

09\_08/99

**PROJECT: BR-0160**

**CONTRACT:**

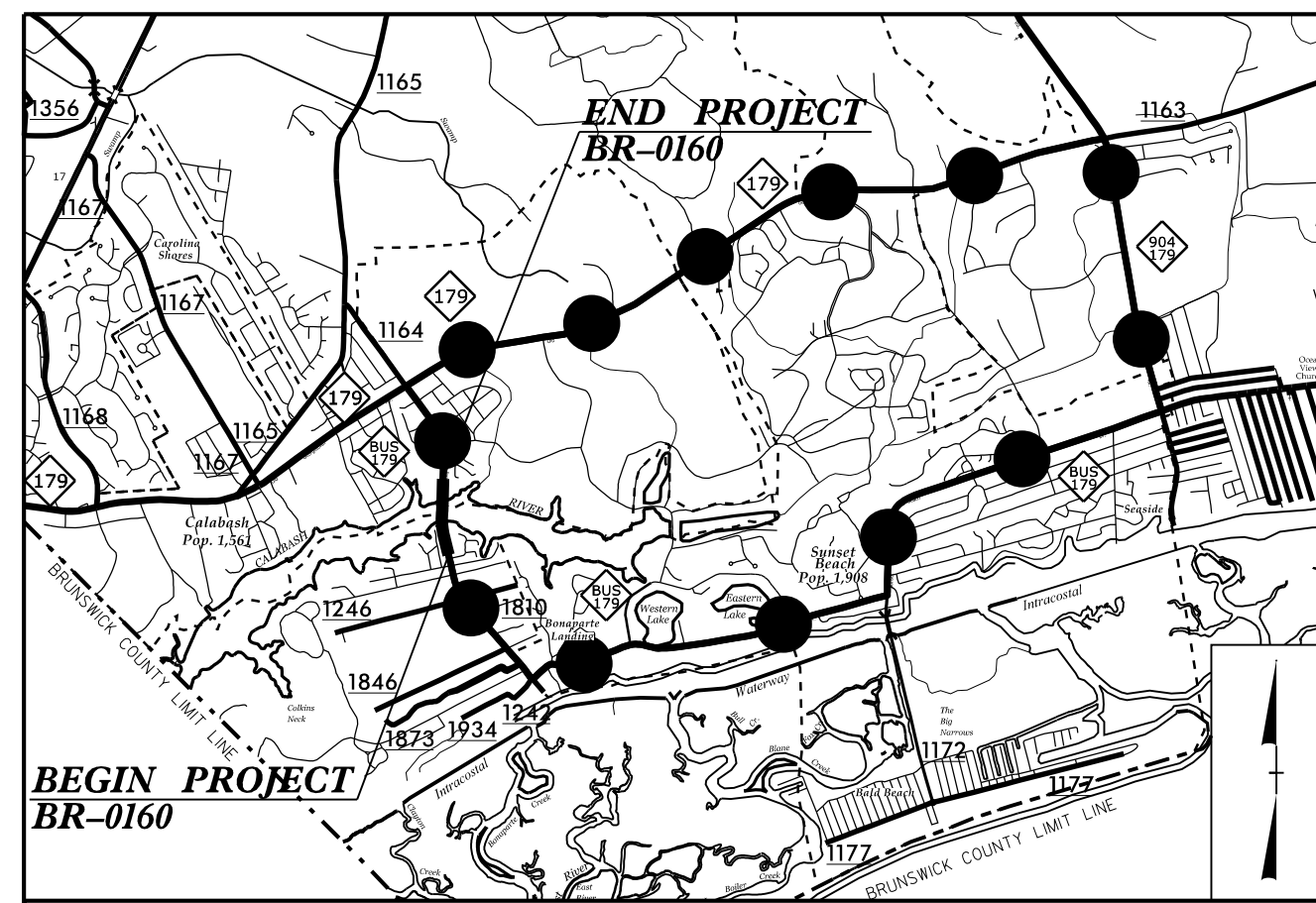
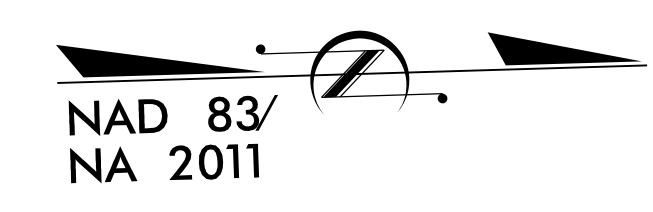
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

T.I.P. NO.	SHEET NO.
BR-0160	UC-1

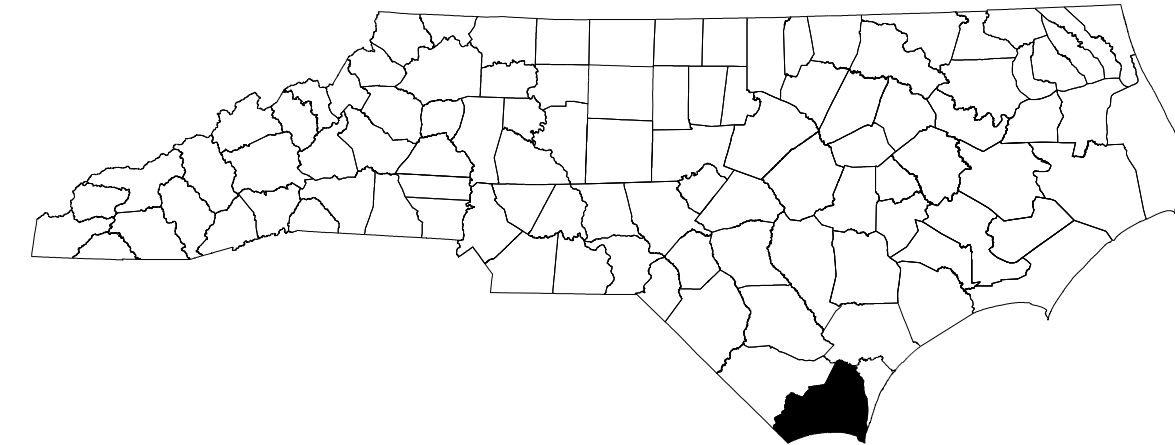
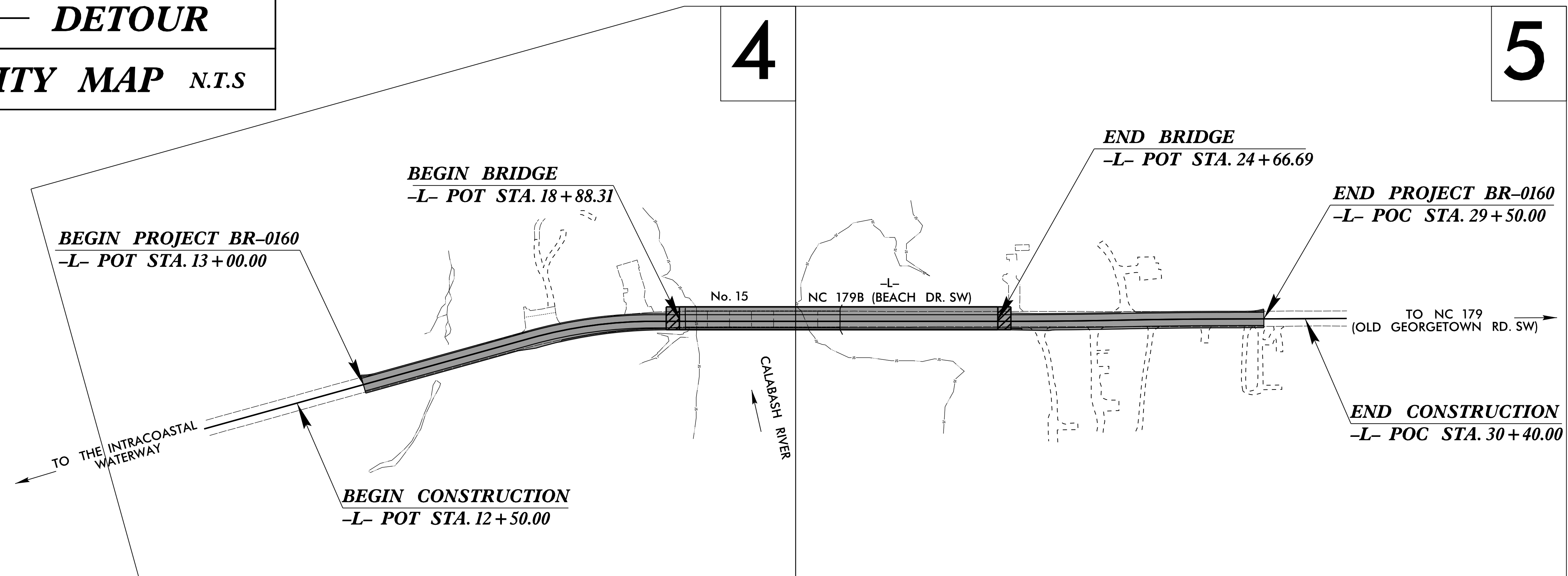
# BRUNSWICK COUNTY

**LOCATION: REPLACE BRIDGE 15 OVER CALABASH RIVER ON NC 179B (BEACH DR. SW)**

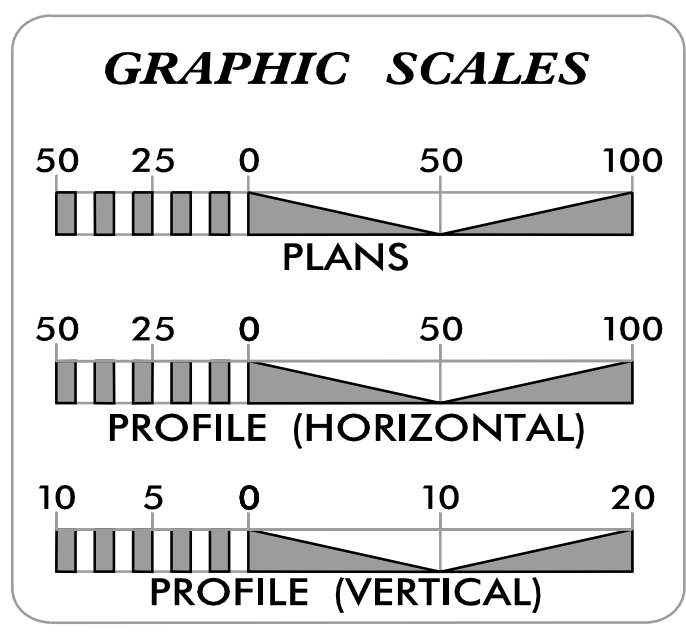
**TYPE OF WORK: WATER & SEWER LINE RELOCATION**



**● ● ●** **DETOUR**  
**VICINITY MAP N.T.S**



DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

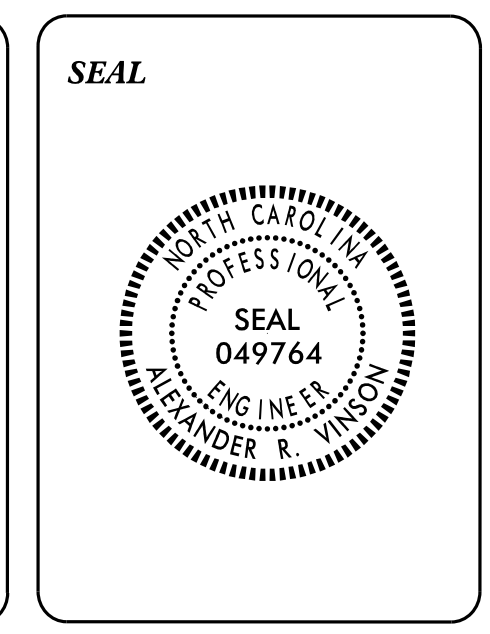


SHEET NO.:	DESCRIPTION:
UC-1	TITLE SHEET
UC-2	UTILITY SYMBOLOGY
UC-3	NOTES
UC-3A TO UC-3G	DETAILS
UC-4 TO UC-7	UTILITY CONSTRUCTION & PROFILE SHEETS

**WATER AND SEWER OWNERS ON PROJECT**  
(A) BRUNSWICK COUNTY

PREPARED IN THE OFFICE OF  
**RS&H**  
**ARCHITECTS-ENGINEERS-PLANNERS, INC.**  
8521 SIX FORKS ROAD, SUITE 400  
RALEIGH, NC 27615

**RICHARD BOLLINGER, PE** UTILITIES PROJECT MANAGER  
**ALEXANDER VINSON, PE** UTILITIES PROJECT ENGINEER  
**BENJAMIN FULLENWIDER** UTILITIES PROJECT DESIGNER



**DIVISION OF HIGHWAYS UTILITIES UNIT**  
1555 MAIL SERVICES CENTER  
RALEIGH, NC 27699-1555  
PHONE (919) 707-6690  
FAX (919) 250-4151

**BO HEMPHILL, PE** EASTERN UTILITIES MANAGER  
**LONNY SLEEPER** DIVISION 3 UTILITY ENGINEER  
**JON GILES** DIVISION 3 UTILITIES

17-FEB-2023 11:28  
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\$\$\$\$\$SERVNAME\$\$\$\$\$

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

## UTILITIES PLAN SHEET SYMBOLS

### PROPOSED WATER SYMBOLS

Water Line (Sized as Shown)	
11 1/4 Degree Bend	
22 1/2 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	
Water Meter	
Relocate Water Meter	
Remove Water Meter	
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 Forced 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		Sanitary Sewer Cleanout	
End of Information			

\*For Existing Utilities  
 Utility Line Drawn from Record (Type as Shown)   
 Designated Utility Line (Type as Shown)

5/14/99  
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# UTILITY CONSTRUCTION

PROJECT REFERENCE NO. <i>BR-0160</i>	SHEET NO. <b>UC-3</b>
DESIGNED BY: <i>ARV</i>	
DRAWN BY: <i>ARV</i>	
CHECKED BY: <i>RLB</i>	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	

UTILITY CONSTRUCTION PLANS ONLY

## UTILITY CONSTRUCTION

### 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 UTILITIES BELONG TO BRUNSWICK COUNTY WATER AND SEWER.
  
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, 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, 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:

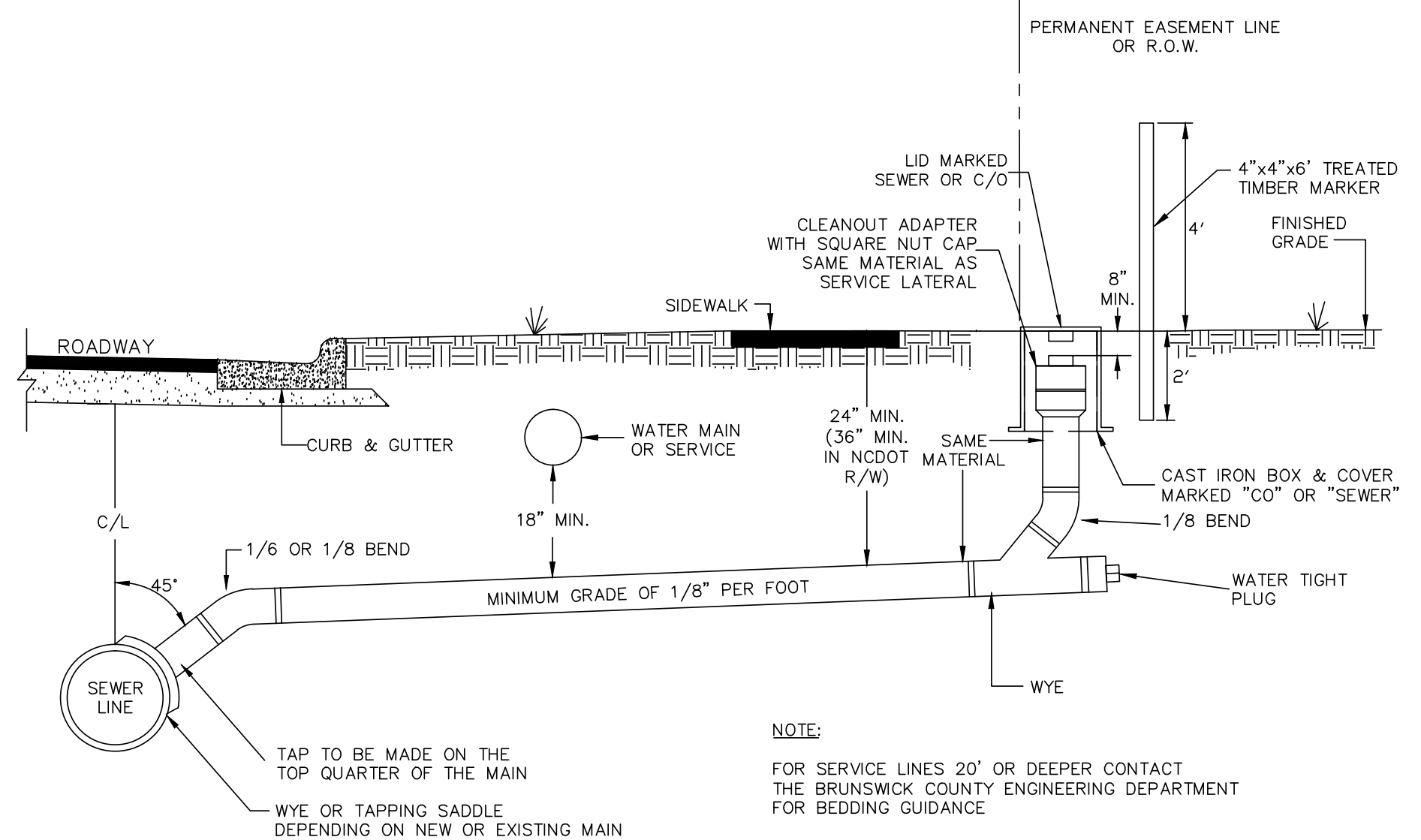
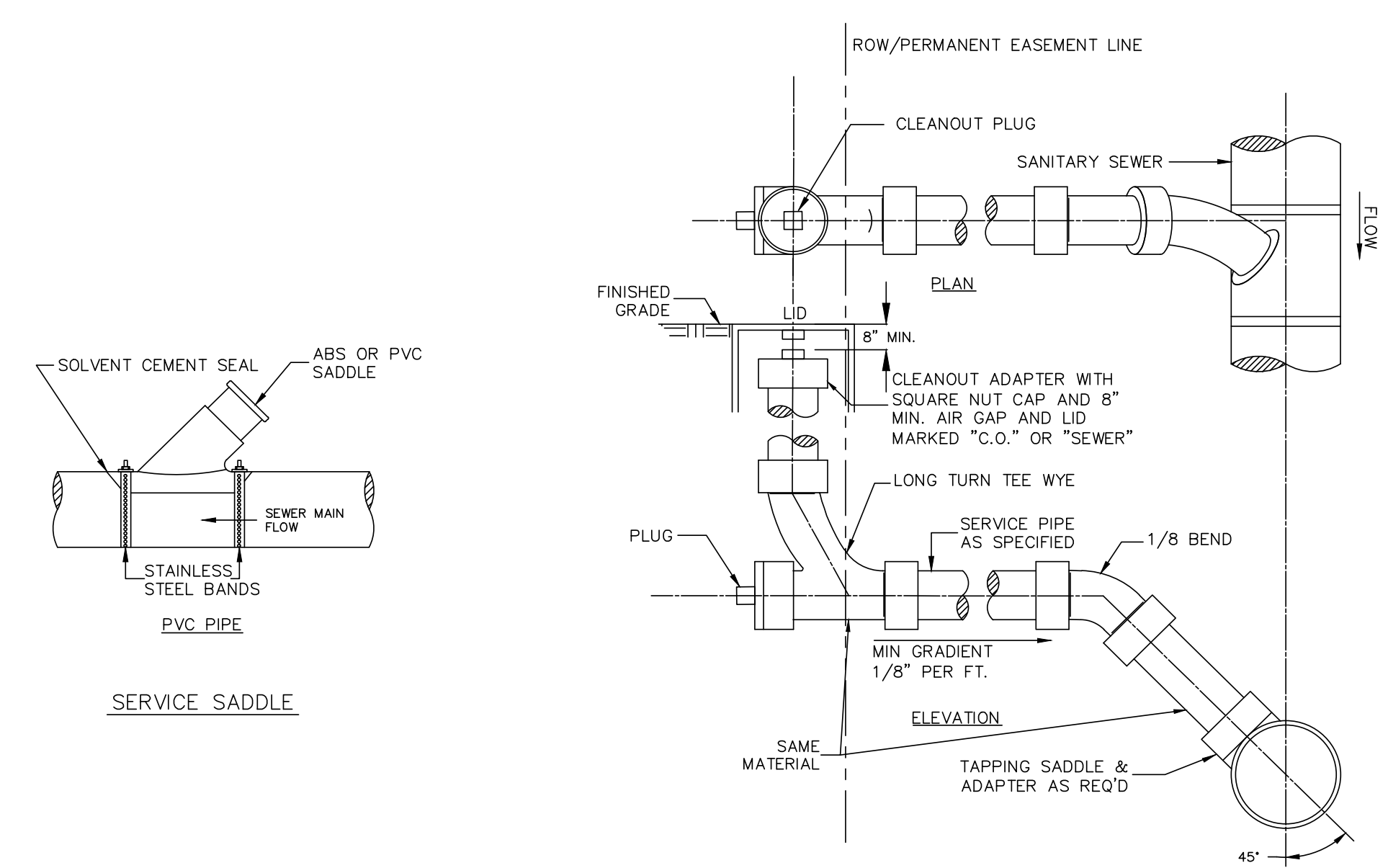
1. WORK PERFORMED ON BRUNSWICK COUNTY UTILITIES WATER AND SEWER SYSTEMS SHALL CONFORM WITH THE 2018 NCDOT STANDARD SPECIFICATIONS AND THE ADDITIONAL REQUIREMENTS OF THE BRUNSWICK COUNTY ENGINEERING DESIGN MANUAL STANDARD SPECIFICATIONS AND GENERAL DETAILS (MAY 2020) THAT ARE PROVIDED IN THE FOLLOWING PLANS NOTES AND SPECIAL PROVISIONS.
  
