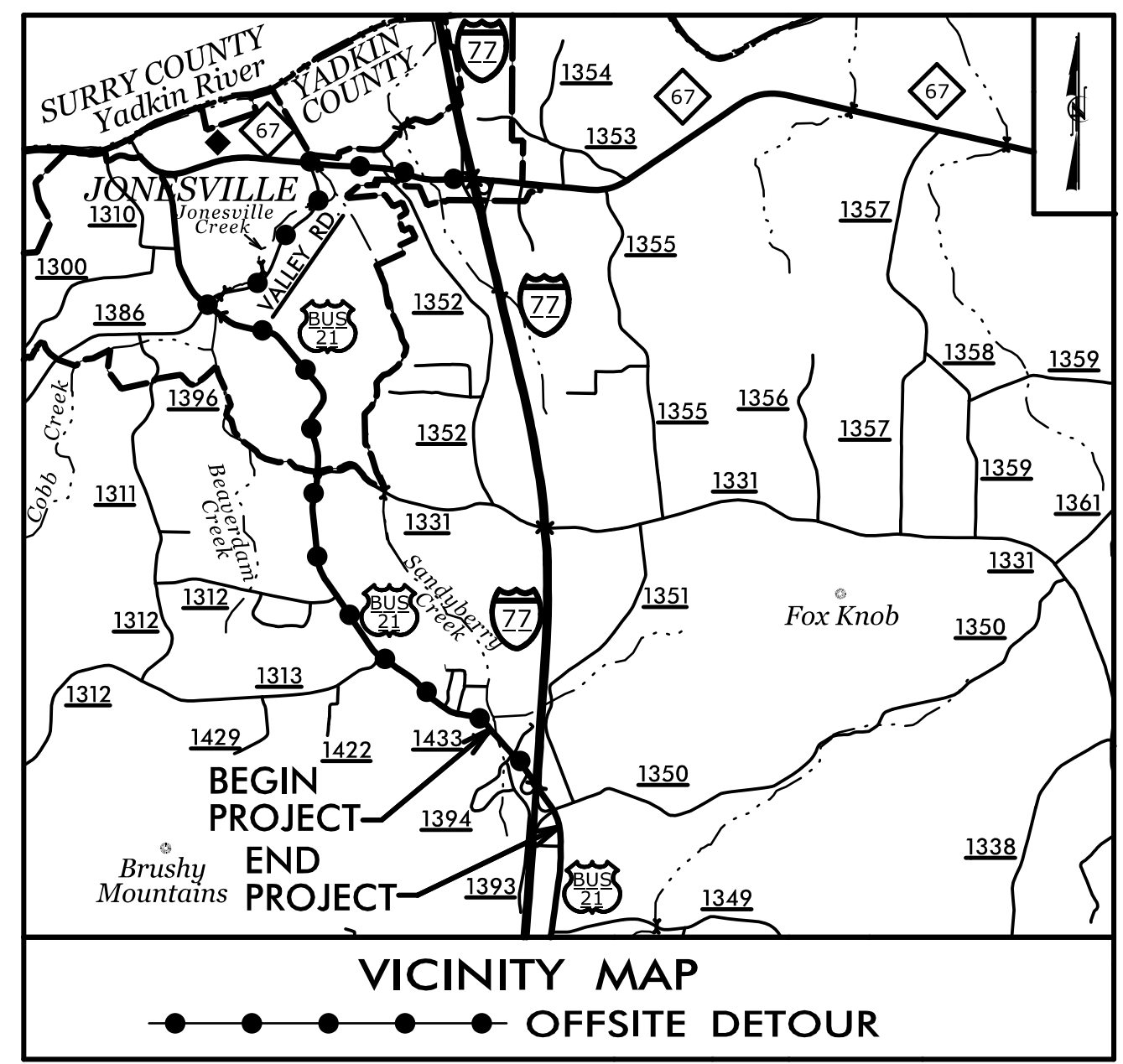


**TIP PROJECT: B-5833**

|               |             |
|---------------|-------------|
| T.I.P. NO.    | SHEET NO.   |
| <b>B-5833</b> | <b>UC-1</b> |

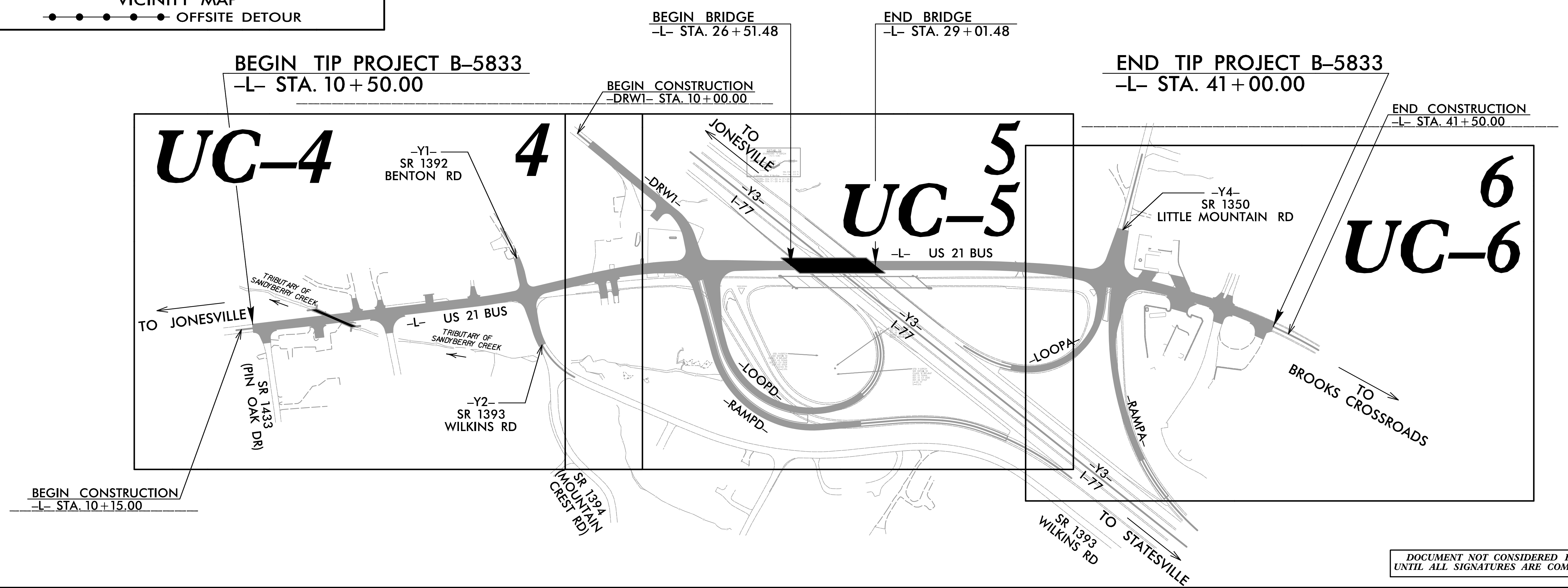


STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

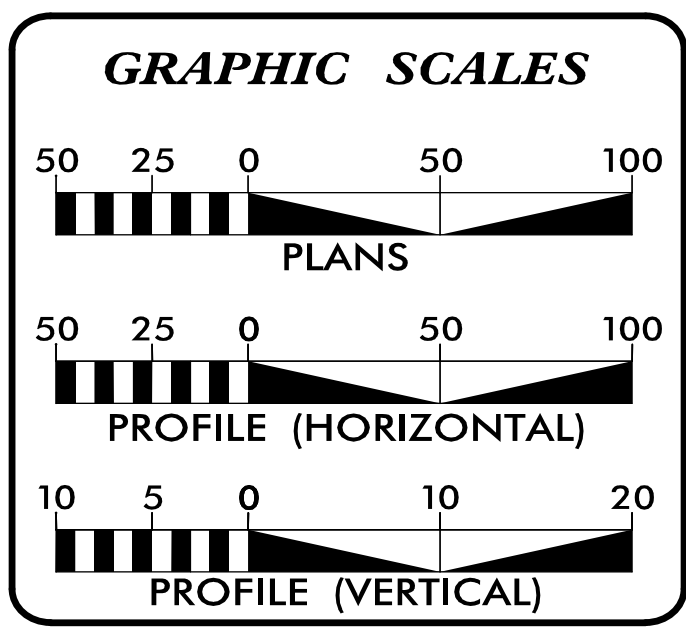
# UTILITY CONSTRUCTION PLANS YADKIN COUNTY

**LOCATION: REPLACE BRIDGE NO. 29 OVER I-77 ON US 21 BUS**

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



DOCUMENT NOT CONSIDERED FINAL  
UNTIL ALL SIGNATURES ARE COMPLETED



**INDEX OF SHEETS**

| SHEET NO.:     | DESCRIPTION:                |
|----------------|-----------------------------|
| UC-1           | TITLE SHEET                 |
| UC-2           | UTILITY SYMBOLOGY           |
| UC-3           | NOTES                       |
| UC-3A          | DETAILS                     |
| UC-4 THRU UC-6 | UTILITY CONSTRUCTION SHEETS |
| UC-7 THRU UC-8 | PROFILE SHEETS              |

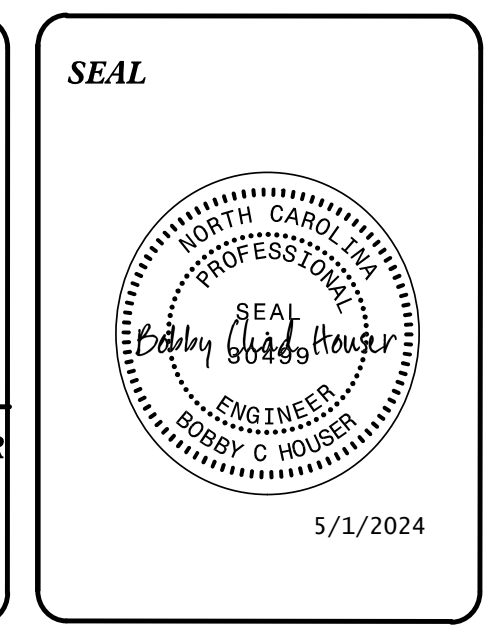
**WATER AND SEWER OWNERS ON PROJECT**

(A) WATER - TOWN OF JONESVILLE  
(B) SEWER - YADKIN VALLEY SEWER AUTHORITY

PREPARED IN THE OFFICE OF

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**STEVE TREXLER** UTILITIES COORDINATOR

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

## 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                             |  |

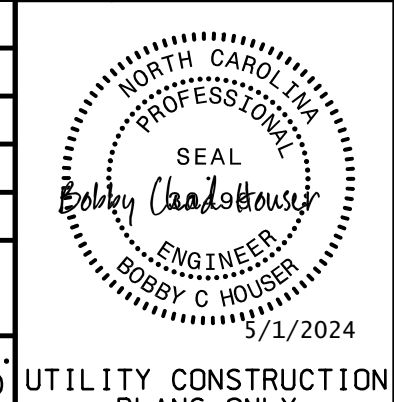
|                   |  |
|-------------------|--|
| Thrust Block      |  |
| Air Release Valve |  |
| Utility Vault     |  |
| Concrete Pier     |  |
| Steel Pier        |  |
| Plan Note         |  |
| Pay Item Note     |  |

### 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 | AATUR  | Sanitary Sewer Cleanout                   |  |
| End of Information                     | E.O.I. |   |  |

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

# UTILITY CONSTRUCTION

|   |  |
|---|--|
| PROJECT REFERENCE NO.   | SHEET NO.  |
| <b>B-5833</b>   | <b>UC-3</b>  |
| DESIGNED BY: <b>BCH</b>   |  |
| DRAWN BY: <b>KSA</b>  |  |
| CHECKED BY:   |  |
| APPROVED BY:  |  |
| REVISED:  |  |
| NORTH CAROLINA DEPARTMENT OF TRANSPORTATION<br>UTILITIES ENGINEERING SEC.<br>PHONE: (919) 707-6690<br>FAX: (919) 250-4151 |  |
| UTILITY CONSTRUCTION PLANS ONLY   |  |

