

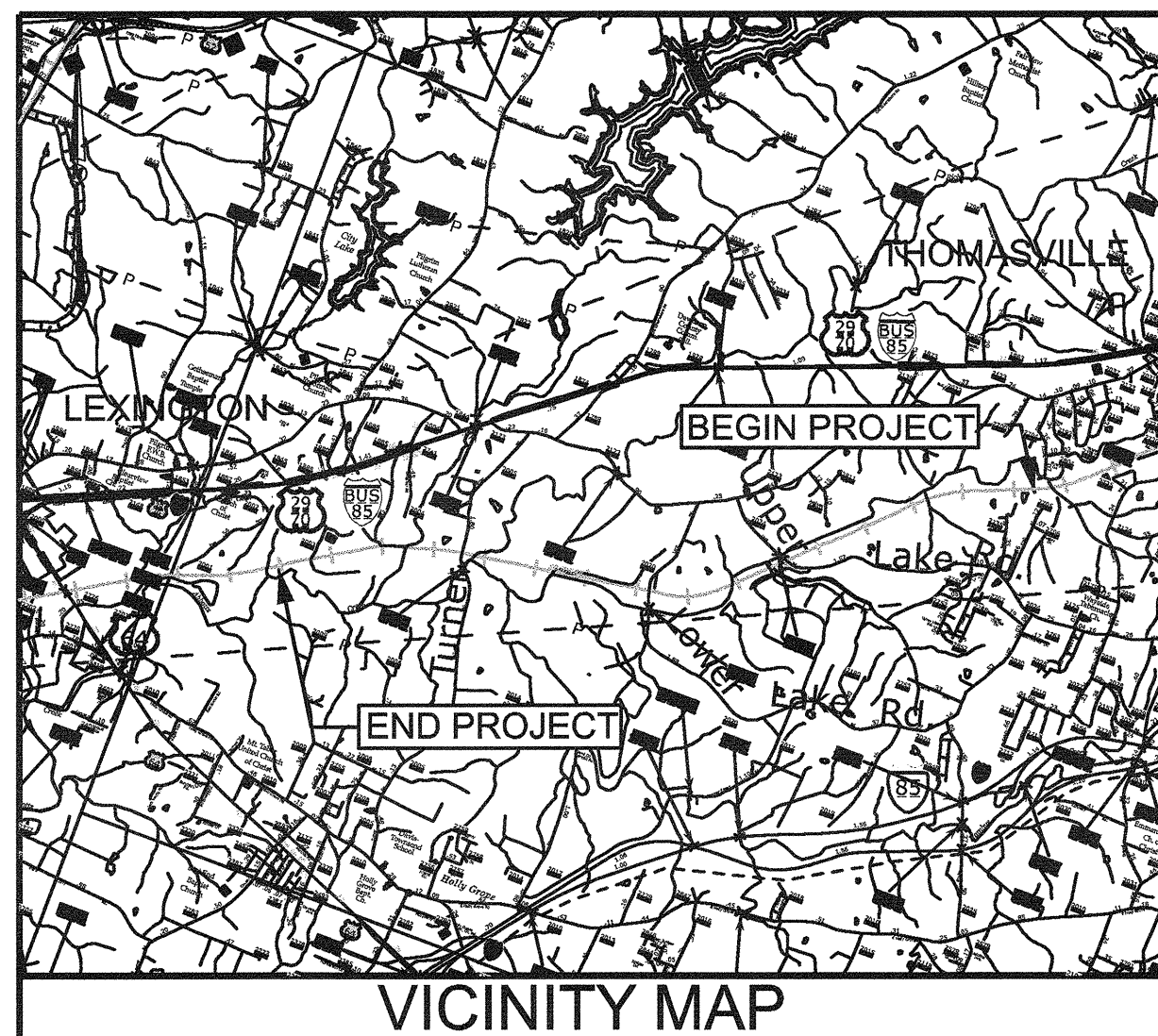
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DAVIDSON COUNTY

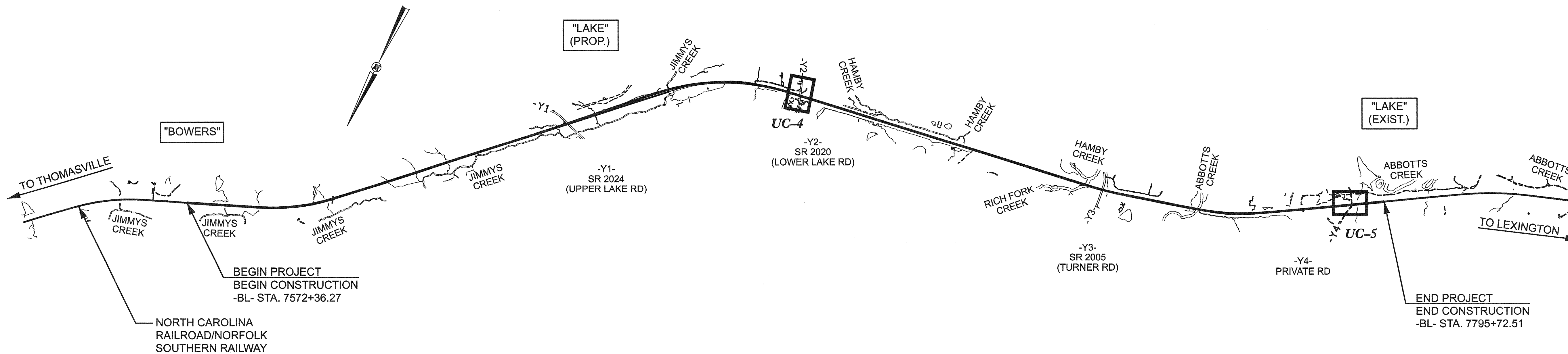
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	C-4901A	UC-1	11

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554

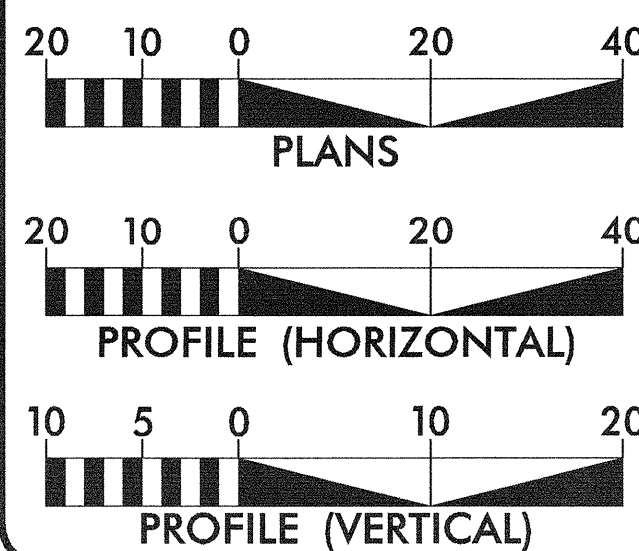
DATE: MARCH 7, 2013



**LOCATION: "BOWERS" (MP 309.8) TO "LAKE" (MP 314.0)
ON THE NCRNRS MAINLINE**
TYPE OF WORK: UTILITIES CONSTRUCTION



GRAPHIC SCALES



INDEX OF SHEETS

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UC-8 TO UC-11	DETAILS

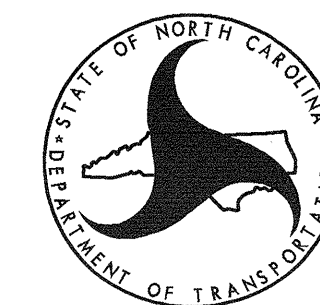
UTILITY OWNERS ON THIS PROJECT:

WATER - DAVIDSON WATER INC.

UTILITY DESIGN ENGINEER



2013-MAR-08



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

RAIL DIVISION

UTILITY DESIGN BY:

MA Engineering
CONSULTANTS, INC.
598 East Chatham Street, Suite 137, Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Prepared for:

ENGINEERING & SAFETY BRANCH

MAIL: 1536 MAIL SERVICE CENTER RALEIGH, NC 27639-1536 DELIVERY: 860 CAPITAL BOULEVARD RALEIGH, NC 27603 PHONE: (919) 715-8803 FAX: (919) 715-8804

\$\$\$DATE\$\$\$
\$\$\$TIME\$\$\$
\$\$\$DOWNS\$\$\$
\$\$\$SERIALNAME\$\$\$

Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

STATE OF NORTH CAROLINA
RAIL DIVISION

UTILITIES PLAN SHEET SYMBOLS

Water

Proposed Back Flow Preventor	
Relocate Back Flow Preventor	
Existing Water Valve	
Proposed Valve	
Proposed Tapping Valve	
Existing Water Meter	
Proposed Water Meter	
Proposed Water Meter/Vault	
Relocate Water Meter	
Remove Water Meter	REM WM
Existing Hydrant	
Prop Hydrant	
Relocate Hydrant	
Remove Hydrant	REM FH

Proposed RPZ Back Flow Preventor	
Relocate RPZ Back Flow Preventor	
Water Cross	
Water Plug	
Water Reducer	
Water Tee	
Water Pump Station	
Water Thrust Block	
Blow Off Valve	
Air Release Valve	
Water Line Stop	
Water Line Stop w Bypass	

Utility By Other Symbols

Proposed Tel Pole	
Proposed Power Pole	
Proposed Joint Use Power, Tel Pole	
Proposed Joint Use Power, CATV Pole	
Proposed Joint Use Power, Tel, CATV Pole	
Proposed Joint Use Tel, CATV Pole	

Sewer

Existing Manhole	
Proposed UT Manhole	
Remove UT Manhole	REM UT MH
Abandon Utility Manhole	ABAND MH
Sewer Line Stop	
Sewer Line Stop w Bypass	

Sewer Cross	
Sewer Plug	
Sewer Reducer	
Sewer Tee	
Sewer Pump Station	
Sewer Thrust Block	

PUE Monument	
Concrete Pier	
Steel Pile Pier	
Test Hole (SUE)	
Prop Utility Vault	

0248DEL P10C1

SYNTHETIC CONDITION

0248DEL_P10C1

UTILITY CONSTRUCTION NOTES

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554

DATE: MARCH 7, 2013

PROJECT REFERENCE NO. SHEET NO.
C-4901A UC-3

UTILITY DESIGN ENGINEER



2013-MAR-08

MA Engineering CONSULTANTS, INC. 598 E. Chatham Street, Suite 137, Cary, N. C. 27511