2. ALL PROPOSED WATER & SEWER LINES SHALL BE PVC (C-900) PIPE FOR TRENCHED INSTALLATION AND HDPE (SDR-9) FOR TRENCHLESS. ALL FITTINGS SHALL BE DUCTILE IRON PRESSURE CLASS 311.
  
3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND OWNER A MINIMUM OF 7 DAYS IN ADVANCE OF A PLANNED SERVICE INTERRUPTION. THE BRUNSWICK COUNTY POINT OF CONTACT TO SCHEDULE SERVICE INTERRUPTIONS IS BRENT LOCKAMY, DEPUTY DIRECTOR DESIGN AND CONSTRUCTION AT (910) 253-2460.
  
4. CONTRACTOR'S ATTENTION IS DIRECTED TO SECTIONS 102, 107, AND 1550 OF THE STANDARD SPECIFICATIONS CONCERNING TRENCHLESS INSTALLATION. IT IS CONTRACTOR'S RESPONSIBILITY TO HAVE BORE DESIGNED AND SEALED BY A LICENSED NORTH CAROLINA PROFESSIONAL ENGINEER. NO DAMAGE IS ALLOWED TO RIVER, WETLANDS, OR BUFFER ZONES.
  
5. ALL FORCE MAINS SHALL BE SUCCESSFULLY HYDROSTATICALLY PRESSURE TESTED PER AWWA STANDARDS AT A PRESSURE OF ONE AND ONE-HALF TIMES THE RATED WORKING PRESSURE, BUT IN NO CASE SHALL THE TEST PRESSURE BE LESS THAN ONE HUNDRED FIFTY PSIG FOR A MINIMUM OF TWO HOURS. ALL FORCE MAIN PRESSURE TESTING SHALL BE WITNESSED AND APPROVED BY BOTH COUNTY STAFF AND THE ENGINEER. MINIMUM FORTY-EIGHT HOURS' NOTICE IS REQUIRED TO SCHEDULE A FORCE MAIN PRESSURE TEST WITH COUNTY STAFF. HORIZONTAL DIRECTIONAL DRILLS SHALL BE PRESSURE TESTED AS NOTED ON THE COUNTY HDD STANDARD DETAILS AND WILL BE TESTED A SECOND TIME AS PART OF THE OVERALL SYSTEM PRESSURE TEST ONCE THE HDD FORCE MAIN HAS BEEN CONNECTED TO THE INSTALLED FORCE MAIN SYSTEM WITH THE REQUIRED VALVES IN PLACE AT EACH END OF THE HDD.

6. REFERENCE THE CONNECTION OF THE NEW 8-INCH WATER MAIN AND THE EXISTING 8-INCH WATER MAIN ON UTILITIES PLAN SHEET UC-4 AND UC-5: THE CONNECTION SHALL BE MADE WITHIN A 4-HOUR PERIOD, AT NIGHT, ON A WEEKEND. THE CONNECTION WILL NOT BE ALLOWED DURING THE PEAK USAGE PERIOD FROM MEMORIAL DAY THROUGH LABOR DAY.
  
7. REFERENCE THE CONNECTION OF THE NEW 8-INCH FORCE MAIN AND THE EXISTING 8-INCH FORCE MAIN SHOWN ON UTILITIES PLAN SHEET UC-6 AND UC-7: THE EXISTING FORCE MAIN CONVEYS AN AVERAGE OF APPROXIMATELY 85,000 GALLONS PER DAY DURING THE NON -TOURIST SEASON. CONTRACTOR SHALL DEVELOP PUMP AROUND PLAN AND SUBMIT TO BRUNSWICK COUNTY PUBLIC UTILITIES AND NCDOT DIVISION 3 FOR APPROVAL NO LATER THAN JUNE 30TH, 2023. THE BRUNSWICK COUNTY POINT OF CONTACT FOR BYPASS OPERATION PLAN REVIEW IS BRENT LOCKAMY, DEPUTY DIRECTOR DESIGN AND CONSTRUCTION AT (910) 253-2460. THE NCDOT DIVISION 3 POINT OF CONTACT FOR BYPASS OPERATION PLAN REVIEW IS JOSHUA T. PRATT, PE, DIVISION RESIDENT ENGINEER AT (910) 398-9130.
  
8. TRACER WIRE, TRACER TAPE, AND RADIO MARKER BALLS ARE REQUIRED TO BE USED ON PROPOSED WATER AND SEWER LINES IN ACCORDANCE WITH THE BRUNSWICK COUNTY DESGIN MANUAL. TAPE SHALL BE THREE INCHES WIDE, BLUE IN COLOR, BEARING CONTINUOUS MESSAGE "CAUTION WATER(SEWER) LINE BURIED BELOW". TAPE SHALL BE MADE OF PLASTIC OR OTHER PERMANENT MATERIAL AND SHALL BE BURIED CONTINUOUSLY ABOVE THE WATER(SEWER) MAIN AT A DEPTH OF EIGHTEEN INCHES BELOW FINISHED GRADE. ALL WATER(SEWER) MAINS SHALL HAVE A #12 AWG, HIGH STRENGTH COPPER CLAD STEEL CONDUCTOR (HS-CCS) WITH HPDE INSULATION, AND RATED FOR DIRECT BURIAL. THE WIRE SHALL BE BROUGHT UP IN VALVE BOXES PER COUNTY STANDARD DETAIL.
  
9. REFERENCE THE RELOCATION OF THE WATER METERS SHOWN ON UTILITIES PLAN SHEET UC-5: CONTRACTOR SHALL MOVE EXISTING WATER METERS FROM THE EXISTING METER BOXES TO THE CORRESPONDING NEW METER BOXES. THE CONTRACTOR SHALL REMOVE THE OLD METER BOXES WHEN NO LONGER IN SERVICE.

PROJECT REFERENCE NO.	SHEET NO.
BR-0160	UC-3A
DESIGNED BY: ARV	
DRAWN BY: ARV	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	UTILITY CONSTRUCTION PLANS ONLY

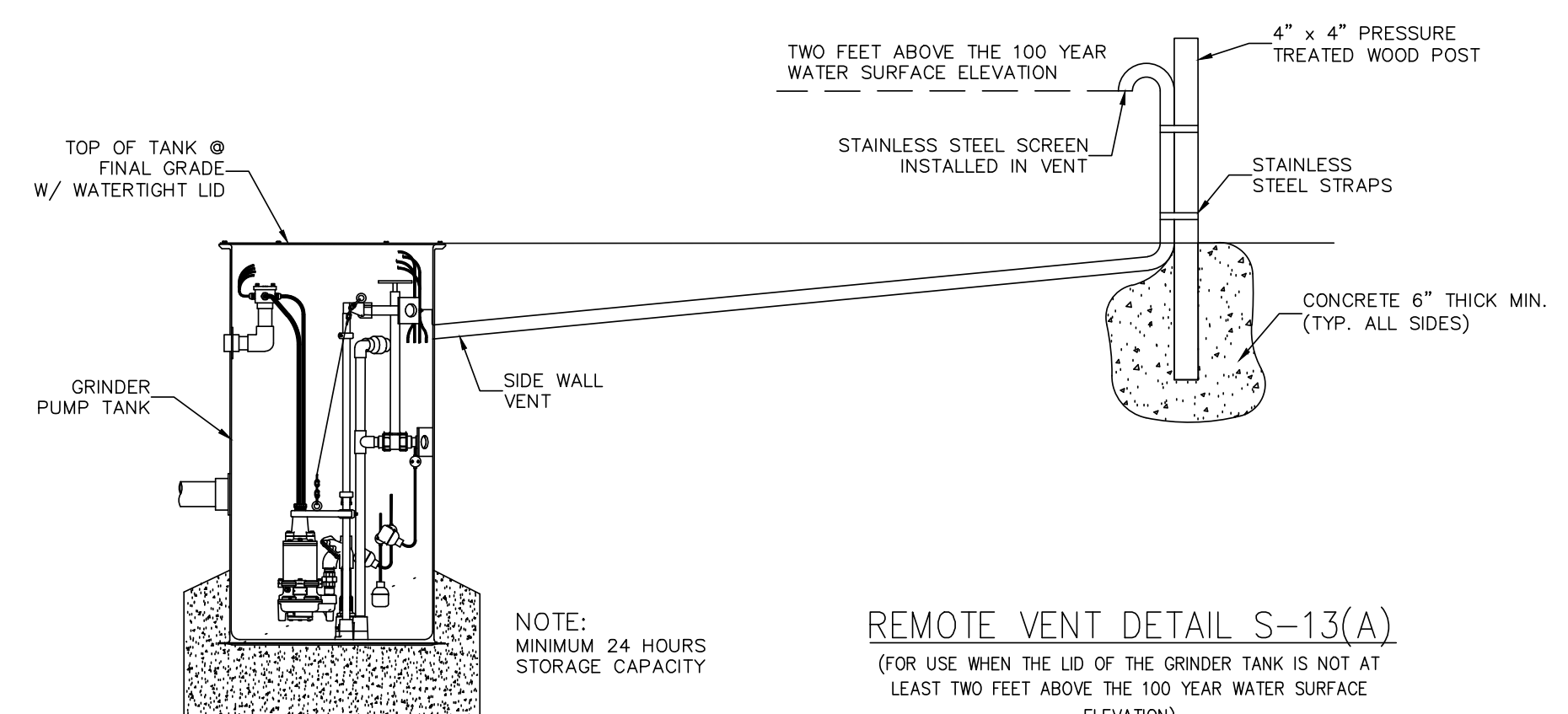
# PROJECT TYPICAL DETAILS

## UTILITY CONSTRUCTION

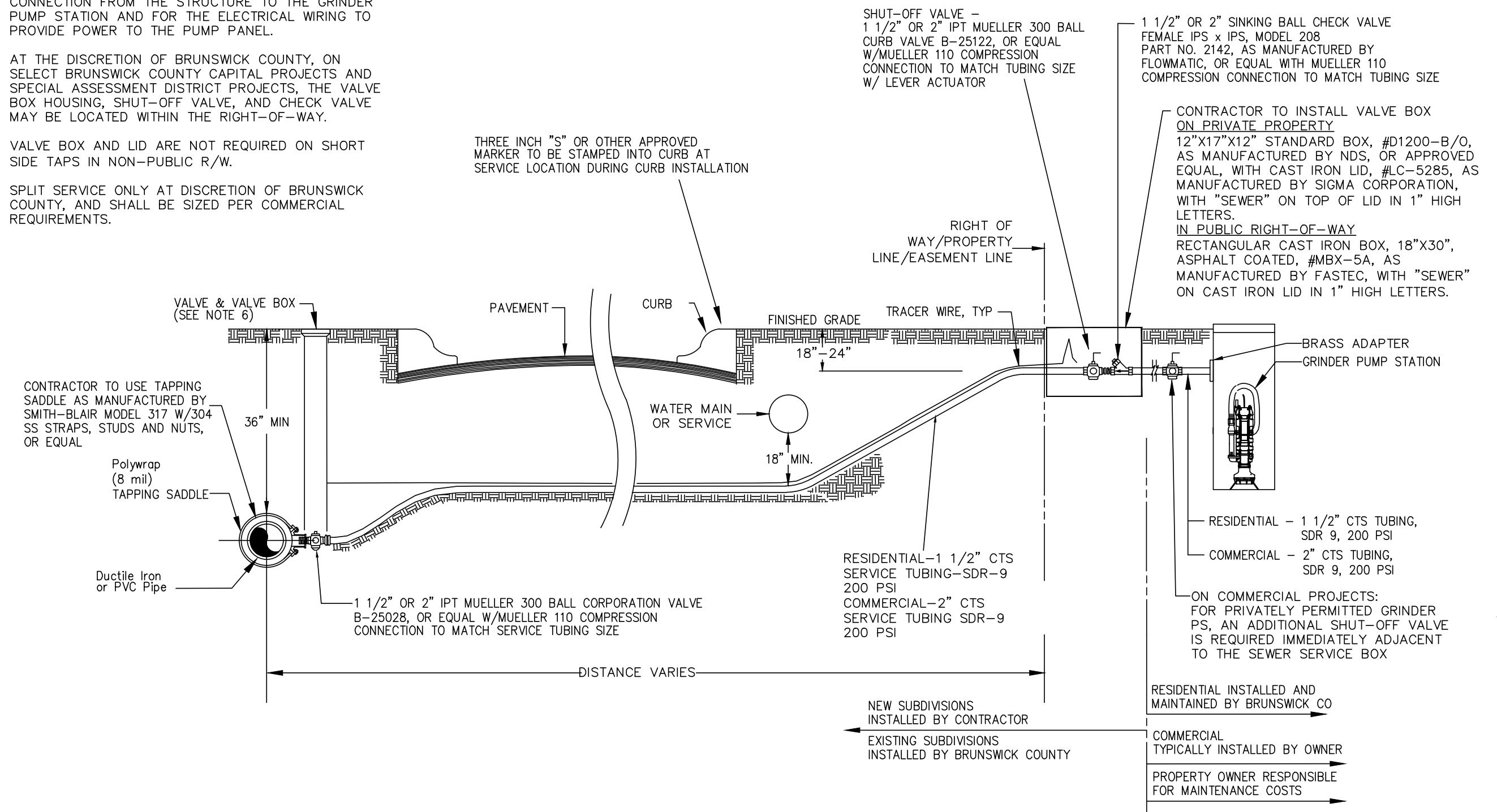


- NOTES:
- ALL TAPS WILL BE MADE IN ACCORDANCE WITH BRUNSWICK COUNTY SPECIFICATIONS AND AWWA GUIDELINE "ANSI/AWWA C600-93" OR LATEST REVISION FOR TAPPING THROUGH POLYETHYLENE ENCASEMENT.
  - ALL MATERIAL TO COMPLY WITH BRUNSWICK COUNTY SPECIFICATIONS.
  - TRACER WIRE SHALL BE INSTALLED FROM THE FORCE MAIN TO THE VALVE BOX.
  - THE HOMEOWNER IS RESPONSIBLE FOR THE GRAVITY CONNECTION FROM THE STRUCTURE TO THE GRINDER PUMP STATION AND FOR THE ELECTRICAL WIRING TO PROVIDE POWER TO THE PUMP PANEL.
  - AT THE DISCRETION OF BRUNSWICK COUNTY, ON SELECT BRUNSWICK COUNTY CAPITAL PROJECTS AND SPECIAL ASSESSMENT DISTRICT PROJECTS, THE VALVE BOX HOUSING, SHUT-OFF VALVE, AND CHECK VALVE MAY BE LOCATED WITHIN THE RIGHT-OF-WAY.
  - VALVE BOX AND LID ARE NOT REQUIRED ON SHORT SIDE TAPS IN NON-PUBLIC R/W.
  - SPLIT SERVICE ONLY AT DISCRETION OF BRUNSWICK COUNTY, AND SHALL BE SIZED PER COMMERCIAL REQUIREMENTS.

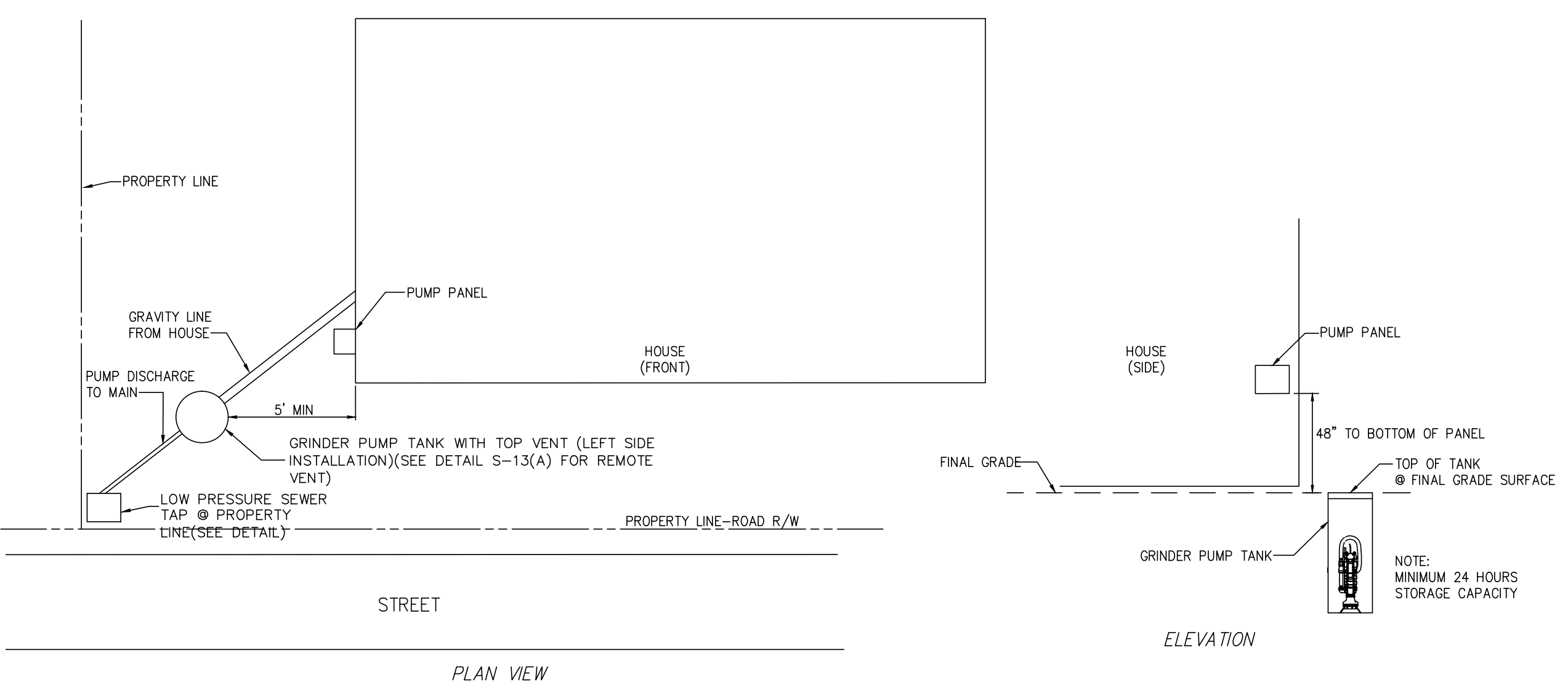
SANITARY SEWER TAPS & SERVICE LATERALS  
DETAIL S-11



REMOTE VENT DETAIL S-13(A)  
(FOR USE WHEN THE LID OF THE GRINDER TANK IS NOT AT LEAST TWO FEET ABOVE THE 100 YEAR WATER SURFACE ELEVATION)