## 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 2024.
2. THE EXISTING UTILITIES BELONG TO THE TOWN OF JONESVILLE AND YADKIN VALLEY SEWER AUTHORITY.
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 ENVIRONMENT 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. ALL PROPOSED WATER LINE 4 TO 16 INCHES IN DIAMETER, SHALL BE DUCTILE IRON PIPE - PRESSURE CLASS 350 AND UTILIZE FLEXIBLE PUSH-ON RESTRAINED JOINTS.
2. ALL PROPOSED STEEL ENCASEMENTS SHALL BE SMOOTH WALL WITH A MINIMUM THICKNESS OF 0.25 INCHES.
3. ALL WATER LINE FITTINGS 4 TO 12 INCHES IN DIAMETER, SHALL BE PRESSURE CLASS 350 DUCTILE IRON RESTRAINED JOINT IN ACCORDANCE WITH ANSI A21.10 / AWWA C110 AND ANSI A21.4 / AWWA C104.
4. WATER LINE UTILIZING RESTRAINED JOINTS SHALL BE TYTON JOINT, HP LOK, AMERICAN "FAST GRIP", US PIPE "FIELD-LOK" OR APPROVED EQUAL.
5. ALL WATERLINE SHALL HAVE COATED TRACER WIRE NO SMALLER THAN 14 AWG SOLID COPPER.
6. ALL VALVES - 2" THROUGH 12" SHALL BE RESILIENT WEDGE GATE, CAST IRON BODY, CONFORMING TO AWWA C509, LATEST VERSION. SEALING MECHANISM SHALL PROVIDE ZERO LEAKAGE AT THE WATER WORKING PRESSURE AGAINST THE LINE FLOW FROM EITHER DIRECTION AND BE DESIGNED SUCH THAT NO EXPOSED METAL SEAMS, EDGES, SCREWS, ETC. ARE WITHIN THE WATERWAY IN THE CLOSED POSITION. THE GATE SHALL NOT BE WEDGED INTO A POCKET NOR SLIDE ACROSS THE SEATING SURFACE TO OBTAIN TIGHT CLOSURE. ALL INTERNAL AND EXTERNAL FERROUS SURFACES OF THE VALVE, INCLUDING THE INTERIOR OF THE GATE, SHALL BE COATED WITH A PROTECTIVE COATING CONFORMING TO AWWA C550, LATEST VERSION. COATING SHALL BE APPLIED TO CASTINGS PRIOR TO ASSEMBLY TO ASSURE ALL EXPOSED AREAS WILL BE COVERED. VALVES SHALL BE RATED AT 200 PSI WORKING PRESSURE. UNLESS OTHERWISE NOTED, UNDERGROUND VALVES SHALL HAVE AN OPERATING NUT AND EXPOSED VALVES SHALL HAVE A HAND WHEEL OPERATOR. OPERATING NUT SHALL BE 2"x2", OPEN LEFT.
7. EACH VALVE BURIED IN THE GROUND SHALL BE PROVIDED WITH AN APPROVED TYPE OF VALVE BOX AND COVER. THE BOXES SHALL BE ADJUSTABLE SCREW TYPE 24-INCH OR 36-INCH.

8. ALL VALVE BOXES SHALL BE CONSTRUCTED OF CAST IRON THAT COMPLIES WITH THE REQUIREMENTS OF ASTM A48. VALVE BOXES SHALL BE THE APPROPRIATE RANGE OF ADJUSTMENT FOR THE SITE AND CONTRACTOR SHOULD MINIMIZE THE USE OF EXTENSIONS.

9. PROVIDE THRUST RESTRAINT ON THE EXISTING WATER LINE WHERE TIE-INS ARE MADE AS NECESSARY.
10. CONTRACTOR SHALL NOT OPERATE ANY VALVES ON THE EXISTING UTILITY SYSTEMS. CONTRACTOR SHALL CONTACT THE UTILITY OWNER TO CONDUCT STRATEGIC OPERATION OF VALVES FOR SERVICE INTERRUPTION IN ORDER TO PERFORM SPECIFIC WORK.

11. ANY BENDS OF PVC WATER PIPE NOT SPECIFICALLY CALLED OUT WITH A 90, 45, 22.5, OR 11.25 DEGREE BEND FITTING, SHALL BE CONSTRUCTED BY A RADIAL BEND OF THE PIPE AS NOTED ON THE PLANS OR IN ACCORDANCE WITH PIPE MANUFACTURER'S SPECIFICATIONS (WHICHEVER IS MORE STRINGENT) - OR A COMBINATION OF BEND FITTINGS AND A RADIAL BEND OF THE PIPE. DEFLECTION OF THE PIPE JOINTS ON PVC PIPE MATERIAL IS NOT AN ACCEPTABLE METHOD OF PIPE BENDING.

12. ALL MATERIALS, EQUIPMENT, LABOR, AND WORKSMANSHIP SHALL BE IN ACCORDANCE WITH NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.

13. UTILITY OWNER MUST BE PRESENT FOR ANY TESTING OR CONNECTIONS TO THE EXISTING SYSTEM INCLUDING BUT NOT LIMITED TO ALL TAPS AND TEMPORARY CONSTRUCTION CONNECTIONS. A NOTICE OF 72 HOURS MUST BE PROVIDED.

14. ALL PROPOSED GRAVITY SEWER SHALL BE DUCTILE IRON PIPE - PRESSURE CLASS 350.

15. ALL PROPOSED MANHOLES SHALL UTILIZE WATERTIGHT FRAME AND LIDS.

16. IF IT IS DETERMINED THAT TYING TO AN EXISTING MANHOLE SHALL CAUSE SIGNIFICANT DAMAGE OR THAT THE STRUCTURAL INTEGRITY OF A GIVEN MANHOLE IS IN QUESTION, THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY.

**UTILITY CONSTRUCTION**  
**DOCUMENT NOT CONSIDERED FINAL**  
**UNLESS ALL SIGNATURES COMPLETED**

# WATER LINE PROJECT TYPICAL DETAILS

## UTILITY CONSTRUCTION

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

**ELEVATION**

**END ELEVATION**

**NOTES:**

- CASING SPACERS "SPIDERS" SHALL BE USED FOR SUPPORT OF THE CARRIER PIPE WITHIN THE STEEL ENCASEMENT PIPE. SPIDERS SHALL BE CENTERED AND RESTRAINED. SPIDERS SHALL HAVE A STAINLESS STEEL SHEET AND STAINLESS STEEL RISERS WITH POLYETHYLENE RUNNERS, MANUFACTURED BY CASCADE WATERWORKS MFG. COMPANY, OR APPROVED EQUAL.
- A MINIMUM SPACING OF 2 SPIDERS PER JOINT OF CARRIER PIPE SHALL BE REQUIRED IN ORDER TO PREVENT SAGGING OF CARRIER PIPE. REFER TO THE MANUFACTURER'S RECOMMENDATIONS FOR SPACING AND SIZE OF SPACERS BASED ON THE SIZE AND TYPE OF THE CARRIER PIPE.
- THE SPIDERS SHALL BE SPACED EVENLY ALONG THE CARRIER PIPE SUCH THAT EACH SPIDER SUPPORTS THE SAME UNIT WEIGHT OF THE CARRIER MAIN.
- REFER TO PLAN SHEETS AND PROFILE SHEETS FOR LENGTH AND DIAMETER OF PROPOSED STEEL ENCASEMENT PIPES FOR EACH CROSSING.
- STEEL ENCASEMENT PIPES SHALL EXTEND AS A MINIMUM: TO 3 FEET BEHIND BACK OF CURB LINES; TO 5 FEET BEYOND THE TOE OF SLOPE IN FILL SECTIONS, AND; FROM DITCH LINE TO DITCH LINE IN CUT SECTIONS.
- THE TOP OF ENCASEMENT PIPE SHALL PROVIDE THE FOLLOWING MINIMUM BURY DEPTHS: 3 FEET BELOW THE TRAVEL SURFACE OF ROADWAYS, AND; 2 FEET BELOW PAVED OR UNPAVED DITCH ELEVATIONS; UNLESS OTHERWISE NOTED ON THE PLANS.
- THE INSIDE DIAMETER OF THE ENCASEMENT PIPE SHALL BE AT LEAST 2 INCHES GREATER THAN THE LARGEST OUTSIDE DIAMETER OF THE CARRIER PIPE JOINTS OR COUPLINGS FOR CARRIER PIPE LESS THAN 6 INCHES IN DIAMETER, AND AT LEAST 4 INCHES GREATER FOR CARRIER PIPE 6 INCHES AND LARGER IN DIAMETER.
- ALL JOINTS BETWEEN THE SECTIONS OF ENCASEMENT PIPE SHALL BE FULLY WELDED AROUND THE COMPLETE CIRCUMFERENCE OF THE PIPE.
- FOR EXISTING UTILITY PIPE INSTALLATIONS, THE STEEL ENCASEMENT PIPE SHALL BE A SPLIT STEEL ENCASEMENT PIPE MADE UP OF TWO (2) SEMI-CIRCULAR SECTIONS JOINED BY A CONTINUOUS WELD FROM ONE END TO THE OTHER WITHOUT ANY TRACEABLE VOIDS. JOINTS BETWEEN HORIZONTAL SECTIONS OF ENCASEMENT PIPE SHALL BE FULLY WELDED AROUND THE COMPLETE CIRCUMFERENCE OF THE PIPE.
- STEEL ENCASEMENT PIPES SHALL BE EITHER SMOOTH WALL OR SPIRAL WELDED AND HAVE A SPECIFIED MINIMUM YIELD STRENGTH OF AT LEAST 35,000 PSI.
- UNCOATED AND UNPROTECTED STEEL ENCASEMENT PIPE SHALL HAVE A MINIMUM WALL THICKNESS AS NOTED BELOW FOR THE FOLLOWING OUTSIDE DIAMETER OF PIPES:  
 0.188 INCHES FOR 12" AND SMALLER  
 0.250 INCHES FOR 14" AND SMALLER  
 0.312 INCHES FOR 26"  
 0.250 INCHES FOR 14"      0.312 INCHES FOR 30"  
 0.250 INCHES FOR 16"      0.375 INCHES FOR 36"  
 0.250 INCHES FOR 20"      0.500 INCHES FOR 42"  
 0.250 INCHES FOR 24"      0.500 INCHES FOR 48"