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 2012.
2. THE EXISTING UTILITIES BELONG TO:

DAVIDSON WATER, INC .
CONTACT: ROBERT WALTERS
PHONE: 336-731-5526
3. ALL WATER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL AND NATURAL RESOURCES, DIVISION OF ENVIRONMENTAL HEALTH. ALL SEWER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, DIVISION OF WATER QUALITY. 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:

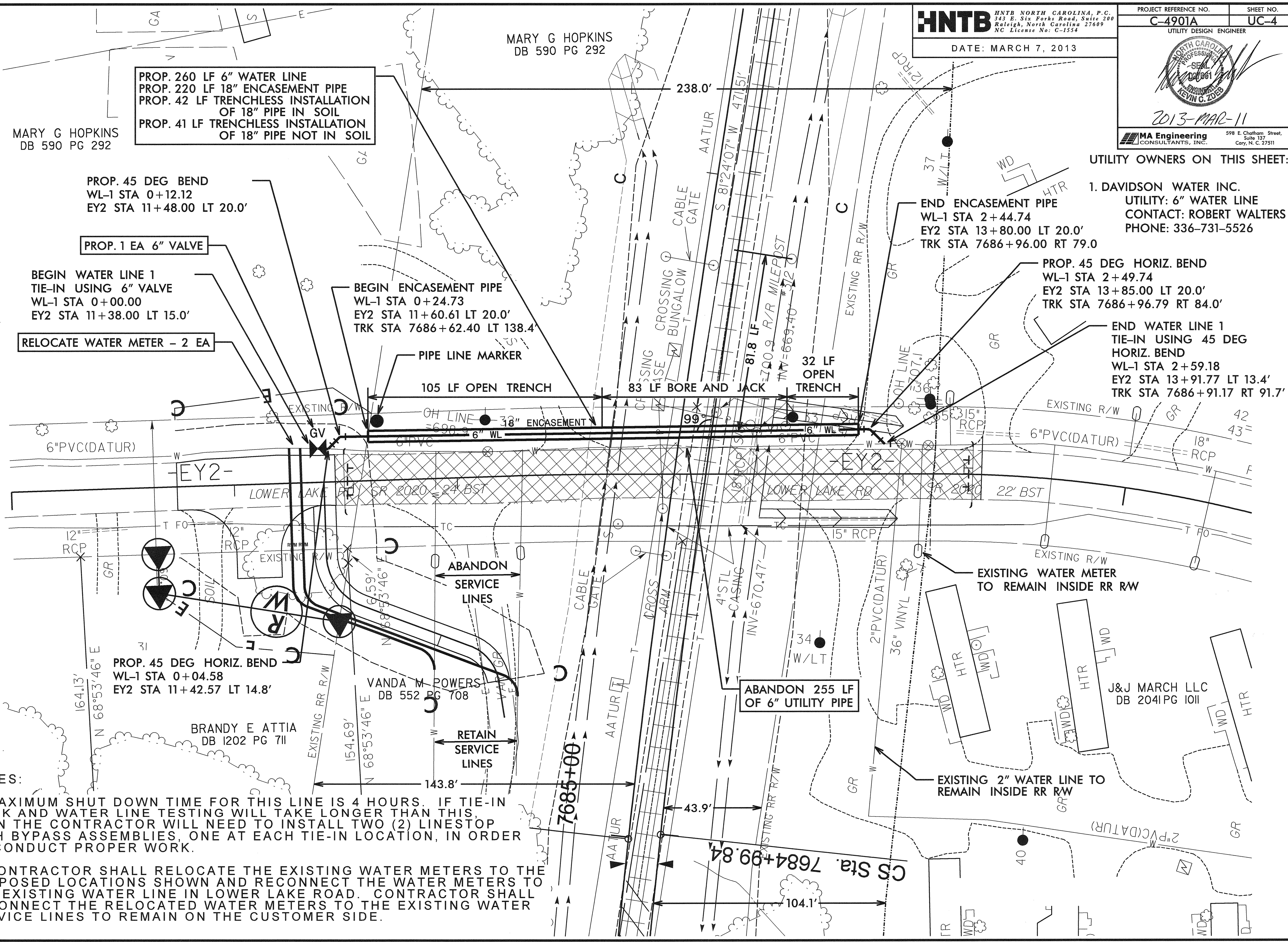
1. PROPOSED WATER LINE SHALL BE D.I.R.J. (DUCTILE IRON RESTRAINED JOINT) PIPE. THE 6-INCH WATER LINE SHALL BE THICKNESS CLASS 50 WITH A PRESSURE CLASS OF 350. THE 24-INCH WATER LINE SHALL BE THICKNESS CLASS 55.
2. PROPOSED WATER LINE FITTINGS, 4-INCHES THROUGH 24-INCHES IN DIAMETER, SHALL BE DUCTILE IRON.
3. ALL FITTINGS (BENDS, TEES, CROSSES, REDUCERS, PLUGS, ETC.) SHALL BE ADEQUATELY RESTRAINED BY THE USE OF RESTRAINED JOINT CONSTRUCTION.
4. CONTRACTOR'S ATTENTION IS DIRECTED TO SECTIONS 102, 107, AND 1550 OF THE STANDARD SPECIFICATIONS CONCERNING TRENCHLESS INSTALLATION. IT IS THE 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. MAXIMUM SHUT DOWN TIME FOR THE 6" WATER LINE IS 4 HOURS. IF TIE-IN WORK AND WATER LINE TESTING WILL TAKE LONGER THAN THIS THEN THE CONTRACTOR WILL NEED TO INSTALL TWO (2) LINE STOP WITH BYPASS ASSEMBLIES, ONE AT EACH TIE-IN LOCATION, IN ORDER TO CONDUCT PROPER WORK.
6. MAXIMUM SHUT DOWN TIME FOR THE 24" WATER LINE IS 6 HOURS. IF TIE-IN WORK AND WATER LINE TESTING WILL TAKE LONGER THAN THIS THEN THE CONTRACTOR WILL NEED TO INSTALL TWO (2) LINE STOP WITH BYPASS ASSEMBLIES, ONE AT EACH TIE-IN LOCATION, IN ORDER TO CONDUCT PROPER WORK.
7. THE EXISTING WATER LINES SHALL BE RESTRAINED AT ALL TIE-IN LOCATIONS BY USE OF A THRUST COLLAR, UNLESS OTHERWISE DIRECTED BY THE RESIDENT ENGINEER OR A REPRESENTATIVE OF DAVIDSON WATER, INC.
8. WATER SERVICE LINES SHALL BE 3/4" TYPE K COPPER TUBING IN ACCORDANCE WITH ASTM B-88.

9. 6" GATE VALVES SHALL BE OPEN LEFT WITH A NON-RISING STEM, IRON BODY, 200 PSI WORKING PRESSURE, RESILIENT SEATED, AND MECHANICAL JOINT WITH RESTRAINING GLANDS.
10. 24" BUTTERFLY VALVES SHALL BE EPOXY COATED INSIDE, BI-DIRECTION OPEN, 250 PSI MAXIMUM WORKING PRESSURE, RESILIENT SEATED, AND MECHANICAL JOINT WITH RESTRAINING GLANDS.
11. ALL WATER MAINS SHALL BE PRESSURE TESTED TO 200 PSI.
12. ALL WATER MAINS SHALL BE FLUSHED AND DISINFECTED PRIOR TO BEING PLACED INTO SERVICE. FLUSHING VELOCITY SHALL BE A MINIMUM OF 2.5 FPS. BACTERIOLOGICAL TEST SAMPLES SHALL BE TAKEN BY DAVIDSON WATER, INC. FOR EVALUATION AND LINE DISINFECTANT APPROVAL.

LIST OF STANDARD DRAWINGS

1515.01 WATER METER

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PROP. 260 LF 6" WATER LINE
 PROP. 220 LF 18" ENCASEMENT PIPE
 PROP. 42 LF TRENCHLESS INSTALLATION
 OF 18" PIPE IN SOIL
 PROP. 41 LF TRENCHLESS INSTALLATION
 OF 18" PIPE NOT IN SOIL

PROP. 45 DEG BEND
 WL-1 STA 0+12.12
 EY2 STA 11+48.00 LT 20.0'

PROP. 1 EA 6" VALVE

BEGIN WATER LINE 1
 TIE-IN USING 6" VALVE
 WL-1 STA 0+00.00
 EY2 STA 11+38.00 LT 15.0'

RELOCATE WATER METER - 2 EA

BEGIN ENCASEMENT PIPE
 WL-1 STA 0+24.73
 EY2 STA 11+60.61 LT 20.0'
 TRK STA 7686+62.40 LT 138.4'

PIPE LINE MARKER

105 LF OPEN TRENCH

83 LF BORE AND JACK

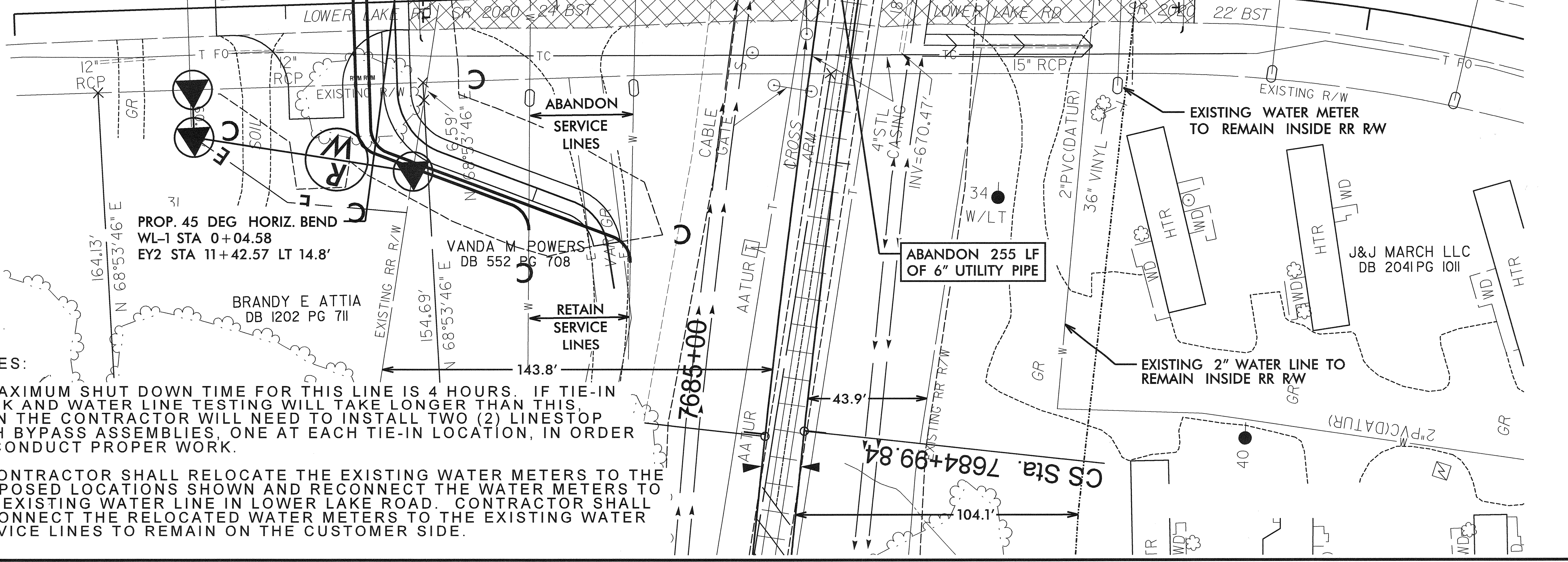
32 LF OPEN TRENCH

6" PVC(DATUR)