LOW PRESSURE SEWER CONNECTION  
DETAIL S-12



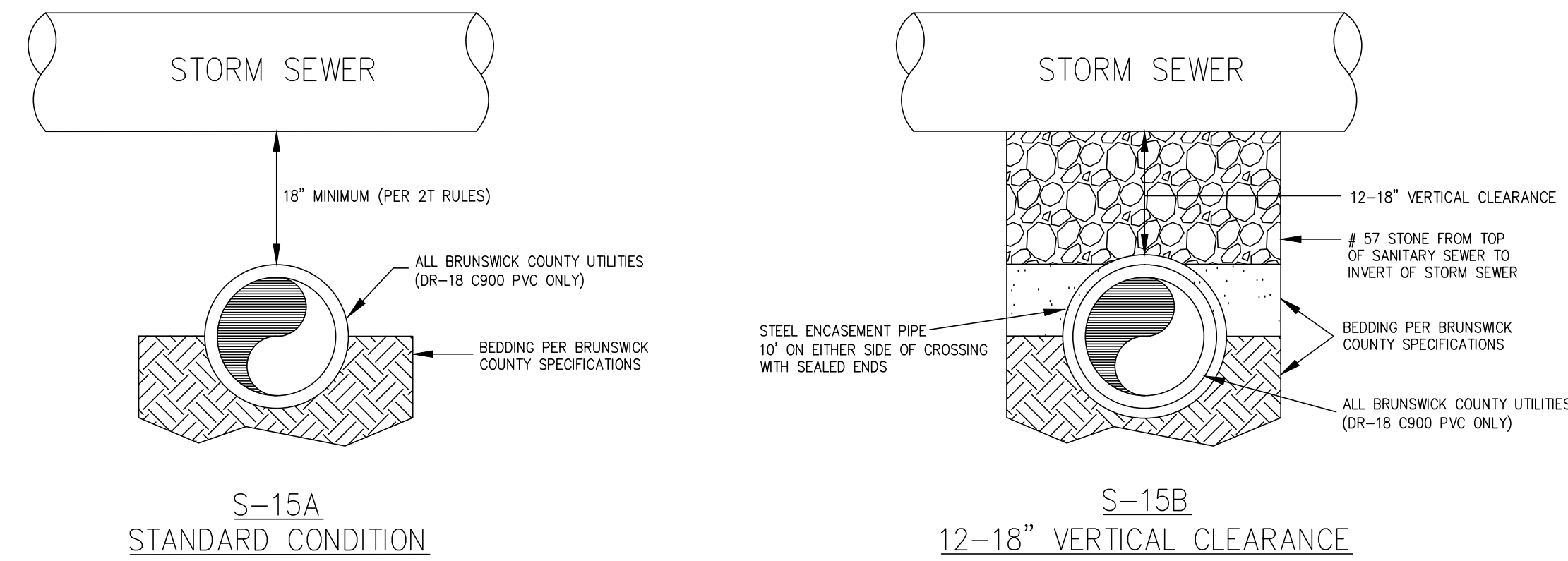
TYPICAL RESIDENTIAL GRINDER PUMP STATION LOCATION  
DETAIL S-13

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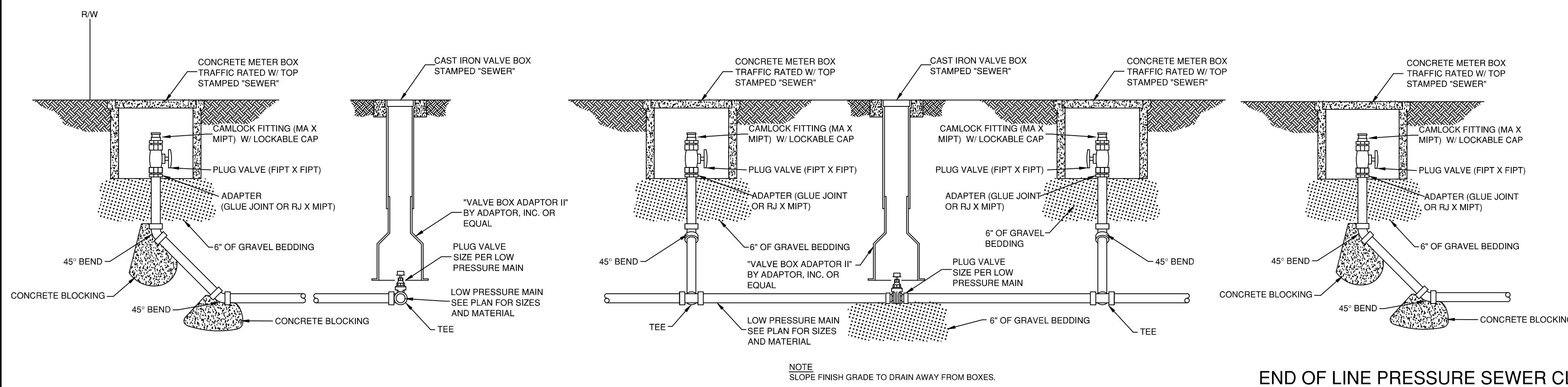
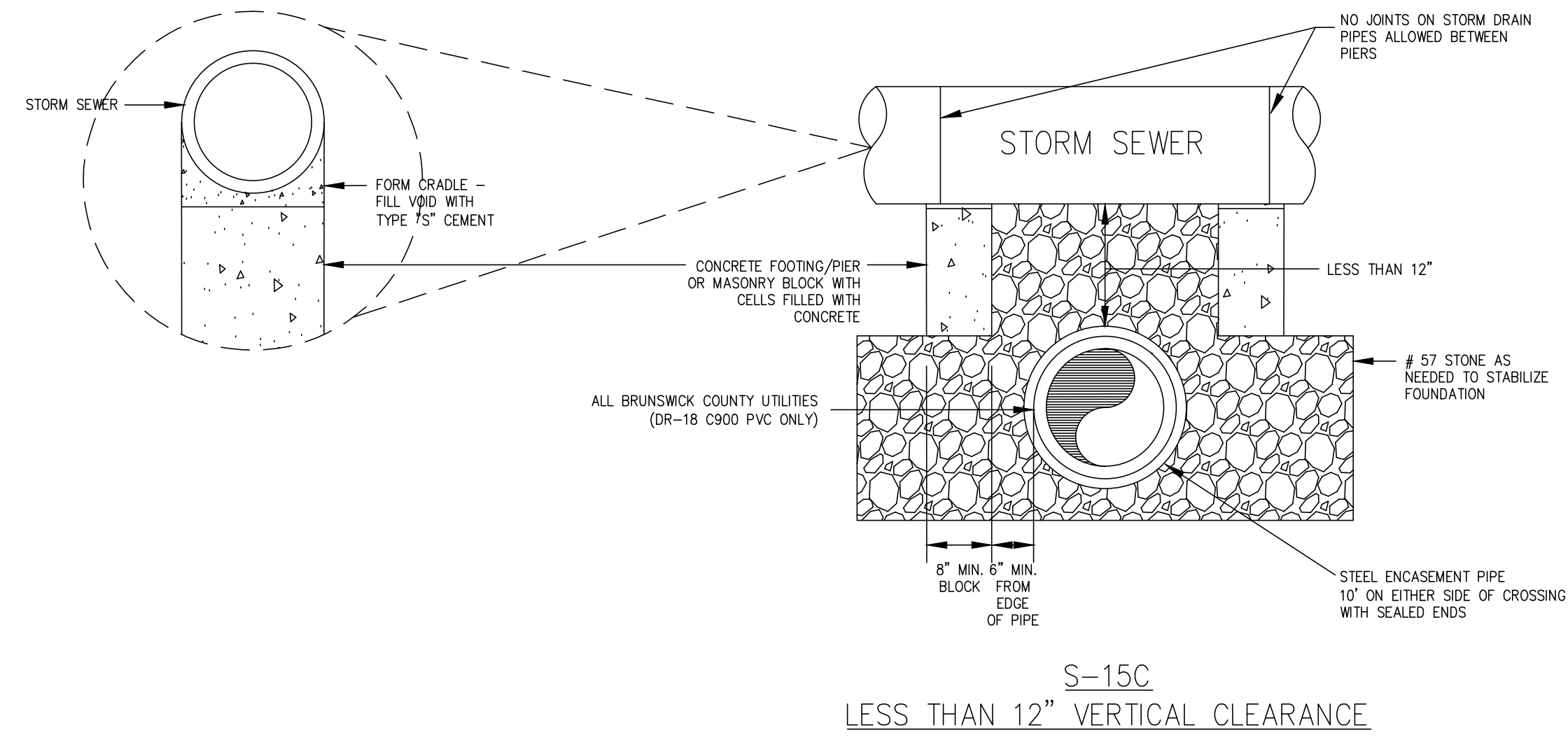
PROJECT REFERENCE NO.	SHEET NO.
BR-0160	UC-3B
DESIGNED BY: ARV	
DRAWN BY: ARV	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	UTILITY CONSTRUCTION PLANS ONLY

## UTILITY CONSTRUCTION

# PROJECT TYPICAL DETAILS

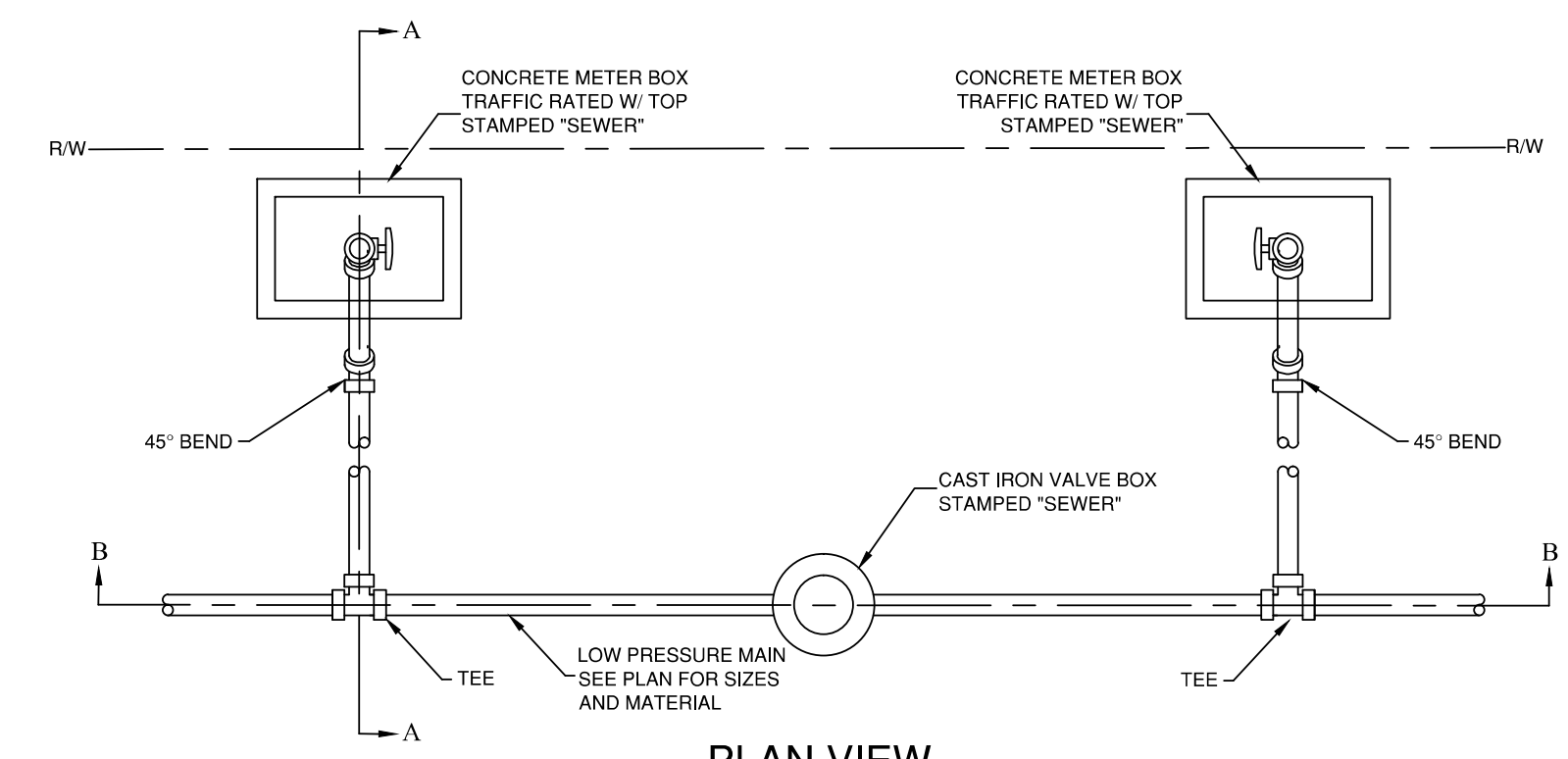


### GRAVITY SEWER CROSSING BELOW STORM SEWER DETAIL S-15



### IN-LINE PRESSURE SEWER CLEANOUT

### END OF LINE PRESSURE SEWER CLEANOUT



### LOW PRESSURE SEWER CLEANOUT DETAIL S-19

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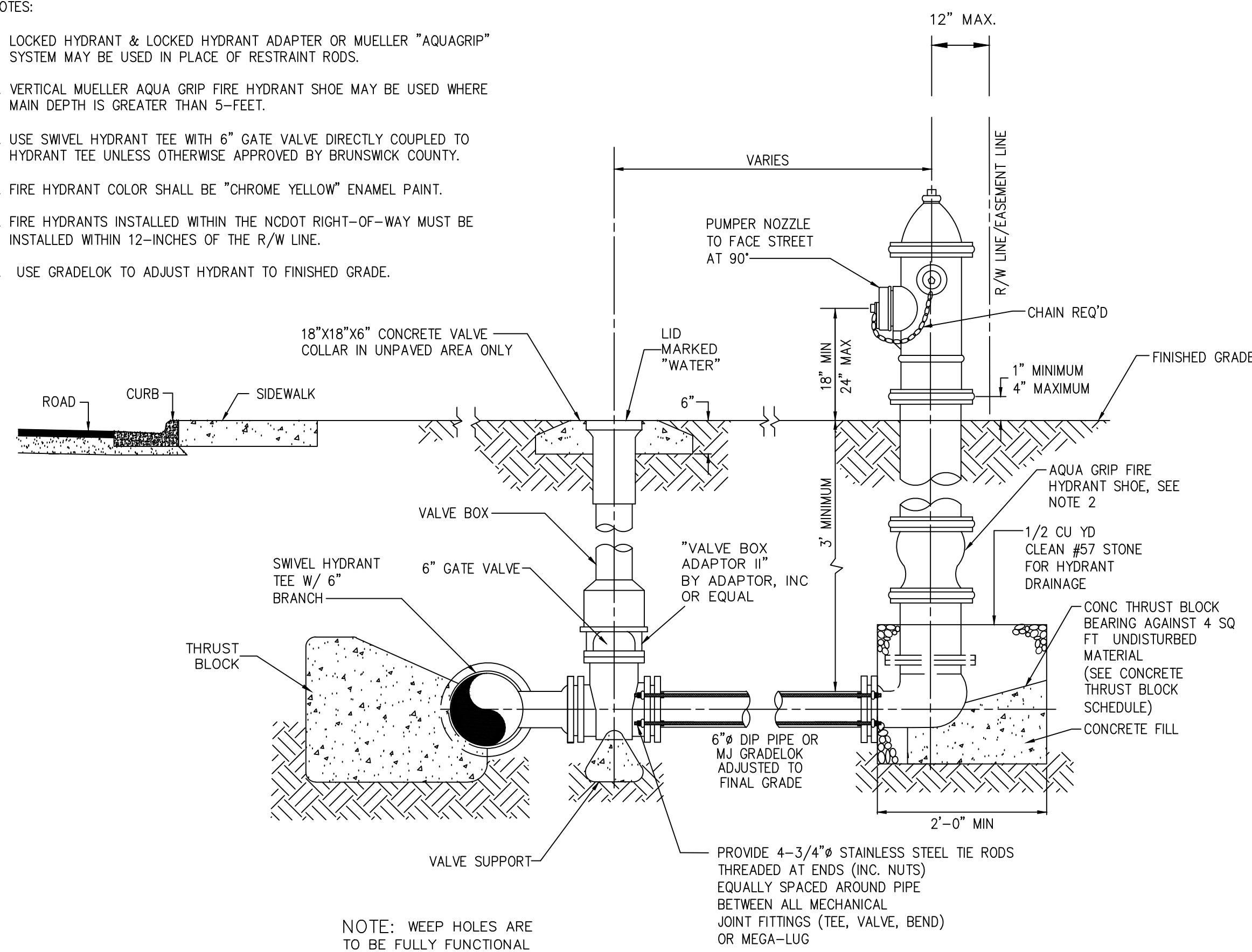
# PROJECT TYPICAL DETAILS

PROJECT REFERENCE NO.	SHEET NO.
BR-0160	UC-3C
DESIGNED BY: ARV	
DRAWN BY: ARV	
CHECKED BY: RLB	
APPROVED BY:	
REVISED BY:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

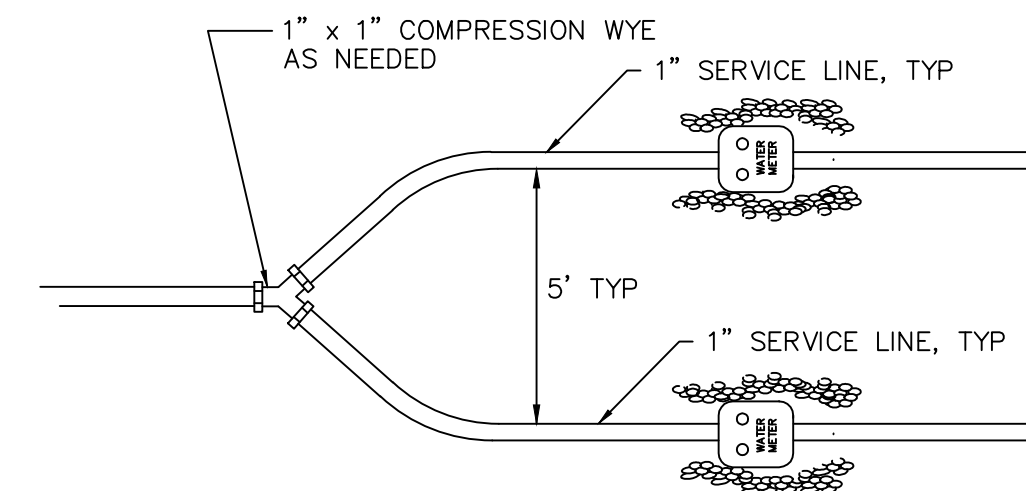
## UTILITY CONSTRUCTION

### NOTES:

1. LOCKED HYDRANT & LOCKED HYDRANT ADAPTER OR MUELLER "AQUAGRIP" SYSTEM MAY BE USED IN PLACE OF RESTRAINT RODS.
2. VERTICAL MUELLER AQUA GRIP FIRE HYDRANT SHOE MAY BE USED WHERE MAIN DEPTH IS GREATER THAN 5- FEET.
3. USE SWIVEL HYDRANT TEE WITH 6" GATE VALVE DIRECTLY COUPLED TO HYDRANT TEE UNLESS OTHERWISE APPROVED BY BRUNSWICK COUNTY.
4. FIRE HYDRANT COLOR SHALL BE "CHROME YELLOW" ENAMEL PAINT.
5. FIRE HYDRANTS INSTALLED WITHIN THE NCDOT RIGHT-OF-WAY MUST BE INSTALLED WITHIN 12-INCHES OF THE R/W LINE.
6. USE GRADELOK TO ADJUST HYDRANT TO FINISHED GRADE.



FIRE HYDRANT ON  
 MAINS 12" AND SMALLER  
 DETAIL W-1

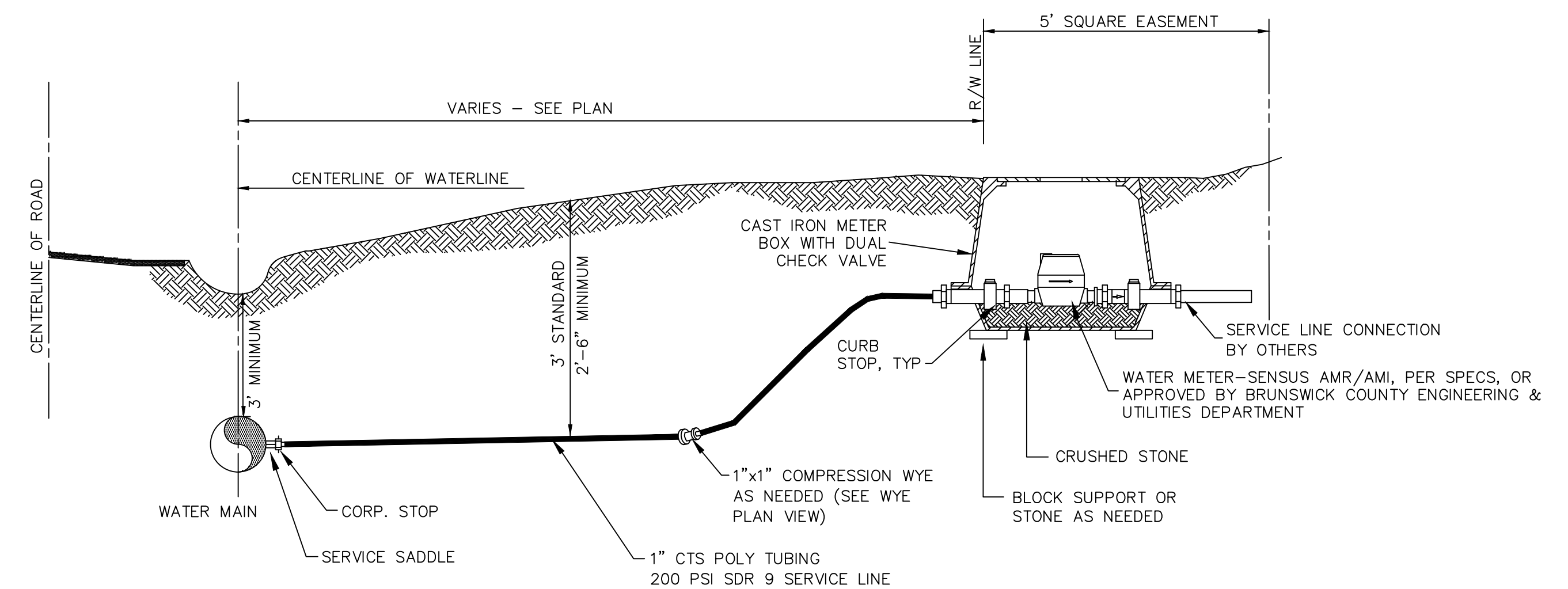


WYE PLAN VIEW FOR WATER/IRRIGATION SPLIT SERVICE  
 (IRRIGATION SERVICE INSTALLED AFTER MAIN METER)

APPROVED SINGLE METER BOXES FOR 3/4" METERS	
FORD	LYLV-141-243-TP-NL
MCDONALD	776-208-PC2G437
MUELLER	H-1462-K

\* OR APPROVED EQUAL

1. OR APPROVED EQUAL - MUST ACCOMMODATE SENSUS WATER METER WITH AMR/AMI
2. LID TO BE LOCKING TYPE



### NOTE:

- 1) CONTRACTOR SHALL PLACE METER BOX IN NON-TRAFFIC AREA AT LOCATION SPECIFIED BY BRUNSWICK COUNTY ENGINEERING DEPARTMENT.
- 2) METER BOXES SHALL BE CAST IRON WITH DUAL CHECK VALVES.
- 3) 1-1/2" AND 2" METERS WILL REQUIRE 2" CTS POLY TUBING.
- 4) 1, 1-1/2" AND 2" METERS WILL REQUIRE A METER BOX SIZED ADEQUATELY TO HOUSE A 1, 1-1/2" OR 2" SENSUS METER, HORIZONTAL BYPASS SETTER, AND MXU. ALL REQUIRED ITEMS TO BE PROVIDED BY INSTALLER.
- 5) 1, 1-1/2" AND 2" METER BOXES SHALL BE MARKED WATER AND HAVE A HOLE FOR INSTALLATION OF THE MXU AND TOUCH PAD TO BE PROVIDED BY INSTALLER.
- 6) NO PLASTIC BOXES FOR 1 1/2" AND 2" METERS. BOX MUST BE DUCTILE IRON OR QUAZITE.
- 7) ALL WATER SERVICE LATERALS SHALL HAVE A TRACER WIRE INSTALLED PER BRUNSWICK COUNTY WATER DISTRIBUTION TECHNICAL SPECIFICATIONS.