**STEEL ENCASEMENT PIPE UNDER ROADS**

**THRUST RESTRAINT FOR PIPE LINES**

**RESTRAINED JOINT DESIGN TABLE FOR DUCTILE IRON PIPE**

| FITTING                          | REQUIRED RESTRAINED LENGTH (FT)<br>OF BARE D.I. PIPE BY DEPTH OF COVER |             |             |             |             |             |             |              |
|----------------------------------|--|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|                                  | 3 FT   | 4 FT        | 5 FT        | 6 FT        | 7 FT        | 8 FT        | 9 FT        | 10 FT        |
| <b>HORIZONTAL BENDS</b>          |  |             |             |             |             |             |             |              |
| 6 INCH DIA - 11.25 DEG           | 3  | 2           | 2           | 2           | 2           | 1           | 1           | 1            |
| 6 INCH DIA - 22.5 DEG            | 5  | 4           | 4           | 3           | 3           | 3           | 3           | 2            |
| 6 INCH DIA - 45 DEG              | 11   | 9           | 8           | 7           | 7           | 6           | 5           | 5            |
| 6 INCH DIA - 90 DEG              | 26   | 22          | 19          | 17          | 16          | 14          | 13          | 12           |
| 8 INCH DIA - 11.25 DEG           | 3  | 3           | 2           | 2           | 2           | 2           | 2           | 2            |
| 8 INCH DIA - 22.5 DEG            | 7  | 6           | 5           | 5           | 4           | 4           | 3           | 3            |
| 8 INCH DIA - 45 DEG              | 14   | 12          | 10          | 9           | 8           | 8           | 7           | 7            |
| 8 INCH DIA - 90 DEG              | 33   | 29          | 25          | 23          | 20          | 19          | 17          | 16           |
| 12 INCH DIA - 11.25 DEG          | 5  | 4           | 4           | 3           | 3           | 3           | 2           | 2            |
| 12 INCH DIA - 22.5 DEG           | 9  | 8           | 7           | 6           | 6           | 5           | 5           | 5            |
| 12 INCH DIA - 45 DEG             | 20   | 17          | 15          | 13          | 12          | 11          | 10          | 10           |
| 12 INCH DIA - 90 DEG             | 47   | 41          | 36          | 33          | 29          | 27          | 25          | 23           |
| 16 INCH DIA - 11.25 DEG          | 6  | 5           | 5           | 4           | 4           | 3           | 3           | 3            |
| 16 INCH DIA - 22.5 DEG           | 12   | 11          | 9           | 8           | 8           | 7           | 6           | 6            |
| 16 INCH DIA - 45 DEG             | 25   | 22          | 19          | 17          | 16          | 14          | 13          | 12           |
| 20 INCH DIA - 11.25 DEG          | 7  | 6           | 6           | 5           | 5           | 4           | 4           | 4            |
| 20 INCH DIA - 22.5 DEG           | 15   | 13          | 11          | 10          | 9           | 9           | 8           | 7            |
| 20 INCH DIA - 45 DEG             | 31   | 27          | 24          | 21          | 19          | 18          | 16          | 15           |
| 20 INCH DIA - 90 DEG             | 74   | 65          | 57          | 52          | 47          | 43          | 40          | 37           |
| <b>VERTICAL BENDS - DOWN</b>     | <b>3 FT</b>  | <b>4 FT</b> | <b>5 FT</b> | <b>6 FT</b> | <b>7 FT</b> | <b>8 FT</b> | <b>9 FT</b> | <b>10 FT</b> |
| 6 INCH DIA - 11.25 DEG           | 7  | 6           | 5           | 5           | 4           | 4           | 4           | 3            |
| 6 INCH DIA - 22.5 DEG            | 15   | 13          | 11          | 10          | 9           | 8           | 8           | 7            |
| 6 INCH DIA - 45 DEG              | 31   | 27          | 23          | 21          | 19          | 17          | 16          | 15           |
| 8 INCH DIA - 11.25 DEG           | 10   | 8           | 7           | 6           | 6           | 5           | 5           | 5            |
| 8 INCH DIA - 22.5 DEG            | 19   | 17          | 15          | 13          | 12          | 11          | 10          | 9            |
| 8 INCH DIA - 45 DEG              | 40   | 35          | 30          | 27          | 25          | 22          | 21          | 19           |
| 12 INCH DIA - 11.25 DEG          | 14   | 12          | 10          | 9           | 8           | 8           | 7           | 7            |
| 12 INCH DIA - 22.5 DEG           | 28   | 24          | 21          | 19          | 17          | 16          | 14          | 13           |
| 12 INCH DIA - 45 DEG             | 57   | 50          | 44          | 39          | 35          | 32          | 30          | 28           |
| 16 INCH DIA - 11.25 DEG          | 18   | 15          | 14          | 12          | 11          | 10          | 9           | 9            |
| 16 INCH DIA - 22.5 DEG           | 36   | 31          | 27          | 25          | 22          | 20          | 19          | 17           |
| 16 INCH DIA - 45 DEG             | 74   | 65          | 57          | 51          | 46          | 42          | 39          | 36           |
| 20 INCH DIA - 11.25 DEG          | 22   | 19          | 17          | 15          | 14          | 12          | 11          | 11           |
| 20 INCH DIA - 22.5 DEG           | 44   | 38          | 34          | 30          | 27          | 25          | 23          | 21           |
| 20 INCH DIA - 45 DEG             | 91   | 79          | 70          | 63          | 57          | 52          | 48          | 44           |
| <b>VERTICAL BENDS - UP</b>       | <b>3 FT</b>  | <b>4 FT</b> | <b>5 FT</b> | <b>6 FT</b> | <b>7 FT</b> | <b>8 FT</b> | <b>9 FT</b> | <b>10 FT</b> |
| 6 INCH DIA - 11.25 DEG           | 3  | 2           | 2           | 2           | 2           | 1           | 1           | 1            |
| 6 INCH DIA - 22.5 DEG            | 5  | 4           | 4           | 3           | 3           | 3           | 3           | 2            |
| 6 INCH DIA - 45 DEG              | 11   | 9           | 8           | 7           | 7           | 6           | 5           | 5            |
| 8 INCH DIA - 11.25 DEG           | 3  | 3           | 2           | 2           | 2           | 2           | 2           | 2            |
| 8 INCH DIA - 22.5 DEG            | 7  | 6           | 5           | 5           | 4           | 4           | 3           | 3            |
| 8 INCH DIA - 45 DEG              | 14   | 12          | 10          | 9           | 8           | 8           | 7           | 7            |
| 12 INCH DIA - 11.25 DEG          | 5  | 4           | 4           | 3           | 3           | 3           | 2           | 2            |
| 12 INCH DIA - 22.5 DEG           | 9  | 8           | 7           | 6           | 6           | 5           | 5           | 5            |
| 12 INCH DIA - 45 DEG             | 20   | 17          | 15          | 13          | 12          | 11          | 10          | 10           |
| 16 INCH DIA - 11.25 DEG          | 6  | 5           | 5           | 4           | 4           | 3           | 3           | 3            |
| 16 INCH DIA - 22.5 DEG           | 12   | 11          | 9           | 8           | 8           | 7           | 6           | 6            |
| 16 INCH DIA - 45 DEG             | 25   | 22          | 19          | 17          | 16          | 14          | 13          | 12           |
| 20 INCH DIA - 11.25 DEG          | 7  | 6           | 6           | 5           | 5           | 4           | 4           | 4            |
| 20 INCH DIA - 22.5 DEG           | 15   | 13          | 11          | 10          | 9           | 9           | 8           | 7            |
| 20 INCH DIA - 45 DEG             | 31   | 27          | 24          | 21          | 19          | 18          | 16          | 15           |
| <b>DEAD ENDS / VALVES</b>        | <b>3 FT</b>  | <b>4 FT</b> | <b>5 FT</b> | <b>6 FT</b> | <b>7 FT</b> | <b>8 FT</b> | <b>9 FT</b> | <b>10 FT</b> |
| 6 INCH DIA                       | 50   | 45          | 41          | 38          | 35          | 33          | 31          | 29           |
| 8 INCH DIA                       | 65   | 59          | 54          | 50          | 46          | 43          | 40          | 38           |
| 10 INCH DIA                      | 80   | 72          | 66          | 61          | 56          | 52          | 49          | 46           |
| 12 INCH DIA                      | 94   | 85          | 78          | 72          | 66          | 62          | 58          | 54           |
| 16 INCH DIA                      | 123  | 111         | 102         | 94          | 87          | 81          | 76          | 71           |
| 20 INCH DIA                      | 151  | 137         | 125         | 115         | 107         | 100         | 93          | 88           |
| <b>REDUCERS</b>                  | <b>3 FT</b>  | <b>4 FT</b> | <b>5 FT</b> | <b>6 FT</b> | <b>7 FT</b> | <b>8 FT</b> | <b>9 FT</b> | <b>10 FT</b> |
| 12 INCH X 8 INCH                 | 50   | 45          | 41          | 38          | 35          | 33          | 31          | 29           |
| <b>TEES</b>                      | <b>3 FT</b>  | <b>4 FT</b> | <b>5 FT</b> | <b>6 FT</b> | <b>7 FT</b> | <b>8 FT</b> | <b>9 FT</b> | <b>10 FT</b> |
| 8" RUN X 8" BRANCH : RL = 1 FT   | 64   | 58          | 53          | 48          | 44          | 41          | 38          | 36           |
| 8" RUN X 8" BRANCH : RL = 5 FT   | 59   | 52          | 47          | 42          | 39          | 35          | 32          | 30           |
| 12" RUN X 12" BRANCH : RL = 1 FT | 93   | 84          | 77          | 70          | 65          | 60          | 56          | 53           |
| 12" RUN X 12" BRANCH : RL = 5 FT | 88   | 79          | 71          | 65          | 59          | 54          | 50          | 47           |

**ASSUMPTIONS**  
 LAYING CONDITION = TYPE 4  
 SOIL DESIGNATION = COHESIVE-GRANULAR  
 DESIGN PRESSURE = 200 PSI (TEST PRESSURE)  
 SAFETY FACTOR = 1.5

**NOTES**  
 1. RESTRAINED LENGTH IS MEASURED AS FOLLOWS:  
 A. HORIZONTAL/VERTICAL BENDS: ALONG EACH SIDE OF BEND.  
 B. HORIZONTAL/VERTICAL BENDS - OFFSET: ALONG THE OUTER SIDE OF EACH BEND.  
 ALL PIPE BETWEEN THE TWO BENDS SHALL BE RESTRAINED JOINT.  
 2. WHEN IT IS NOT POSSIBLE TO INSTALL THE RESTRAINED LENGTHS AS NOTED BY THIS TABLE, CONTRACTOR SHALL INSTALL THE APPROPRIATE CONCRETE THRUST RESTRAINTS AS PER THE DETAILS HEREIN.