EY2-

EY2-

6" PVC(DATUR)



PROP. 45 DEG HORIZ. BEND
 WL-1 STA 0+04.58
 EY2 STA 11+42.57 LT 14.8'

BRANDY E ATTIA
 DB 1202 PG 711

VANDA M POWERS
 DB 552 PG 708

ABANDON 255 LF OF 6" UTILITY PIPE

EXISTING WATER METER TO REMAIN INSIDE RR RW

EXISTING 2" WATER LINE TO REMAIN INSIDE RR RW

J&J MARCH LLC
 DB 2041 PG 1011

NOTES:

1. MAXIMUM SHUT DOWN TIME FOR THIS LINE IS 4 HOURS. IF TIE-IN WORK AND WATER LINE TESTING WILL TAKE LONGER THAN THIS, THEN THE CONTRACTOR WILL NEED TO INSTALL TWO (2) LINESSTOP WITH BYPASS ASSEMBLIES, ONE AT EACH TIE-IN LOCATION, IN ORDER TO CONDUCT PROPER WORK.
2. CONTRACTOR SHALL RELOCATE THE EXISTING WATER METERS TO THE PROPOSED LOCATIONS SHOWN AND RECONNECT THE WATER METERS TO THE EXISTING WATER LINE IN LOWER LAKE ROAD. CONTRACTOR SHALL RECONNECT THE RELOCATED WATER METERS TO THE EXISTING WATER SERVICE LINES TO REMAIN ON THE CUSTOMER SIDE.

MARY G HOPKINS
 DB 590 PG 292

MARY G HOPKINS
 DB 590 PG 292

HNTB
 HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554

DATE: MARCH 7, 2013

PROJECT REFERENCE NO. C-4901A
 SHEET NO. UC-4

UTILITY DESIGN ENGINEER

2013-MAR-11

MA Engineering CONSULTANTS, INC. 598 E. Clapham Street, Suite 137, Cary, N. C. 27511

UTILITY OWNERS ON THIS SHEET:

1. DAVIDSON WATER INC.
 UTILITY: 6" WATER LINE
 CONTACT: ROBERT WALTERS
 PHONE: 336-731-5526

PROP. 45 DEG HORIZ. BEND
 WL-1 STA 2+49.74
 EY2 STA 13+85.00 LT 20.0'
 TRK STA 7686+96.79 RT 84.0'

END WATER LINE 1
 TIE-IN USING 45 DEG
 HORIZ. BEND
 WL-1 STA 2+59.18
 EY2 STA 13+91.77 LT 13.4'
 TRK STA 7686+91.17 RT 91.7'

CS Sta. 7684+99.84

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343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554

PROJECT REFERENCE NO. C-4901A SHEET NO. UC-5
UTILITY DESIGN ENGINEER

DATE: FEBRUARY 26, 2013

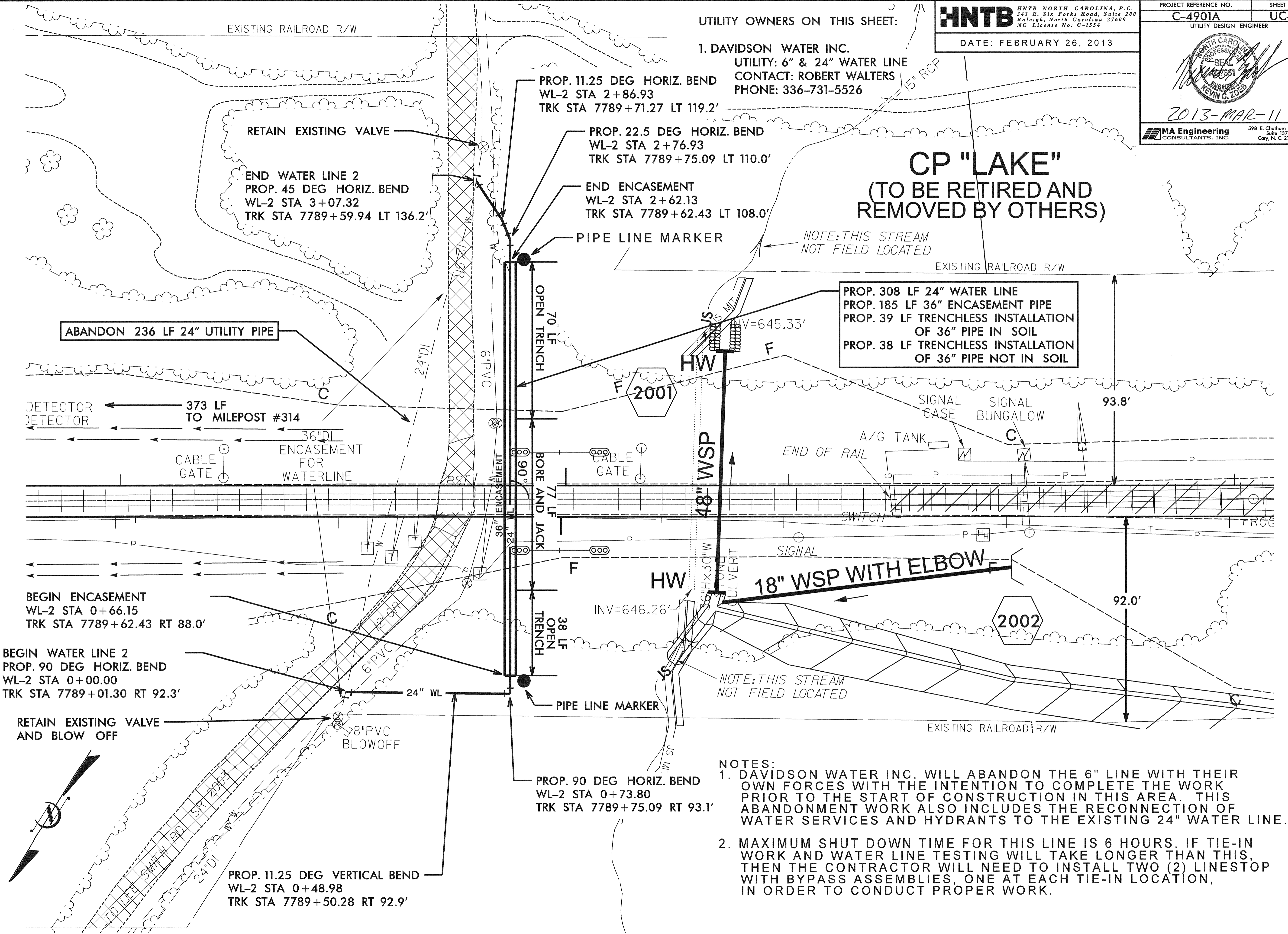
2013-MAR-11

MA Engineering CONSULTANTS, INC.
598 E. Chatham Street,
Suite 137
Cary, N. C. 27511

UTILITY OWNERS ON THIS SHEET:

1. DAVIDSON WATER INC.
UTILITY: 6" & 24" WATER LINE
CONTACT: ROBERT WALTERS
PHONE: 336-731-5526

CP "LAKE"
(TO BE RETIRED AND
REMOVED BY OTHERS)



PROP. 308 LF 24" WATER LINE
PROP. 185 LF 36" ENCASEMENT PIPE
PROP. 39 LF TRENCHLESS INSTALLATION
OF 36" PIPE IN SOIL
PROP. 38 LF TRENCHLESS INSTALLATION
OF 36" PIPE NOT IN SOIL

- NOTES:
1. DAVIDSON WATER INC. WILL ABANDON THE 6" LINE WITH THEIR OWN FORCES WITH THE INTENTION TO COMPLETE THE WORK PRIOR TO THE START OF CONSTRUCTION IN THIS AREA. THIS ABANDONMENT WORK ALSO INCLUDES THE RECONNECTION OF WATER SERVICES AND HYDRANTS TO THE EXISTING 24" WATER LINE.
 2. MAXIMUM SHUT DOWN TIME FOR THIS LINE IS 6 HOURS. IF TIE-IN WORK AND WATER LINE TESTING WILL TAKE LONGER THAN THIS, THEN THE CONTRACTOR WILL NEED TO INSTALL TWO (2) LINESSTOP WITH BYPASS ASSEMBLIES, ONE AT EACH TIE-IN LOCATION, IN ORDER TO CONDUCT PROPER WORK.



