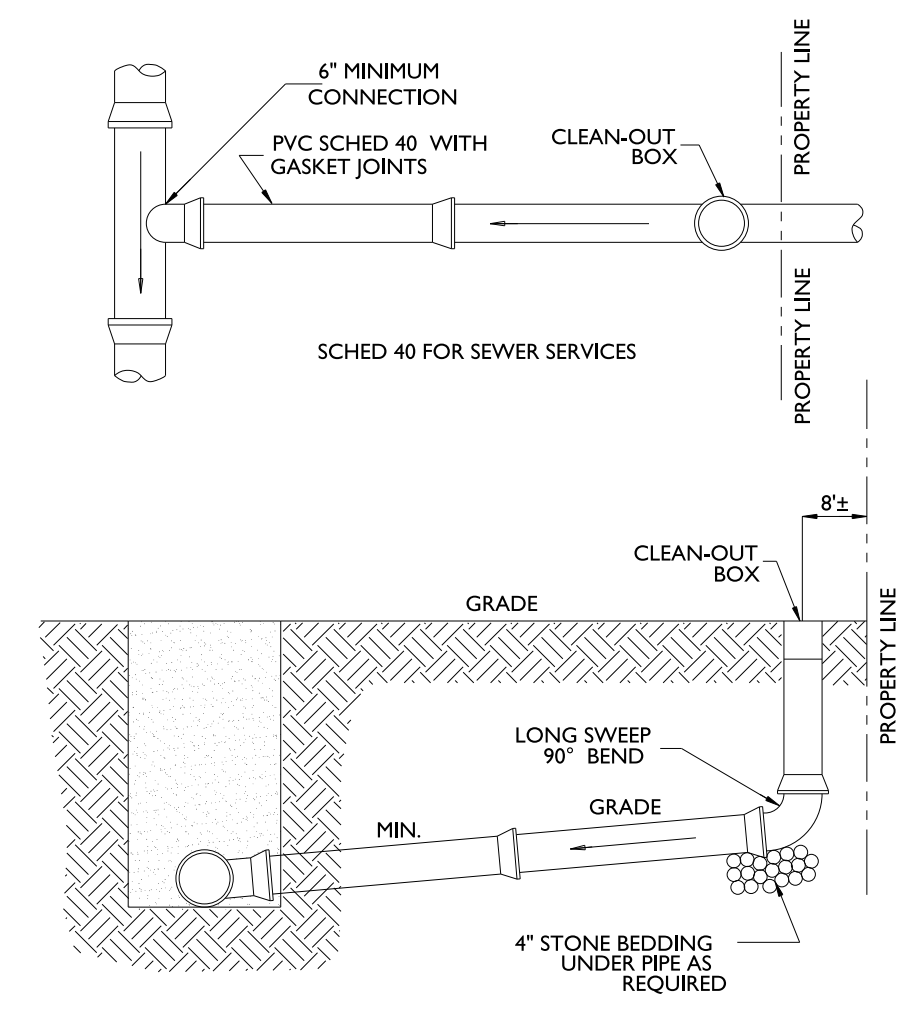
NOTE: USE AT DEPTHS FROM 3 TO 6- FEET

PSD NO. 16 - SADDLE INSTALLATION DETAIL  
NOT TO SCALE

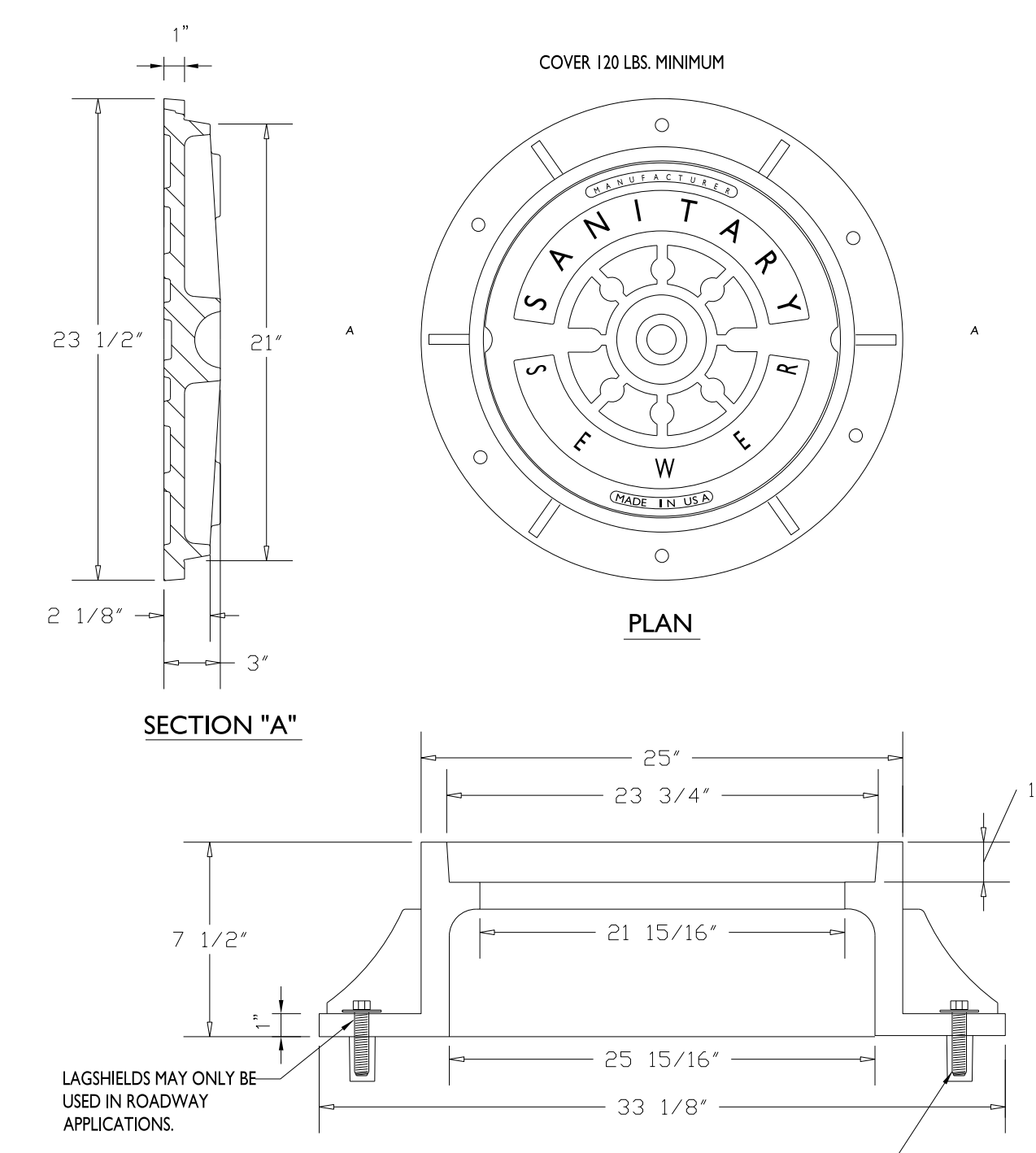


NOTE: ALL SERVICES FOR SINGLE FAMILY RESIDENCES AND SINGLE COMMERCIAL STRUCTURES ARE TO BE INSTALLED WITH AN ELDER VALVE.

PSD NO. 17A - STANDARD SERVICE CLEAN OUT DETAIL  
NOT TO SCALE

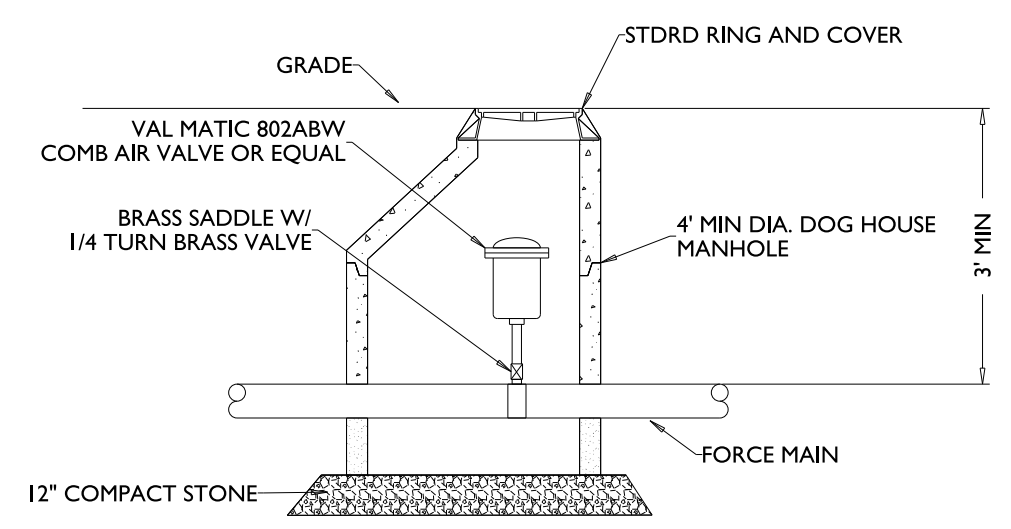


PSD NO. 17 - STANDARD SERVICE DETAIL  
NOT TO SCALE



- NOTES:
1. ALL MANHOLE FRAMES SHALL BE GOOD QUALITY HEAVY DUTY CASTINGS
  2. FRAME SHALL BE A MINIMUM WEIGHT OF 182 LBS.
  3. COVER SHALL WEIGH A MIN. OF 120 LBS.
  4. MANHOLES WITHIN PAVED SURFACES SHALL BE CONSTRUCTED IN ACCORDANCE WITH DETAIL.
  5. CONE SEAL SHALL BE USED BETWEEN RING AND CONE

PSD NO. 18 - STANDARD MANHOLE RING AND COVER  
DETAIL  
NOT TO SCALE



NOTE: AIR RELEASE VALVES TO BE LOCATED AT HIGH POINTS OF THE FORCE MAIN WHERE GRADE DIFFERENCES EXCEED 10' IN ELEVATION.

PSD NO. 24 - AIR RELEASE MANHOLE DETAIL  
NOT TO SCALE