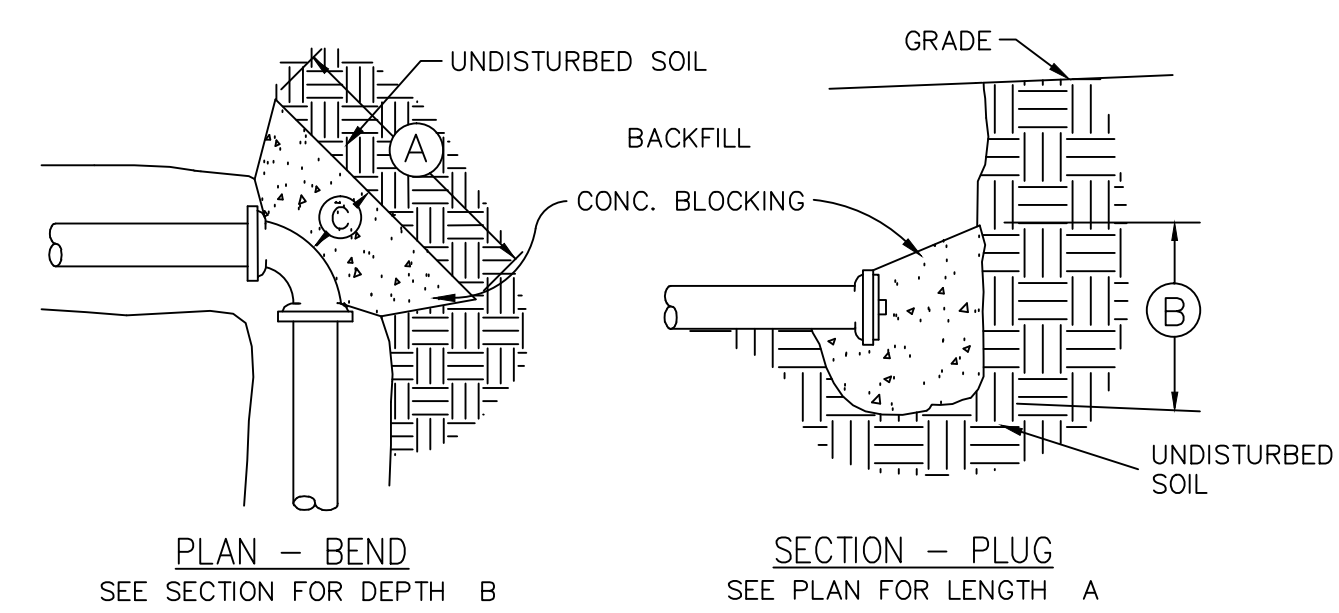
3/4" - 2" STANDARD WATER TAP  
 INSTALLATION  
 DETAIL W-6

(FOR METERS LARGER THAN 2", REFER TO DETAIL ON PAGE 3 OF 5)

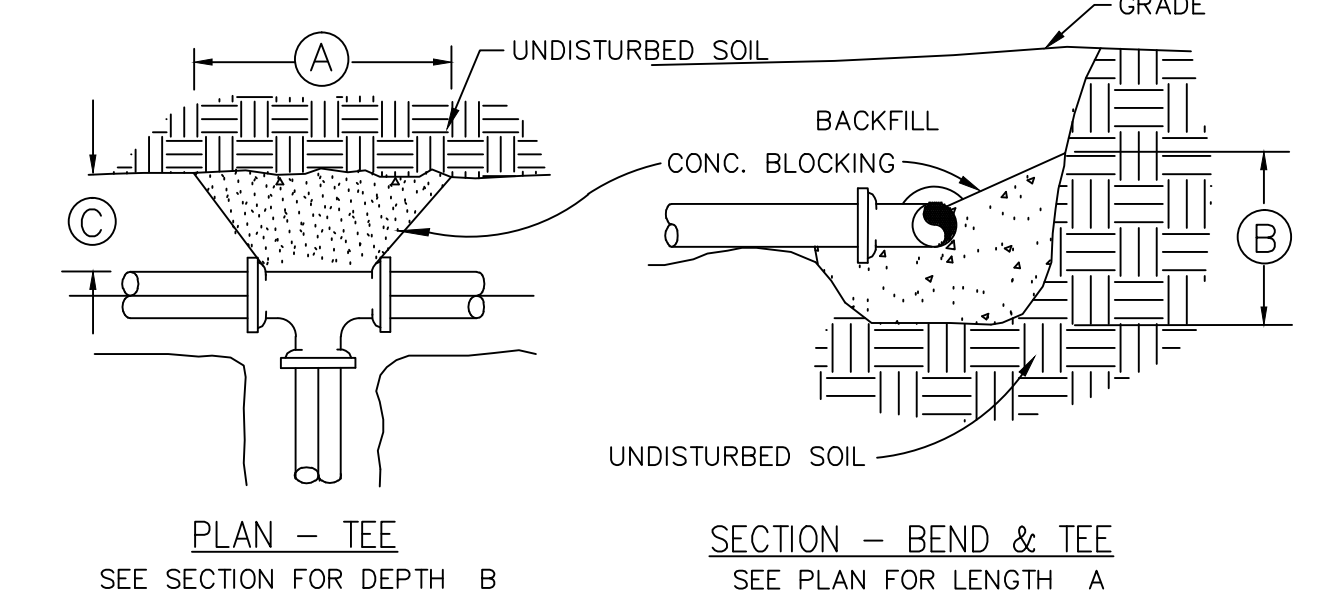
# PROJECT TYPICAL DETAILS

## UTILITY CONSTRUCTION

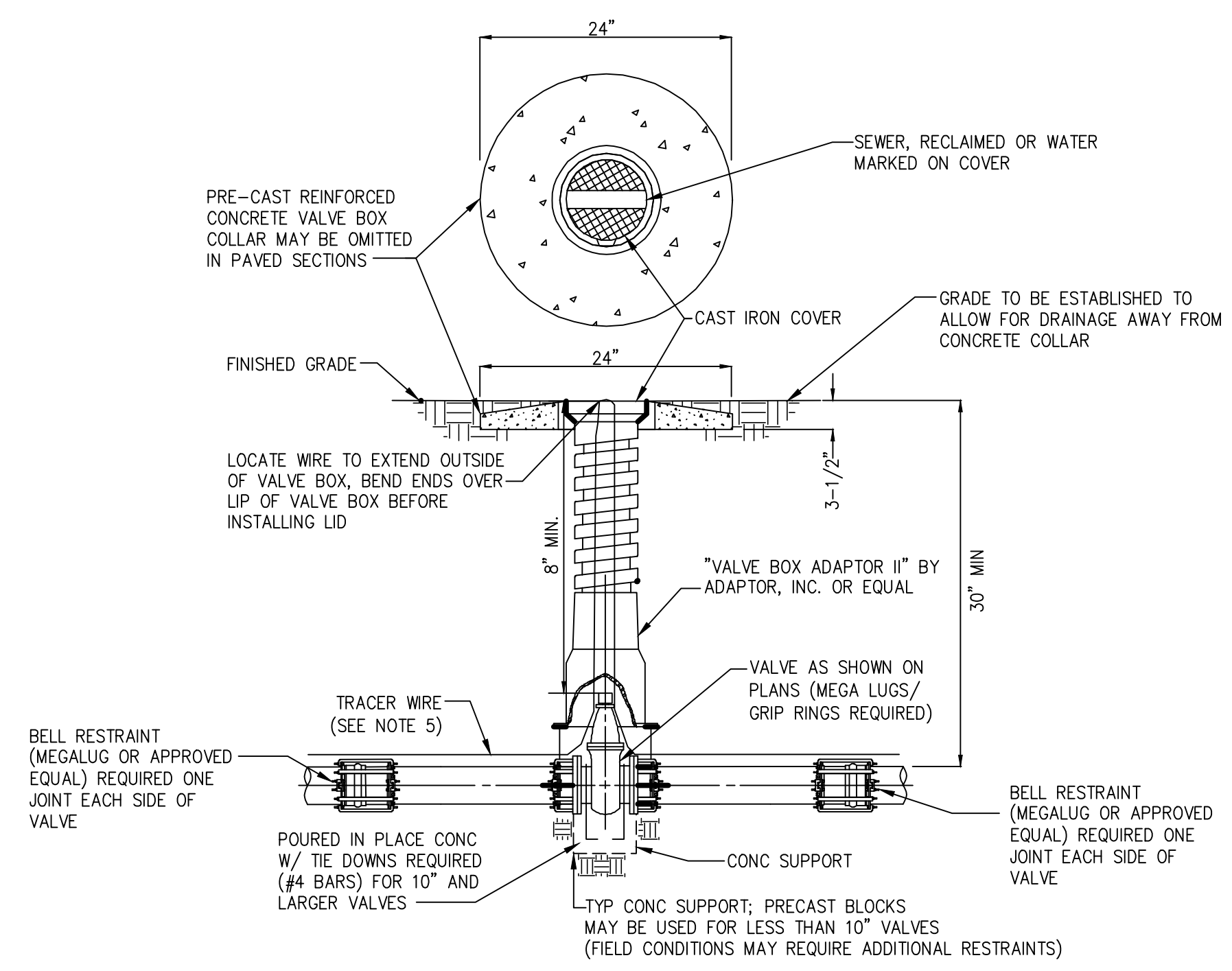
BLOCKING DIMENSIONS			
PIPE SIZE	(A)	(B)	(C)
UP TO 10"	4' - 0"	2' - 6"	1' - 6"
12" TO 16"	5' - 0"	4' - 0"	2' - 0"
18" TO 24"	8' - 0"	6' - 0"	3' - 0"



- NOTES:
- 2500 P.S.I. CONC.
  - REMOVE LOOSE EARTH AND POUR AGAINST UNDISTURBED SOIL.
  - BACKFILL TO EXISTING/FINISH GRADE AFTER CONCRETE HAS CURED FOR 24 HOURS.
  - CONCRETE SHALL NOT COVER FLANGES, BOLTS, MEGA-LUGS, RODS, ETC.

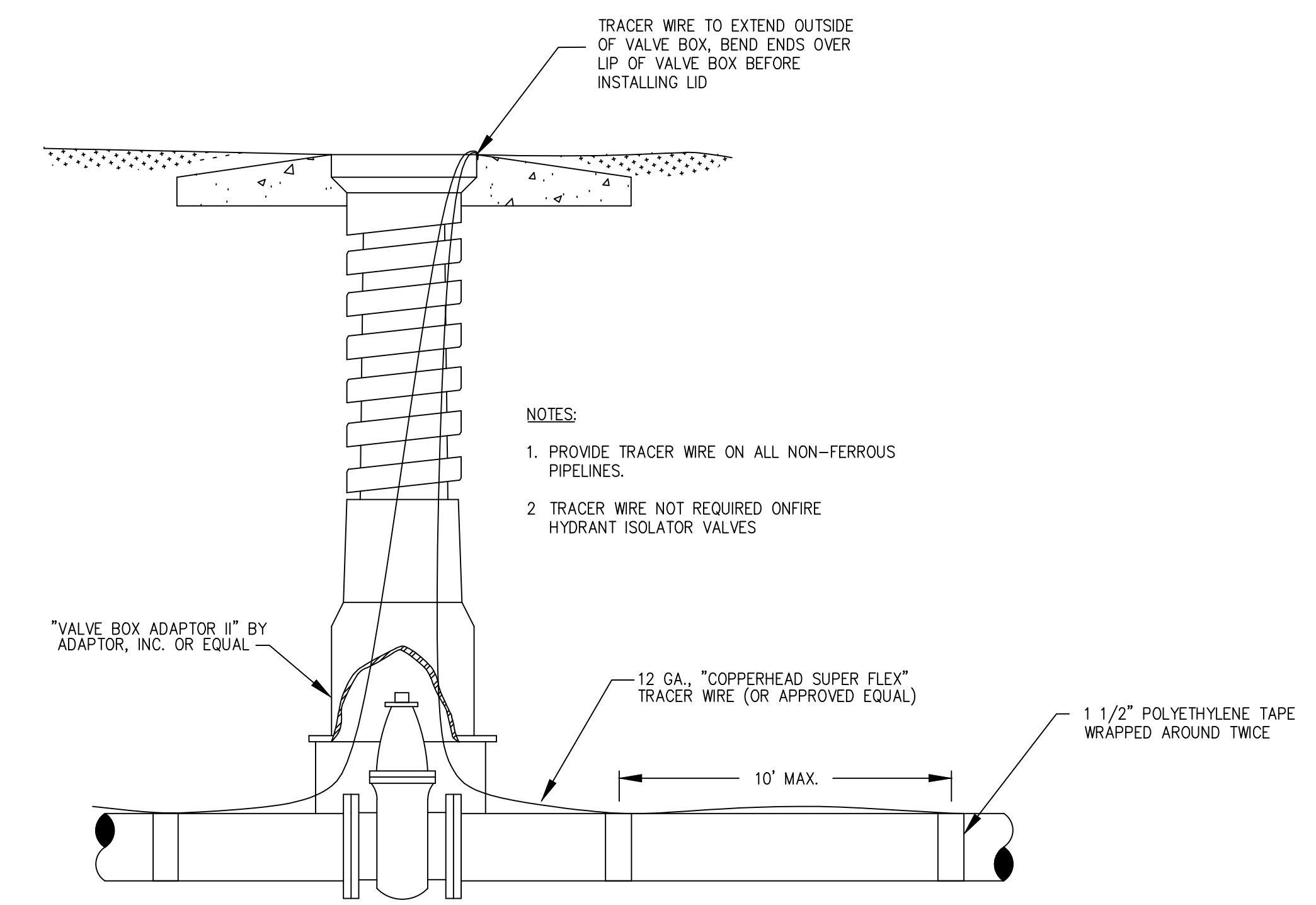


THRUST BLOCKS  
DETAIL W-12



- NOTES:
- TOP OF VALVE BOX AND COLLAR SHALL BE PAINTED GREEN FOR SEWER FM, PURPLE FOR RECLAIMED WATER, AND BLUE FOR WATER.
  - EXTENSION STEM WILL BE REQUIRED TO BE WITHIN 2 FEET OF THE SURFACE IF OPERATING NUT WOULD OTHERWISE BE OVER 5 FEET BELOW GRADE. EXTENSIONS SHALL BE PERMANENTLY ATTACHED TO VALVE NUT AND SHALL BE PROVIDED WITH HORIZONTAL SPACERS FOR VERTICAL ALIGNMENT WITHIN THE VALVE BOX.
  - MINIMUM CLEARANCE TO EXTENSION IS 8".
  - WIRE COLORS REQUIRED: SEWER-GREEN/WATER-BLUE/RECLAIMED WATER-PURPLE OR GREEN WITH PURPLE STRIPE
  - 12 GA. COPPERHEAD SUPER FLEX TRACER WIRE OR APPROVED EQUAL.

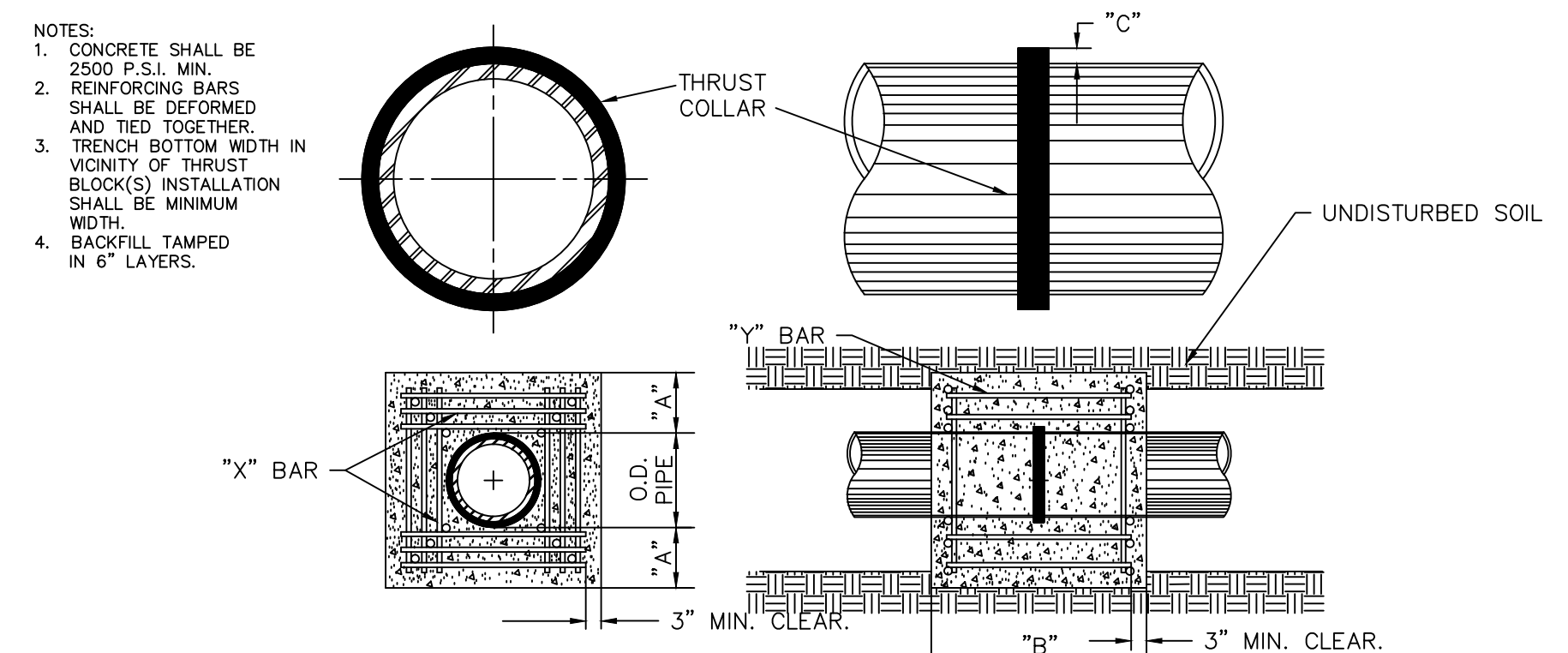
VALVE BOX  
DETAIL WS-9



- NOTES:
- PROVIDE TRACER WIRE ON ALL NON-FERROUS PIPELINES.
  - TRACER WIRE NOT REQUIRED ON FIRE HYDRANT ISOLATOR VALVES