SYSTEMS: \$\$\$\$\$\$
DRAWN: \$\$\$\$\$\$
CHECKED: \$\$\$\$\$\$
DATE: \$\$\$\$\$\$

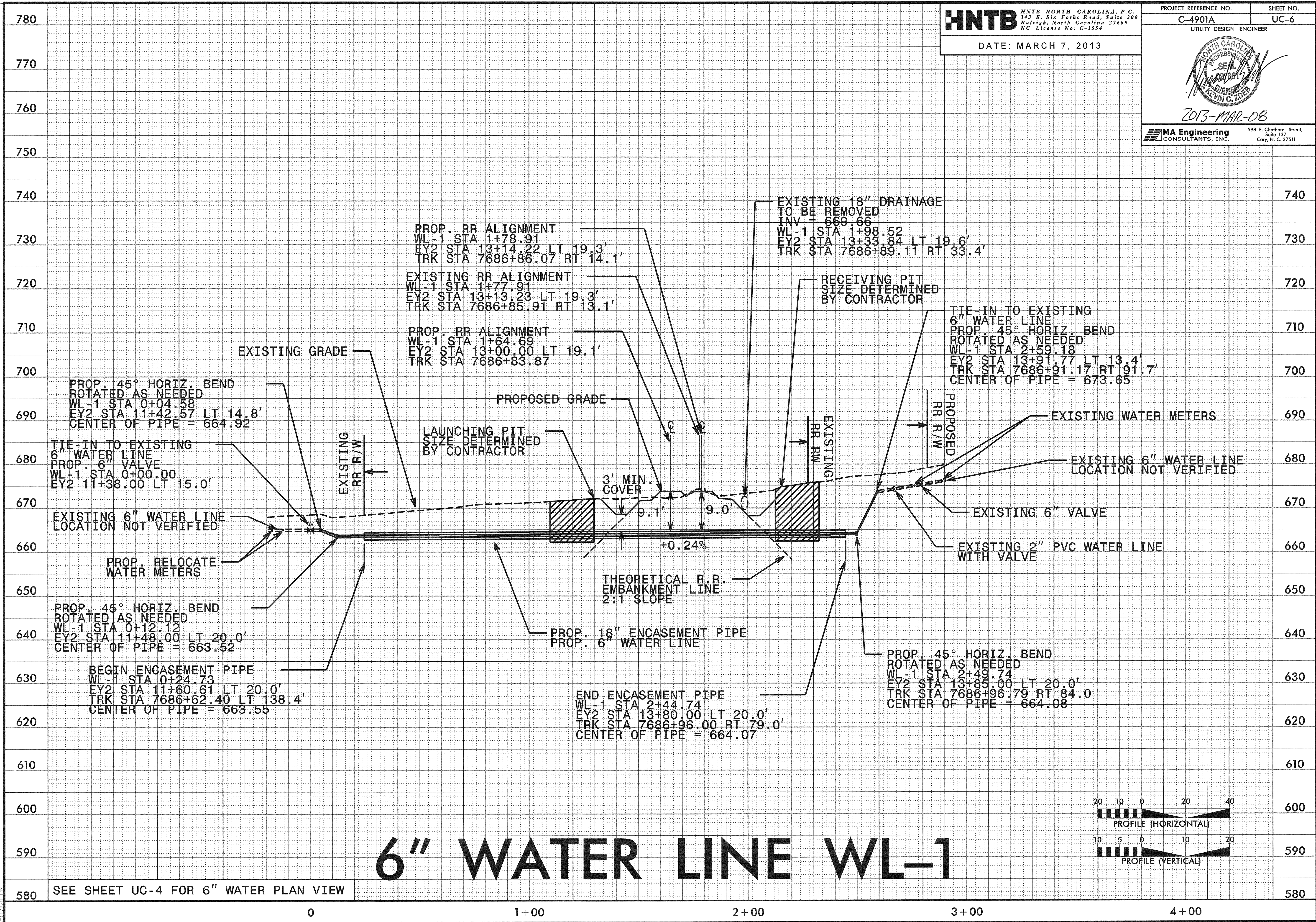
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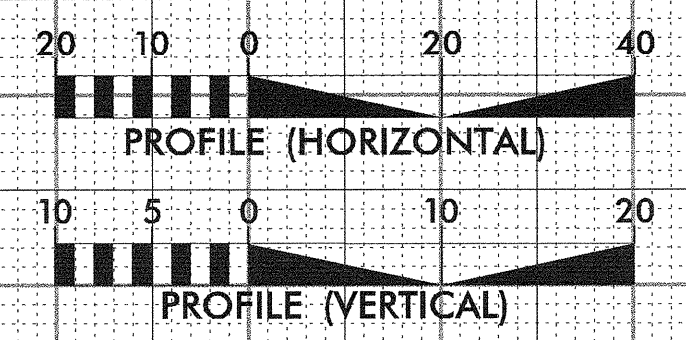
HNTB HNTB NORTH CAROLINA, P.C.
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DATE: MARCH 7, 2013

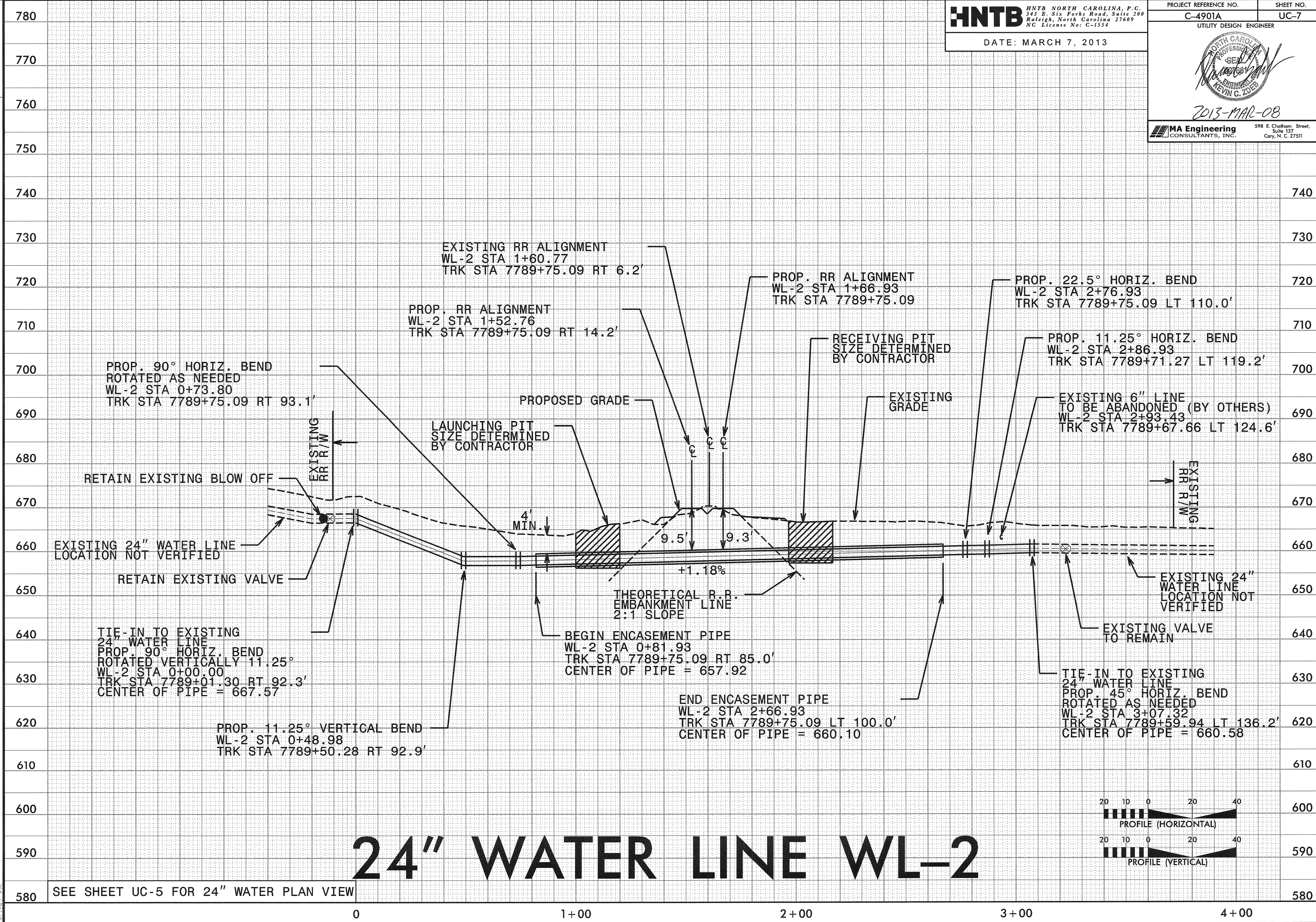
PROJECT REFERENCE NO. C-4901A	SHEET NO. UC-6
UTILITY DESIGN ENGINEER	
	
2013-MAR-08	
	
598 E. Chatham Street, Suite 107, Cary, N.C. 27511	



SEE SHEET UC-4 FOR 6" WATER PLAN VIEW



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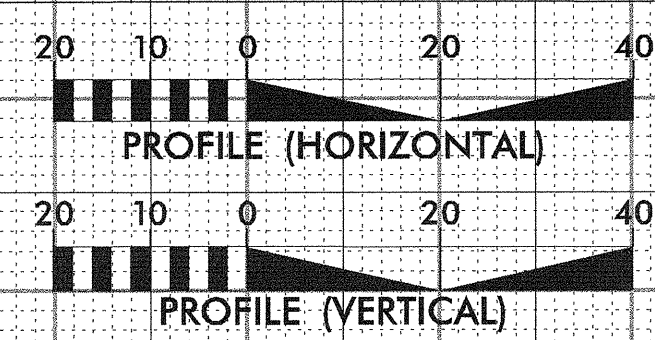
HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554

DATE: MARCH 7, 2013

PROJECT REFERENCE NO. C-4901A	SHEET NO. UC-7
UTILITY DESIGN ENGINEER	
2013-MAR-08	
MA Engineering CONSULTANTS, INC. 598 E. Chatham Street, Suite 137, Cary, N.C. 27511	

