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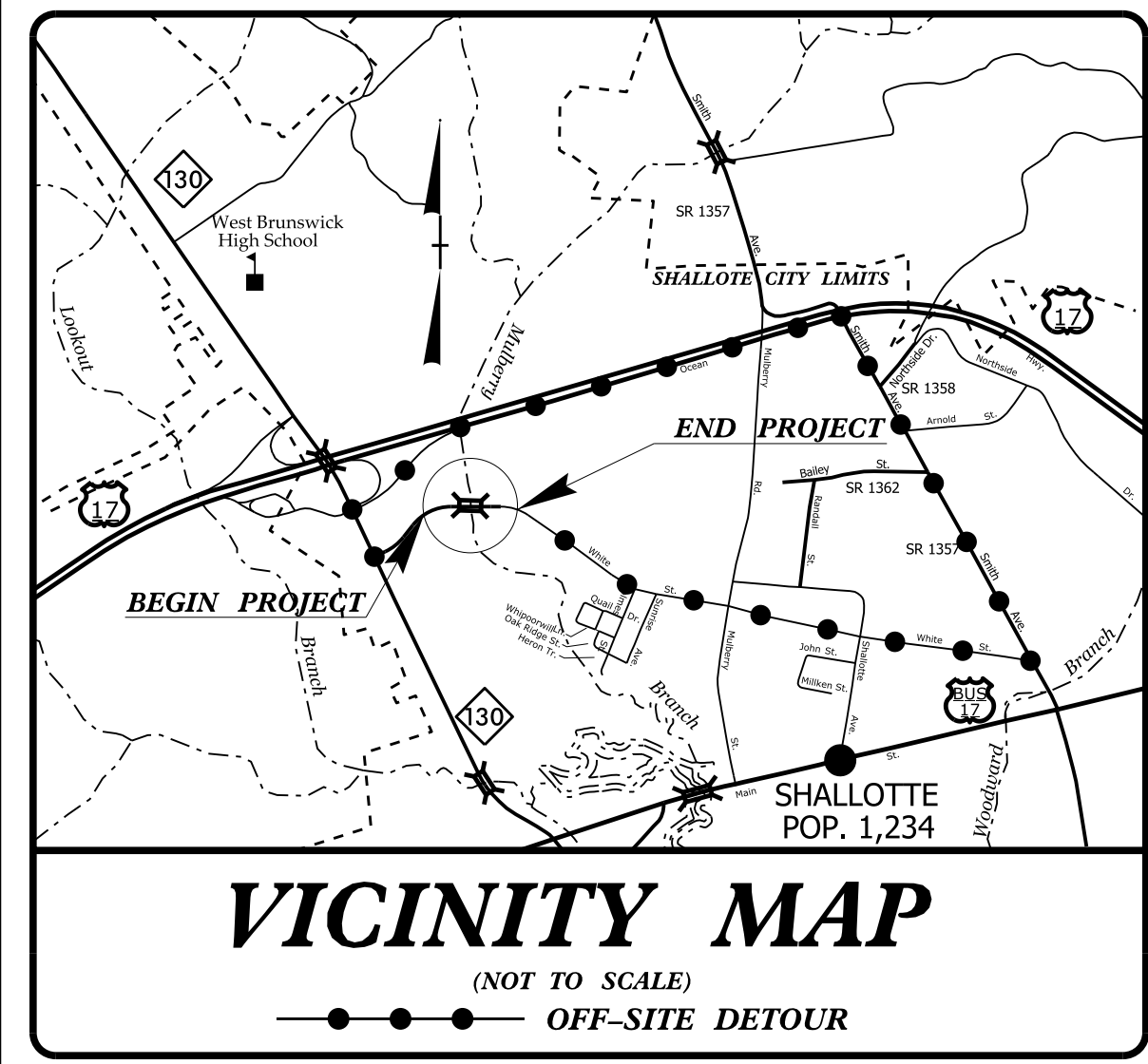
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05/08/19  
 SYSTEMS  
 DGN  
 USERNAME