TRACER WIRE AT VALVES  
DETAIL WS-13

- NOTE:
- WIRE COLOR REQUIRED
  - SEWER-GREEN
  - WATER-BLUE
  - RECLAIMED WATER-PURPLE OR GREEN WITH PURPLE STRIPE



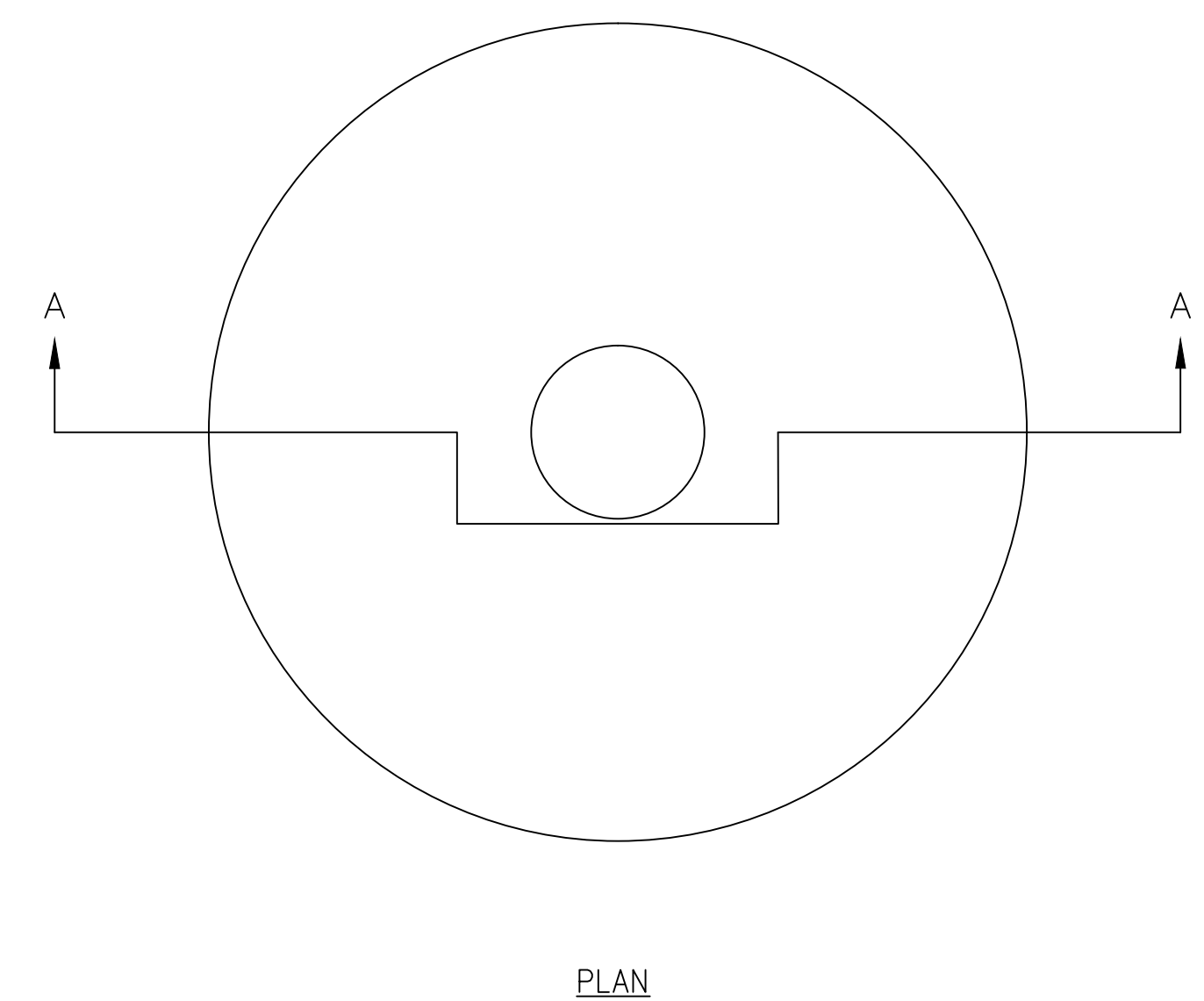
REINFORCING REQUIREMENTS

REINFORCING BAR SCHEDULE						
I.D. PIPE	REBAR SIZE	"X" BAR LENGTH	"X" BAR WGT.	"Y" BAR LENGTH	"Y" BAR WGT.	NO. REQD.
6"-36"	#5	2'-2"+O.D. PIPE	1.043 LBS./FT	1'-1"	1.1 LBS. EA.	X-24,Y-12
48"	#6	3'-0"+O.D. PIPE	1.502 LBS./FT	1'-3"	1.9 LBS. EA.	X-24,Y-12

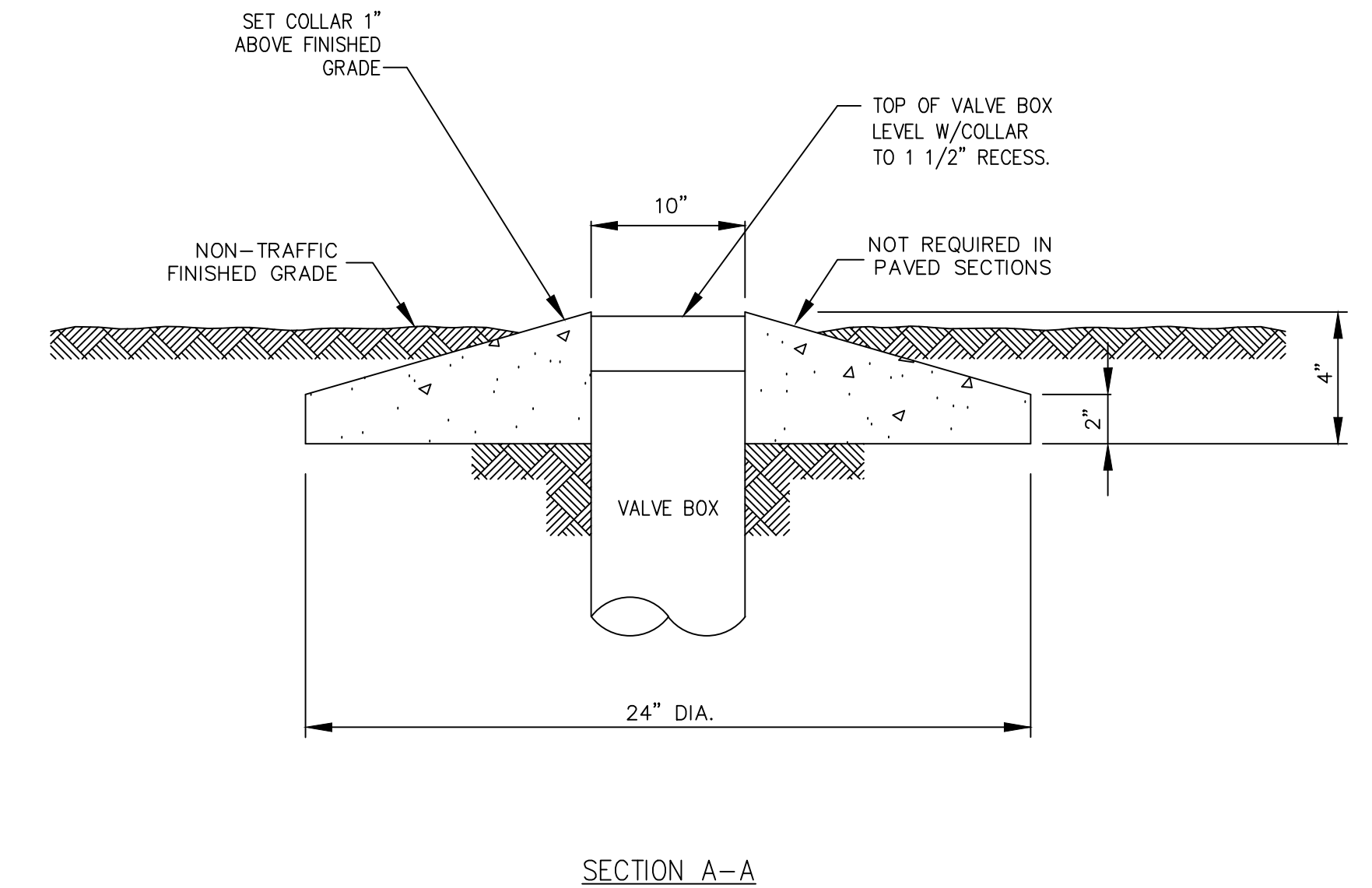
  

REINFORCING BAR SCHEDULE					
I.D. PIPE	"A"	"B"	"C" - 6"-16", 20"-24", 30"-36", 48"		
6"-36"	1'-4"	1'-7"	2"	3"	4"
48"	1'-8"	1'-9"			6"

THRUST COLLAR FOR WATER MAINS  
DETAIL W-13



PLAN



SECTION A-A

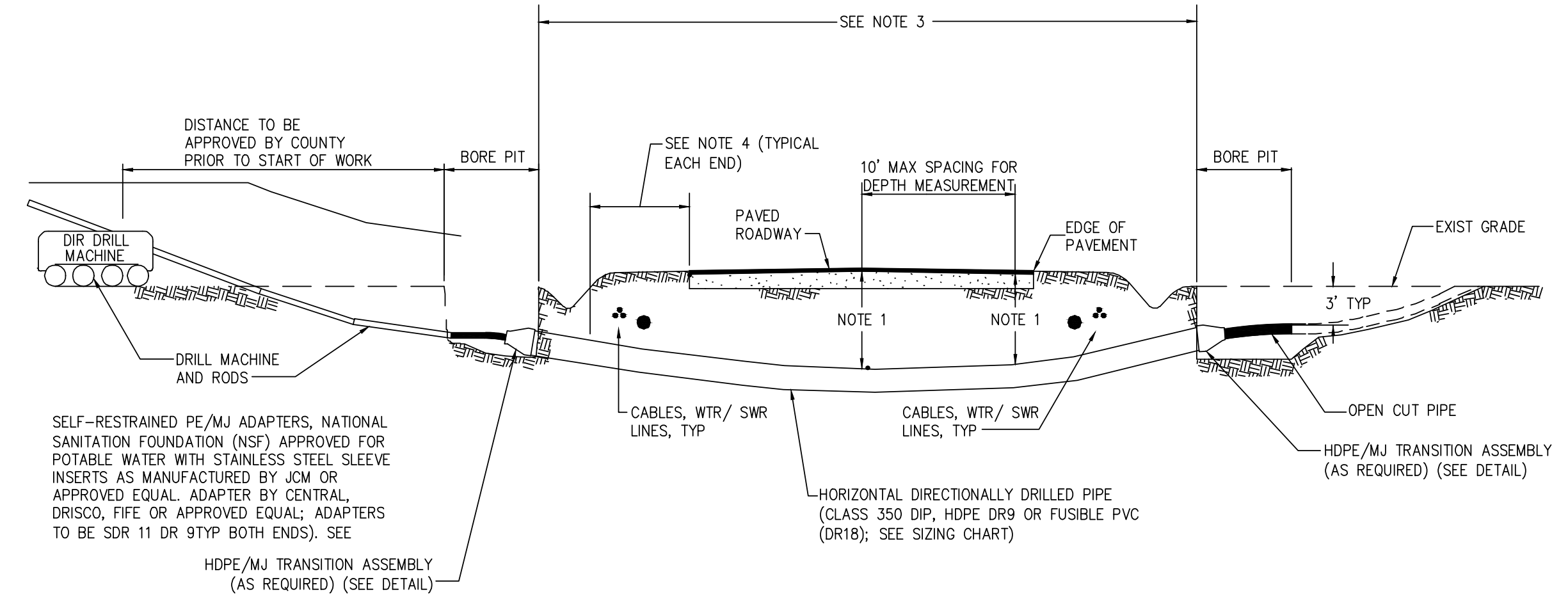
PRECAST CONCRETE VALVE BOX COLLAR  
DETAIL WS-16

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5/14/99

# PROJECT TYPICAL DETAILS

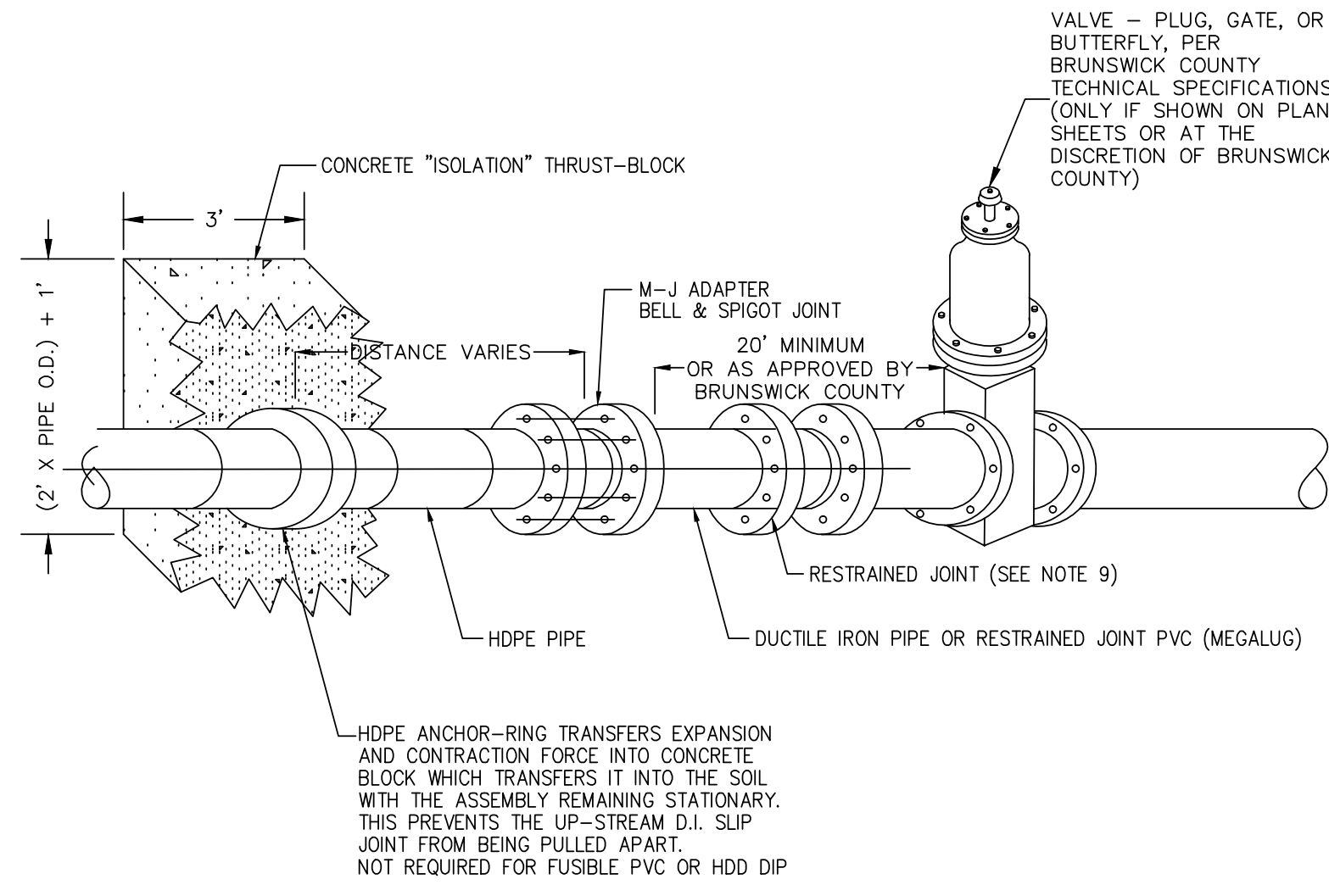
PROJECT REFERENCE NO.	SHEET NO.
BR-0160	UC-3E
DESIGNED BY: ARV	
DRAWN BY: ARV	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151 UTILITY CONSTRUCTION PLANS ONLY	



NOMINAL OPEN CUT PIPE SIZE (INCHES)	NOMINAL HDPE DR9 HDD PIPE SIZE (INCHES)
3	3
4	6
6	8
8	10
10	12
12	16
14	18
16	20
18	24
20	24
24	30
30	36

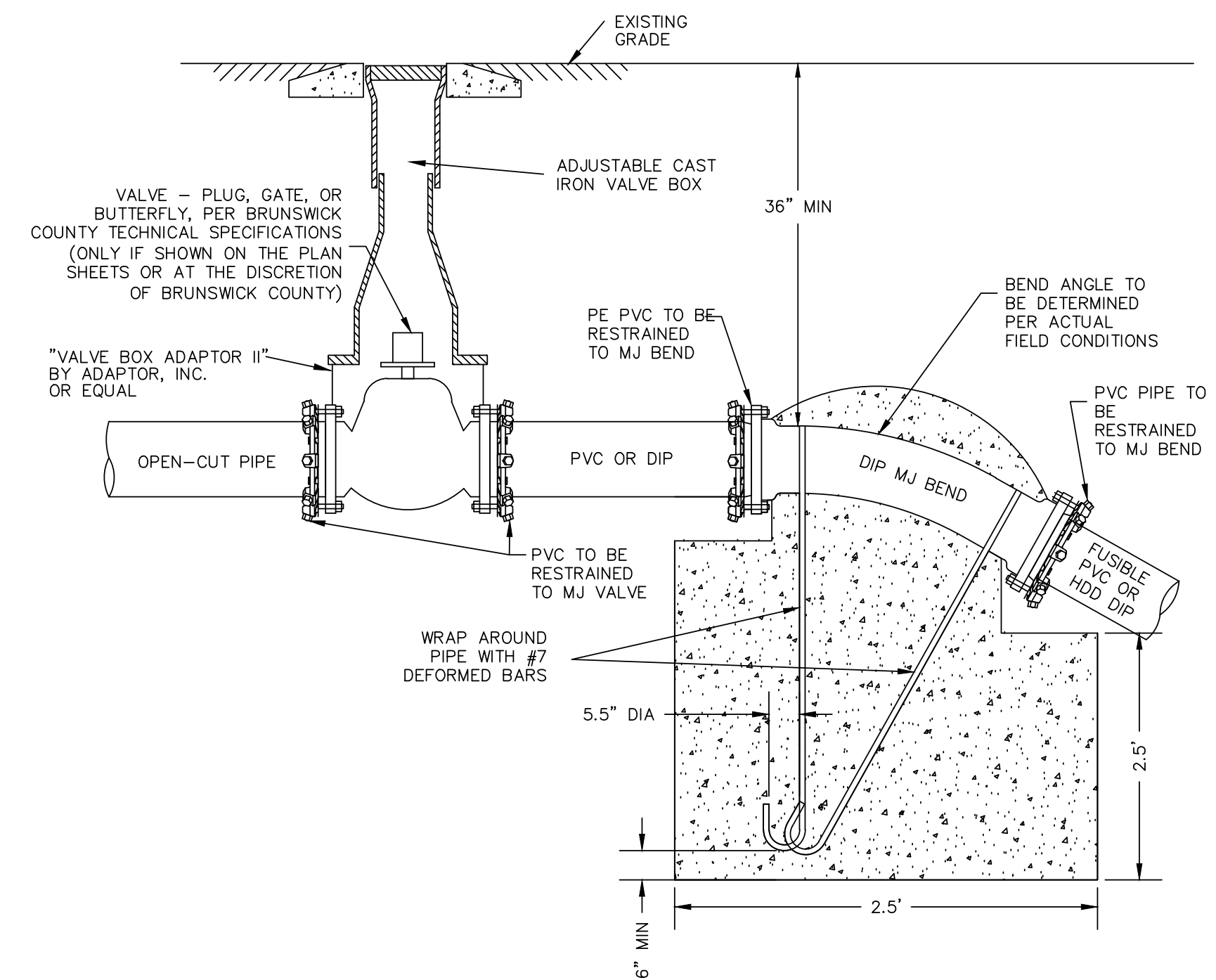
- NOTES:
- AN AS-BUILT PLAN AND PROFILE SHALL BE PROVIDED FROM ENTRY TO EXIT FOR EACH DIRECTIONAL BORE SECTION BY THE DIRECTIONAL BORE CONTRACTOR. THIS SHALL INCLUDE ACCURATE HORIZONTAL AND VERTICAL DIMENSIONS AND SHALL MEET OR EXCEED NCDOT VERTICAL REQUIREMENTS FROM HDD PIPE TO EDGE OF PAVEMENT.
  - ALL BORE SECTIONS SHALL BE HYDROSTATICALLY TESTED PER COUNTY STANDARDS AFTER INSTALLATION, AND PRIOR TO CONNECTION TO THE OPEN CUT WATER/SEWER LINE. A FINAL TEST WILL BE A PART OF THE TOTAL MAIN LINE SYSTEM TEST.
  - LENGTH OF CROSSING, LOCATION OF INSPECTION/OBSERVATION EXCAVATION, NUMBER OF HDD PIPE JOINTS, LOCATION OF DRILL MACHINE, AUGER ENTRANCE LOCATION AND TIE-IN POINTS ARE TO BE APPROVED BY COUNTY PRIOR TO ANY START OF WORK.
  - ON CONVENTIONAL HIGHWAYS, AS A MINIMUM, THE HDD PIPE SHALL EXTEND TO THE SHOULDER BREAK OR 10 FEET BEYOND THE EDGE OF PAVEMENT ON FILL SLOPES, WHICHEVER IS GREATER; 3 FEET BEYOND THE DITCH LINE IN CUTS; AND ON CURBED SECTIONS TO THE BACK OF THE SIDEWALK AREA. ON FREEWAYS, EXPRESSWAYS, AND OTHER CONTROLLED ACCESS HIGHWAYS, THE HDD PIPE WILL BE REQUIRED TO EXTEND TO THE ACCESS CONTROL LINES, TO THE OUTSIDE OF FRONTAGE ROADS, OR A SUFFICIENT DISTANCE TO ALLOW FOR FUTURE HIGHWAY IMPROVEMENTS, OR AS REQUIRED BY THE NCDOT ENCROACHMENT AGREEMENT.
  - THE BORE DEVELOPED FOR THE DIRECTIONALLY DRILLED PIPE SHALL BE KEPT AT A MINIMUM DIAMETER FOR THE PIPE INSTALLATION. THE AUGER HEAD SIZE SHALL BE APPROVED BY THE COUNTY PRIOR TO THE START OF WORK.
  - HORIZONTAL DIRECTIONAL DRILL OF NCDOT STATE ROADS TO BE APPROVED BY NCDOT PRIOR TO CONSTRUCTION. PIPE MATERIAL AND THICKNESS MAY VARY.
  - THE CONTRACTOR SHALL ALLOW SUFFICIENT LENGTHS OF PIPE TO EXTEND PAST THE TERMINATION POINT TO ALLOW FOR CONTRACTION. PULLED HDD PIPE SHALL BE ALLOWED TO RELAX A MINIMUM OF (48) HOURS OR THE AMOUNT OF TIME RECOMMENDED BY THE MANUFACTURER PRIOR TO INITIAL PRESSURE TEST AND MAKING CONNECTIONS.
  - FUSIBLE PVC HAS BEEN APPROVED FOR USE WITHIN NCDOT RIGHT-OF-WAYS.
  - MINIMUM OF (3) RESTRAINED JOINTS ARE REQUIRED UPSTREAM AND DOWNSTREAM OF DIP/HDPE/FUSIBLE PVC MJ ADAPTER ON EACH END OF THE HORIZONTAL DIRECTIONALLY DRILLED PIPE UNLESS OTHERWISE APPROVED BY BRUNSWICK COUNTY.
  - DIP NOT ALLOWED IN SEWER APPLICATION WITHOUT WRITTEN PERMISSION FROM BRUNSWICK COUNTY.