24" WATER LINE WL-2

SEE SHEET UC-5 FOR 24" WATER PLAN VIEW

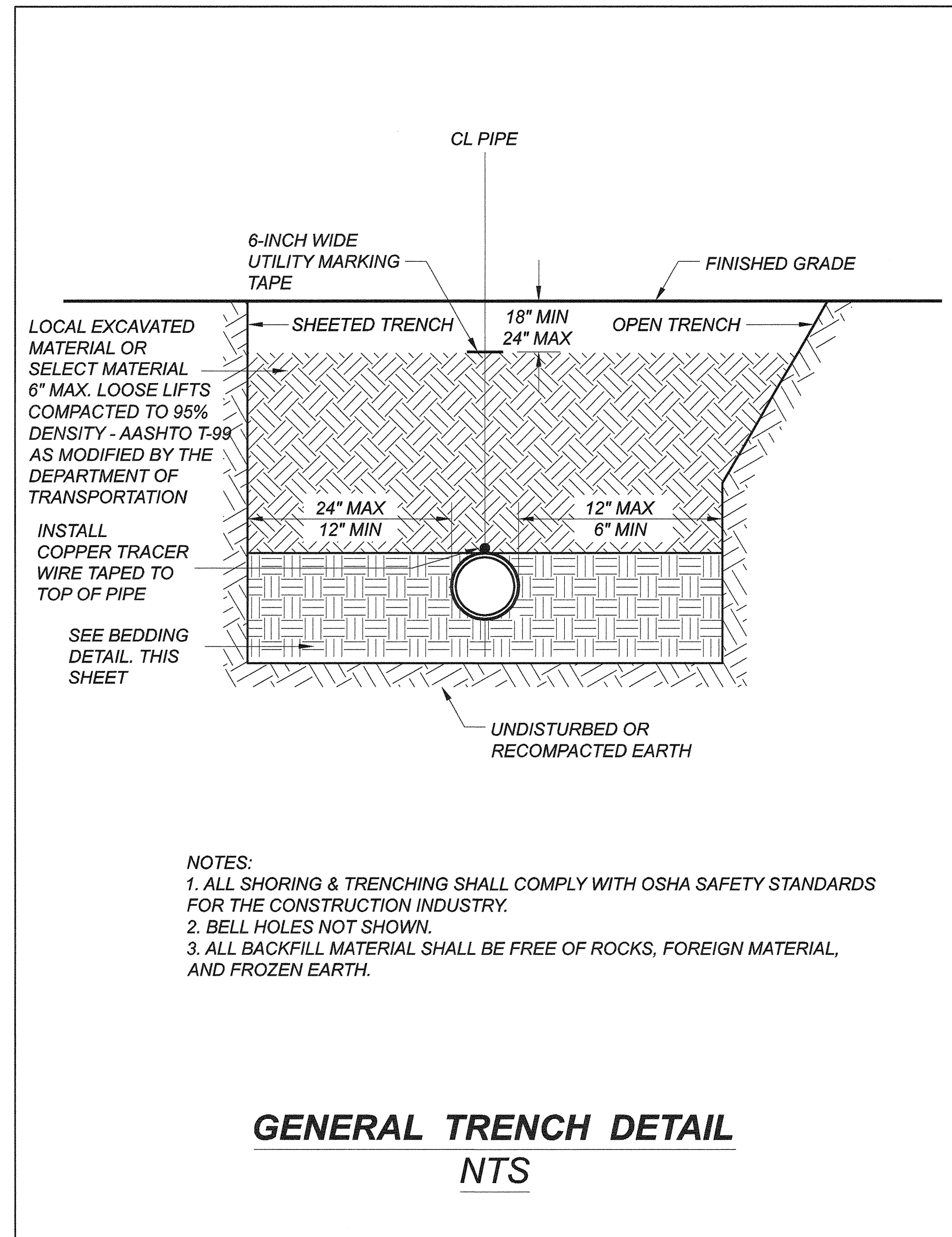


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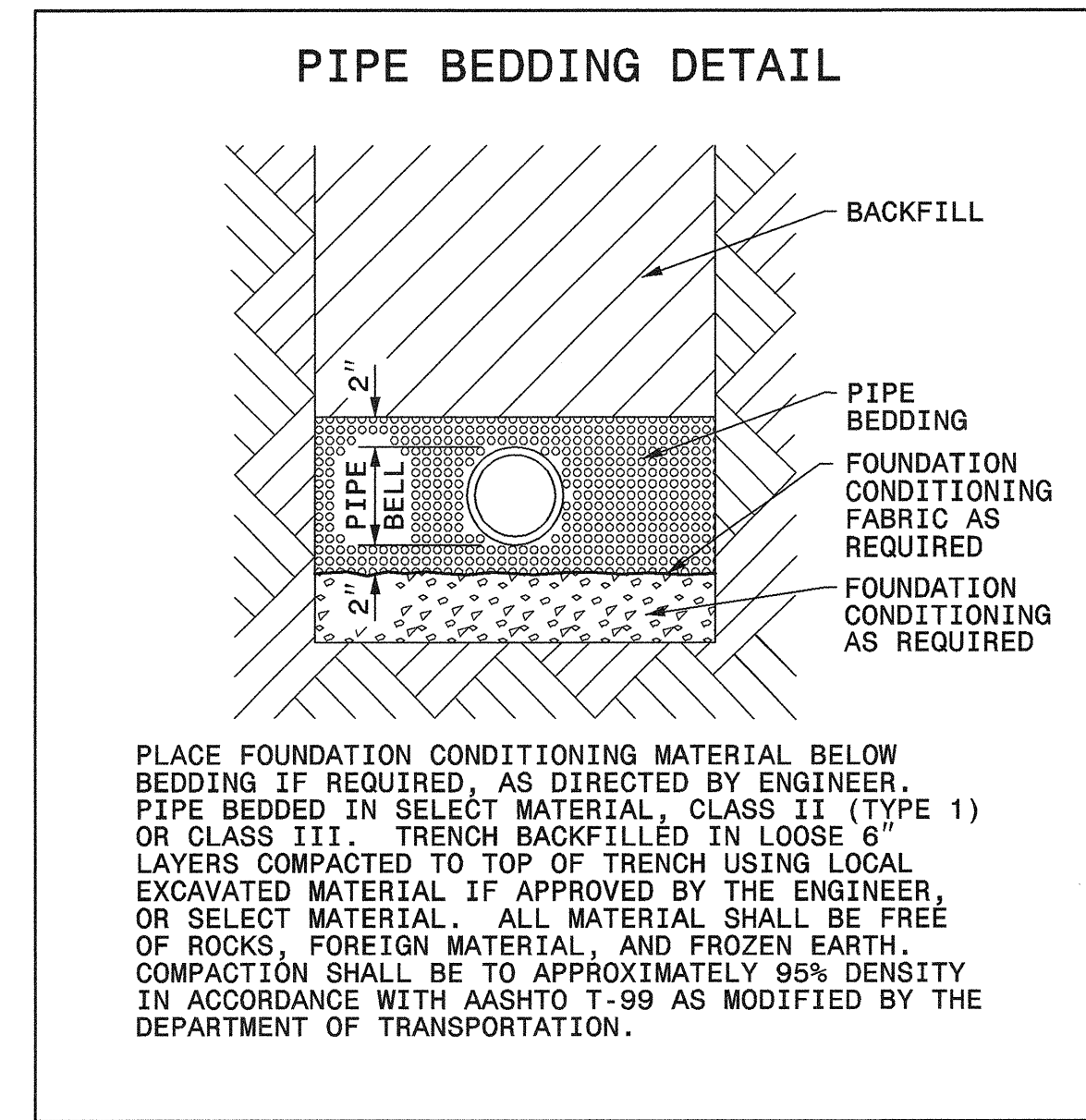
TIME TO COMPLETE THIS WORK IS APPROXIMATELY 10 HOURS. THIS WORK IS SUBJECT TO THE AVAILABILITY OF MATERIALS AND LABOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL MAINTAIN A SAFE WORKING ENVIRONMENT AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL DEBRIS AND RESTORING THE AREA TO ORIGINAL CONDITION OR BETTER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL MAINTAIN A SAFE WORKING ENVIRONMENT AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL DEBRIS AND RESTORING THE AREA TO ORIGINAL CONDITION OR BETTER.



2013-MAR-08

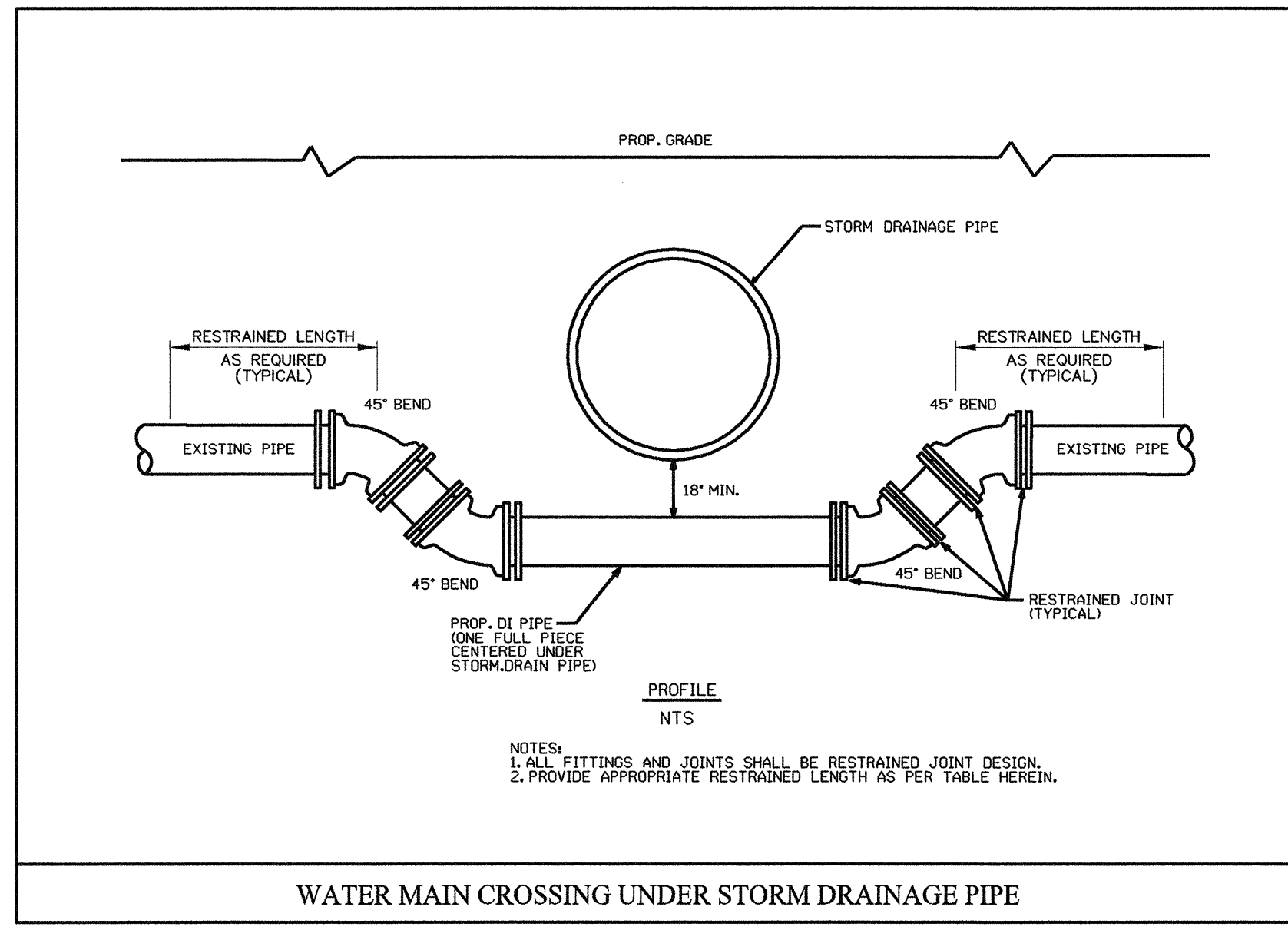


- NOTES:
1. ALL SHORING & TRENCHING SHALL COMPLY WITH OSHA SAFETY STANDARDS FOR THE CONSTRUCTION INDUSTRY.
 2. BELL HOLES NOT SHOWN.
 3. ALL BACKFILL MATERIAL SHALL BE FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH.