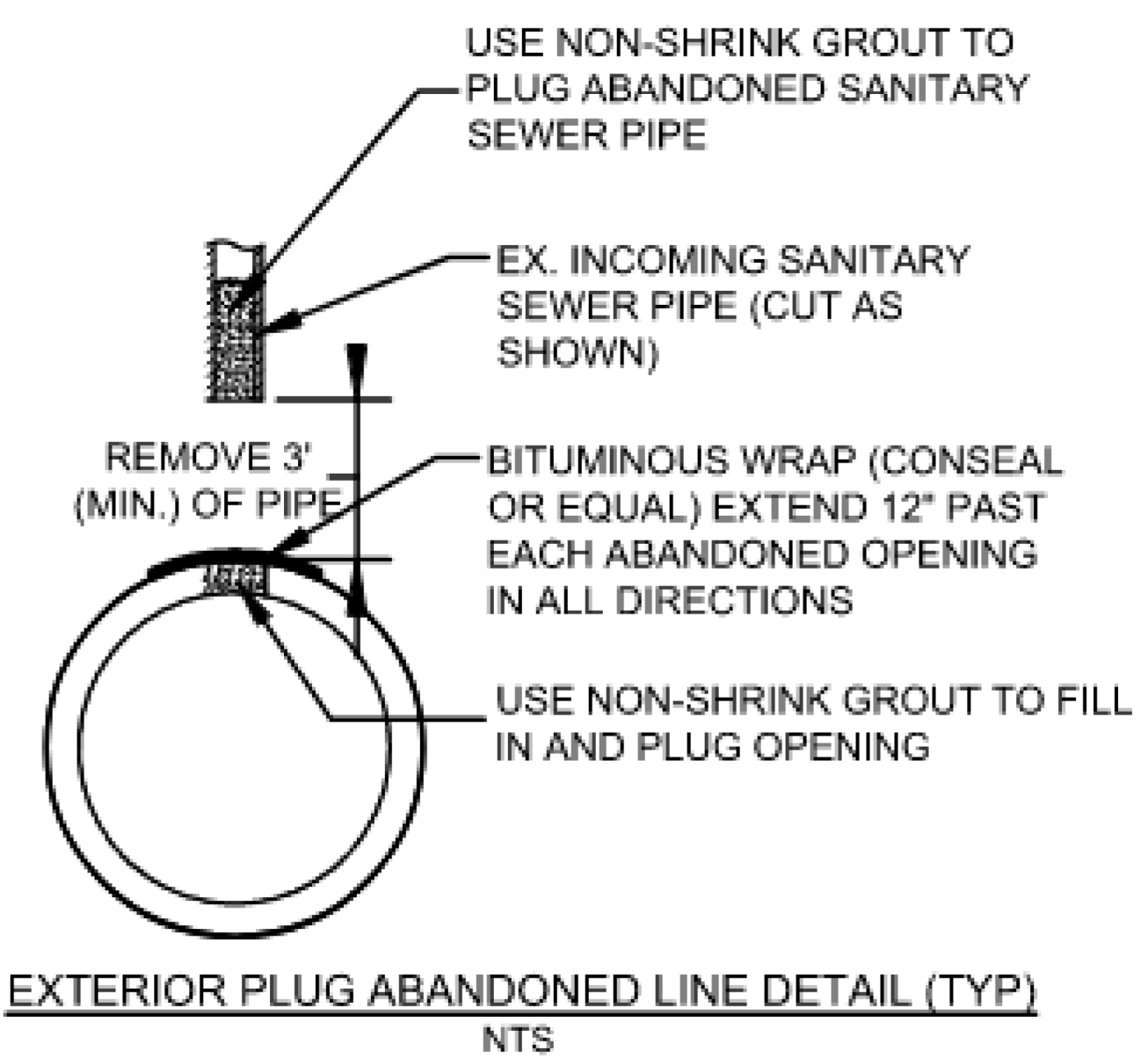
**CREEK CROSSING DETAIL**

**WATER VALVE BOX INSTALLATION  
FOR 4", 6", 8", AND 12" GATE VALVES**

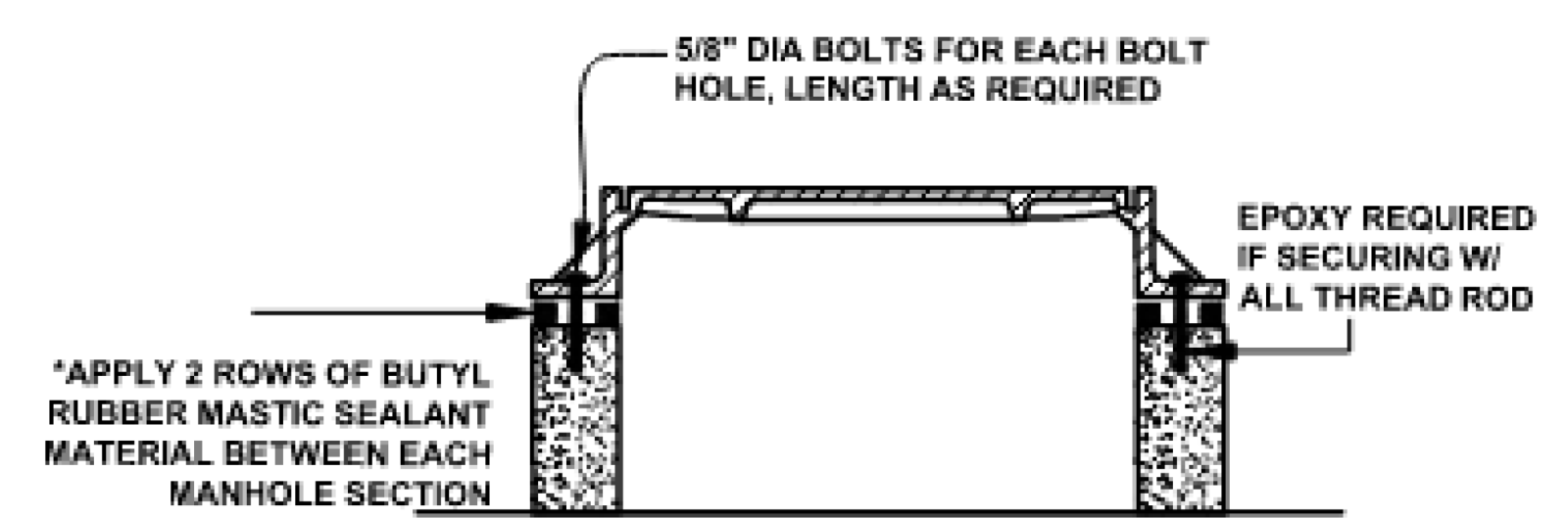
# SANITARY SEWER PROJECT TYPICAL DETAILS

|  |                                 |
|--|---------------------------------|
| PROJECT REFERENCE NO.  | SHEET NO.                       |
| B-5833   | UC-3B                           |
| DESIGNED BY: BCH   |                                 |
| DRAWN BY: KSA  |                                 |
| CHECKED BY:  |                                 |
| APPROVED BY:   |                                 |
| REVISED:   | UTILITY CONSTRUCTION PLANS ONLY |
| NORTH CAROLINA DEPARTMENT OF TRANSPORTATION                          |                                 |
| UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151 |                                 |

**UTILITY CONSTRUCTION**  
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

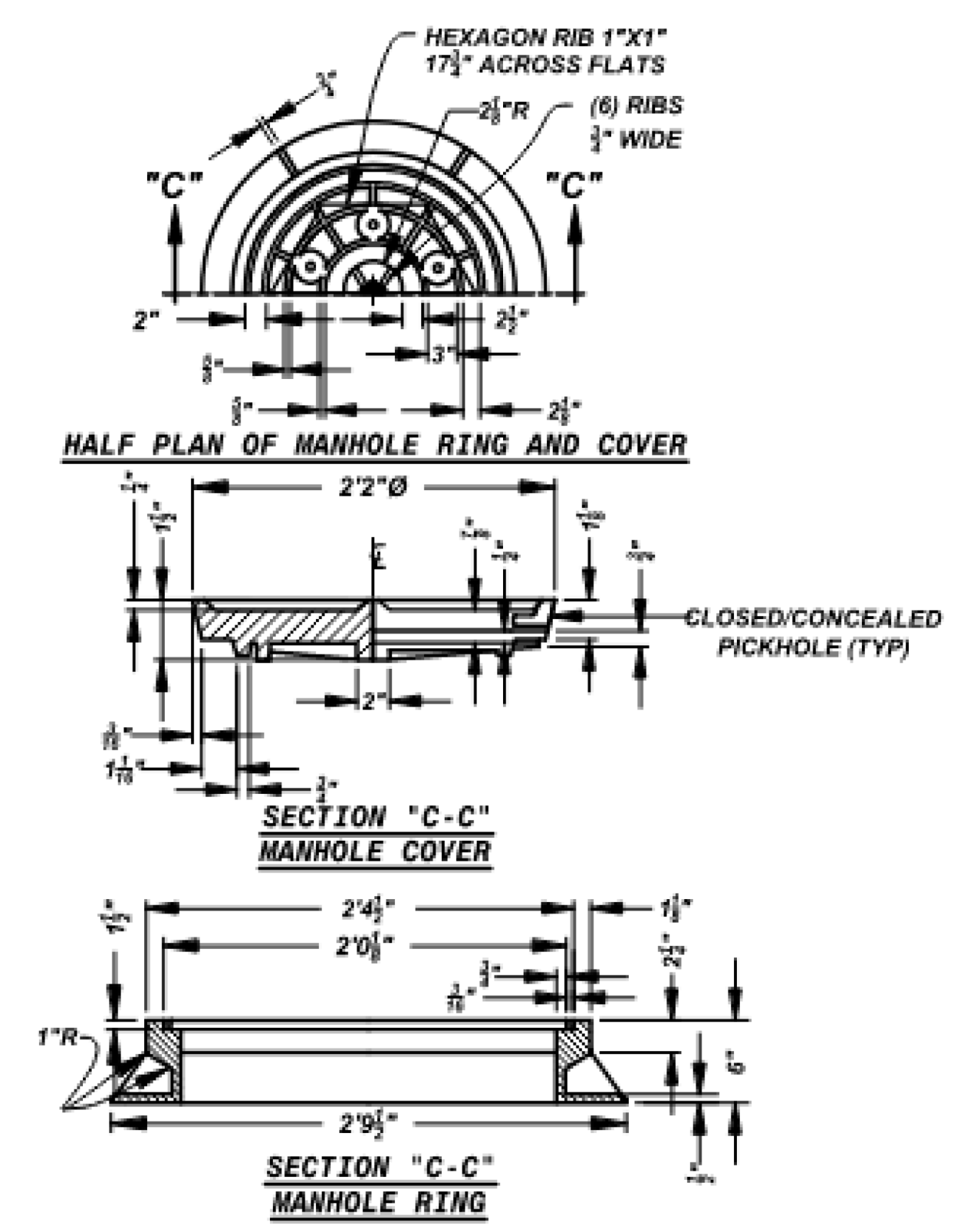


EXTERIOR PLUG ABANDONED LINE DETAIL (TYP)  
NTS

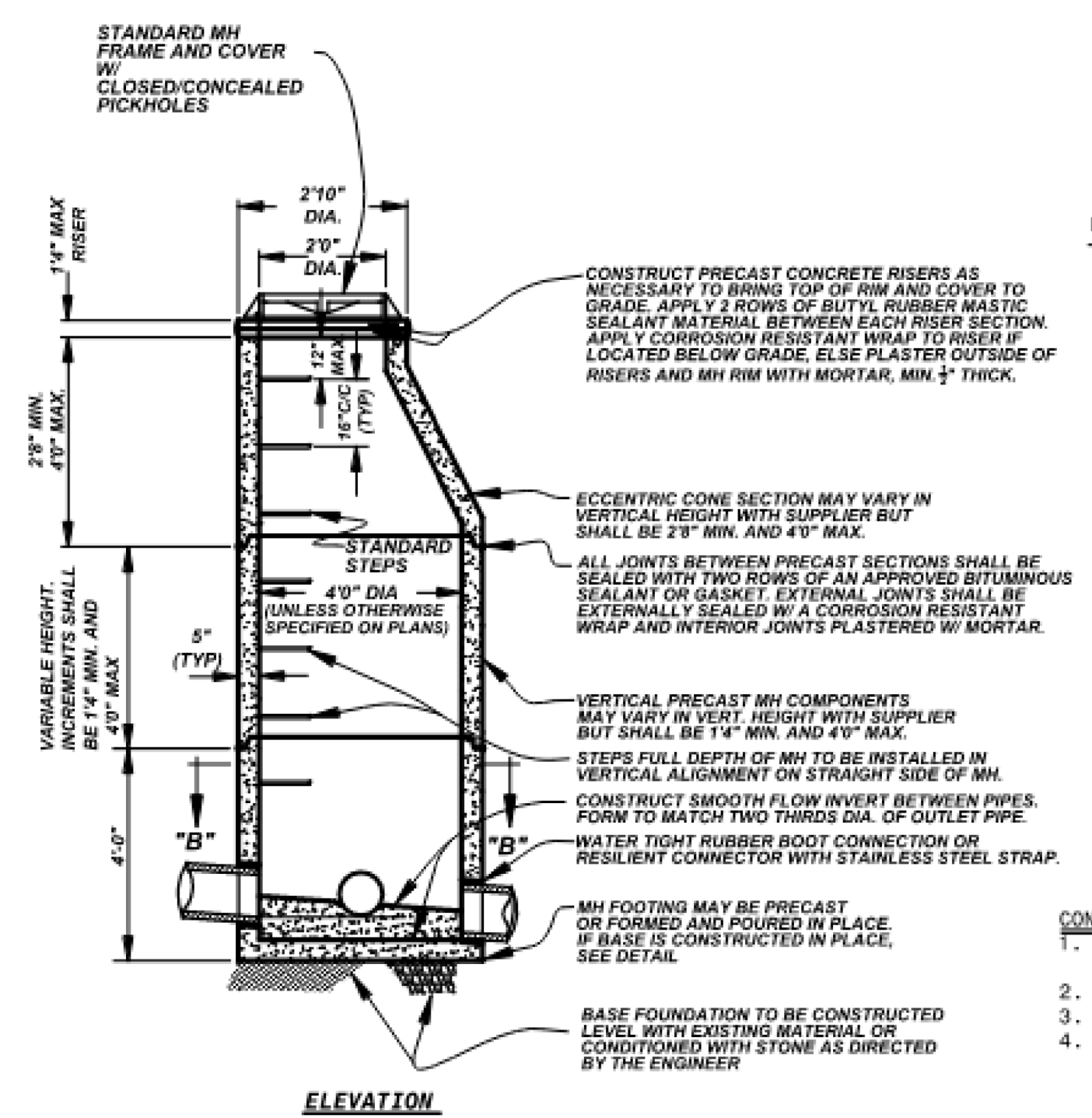


- NOTES:**
1. ALL SURFACES TO BE IN CONTACT WITH SEALANT MATERIAL SHALL BE CLEAN AND FREE OF ALL DEBRIS (ROOTS, SOIL, ETC.) PRIOR TO SEALANT APPLICATION.
  2. FRAME SHALL BE BOLTED DOWN W/ 3/8" DIA STAINLESS STEEL BOLTS USING HILTI, REDHEAD, SIMPSON, OR EQUAL CONCRETE ANCHORS WITH MIN. 3" EMBEDMENT. ALTERNATELY, FRAME MAY BE SECURED W/ 3/8" DIA STAINLESS STEEL ALL THREAD ROD AND EPOXY.