HDPE/MJ TRANSITION ASSEMBLY WS-4A



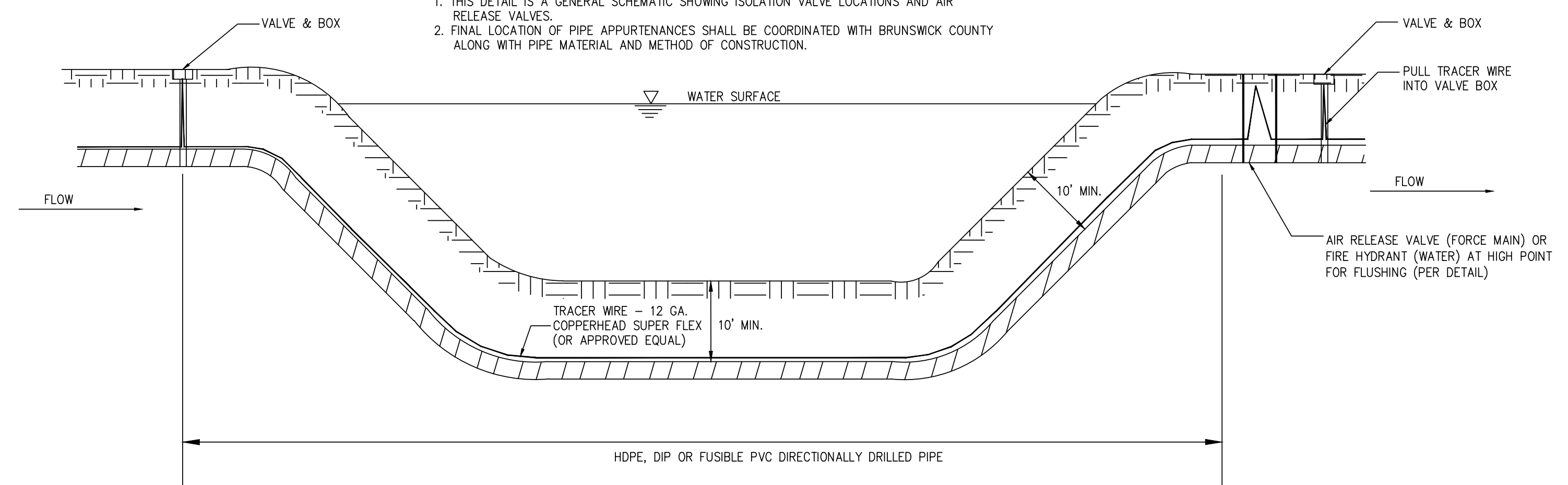
HDPE/MJ TRANSITION ASSEMBLY WS-4B

## DIRECTIONAL DRILL DETAIL WS-4



OPEN-CUT PIPE TO FUSIBLE PVC OR HDD DIP TRANSITION ASSEMBLY WS-4C

- NOTES:
- THIS DETAIL IS A GENERAL SCHEMATIC SHOWING ISOLATION VALVE LOCATIONS AND AIR RELEASE VALVES.
  - FINAL LOCATION OF PIPE APPURTENANCES SHALL BE COORDINATED WITH BRUNSWICK COUNTY ALONG WITH PIPE MATERIAL AND METHOD OF CONSTRUCTION.



VALVE LOCATIONS FOR DIRECTIONAL DRILL OF PIPE UNDER WETLANDS/WATER BODY DETAIL WS-5

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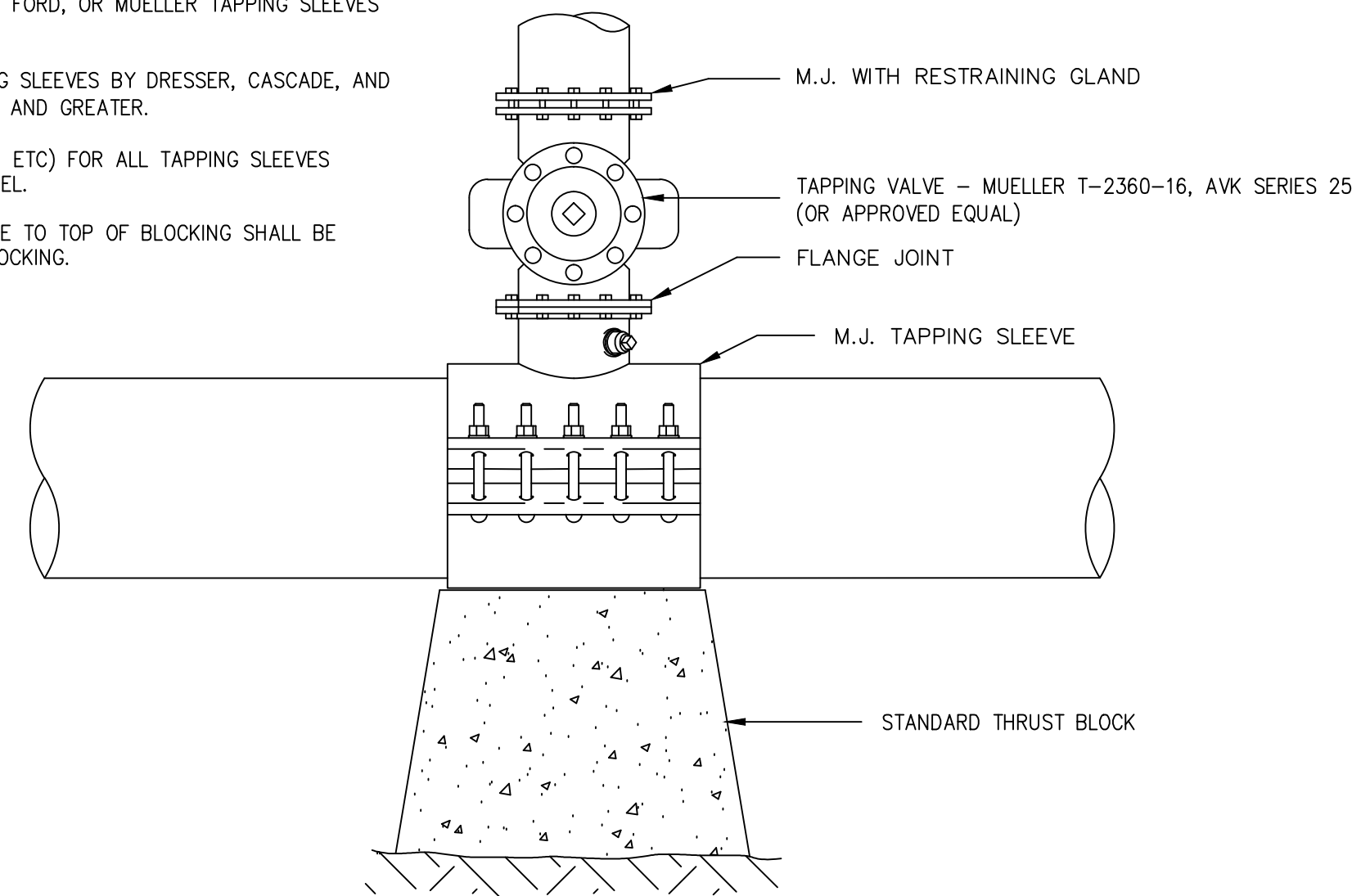
# PROJECT TYPICAL DETAILS

PROJECT REFERENCE NO. <i>BR-0160</i>	SHEET NO. <b>UC-3F</b>
DESIGNED BY: <i>ARV</i>	
DRAWN BY: <i>ARV</i>	
CHECKED BY: <i>RLB</i>	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

## UTILITY CONSTRUCTION

**NOTES:**

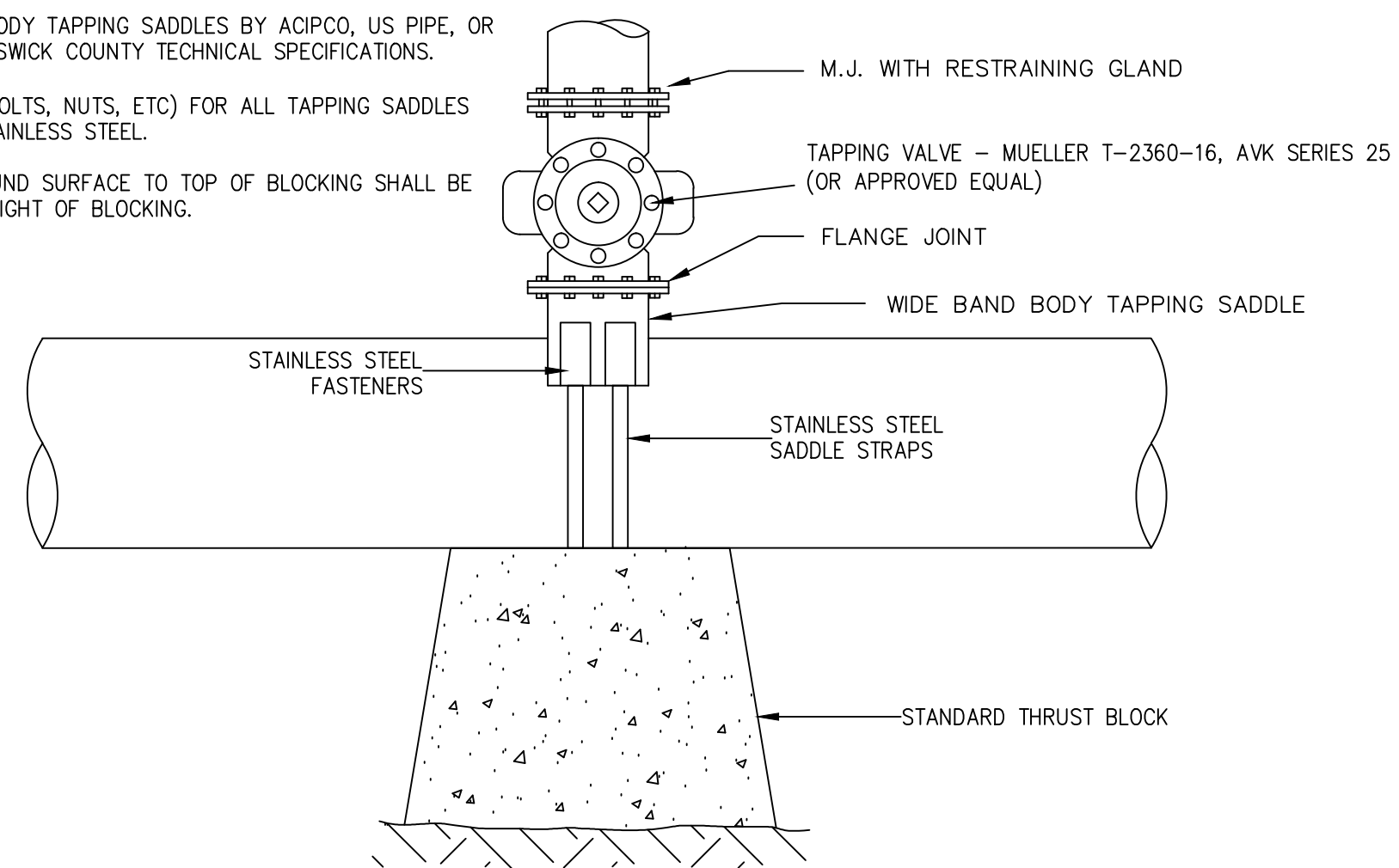
- TAPPING SADDLES ARE NOT ALLOWED WHEN CONNECTING MAIN DIAMETER IS 50% OR LARGER THAN EXISTING MAIN TO BE TAPPED.
- USE STAINLESS STEEL ROMAC, FORD, OR MUELLER TAPPING SLEEVES FOR TAP SIZES 4" - 24".
- USE STAINLESS STEEL TAPPING SLEEVES BY DRESSER, CASCADE, AND JCM FOR TAPS ON MAINS 30" AND GREATER.
- ALL HARDWARE (BOLTS, NUTS, ETC) FOR ALL TAPPING SLEEVES SHALL BE 304 STAINLESS STEEL.
- DEPTH FROM GROUND SURFACE TO TOP OF BLOCKING SHALL BE GREATER THAN HEIGHT OF BLOCKING.



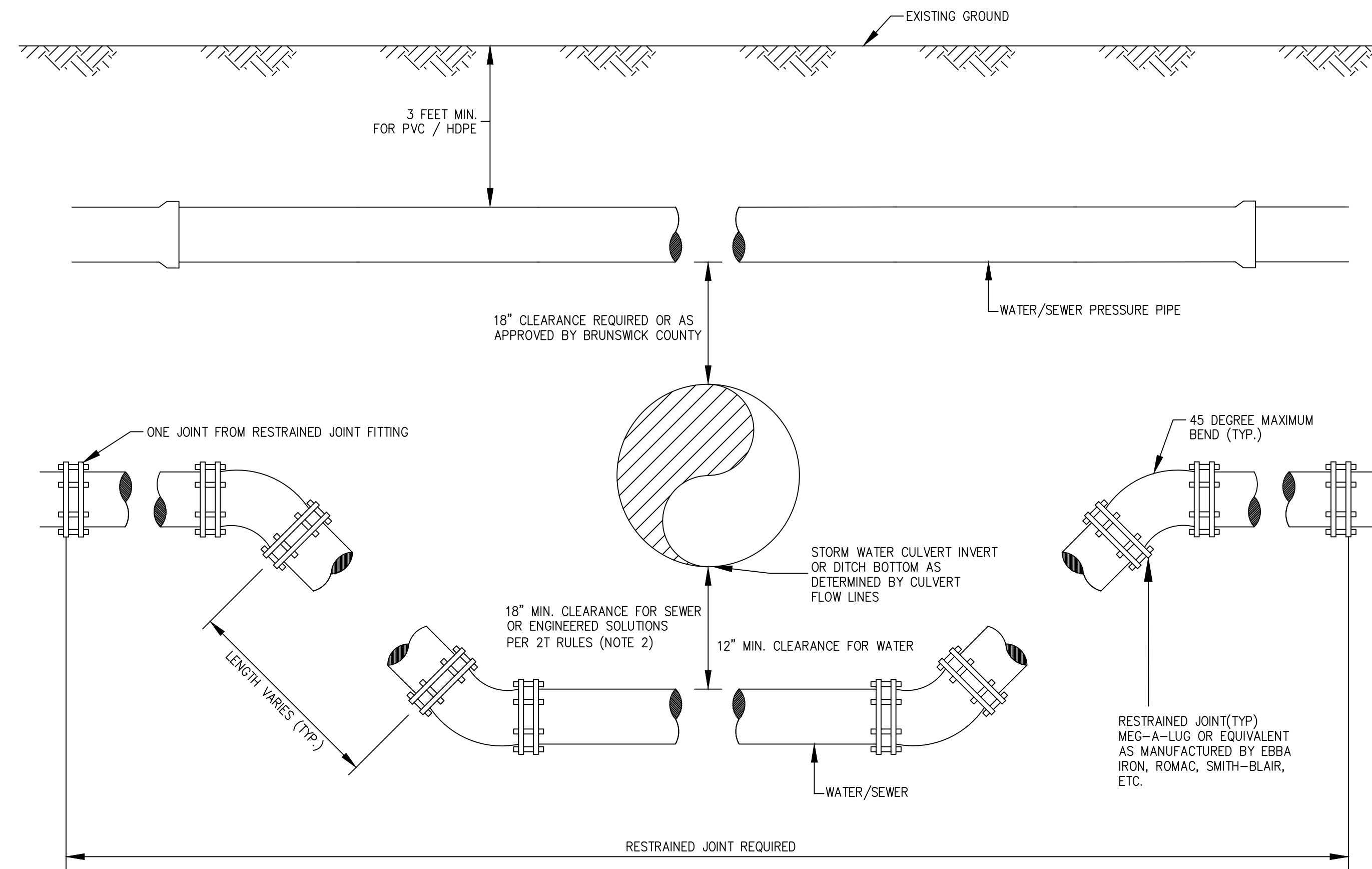
TAPPING SLEEVE & VALVE ASSEMBLY  
DETAIL WS-18

**NOTES:**

- TAPPING SADDLES ARE NOT ALLOWED WHEN CONNECTING MAIN DIAMETER IS 50% OR LARGER THAN EXISTING MAIN TO BE TAPPED.
- USE WIDE BAND BODY TAPPING SADDLES BY ACIPCO, US PIPE, OR EQUAL, PER BRUNSWICK COUNTY TECHNICAL SPECIFICATIONS.
- ALL HARDWARE (BOLTS, NUTS, ETC) FOR ALL TAPPING SADDLES SHALL BE 304 STAINLESS STEEL.
- DEPTH FROM GROUND SURFACE TO TOP OF BLOCKING SHALL BE GREATER THAN HEIGHT OF BLOCKING.



TAPPING SADDLES & VALVE ASSEMBLY  
DETAIL WS-19



**NOTES:**

- USE STAINLESS STEEL THREADED RODS, MEGA-LUG OR APPROVED EQUAL FOR JOINT RESTRAINT.
- SEWER REQUIRES DR-18 C900 UNLESS OTHERWISE APPROVED BY BRUNSWICK COUNTY.
- WATER MAY BE DIP OR DR-18 C900 PIPE.