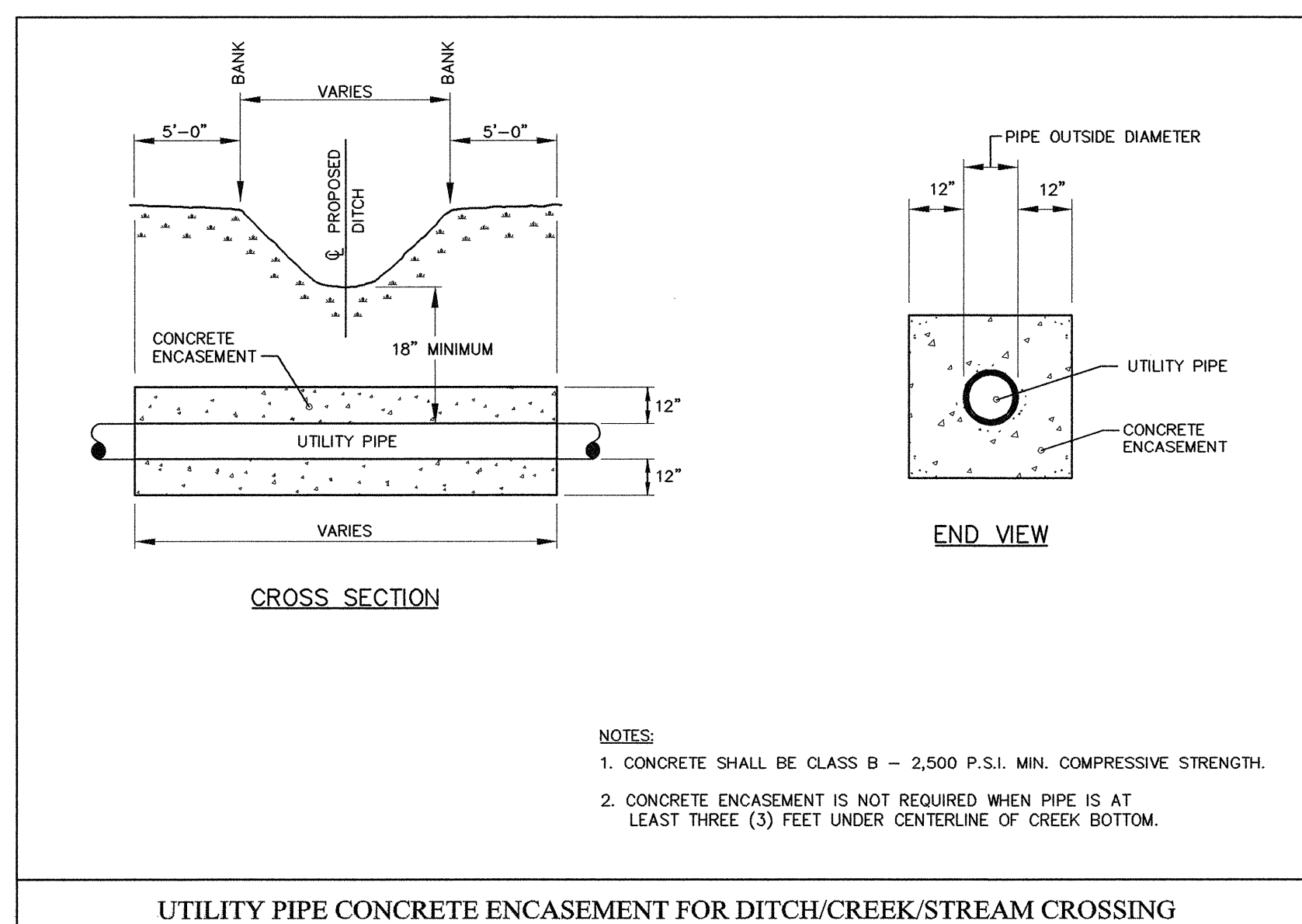


MAXIMUM TRENCH WIDTH
AT TOP OF PIPE

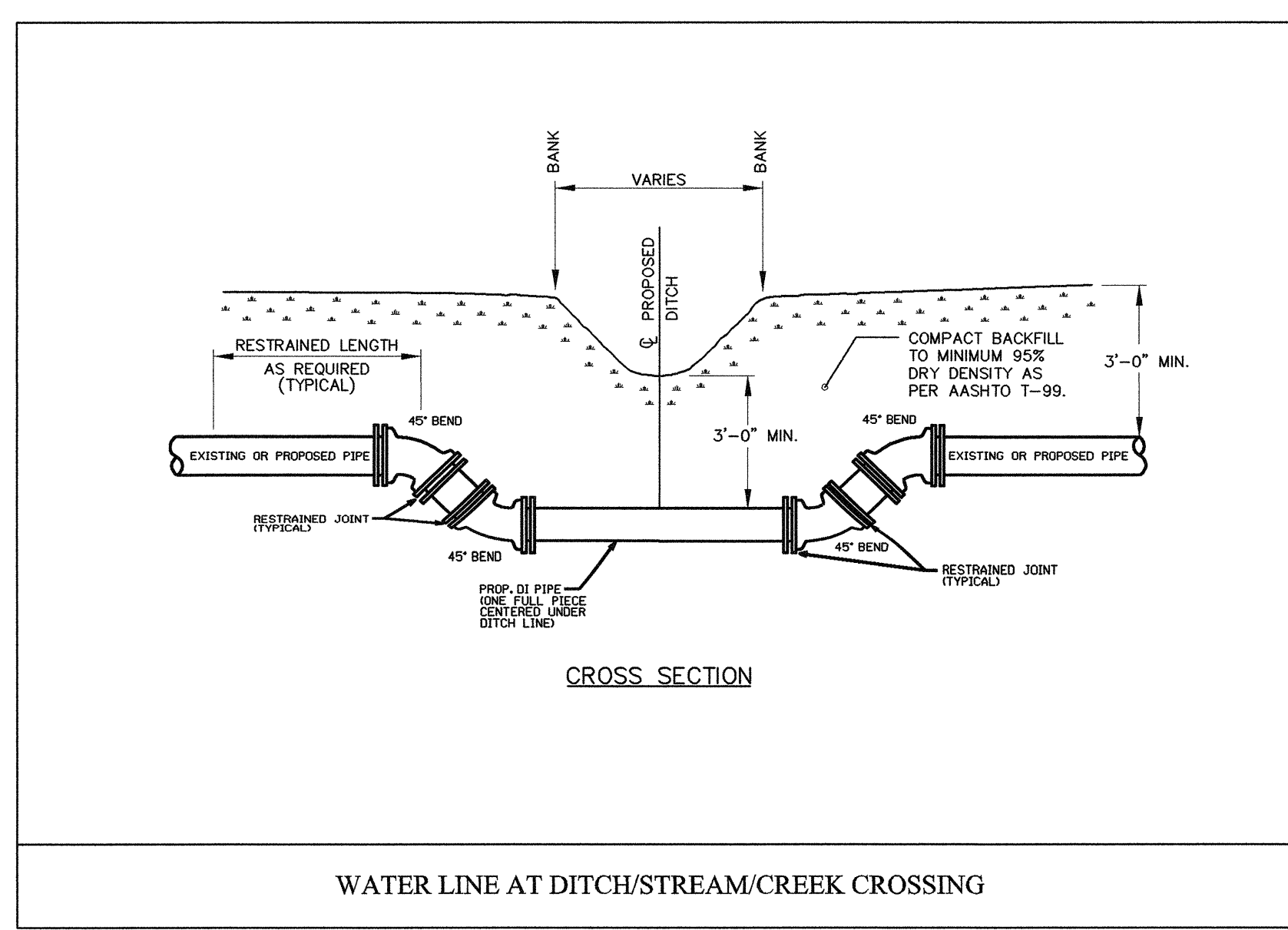
NOMINAL PIPE SIZE (INCHES)	TRENCH WIDTH (INCHES)	NOMINAL PIPE SIZE (INCHES)	TRENCH WIDTH (INCHES)
4	28	20	44
6	30	24	48
8	32	30	54
10	34	36	60
12	36	42	66
14	38	48	72
16	40	54	78
18	42		