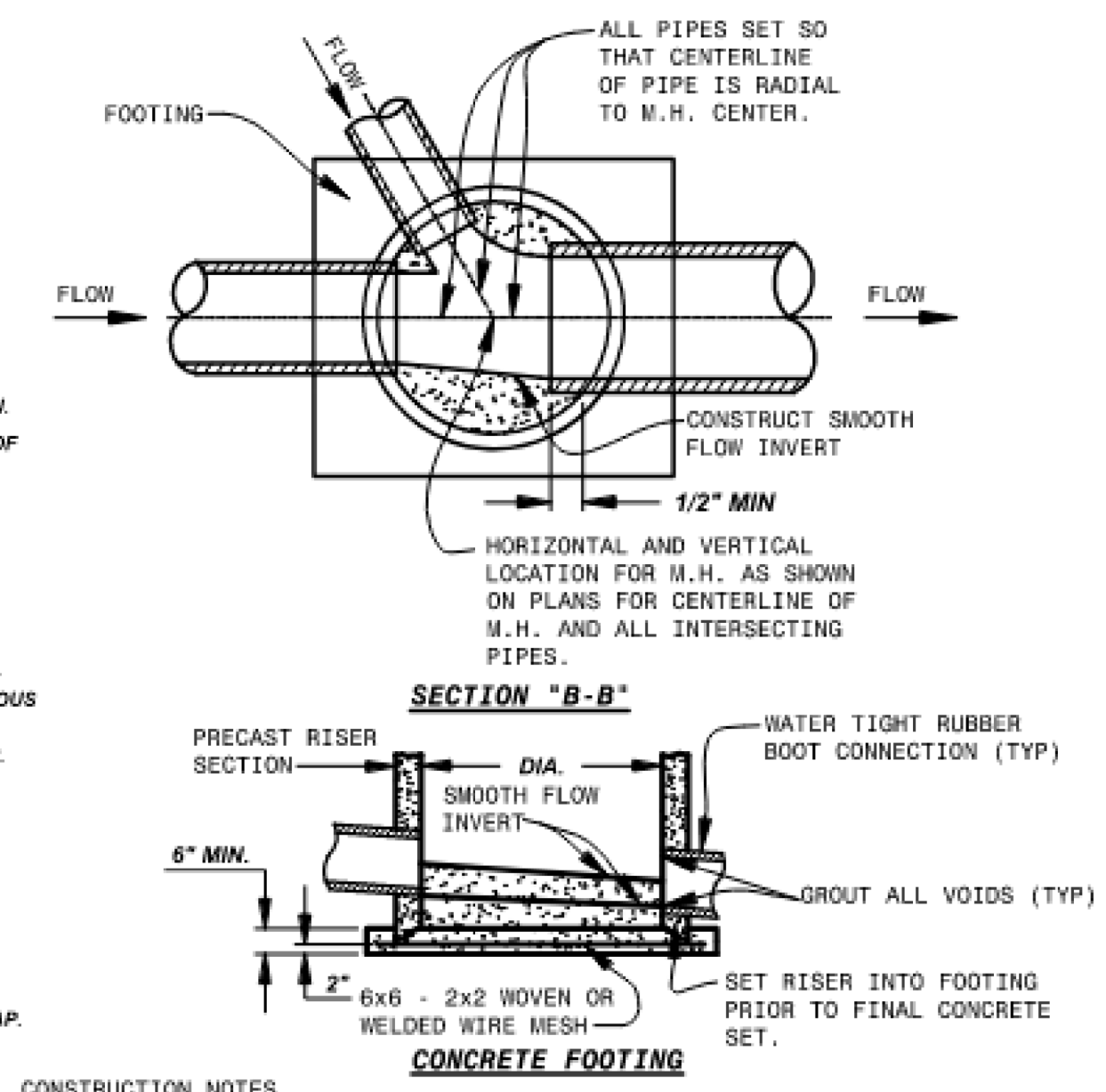
FRAME INSTALLATION IN NON-PAVED AREAS



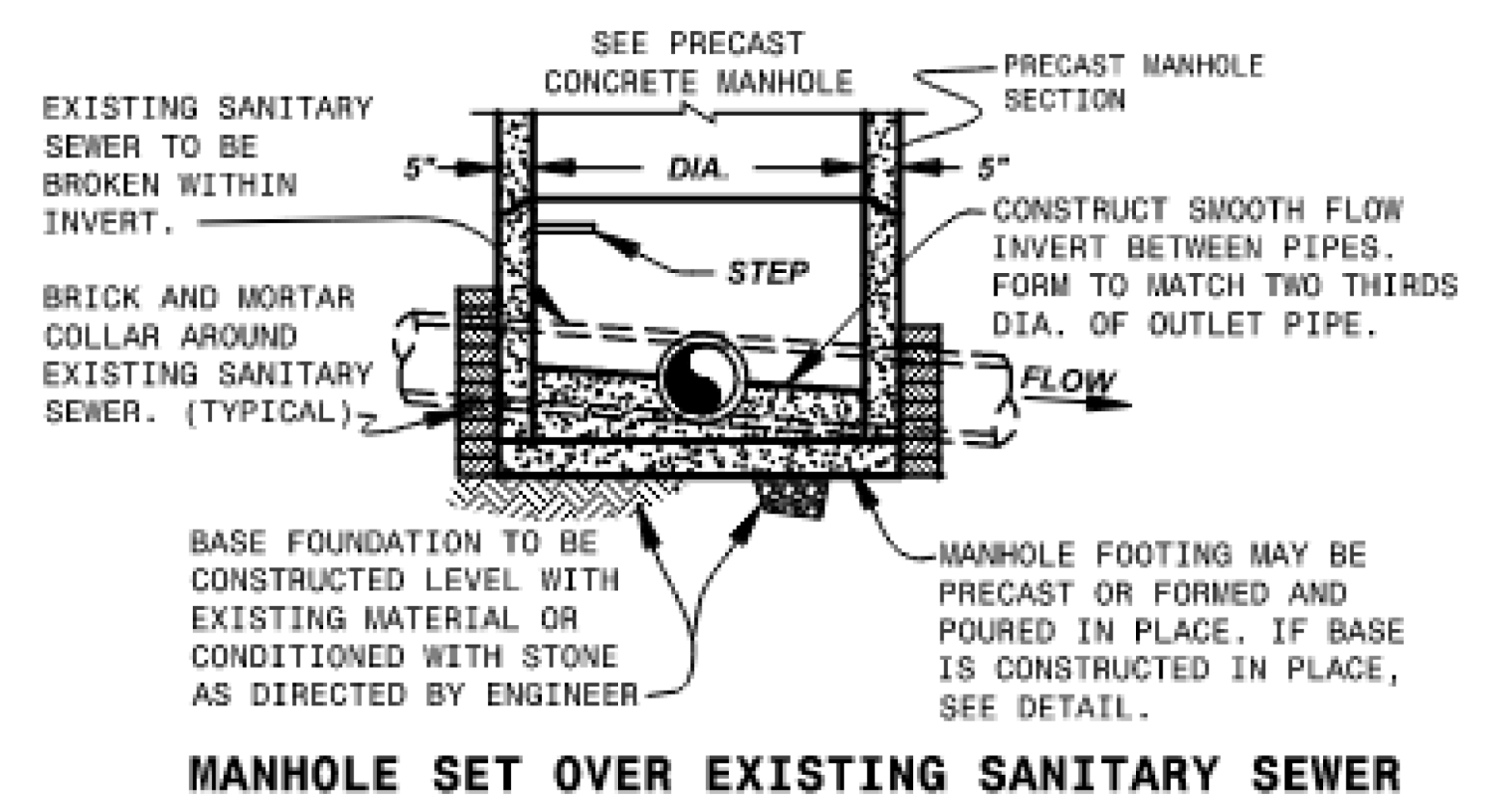
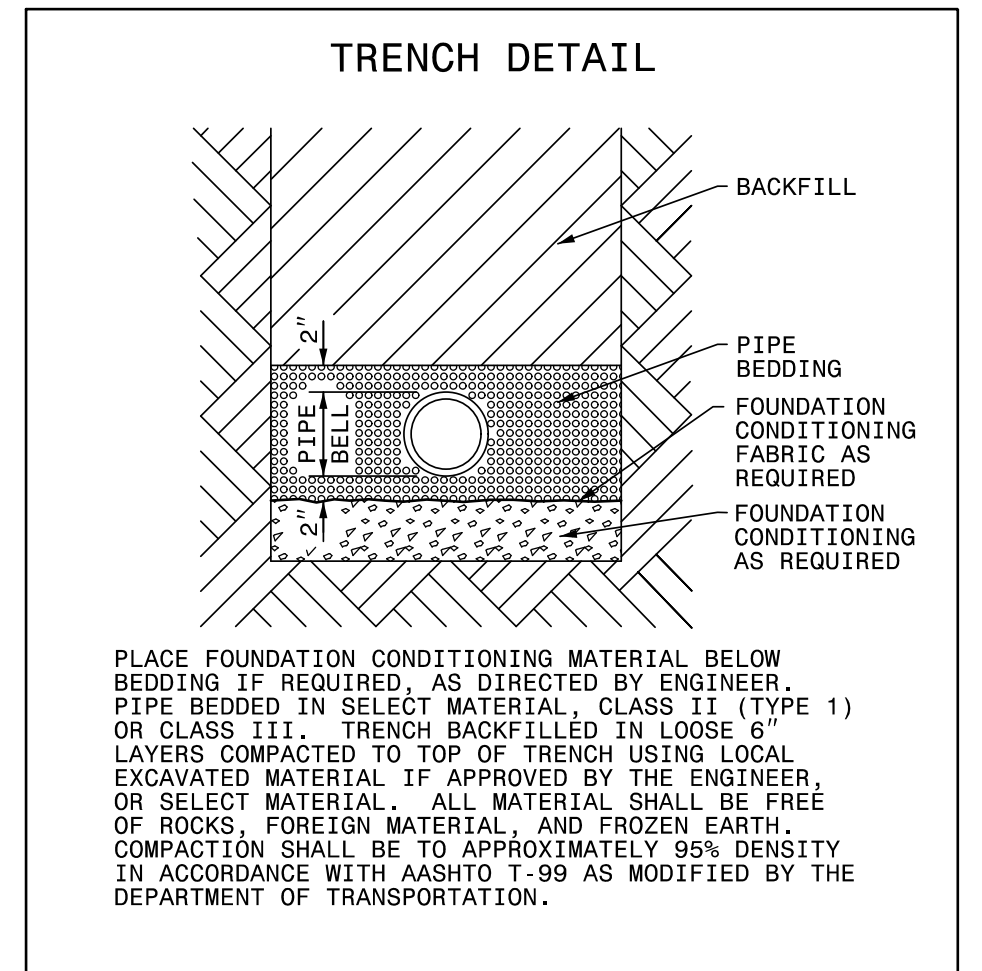
MANHOLE RING AND COVER