DITCH AND/OR STORM DRAIN CROSSING  
OFFSETS BETWEEN WATER/SEWER  
PRESSURE MAIN AND STORM DRAIN  
DETAIL WS-20

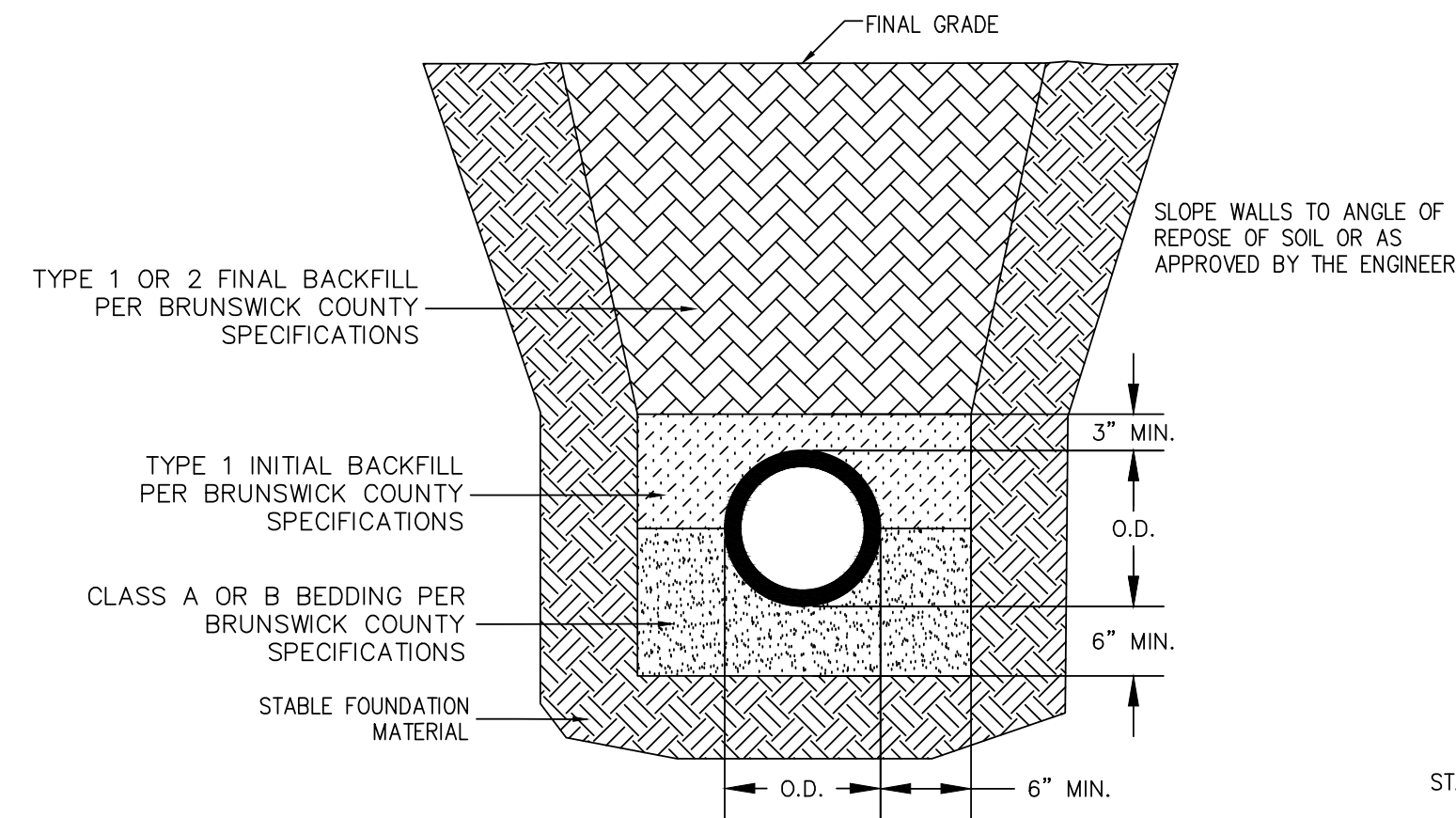
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# PROJECT TYPICAL DETAILS

PROJECT REFERENCE NO.	SHEET NO.
BR-0160	UC-3G
DESIGNED BY: ARV	
DRAWN BY: ARV	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

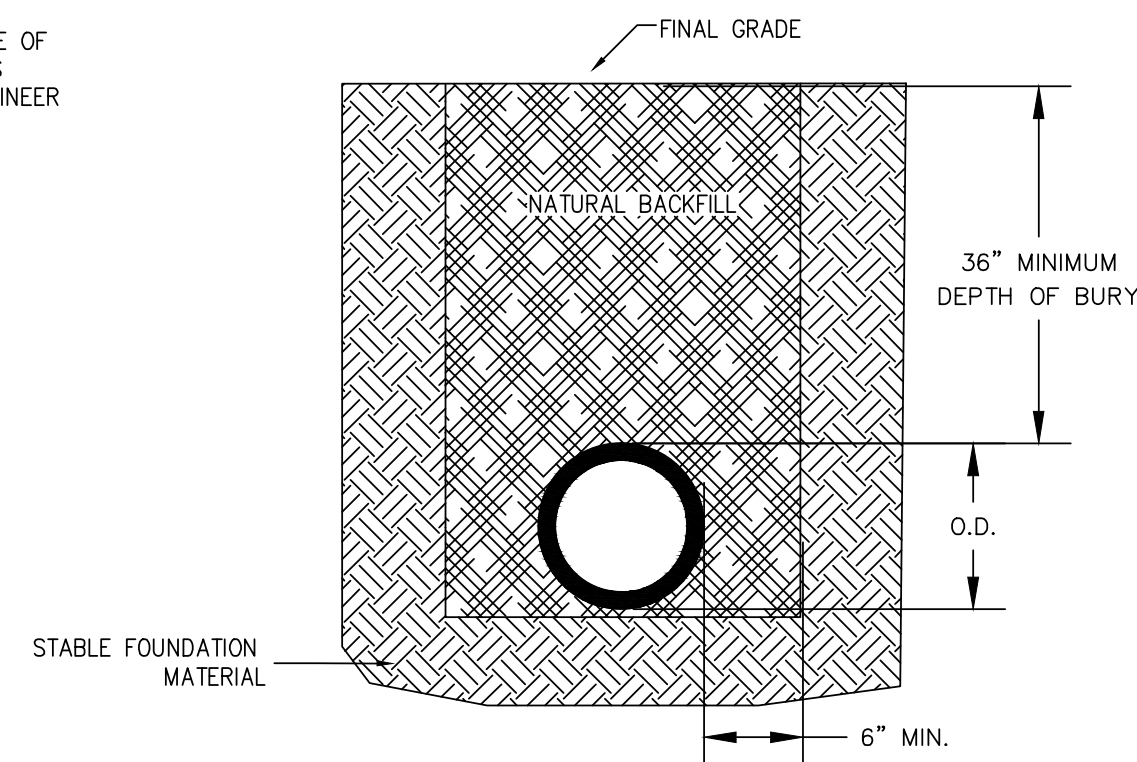
## UTILITY CONSTRUCTION

- DEPTH < 20 FEET - CLASS "A" BEDDING
- UNDERCUT TRENCH BOTTOM 6 INCHES MINIMUM BELOW PIPE
  - FILL PIPE TO SPRING LINE WITH NO. 57 STONE
- DEPTH > 20 FEET - CLASS "B" BEDDING
- UNDERCUT TRENCH BOTTOM 6 INCHES MINIMUM BELOW PIPE
  - FILL TO 6 INCHES ABOVE PIPE WITH NO. 57 STONE
- INSTALLATIONS THAT EXCEED 20 FEET DEPTH SHALL BE DR-18 C900 MINIMUM OR PER MANUFACTURERS RECOMMENDATIONS

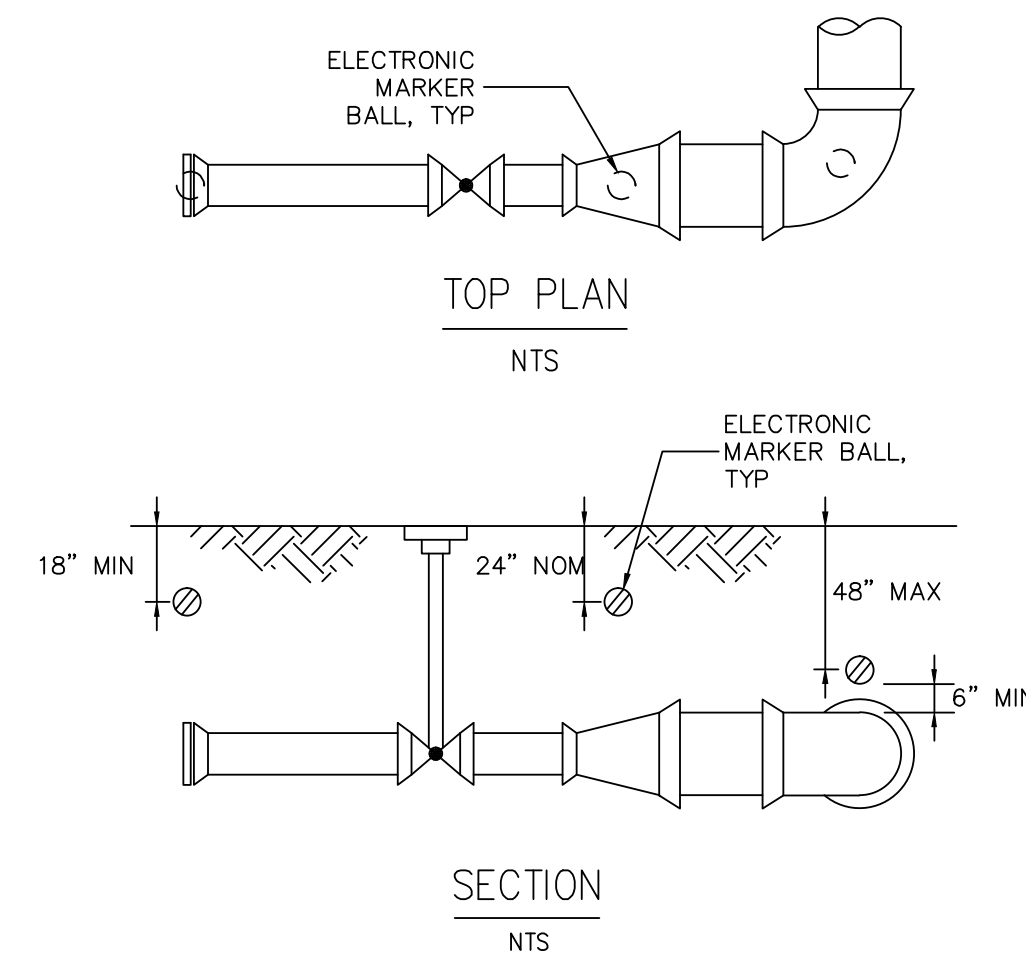


- NOTES:
1. REFER TO THE BRUNSWICK COUNTY TECHNICAL SPECIFICATIONS FOR BACKFILL AND TRENCHING REQUIREMENTS
  2. PIPE SIZE AS INDICATED ON PLANS

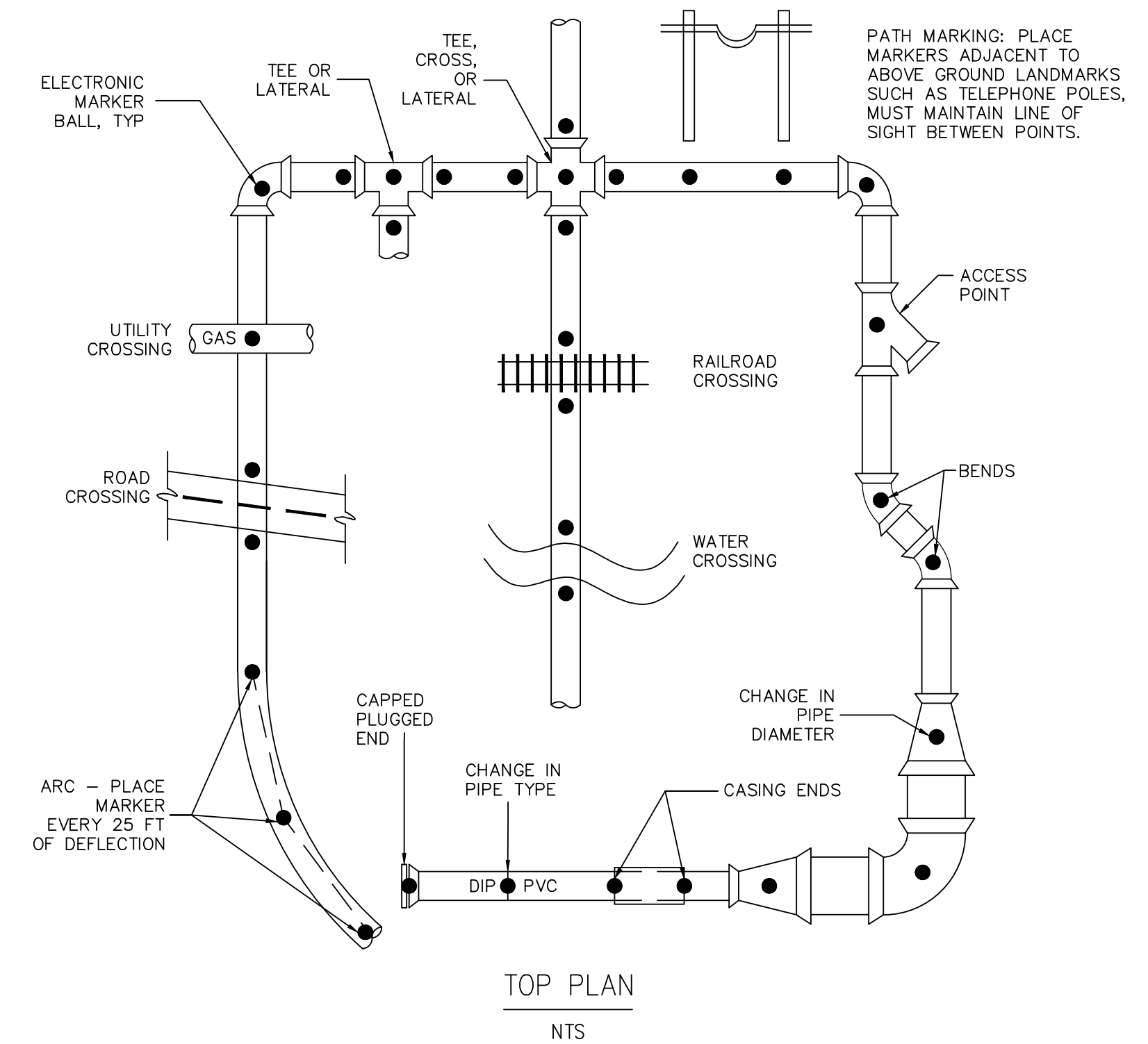
GRAVITY SEWER  
PIPE TRENCH/BEDDING DETAIL  
DETAIL WS-22



WATERMAIN AND/OR SEWER FORCEMAIN (PRESSURE PIPE)  
PIPE TRENCH/BEDDING DETAIL  
DETAIL WS-22A



- NOTES:
1. ELECTRONIC MARKER BALL MATERIALS SHALL BE AS FOLLOWS:
    - a. WATER - 3M SCOTCHMARK ELECTRONIC MARKER, MODEL # 1403-XR, 4-INCH DIAMETER, BLUE
    - b. SEWER - 3M SCOTCHMARK ELECTRONIC MARKER, MODEL # 1404-XR, 4-INCH DIAMETER, GREEN
    - c. RECLAIMED WATER - 3M SCOTCHMARK ELECTRONIC MARKER, MODEL # 1408-XR, 4-INCH DIAMETER, PURPLE
  2. PLACEMENT SHALL CONFORM TO DETAILS ABOVE. FOR FURTHER GUIDANCE, REFER TO BRUNSWICK COUNTY TECHNICAL SPECIFICATIONS SECTION TITLED "ELECTRONIC MARKER BALLS FOR WATER AND SEWER FORCE MAINS".



ELECTRONIC MARKER  
BALL PLACEMENT DETAIL  
DETAIL WS-23

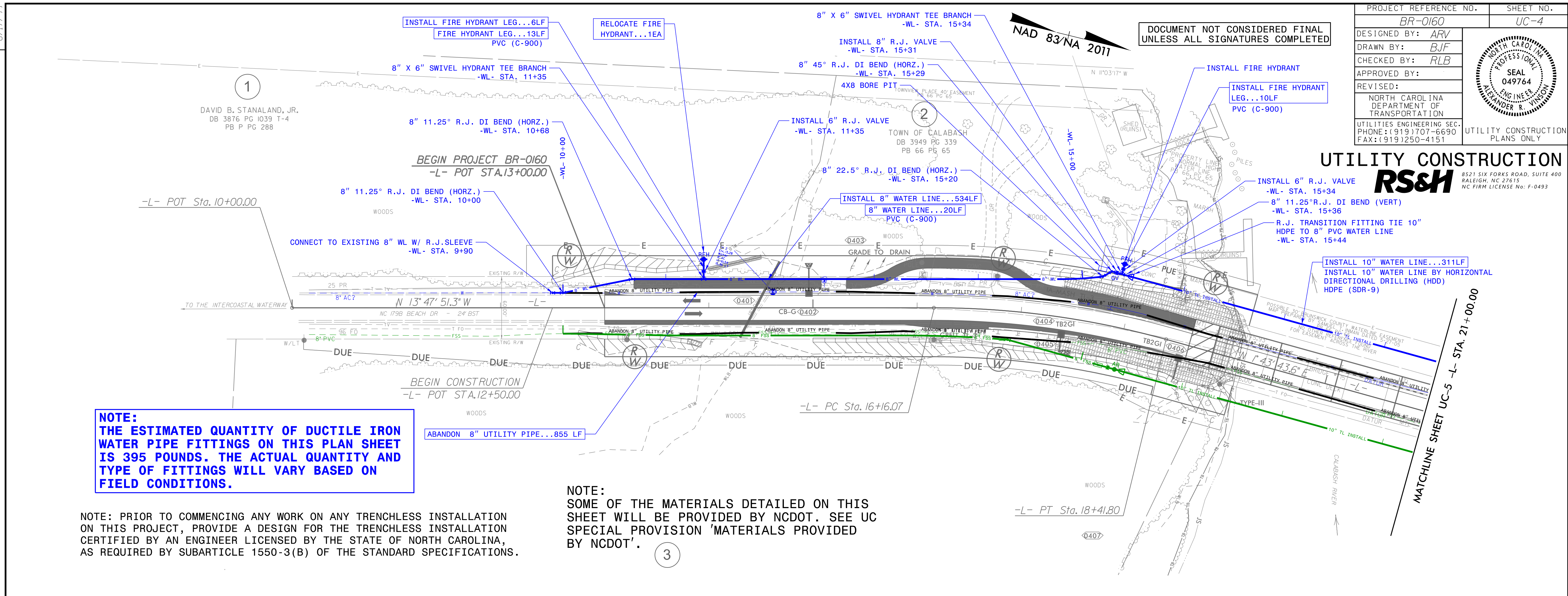
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8/17/99

REVISIONS

PROJECT REFERENCE NO. BR-0160	SHEET NO. UC-4
DESIGNED BY: ARV	
DRAWN BY: BJB	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	UTILITY CONSTRUCTION PLANS ONLY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	

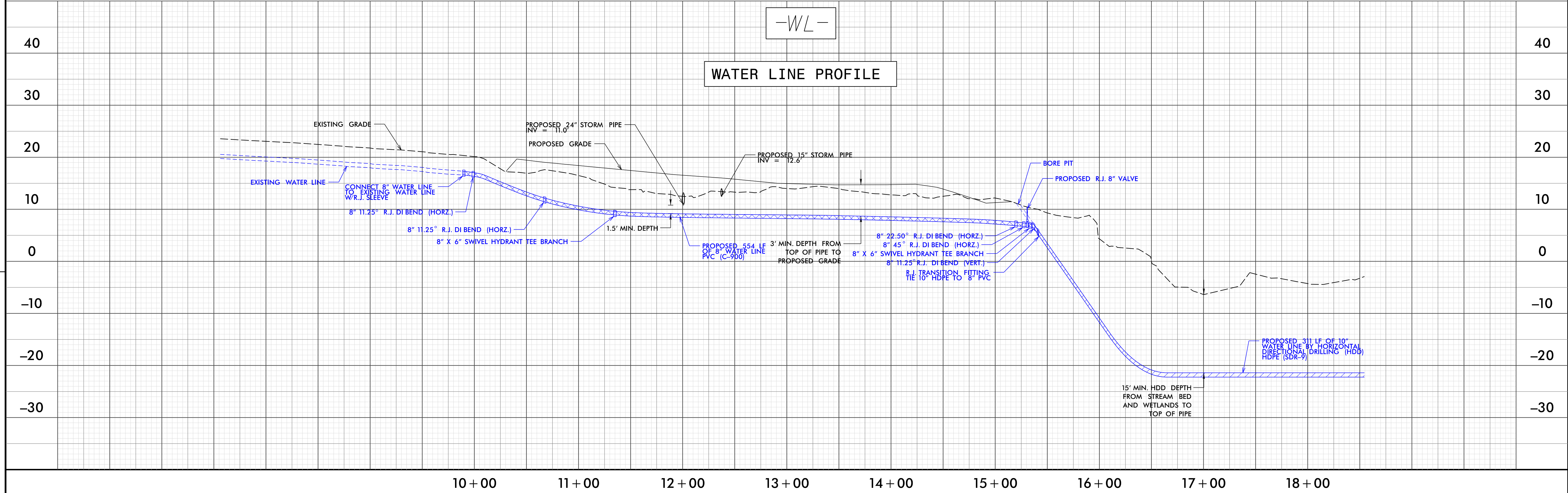
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



**NOTE:**  
 THE ESTIMATED QUANTITY OF DUCTILE IRON WATER PIPE FITTINGS ON THIS PLAN SHEET IS 395 POUNDS. THE ACTUAL QUANTITY AND TYPE OF FITTINGS WILL VARY BASED ON FIELD CONDITIONS.

**NOTE:**  
 SOME OF THE MATERIALS DETAILED ON THIS SHEET WILL BE PROVIDED BY NCDOT. SEE UC SPECIAL PROVISION 'MATERIALS PROVIDED BY NCDOT'.

**NOTE:** PRIOR TO COMMENCING ANY WORK ON ANY TRENCHLESS INSTALLATION ON THIS PROJECT, PROVIDE A DESIGN FOR THE TRENCHLESS INSTALLATION CERTIFIED BY AN ENGINEER LICENSED BY THE STATE OF NORTH CAROLINA, AS REQUIRED BY SUBARTICLE 1550-3(B) OF THE STANDARD SPECIFICATIONS.