**TIP PROJECT: B-4440**

T.I.P. NO.	SHEET NO.
B-4440	UC-1

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



STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

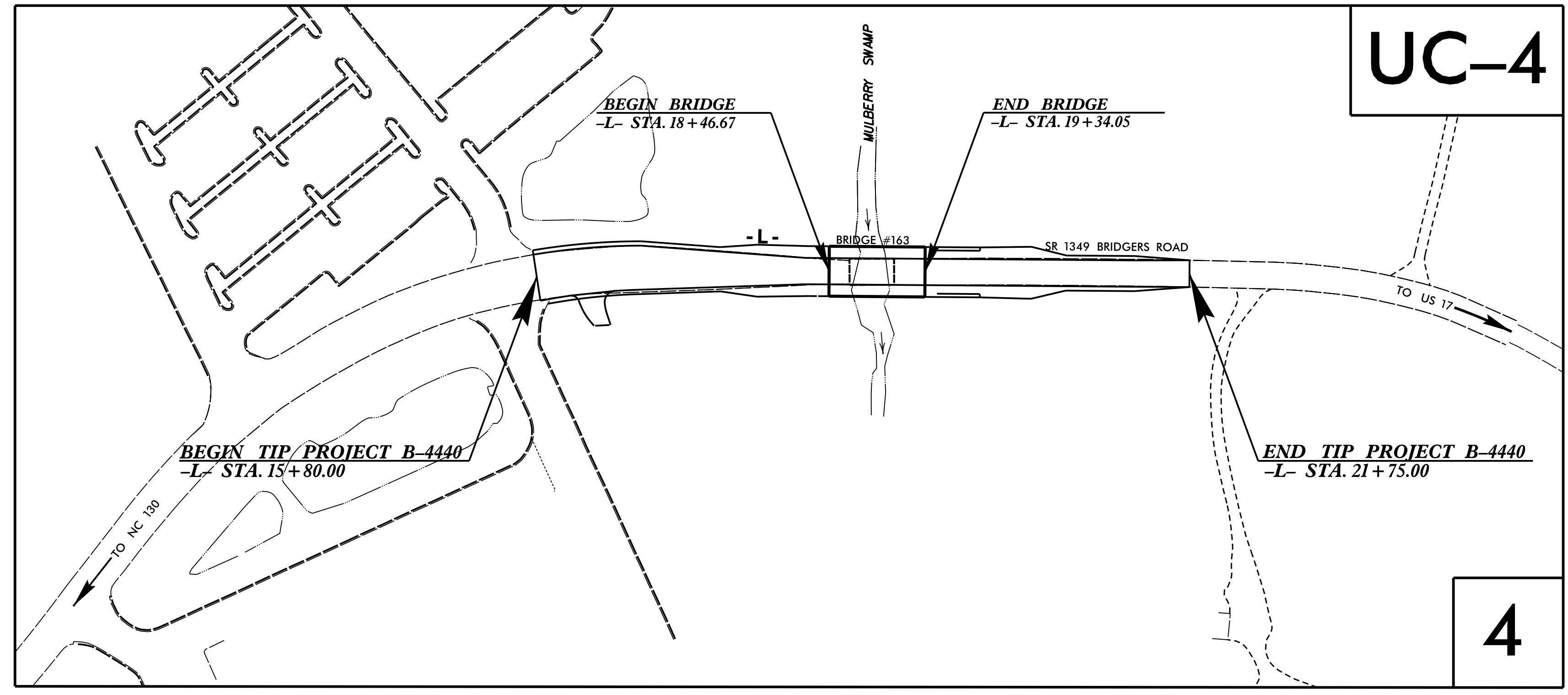
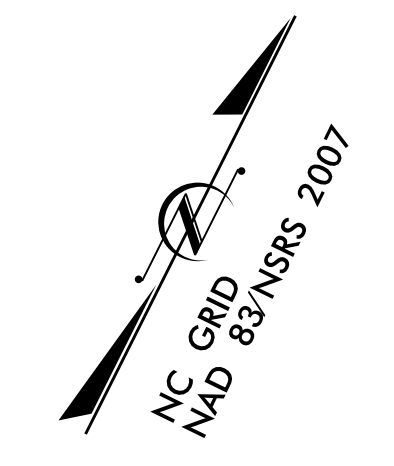
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## UTILITY CONSTRUCTION PLANS BRUNSWICK COUNTY

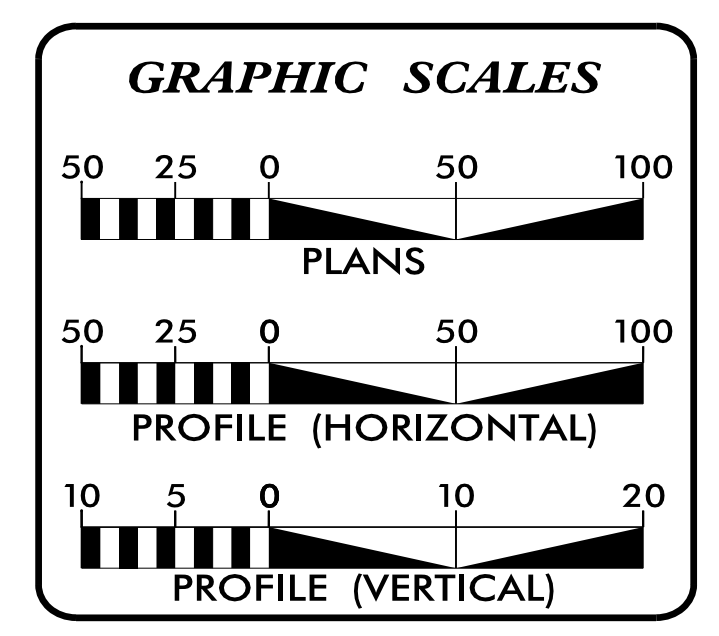
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**LOCATION: REPLACE BRIDGE NO. 163 OVER  
MULBERRY SWAMP ON SR 1349**