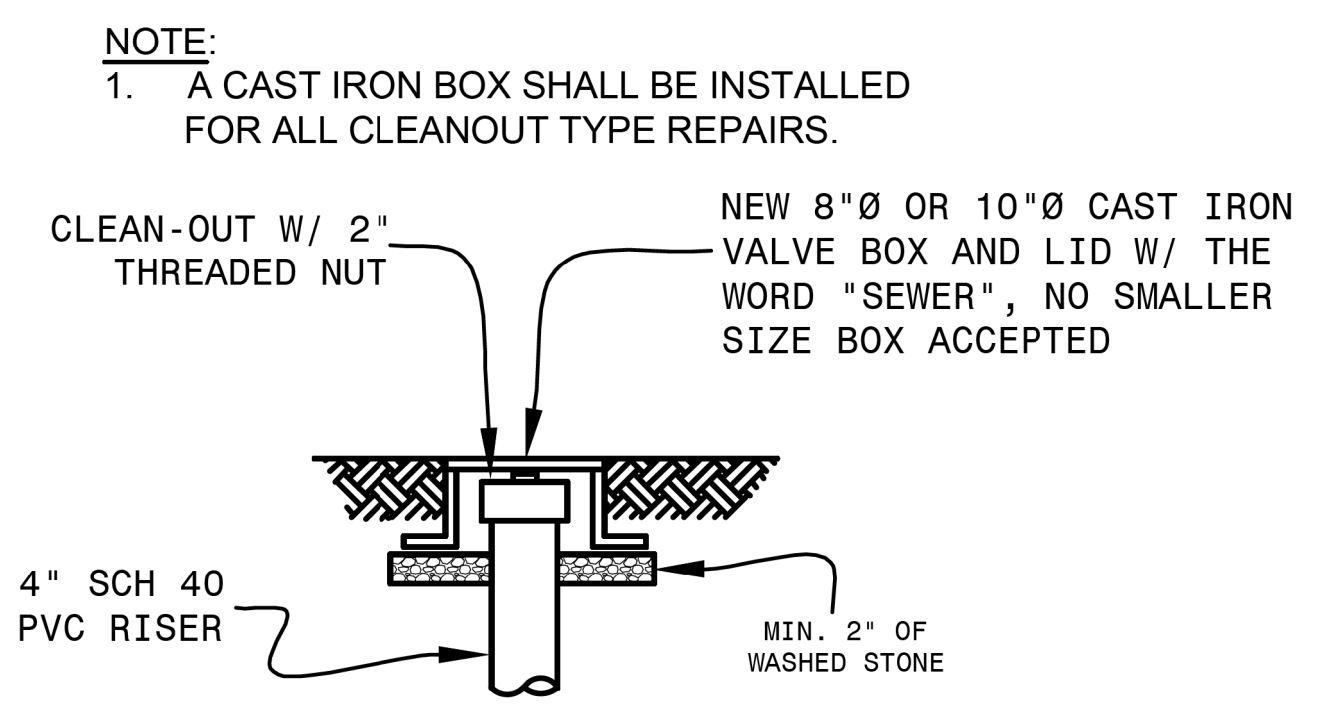
PRECAST CONCRETE MANHOLE



- CONSTRUCTION NOTES:**
1. ALL PRECAST M.H. COMPONENTS SHALL MEET REQUIREMENTS OF ASTM C-478, LATEST REVISION.
  2. ALL "FORMED IN PLACE" CONCRETE SHALL BE CLASS "B".
  3. ALL MANHOLES SHALL BE CONSTRUCTED PLUMB.
  4. IF MANHOLE IS SET IN LOCATION OF HIGH WATER TABLE OR UNDERGROUND WATER IS ENCOUNTERED, THE CONTRACTOR SHALL INSTALL UNDER DRAINS AND STONE AS DIRECTED IN THE FIELD BY THE ENGINEER.



MANHOLE SET OVER EXISTING SANITARY SEWER

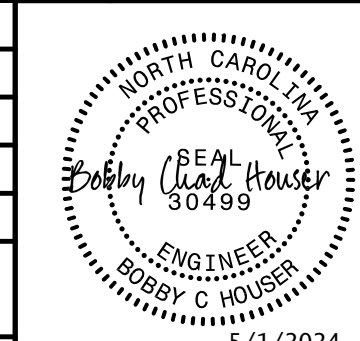


CLEANOUT RELOCATION DETAIL  
NTS

The estimated quantity of Ductile Iron Water Pipe Fitting on this plan sheet is 3500 pounds. The actual quantity and type of fittings will vary based on field conditions.

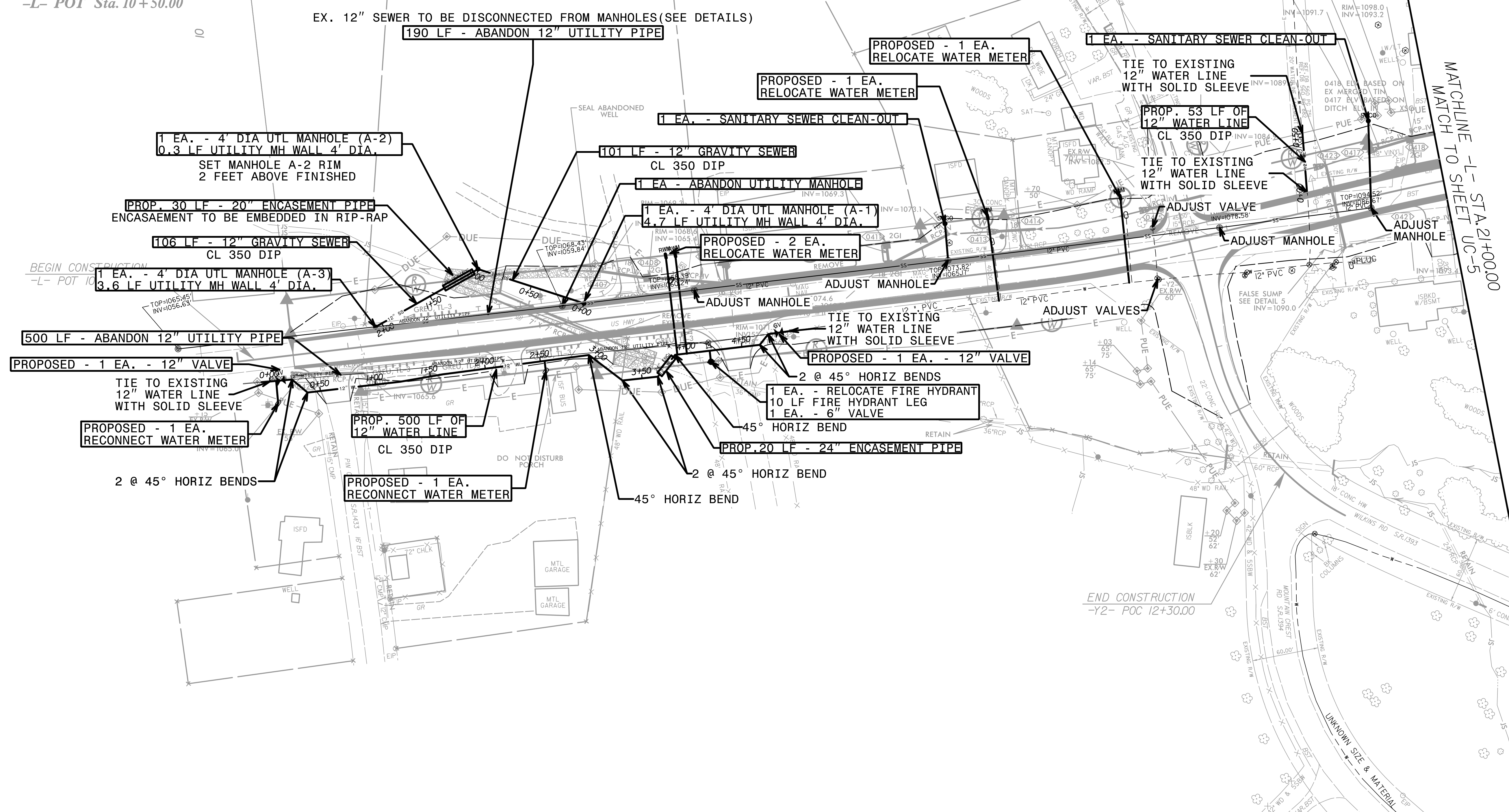
The estimated quantity of "Water Service Line" on this plan sheet is 350 linear feet. The actual quantity will vary based on field conditions and will be determined during construction.

The estimated quantity of "Sewer Service Line" on this plan sheet is 100 linear feet. The actual quantity will vary based on field conditions and will be determined during construction.

|   |  |
|---|--|
| PROJECT REFERENCE NO.<br><b>B-5833</b>  | SHEET NO.<br><b>UC-4</b>   |
| DESIGNED BY: <b>BCH</b>   |  |
| DRAWN BY: <b>VML</b>  |  |
| CHECKED BY:   |  |
| APPROVED BY:  |  |
| REVISED:  | 5/1/2024   |
| NORTH CAROLINA DEPARTMENT OF TRANSPORTATION<br>UTILITIES ENGINEERING SEC.<br>PHONE: (919) 707-6690<br>FAX: (919) 250-4151 |  |
| <b>UTILITY CONSTRUCTION</b><br>DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                           |  |



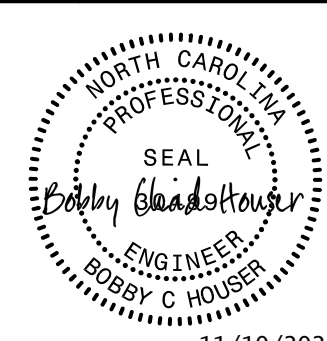
**BEGIN TIP PROJECT B-5833**  
-L- POT Sta. 10+50.00



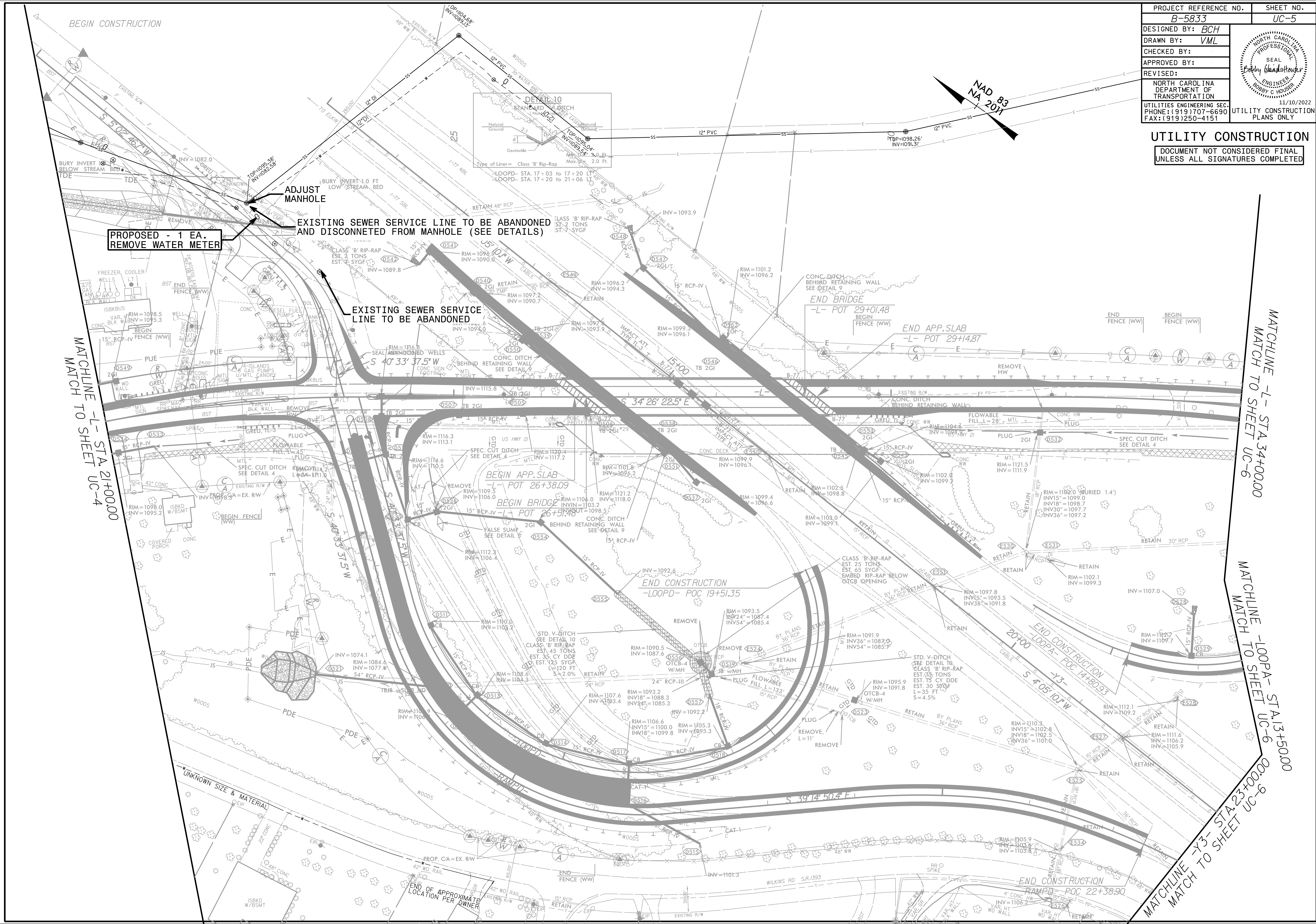
**BEGIN CONSTRUCTION**  
-L- POT 10+50.00