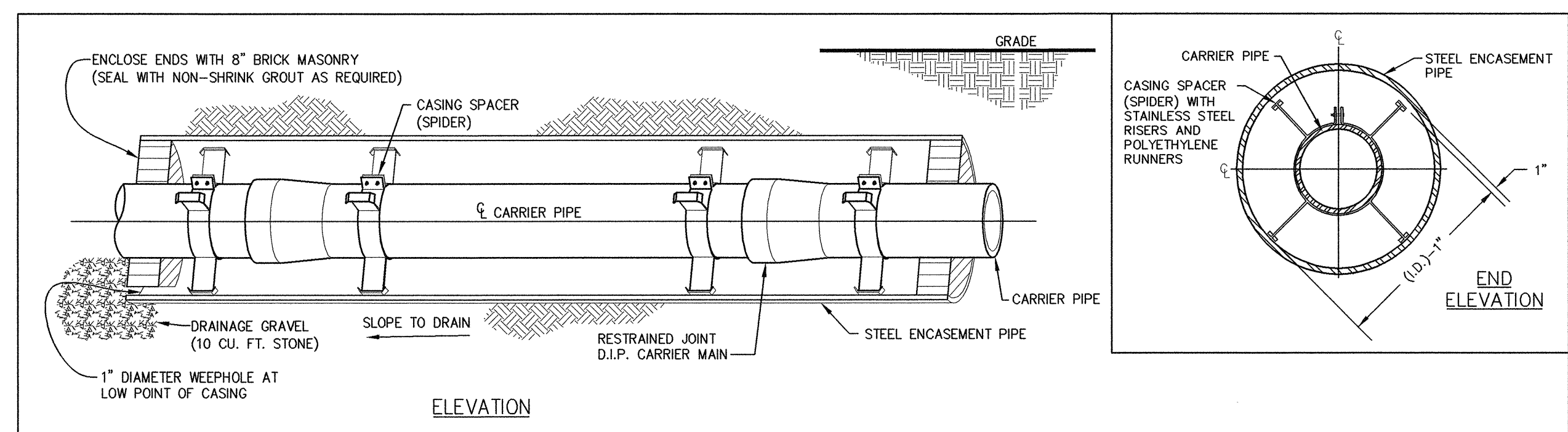
WATER MAIN CROSSING UNDER STORM DRAINAGE PIPE



UTILITY PIPE CONCRETE ENCASMENT FOR DITCH/CREEK/STREAM CROSSING

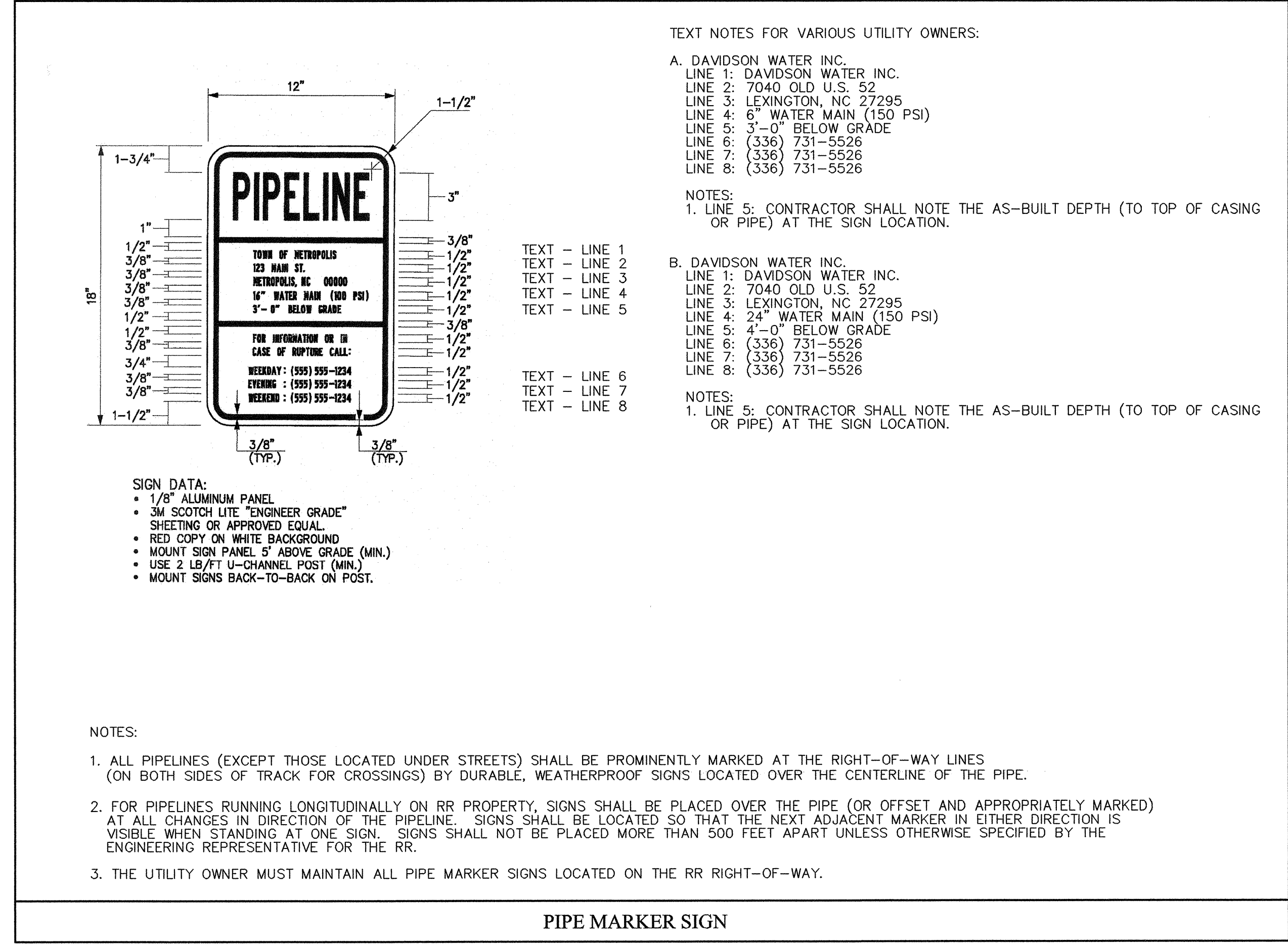


WATER LINE AT DITCH/STREAM/CREEK CROSSING



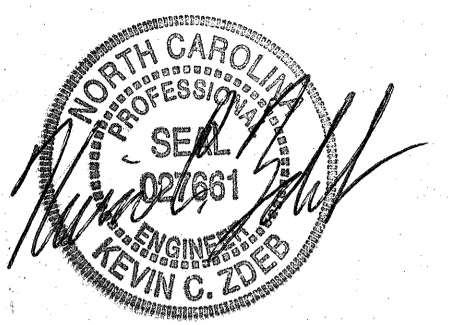
- NOTES:
- CASING SPACERS "SPIDERS" SHALL BE USED FOR SUPPORT OF THE CARRIER PIPE WITHIN THE STEEL ENCASMENT PIPE. SPIDERS SHALL BE CENTERED AND RESTRAINED. SPIDERS SHALL HAVE A STAINLESS STEEL SHELL AND STAINLESS STEEL RISERS WITH POLYETHYLENE RUNNERS, MANUFACTURED BY CASCADE WATERWORKS MFG. COMPANY 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 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 PIPE.
 - STEEL ENCASMENT PIPES SHALL EXTEND TO THE RAILROAD RIGHT-OF-WAY LINES OR AS SHOWN ON THE PLANS.
 - STEEL ENCASMENT PIPES TO BE INSTALLED UNDER TRACK AND WITHIN 45 FEET OF THE CENTERLINE OF THE OUTERMOST EXISTING TRACK SHALL BE INSTALLED BY BORE AND JACK.
 - REFER TO PLAN SHEETS AND PROFILE SHEETS FOR LENGTH AND INSIDE DIAMETER OF PROPOSED STEEL ENCASMENT PIPES FOR EACH CROSSING.
 - THE INSIDE DIAMETER OF THE CARRIER 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 ENCASMENT PIPE SHALL BE FULLY WELDED AROUND THE COMPLETE CIRCUMFERENCE OF THE PIPE.
 - FOR EXISTING UTILITY PIPE INSTALLATIONS, THE STEEL ENCASMENT PIPE SHALL BE A SPLIT STEEL ENCASMENT 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 ENCASMENT PIPE SHALL BE FULLY WELDED AROUND THE COMPLETE CIRCUMFERENCE OF THE PIPE.
 - STEEL ENCASMENT PIPES SHALL BE SPIRAL WELDED STEEL AND HAVE A SPECIFIED MINIMUM YIELD STRENGTH OF AT LEAST 35,000 PSI IN ACCORDANCE WITH ASTM A139 AND A283.
 - UNCOATED AND UNPROTECTED STEEL ENCASMENT PIPE WITH A MINIMUM COVER OF 5.5 FEET FROM BASE OF RAIL SHALL HAVE A MINIMUM WALL THICKNESS AS NOTED BELOW FOR THE FOLLOWING INSIDE DIAMETER OF PIPES:
- | | |
|--------------------------------|----------------------------|
| 0.188 INCH FOR 10" AND SMALLER | 0.562 INCH FOR 38" |
| 0.250 INCH FOR 12" AND 14" | 0.594 INCH FOR 40" |
| 0.312 INCH FOR 18" | 0.625 INCH FOR 42" |
| 0.344 INCH FOR 20" AND 22" | 0.657 INCH FOR 44" AND 46" |
| 0.375 INCH FOR 24" | 0.688 INCH FOR 48" |
| 0.406 INCH FOR 26" | 0.719 INCH FOR 50" |
| 0.438 INCH FOR 28" | 0.750 INCH FOR 52" |
| 0.469 INCH FOR 30" | 0.781 INCH FOR 54" |
| 0.500 INCH FOR 32" | 0.812 INCH FOR 56" AND 58" |
| 0.532 INCH FOR 34" AND 36" | 0.844 INCH FOR 60" |

STEEL ENCASMENT PIPE UNDER RAILROADS



- NOTES:
- ALL PIPELINES (EXCEPT THOSE LOCATED UNDER STREETS) SHALL BE PROMINENTLY MARKED AT THE RIGHT-OF-WAY LINES (ON BOTH SIDES OF TRACK FOR CROSSINGS) BY DURABLE, WEATHERPROOF SIGNS LOCATED OVER THE CENTERLINE OF THE PIPE.
 - FOR PIPELINES RUNNING LONGITUDINALLY ON RR PROPERTY, SIGNS SHALL BE PLACED OVER THE PIPE (OR OFFSET AND APPROPRIATELY MARKED) AT ALL CHANGES IN DIRECTION OF THE PIPELINE. SIGNS SHALL BE LOCATED SO THAT THE NEXT ADJACENT MARKER IN EITHER DIRECTION IS VISIBLE WHEN STANDING AT ONE SIGN. SIGNS SHALL NOT BE PLACED MORE THAN 500 FEET APART UNLESS OTHERWISE SPECIFIED BY THE ENGINEERING REPRESENTATIVE FOR THE RR.
 - THE UTILITY OWNER MUST MAINTAIN ALL PIPE MARKER SIGNS LOCATED ON THE RR RIGHT-OF-WAY.