**TYPE OF WORK: WATER LINE RELOCATION**



**M A Engineering Consultants, Inc.** 598 East Chatham Street - Suite 137  
Cary, NC 27511  
Phone: 919.297.0220 Fax: 919.297.0221  
NC License: F-0160

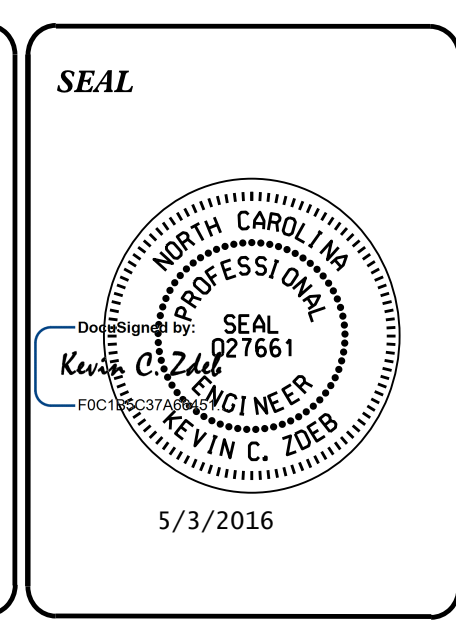


**INDEX OF SHEETS**

SHEET NO.	DESCRIPTION
UC-1	TITLE SHEET
UC-2	UTILITY SYMBOLOGY
UC-3	NOTES
UC-3A & UC-3B	DETAILS
UC-4	UTILITY CONSTRUCTION SHEETS

**WATER AND SEWER OWNERS ON PROJECT**

(1) WATER - TOWN OF SHALLOTTE



**STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION**

PREPARED IN THE OFFICE OF:  
**DIVISION OF HIGHWAYS  
UTILITIES UNIT  
UTILITIES ENGINEERING**

1555 MAIL SERVICES CENTER  
RALEIGH NC 27699-1555  
PHONE (919) 707-6690  
FAX (919) 250-4151

**Roger Worthington, P.E.** UTILITIES SECTION ENGINEER  
**Bo Hemphill, P.E.** UTILITIES SQUAD LEADER PROJECT ENGINEER  
**Nabil Hamdan** UTILITIES PROJECT DESIGNER

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)

5/14/99  
REV: 2/1/2012

8/17/99

REVISIONS

# 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 2012.

2. THE EXISTING UTILITIES BELONG TO:

TOWN OF SHALLOTTE  
CONTACT: ALBERT HUGHES  
PHONE: 910-279-2766

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 OPPROTUNITY 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 8-INCH WATER LINE FOR OPEN TRENCH CONSTRUCTION SHALL BE RESTRAINED JOINT DUCTILE IRON PIPE.

2. PROPOSED 12-INCH WATER LINE FOR TRENCHLESS AND OPEN TRENCH CONSTRUCTION SHALL BE PVC DR-18 CONFORMING TO ANSI/AWWA C900 WITH BUTT-FUSED JOINTS.

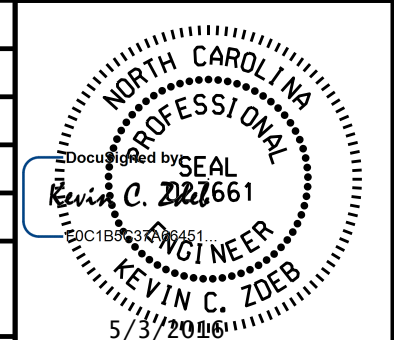
3. ALL WATER LINE FITTINGS, 4-INCHES THROUGH 12-INCHES IN DIAMETER, SHALL BE DUCTILE IRON.

PROJECT REFERENCE NO. <i>B-4440</i>	SHEET NO. <i>UC-3</i>
DESIGNED BY: <i>KCZ</i>	
DRAWN BY: <i>KCZ</i>	
CHECKED BY: <i>KCZ</i>	
APPROVED BY: <i>KCZ</i>	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