10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00

8/17/99

INSTALL 10" WATER LINE...476LF  
INSTALL 10" WATER LINE BY HORIZONTAL  
DIRECTIONAL DRILLING (HDD)  
HDPE (SDR-9)

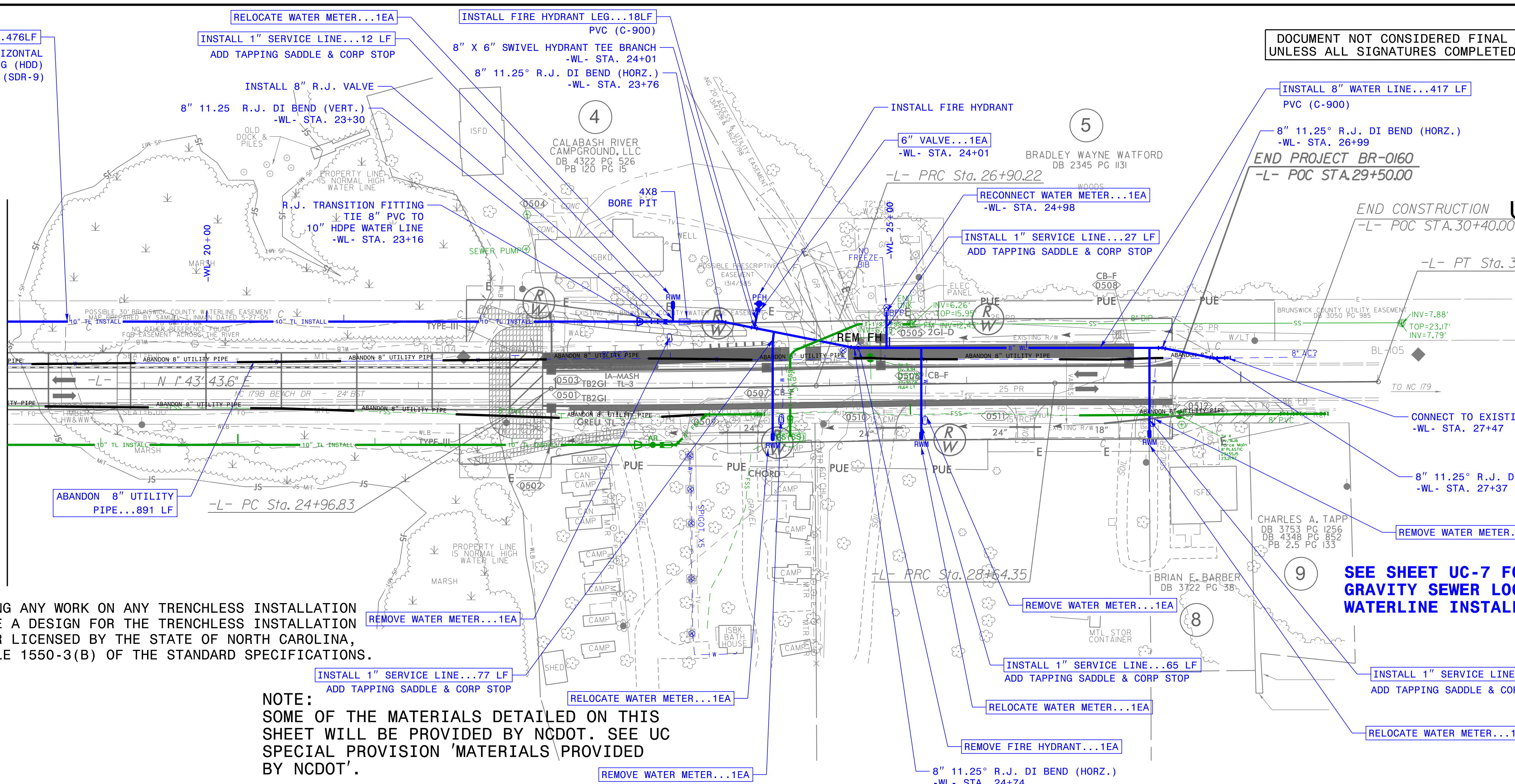
INSTALL 1" SERVICE LINE...12 LF  
ADD TAPPING SADDLE & CORP STOP

INSTALL FIRE HYDRANT LEG...18LF  
PVC (C-900)  
8" X 6" SWIVEL HYDRANT TEE BRANCH  
-WL- STA. 24+01  
8" 11.25° R.J. DI BEND (HORZ.)  
-WL- STA. 23+76

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO. BR-0160	SHEET NO. UC-5
DESIGNED BY: ARV	
DRAWN BY: BJF	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151
UTILITY CONSTRUCTION PLANS ONLY	

MATCHLINE SHEET UC-4 -L- STA. 21+00.00



UTILITY CONSTRUCTION  
**RS&H**  
8521 SIX FORKS ROAD, SUITE 400  
RALEIGH, NC 27615  
NC FIRM LICENSE No. F-0493

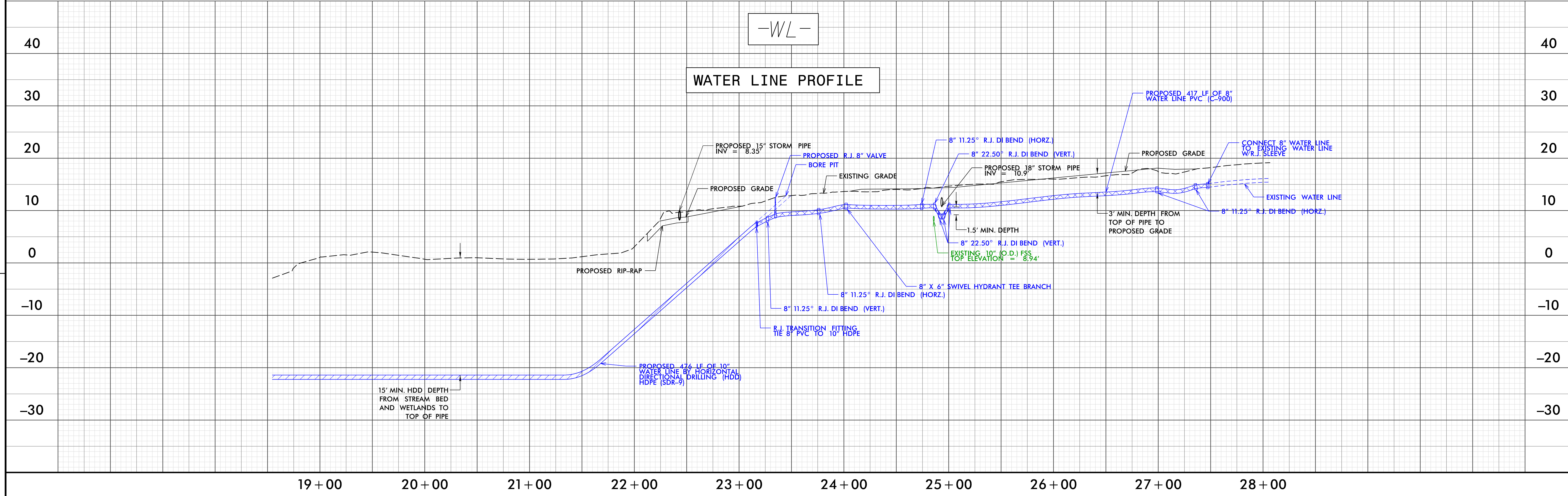
NAD 83/NA 2011

NOTE: PRIOR TO COMMENCING ANY WORK ON ANY TRENCHLESS INSTALLATION ON THIS PROJECT, PROVIDE A DESIGN FOR THE TRENCHLESS INSTALLATION CERTIFIED BY AN ENGINEER LICENSED BY THE STATE OF NORTH CAROLINA, AS REQUIRED BY SUBARTICLE 1550-3(B) OF THE STANDARD SPECIFICATIONS.

NOTE: SOME OF THE MATERIALS DETAILED ON THIS SHEET WILL BE PROVIDED BY NCDOT. SEE UC SPECIAL PROVISION 'MATERIALS PROVIDED BY NCDOT'.

SEE SHEET UC-7 FOR NOTES ON RESIDENTIAL GRAVITY SEWER LOCATES PERTAINING TO WATERLINE INSTALLATION.

REVISIONS



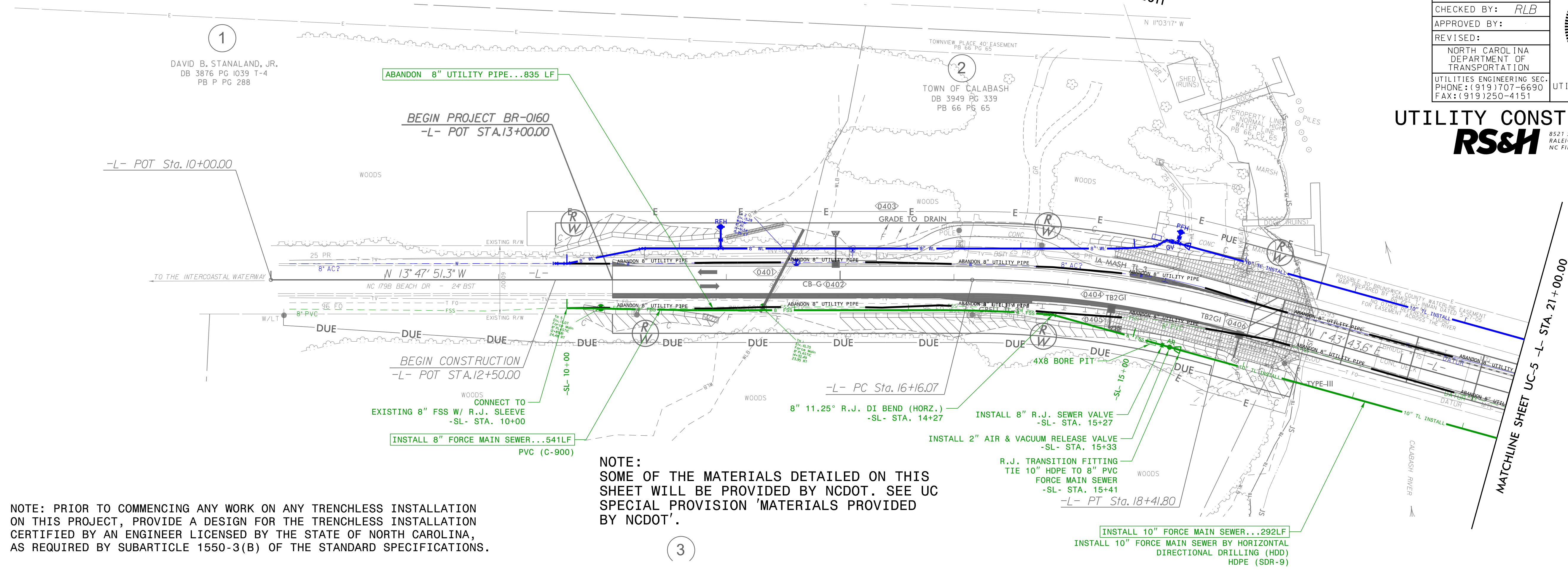
8/17/99

NAD 83/NA 2011

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO. BR-0160	SHEET NO. UC-6
DESIGNED BY: ARV	
DRAWN BY: BJB	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	UTILITY CONSTRUCTION PLANS ONLY

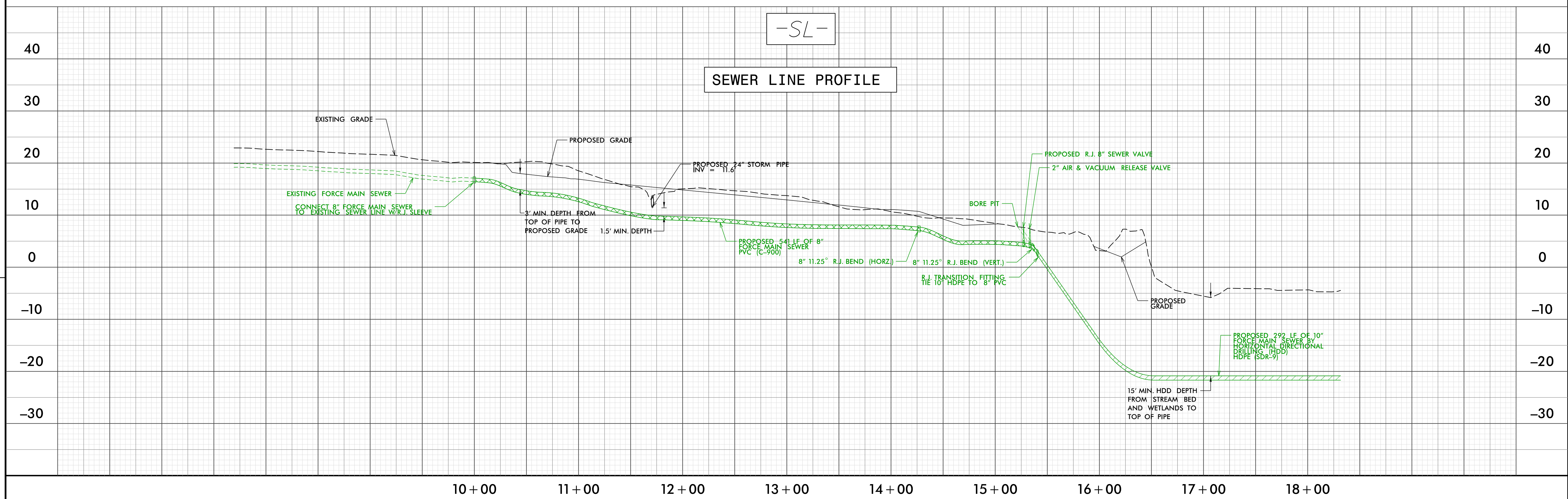
**UTILITY CONSTRUCTION**  
**RS&H**  
 8521 SIX FORKS ROAD, SUITE 400  
 RALEIGH, NC 27615  
 NC FIRM LICENSE NO: F-0493



NOTE: PRIOR TO COMMENCING ANY WORK ON ANY TRENCHLESS INSTALLATION ON THIS PROJECT, PROVIDE A DESIGN FOR THE TRENCHLESS INSTALLATION CERTIFIED BY AN ENGINEER LICENSED BY THE STATE OF NORTH CAROLINA, AS REQUIRED BY SUBARTICLE 1550-3(B) OF THE STANDARD SPECIFICATIONS.

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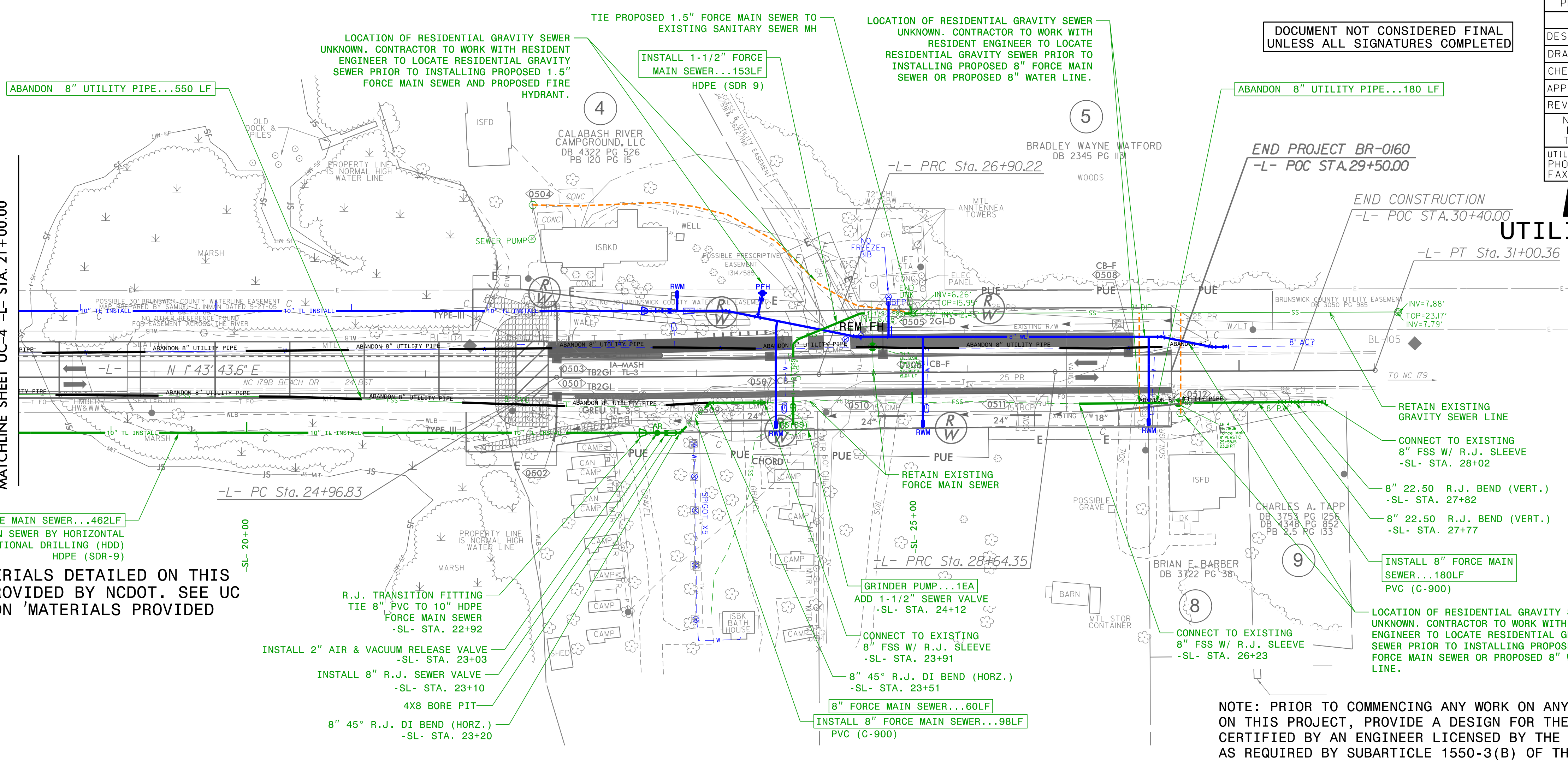
REVISIONS



8/17/99

REVISIONS

MATCHLINE SHEET UC-4 -L- STA. 21+00.00



**NOTE:**  
 SOME OF THE MATERIALS DETAILED ON THIS SHEET WILL BE PROVIDED BY NCDOT. SEE UC SPECIAL PROVISION 'MATERIALS PROVIDED BY NCDOT'.

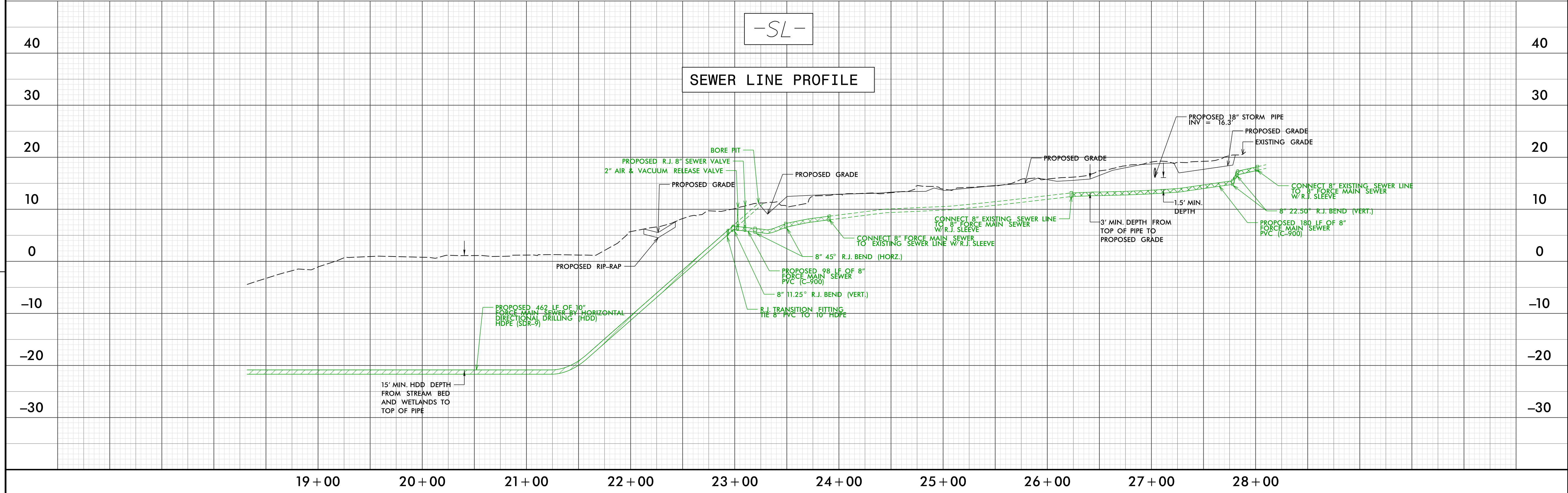
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PROJECT REFERENCE NO.	SHEET NO.
BR-0160	UC-7
DESIGNED BY: ARV	
DRAWN BY: BJB	
CHECKED BY: RLB	
APPROVED BY:	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
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**RS&H**  
 UTILITY CONSTRUCTION

NAD 83/NA 2011

APPROXIMATE LOCATION OF EXISTING RESIDENTIAL SEWER LINES  
 THESE LINES ARE NOT SURVEYED AND ARE INCLUDED AS A STARTING POINT FOR FIELD LOCATING



SEWER LINE PROFILE