**END CONSTRUCTION**  
-Y2- POC 12+30.00

MATCHLINE TO SHEET UC-5  
-L- STA 21+00.00

|  |  |
|--|--|
| PROJECT REFERENCE NO.<br><b>B-5833</b>                                     | SHEET NO.<br><b>UC-5</b>   |
| DESIGNED BY: <b>BCH</b>  |  |
| DRAWN BY: <b>VML</b>   |  |
| CHECKED BY:  |  |
| APPROVED BY:   |  |
| REVISED:   |  |
| NORTH CAROLINA<br>DEPARTMENT OF<br>TRANSPORTATION                          |  |
| UTILITIES ENGINEERING SEC.<br>PHONE: (919) 707-6690<br>FAX: (919) 250-4151 |  |
| UTILITY CONSTRUCTION<br>PLANS ONLY   |  |

**UTILITY CONSTRUCTION**  
 DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED




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

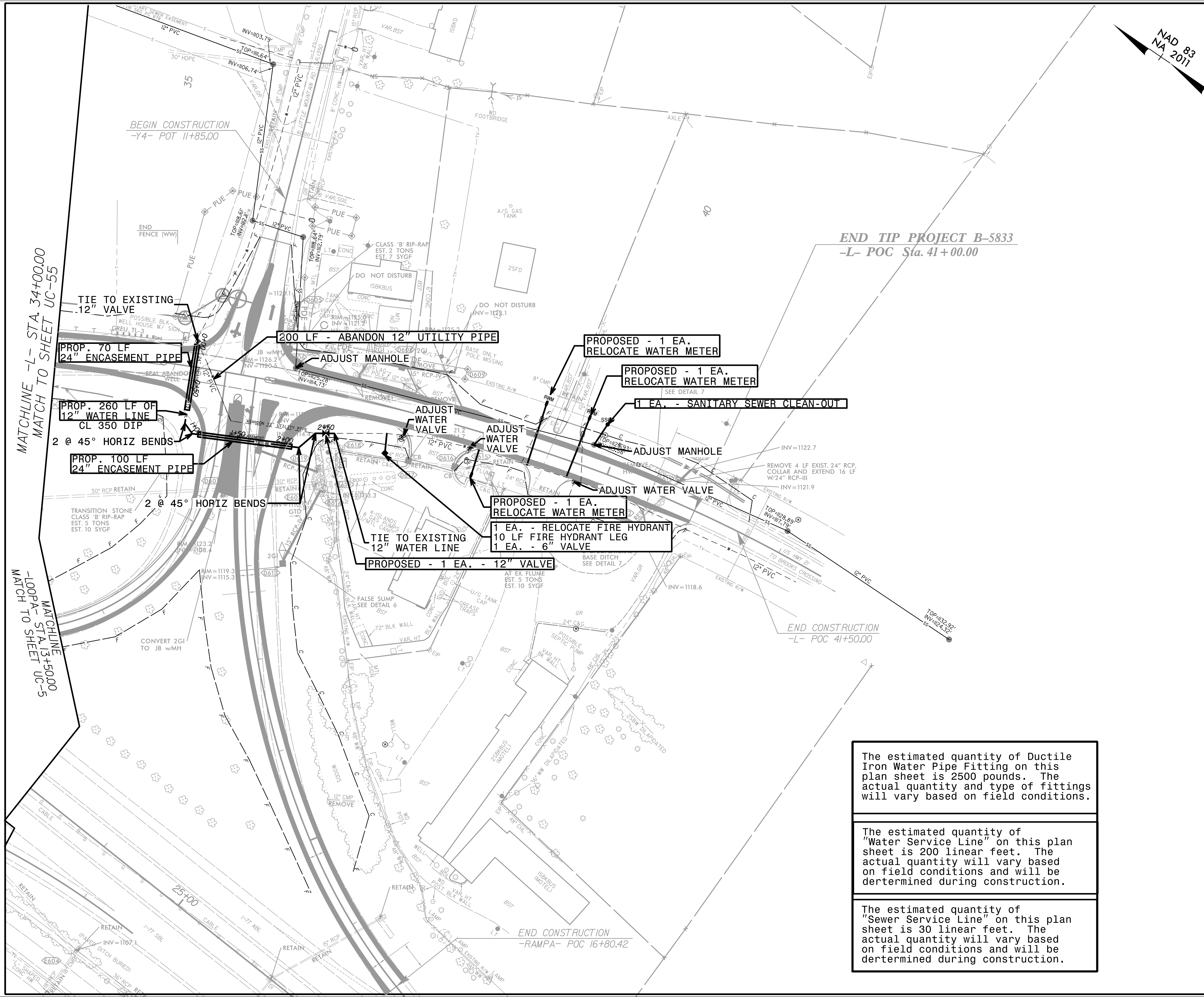
MATCHLINE -L- STA. 34+00.00  
MATCH TO SHEET UC-6

MATCHLINE -LOOPA- STA. 13+50.00  
MATCH TO SHEET UC-6

MATCHLINE -Y3- STA. 23+00.00  
MATCH TO SHEET UC-6

|  |  |
|--|--|
| PROJECT REFERENCE NO.<br><b>B-5833</b>                                     | SHEET NO.<br><b>UC-6</b>   |
| DESIGNED BY: <b>BCH</b>  |  |
| DRAWN BY: <b>VML</b>   |  |
| CHECKED BY:  |  |
| APPROVED BY:   |  |
| REVISED:   | 5/1/2024   |
| NORTH CAROLINA<br>DEPARTMENT OF<br>TRANSPORTATION                          | UTILITY CONSTRUCTION<br>PLANS ONLY   |
| UTILITIES ENGINEERING SEC.<br>PHONE: (919) 707-6690<br>FAX: (919) 250-4151 |  |

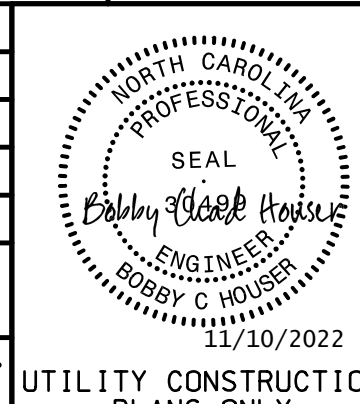
**UTILITY CONSTRUCTION**  
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



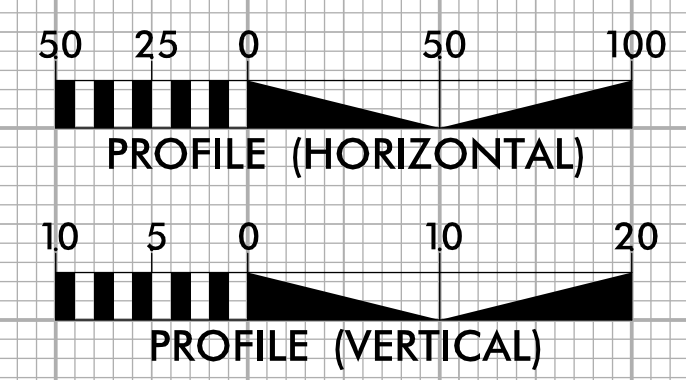
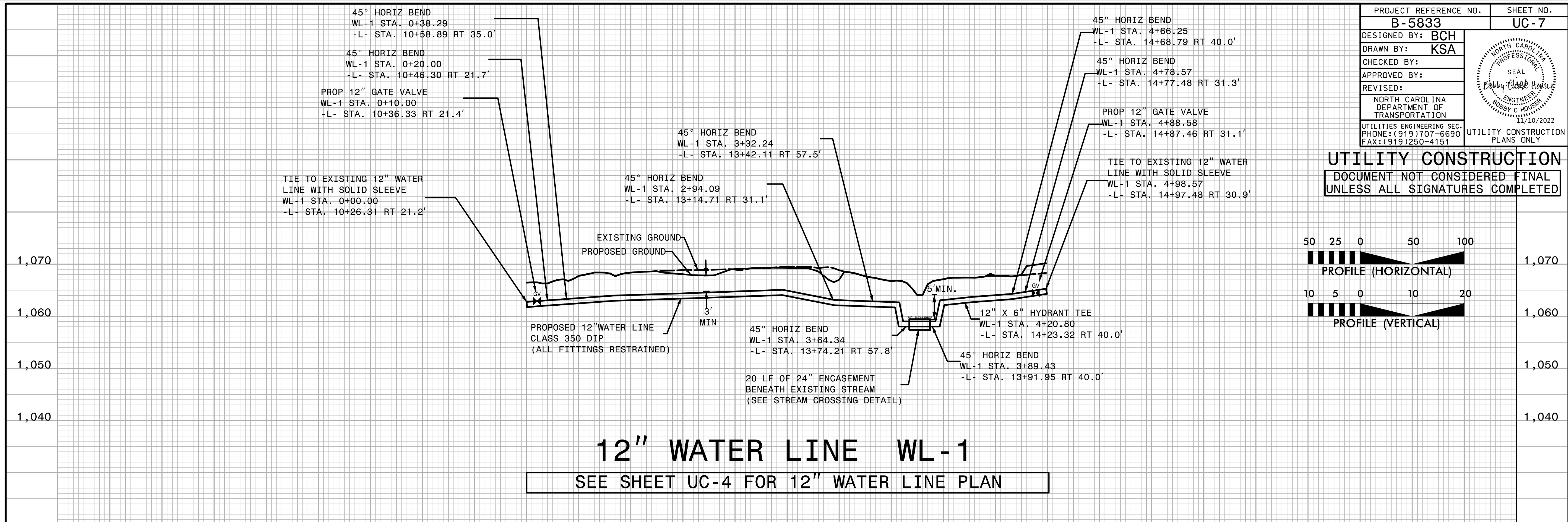
The estimated quantity of Ductile Iron Water Pipe Fitting on this plan sheet is 2500 pounds. The actual quantity and type of fittings will vary based on field conditions.

The estimated quantity of "Water Service Line" on this plan sheet is 200 linear feet. The actual quantity will vary based on field conditions and will be determined during construction.