## UTILITY CONSTRUCTION

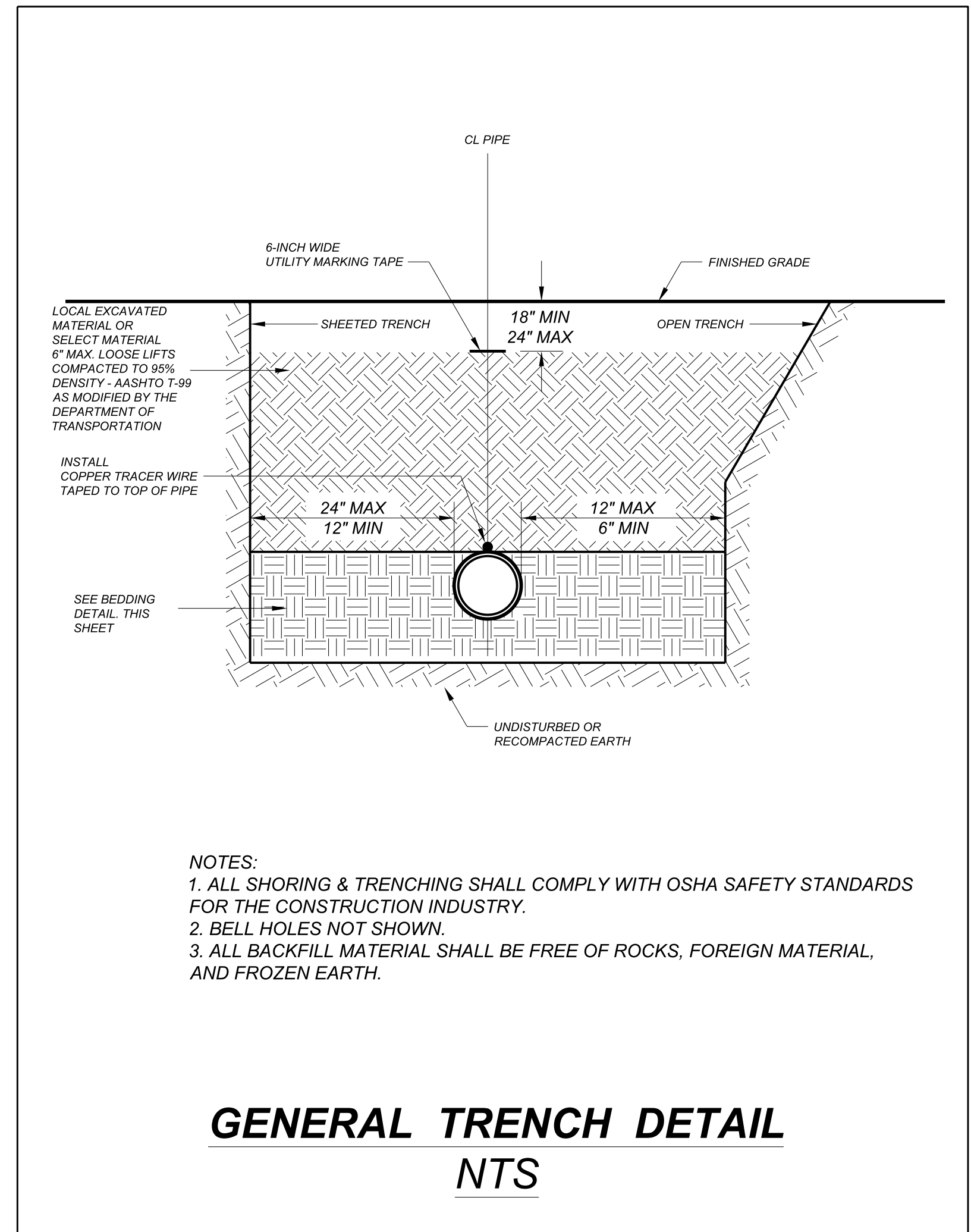
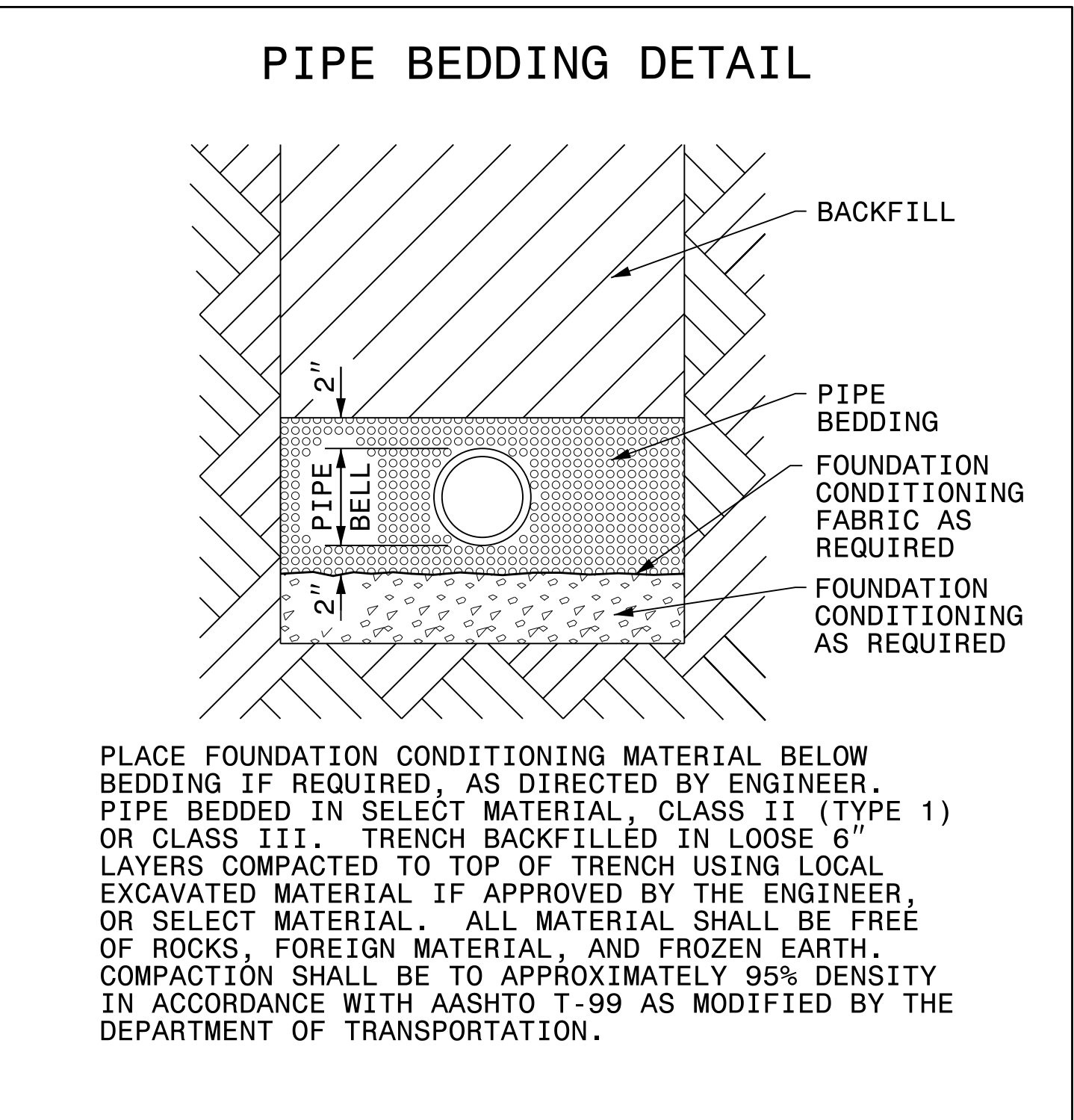
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UNLESS ALL SIGNATURES COMPLETED**