PIPE MARKER SIGN



BASED ON TEST PRESSURE OF 200 P.S.I.

Table with columns for PIPE SIZE, DEGREE OF BEND, LBS. STATIC THRUST, ALLOWABLE SOIL BEARING (PSF), HORIZONTAL RESTRAINT, VERTICAL RESTRAINT, RESTRAINING RODS, and DEGREE OF BEND.

* INCLUDES 1.25 SAFETY FACTOR AND CALCULATED USING THE NOMINAL DIAMETER OF PIPE.

- GENERAL NOTES: 1. CONCRETE SHALL BE CLASS 'B'. 2. CONCRETE SHALL NOT CONTACT BOLT ENDS OF MECHANICAL JOINT FITTINGS. 3. CONSULT WITH ENGINEER FOR CONCRETE REQUIREMENTS ON MAINS LARGER THAN 24 INCHES. 4. ALLOWABLE SOIL BEARING SHALL BE DETERMINED BY THE ENGINEER.

Table with columns for NO., DATE, REVISIONS, and DESCRIPTION.

THRUST RESTRAINT FOR WATER MAINS

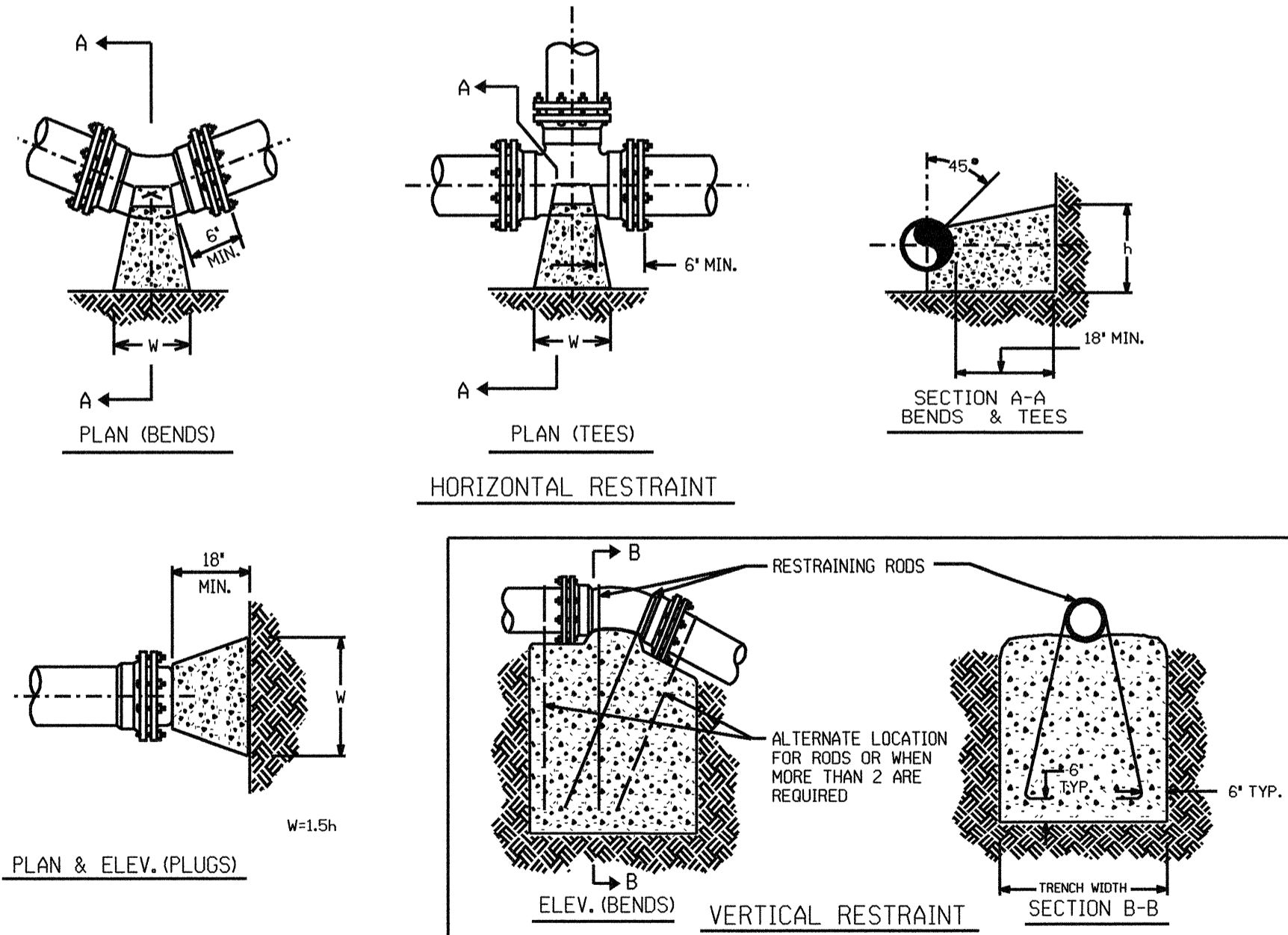
STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS RALEIGH, N.C.

DUCTILE IRON PIPE RESTRAINED JOINT DESIGN TABLE

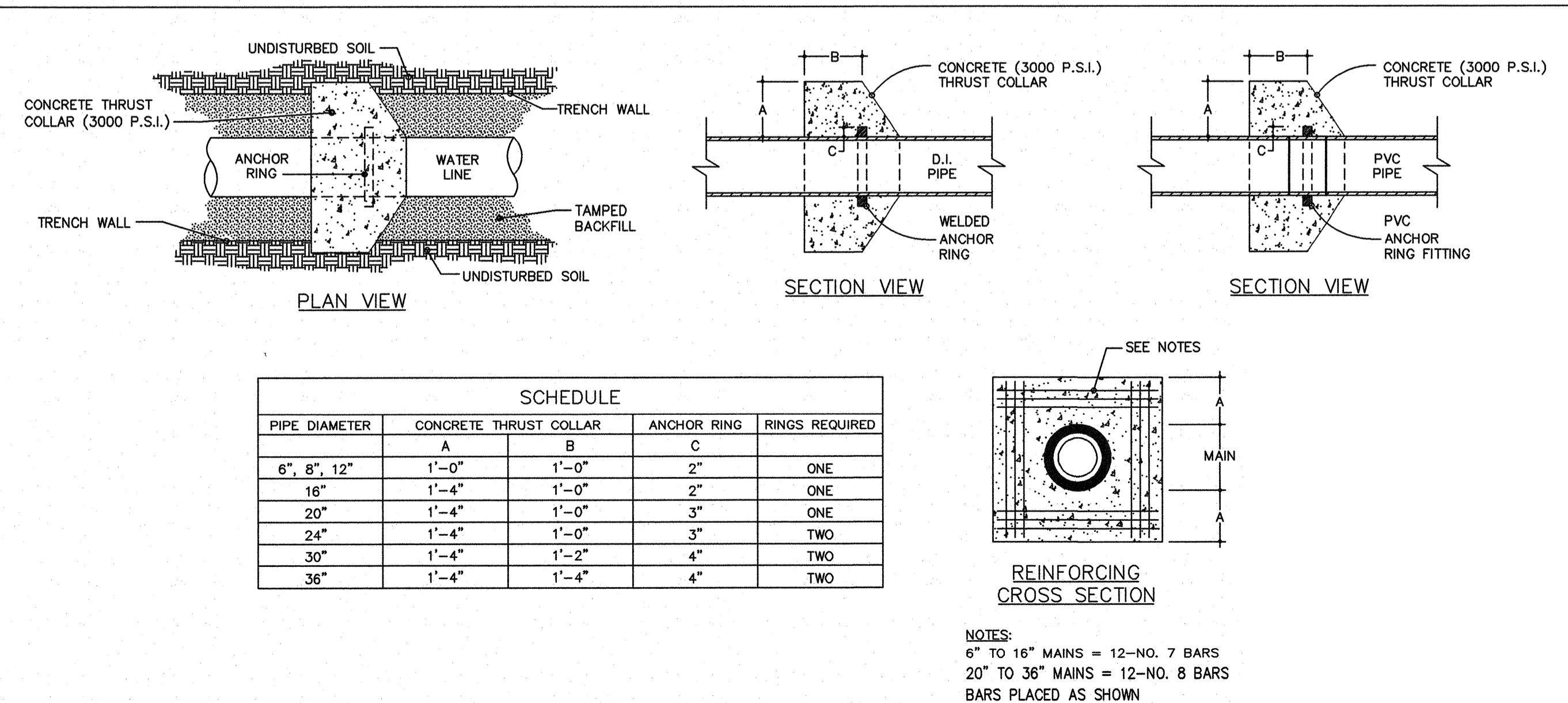
Table with columns for FITTING, REQUIRED RESTRAINED LENGTH (FT) OF BARE D.I. PIPE BY DEPTH OF COVER, and DEAD ENDS / VALVES.

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

- NOTES: 1. RESTRAINED LENGTH IS MEASURED FROM THE CENTER OF THE BEND AS FOLLOWS: A. HORIZONTAL AND VERTICAL BENDS: ALONG EACH SIDE OF BEND. B. HORIZONTAL AND VERTICAL BENDS - OFFSET OR COMBINED: ALONG THE OUTER SIDE OF EACH BEND. HORIZONTAL BEND EXAMPLE... 2. WHEN IT IS NOT POSSIBLE TO INSTALL THE RESTRAINED LENGTHS AS NOTED BY THIS TABLE, THE CONTRACTOR SHALL INSTALL THE APPROPRIATE CONCRETE THRUST RESTRAINTS AS PER THE DETAILS HEREIN.



THRUST RESTRAINT FOR PIPE LINES



SCHEDULE table with columns for PIPE DIAMETER, CONCRETE THRUST COLLAR (A, B), ANCHOR RING (C), and RINGS REQUIRED.

REINFORCING CROSS SECTION

NOTES: 6" TO 16" MAINS = 12-NO. 7 BARS, 20" TO 36" MAINS = 12-NO. 8 BARS, BARS PLACED AS SHOWN

STANDARD THRUST COLLAR INSTALLATION



2013-MAR-08