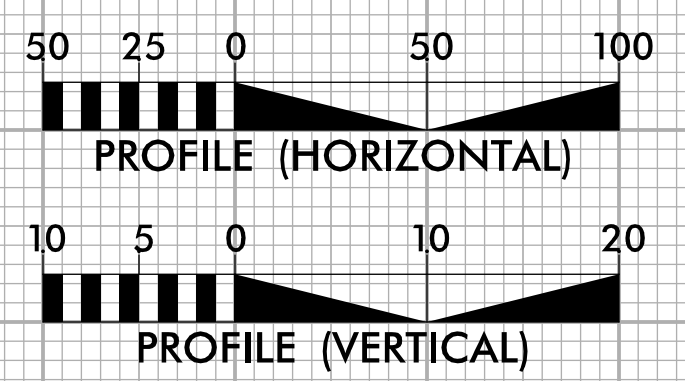
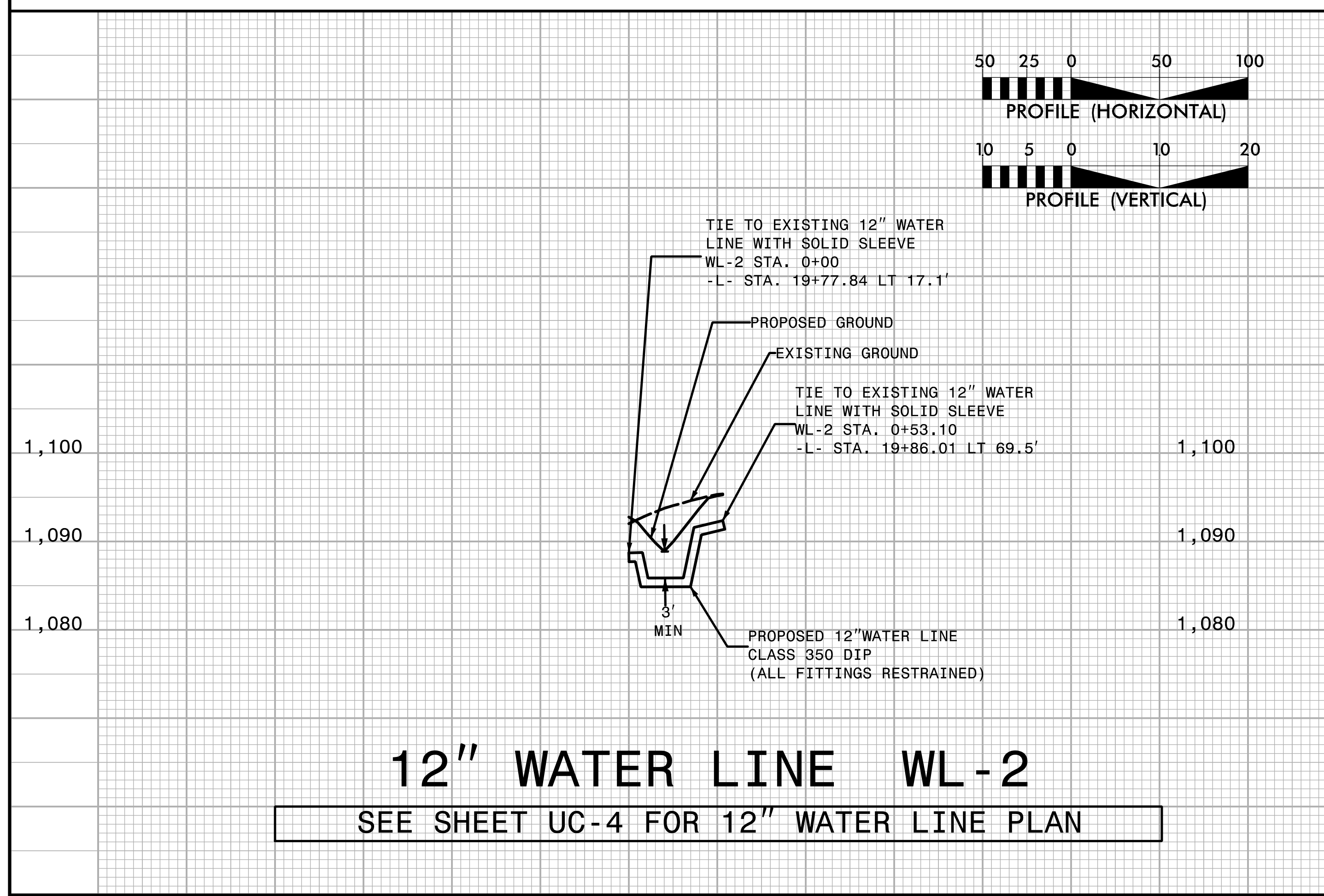
The estimated quantity of "Sewer Service Line" on this plan sheet is 30 linear feet. The actual quantity will vary based on field conditions and will be determined during construction.

|  |  |
|--|--|
| PROJECT REFERENCE NO.  | SHEET NO.  |
| B-5833   | UC-7   |
| DESIGNED BY: BCH   |  |
| DRAWN BY: KSA  |  |
| CHECKED BY:  |  |
| APPROVED BY:   |  |
| REVISED:   |  |
| NORTH CAROLINA DEPARTMENT OF TRANSPORTATION                        |  |
| UTILITIES ENGINEERING SEC. PHONE: (919)707-6690 FAX: (919)250-4151 |  |
| UTILITY CONSTRUCTION PLANS ONLY                                    |  |

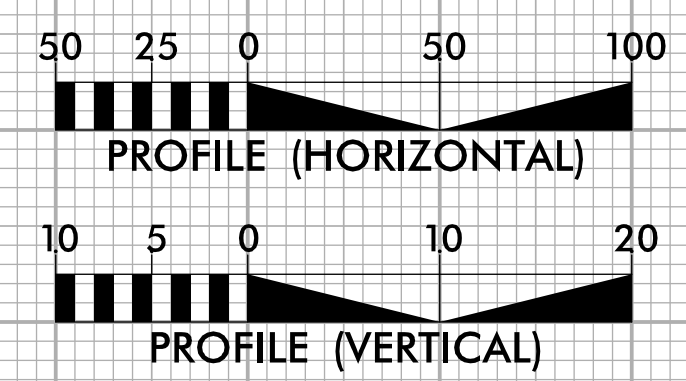
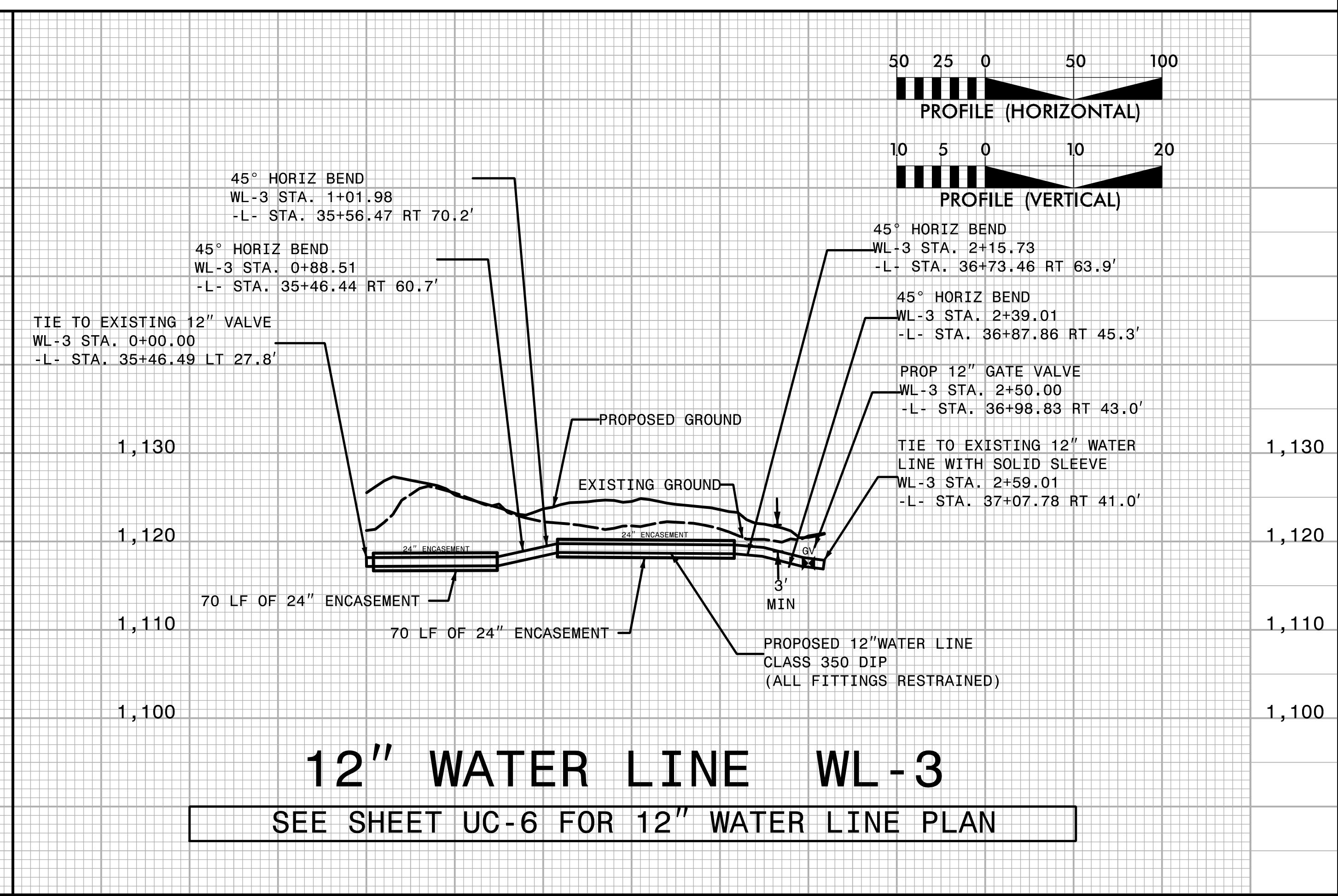
**UTILITY CONSTRUCTION**  
 DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED



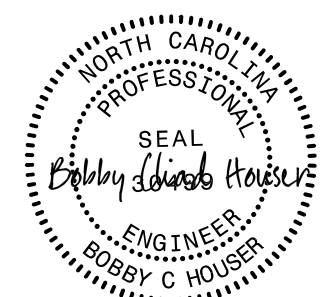
-+00 0+50 1+00 1+50 2+00 2+50 3+00 3+50 4+00 4+50



-+00 0+50

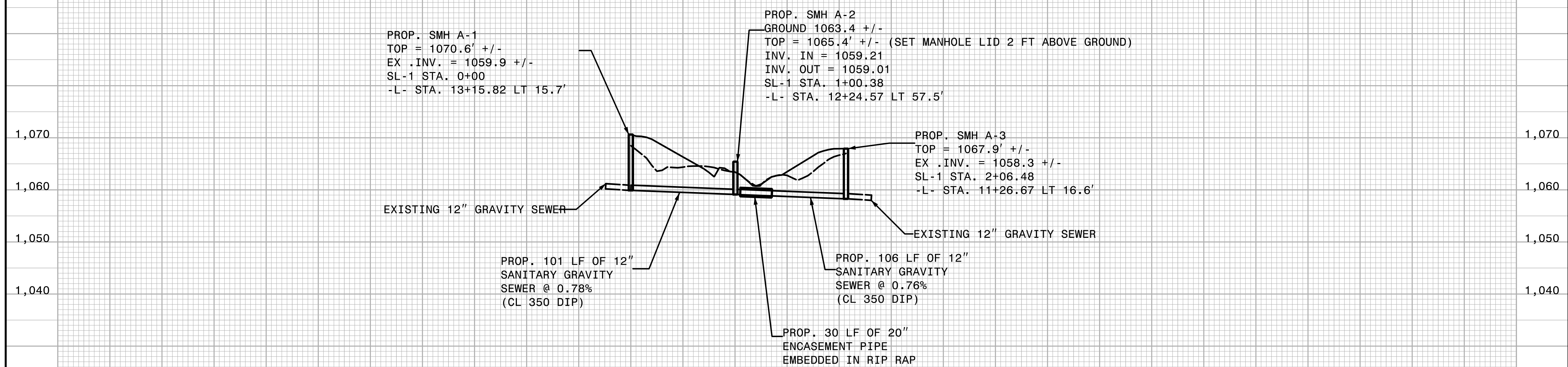
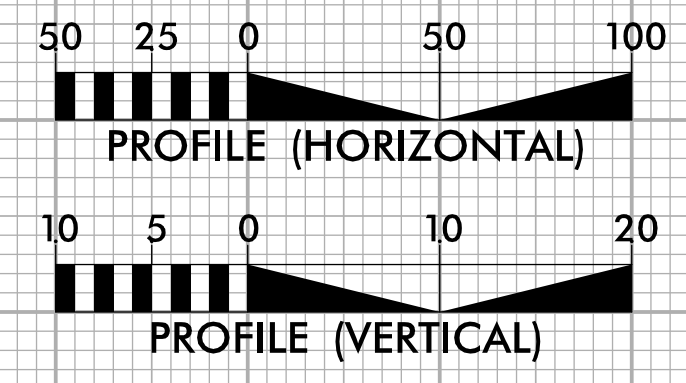


-+00 0+50 1+00 1+50 2+00 2+50

|  |   |
|--|---|
| PROJECT REFERENCE NO.<br><b>B-5833</b>                                     | SHEET NO.<br><b>UC-8</b>  |
| DESIGNED BY: <b>BCH</b>  |  |
| DRAWN BY: <b>KSA</b>   |   |
| CHECKED BY:  |   |
| APPROVED BY:   |   |
| REVISED:   |   |
| NORTH CAROLINA<br>DEPARTMENT OF<br>TRANSPORTATION                          |   |
| UTILITIES ENGINEERING SEC.<br>PHONE: (919) 707-6690<br>FAX: (919) 250-4151 | UTILITY CONSTRUCTION<br>PLANS ONLY  |

**UTILITY CONSTRUCTION**

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



**12" GRAVITY SEWER LINE SL-1**  
SEE SHEET UC-4 FOR 12" GRAVITY SEWER LINE PLAN

-+00 0+50 1+00 1+50 2+00