5/14/99

PROJECT REFERENCE NO. <i>B-4440</i>	SHEET NO. <i>UC-3A</i>
DESIGNED BY: <i>JKC</i>	
DRAWN BY: <i>JKC</i>	
CHECKED BY: <i>KCZ</i>	
APPROVED BY: <i>KCZ</i>	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

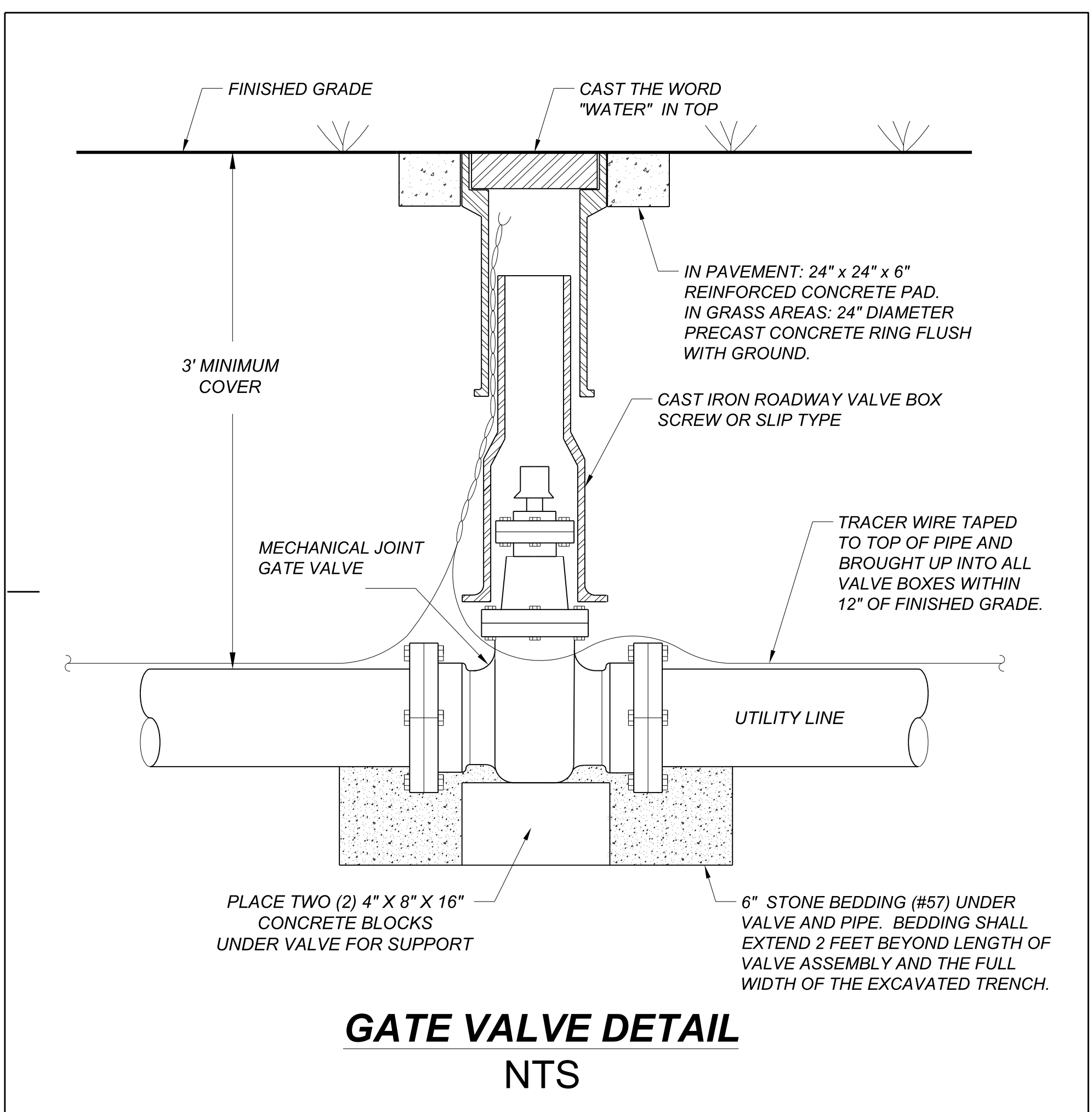
**UTILITY CONSTRUCTION**

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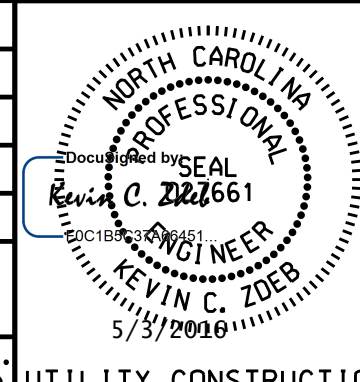


#### MAXIMUM TRENCH WIDTH AT TOP OF PIPE

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		

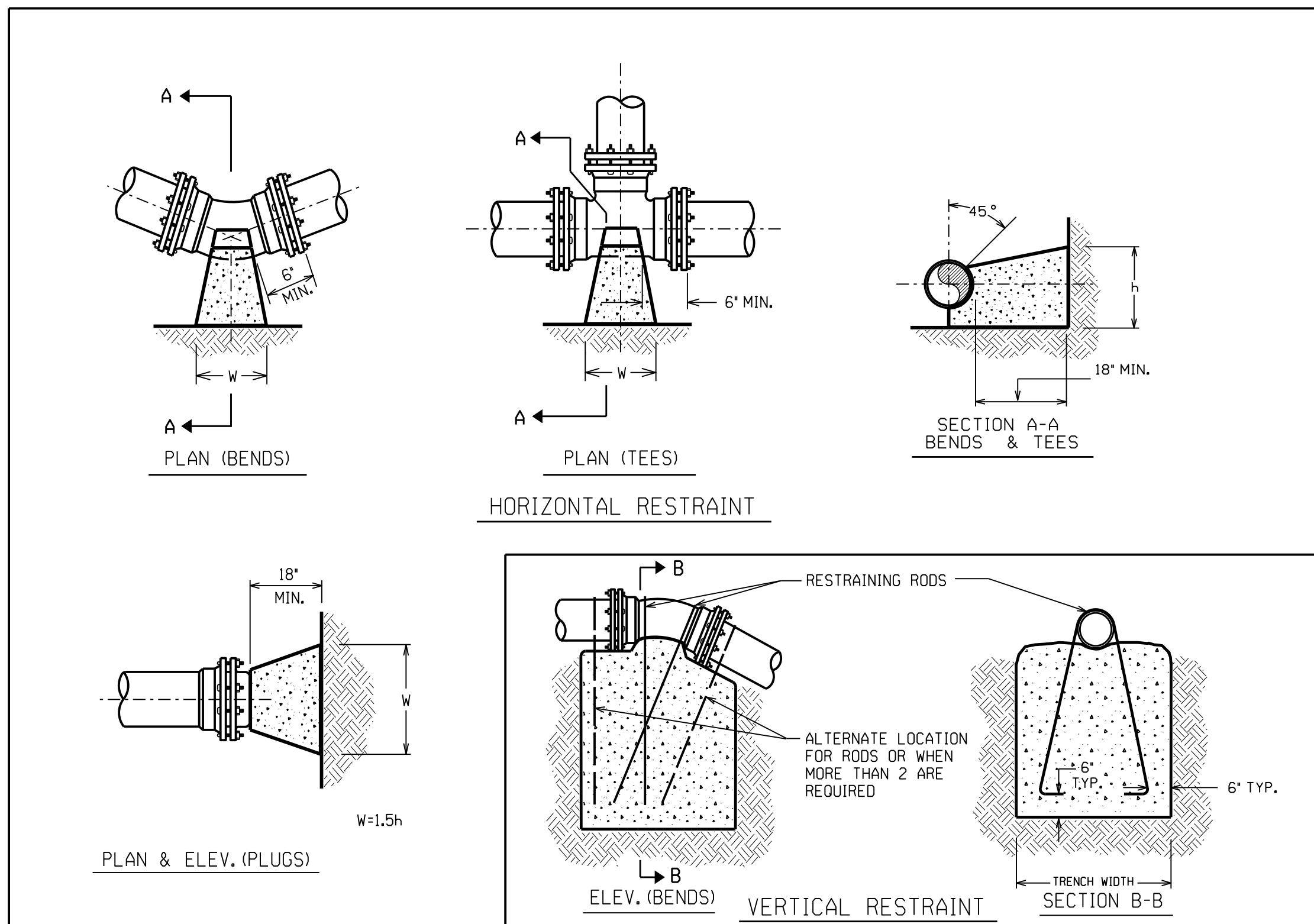


5/14/99

PROJECT REFERENCE NO. B-4440	SHEET NO. UC-3B
DESIGNED BY: KCZ	
DRAWN BY: KCZ	
CHECKED BY: KCZ	
APPROVED BY: KCZ	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION

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THRUST RESTRAINT FOR PIPE LINES

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

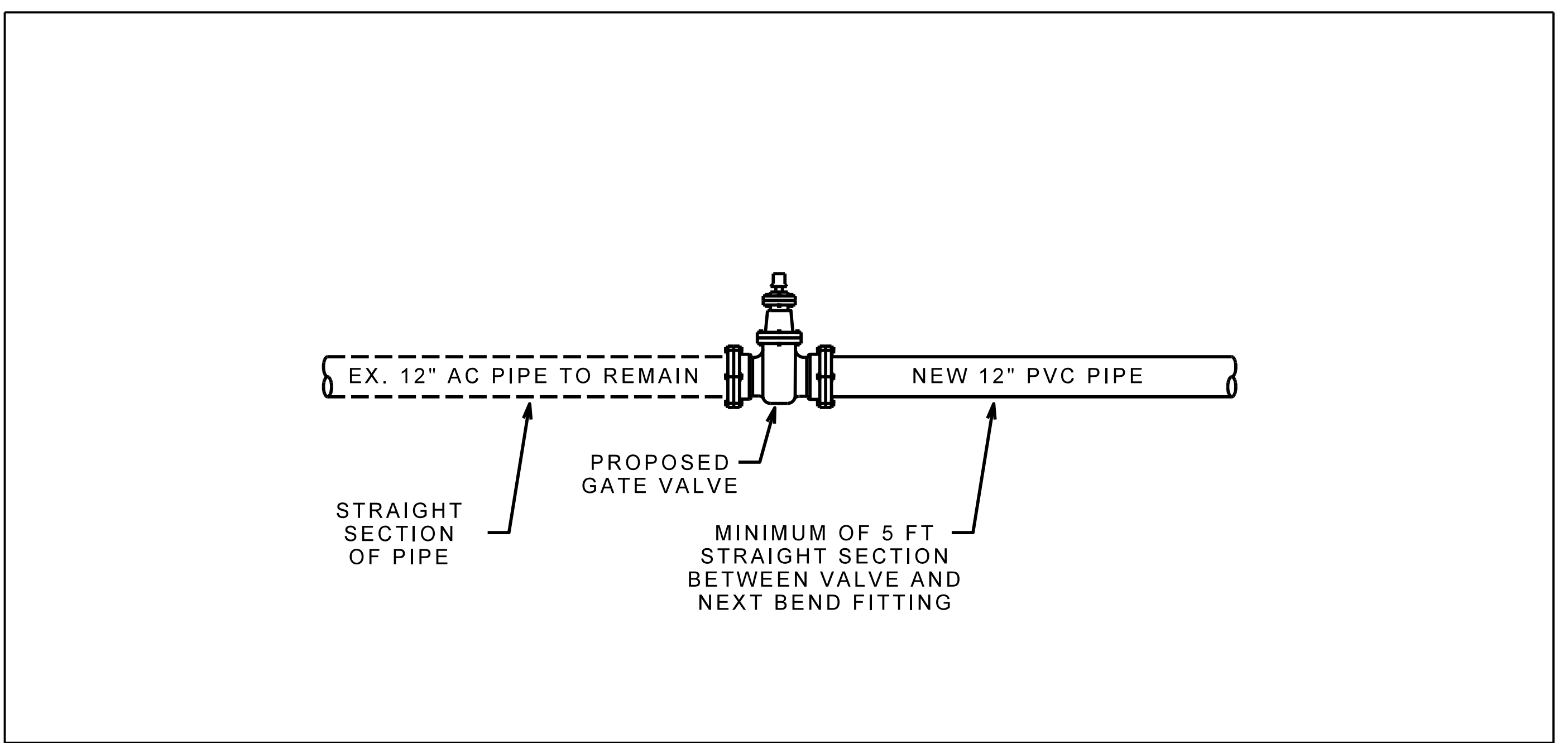
HORIZONTAL RESTRAINT (ALL AREAS GIVEN ARE IN SQUARE FEET)				VERTICAL RESTRAINT (ALL VOLUMES GIVEN ARE IN CUBIC YARDS)**										
PIPE SIZE	DEGREE OF BEND	LBS. STATIC THRUST *	ALLOWABLE SOIL BEARING (PSF)						PIPE SIZE	RESTRAINING RODS NO. REQ'D	DIA.	DEGREE OF BEND		
			1000	2000	3000	4000	5000	6000				7000	8000	11/4°
4"	11/4°	616	1	1	1	1	1	1	1	1	1	1	1	1
	22 1/2°	1,226	1	1	1	1	1	1	1	1	1	1	1	1
	45°	2,405	2	2	2	2	2	2	2	2	2	2	2	2
	90°	4,444	4	4	4	4	4	4	4	4	4	4	4	4
6"	TEE/PLUG	3,143	3	3	3	3	3	3	3	3	3	3	3	3
	11/4°	1,385	2	2	2	2	2	2	2	2	2	2	2	2
	22 1/2°	2,758	3	3	3	3	3	3	3	3	3	3	3	3
	45°	5,409	5	5	5	5	5	5	5	5	5	5	5	5
8"	90°	9,999	10	10	10	10	10	10	10	10	10	10	10	10
	TEE/PLUG	7,068	7	7	7	7	7	7	7	7	7	7	7	7
	11/4°	2,424	3	3	3	3	3	3	3	3	3	3	3	3
	22 1/2°	4,804	5	5	5	5	5	5	5	5	5	5	5	5
10"	45°	9,619	10	10	10	10	10	10	10	10	10	10	10	10
	90°	17,773	18	18	18	18	18	18	18	18	18	18	18	18
	TEE/PLUG	12,568	13	13	13	13	13	13	13	13	13	13	13	13
	11/4°	3,846	4	4	4	4	4	4	4	4	4	4	4	4
12"	22 1/2°	7,661	8	8	8	8	8	8	8	8	8	8	8	8
	45°	15,028	15	15	15	15	15	15	15	15	15	15	15	15
	90°	27,769	28	28	28	28	28	28	28	28	28	28	28	28
	TEE/PLUG	19,635	20	20	20	20	20	20	20	20	20	20	20	20
14"	11/4°	5,543	6	6	6	6	6	6	6	6	6	6	6	6
	22 1/2°	11,032	11	11	11	11	11	11	11	11	11	11	11	11
	45°	21,641	22	22	22	22	22	22	22	22	22	22	22	22
	90°	39,987	40	40	40	40	40	40	40	40	40	40	40	40
16"	TEE/PLUG	28,274	28	28	28	28	28	28	28	28	28	28	28	28
	11/4°	7,544	8	8	8	8	8	8	8	8	8	8	8	8
	22 1/2°	15,016	15	15	15	15	15	15	15	15	15	15	15	15
	45°	29,455	29	29	29	29	29	29	29	29	29	29	29	29
16"	90°	54,425	54	54	54	54	54	54	54	54	54	54	54	54
	TEE/PLUG	38,485	38	38	38	38	38	38	38	38	38	38	38	38
	11/4°	9,854	10	10	10	10	10	10	10	10	10	10	10	10
	22 1/2°	19,612	20	20	20	20	20	20	20	20	20	20	20	20
16"	45°	38,471	38	38	38	38	38	38	38	38	38	38	38	38
	90°	71,085	71	71	71	71	71	71	71	71	71	71	71	71
	TEE/PLUG	50,265	50	50	50	50	50	50	50	50	50	50	50	50

\* INCLUDES 1.25 SAFETY FACTOR  
 GENERAL NOTES:  
 1. CONCRETE SHALL BE CLASS "B".  
 2. CONCRETE SHALL NOT CONTACT BOLTS ENDS OF MECHANICAL JOINT FITTINGS.  
 3. CONSULT WITH ENGINEER FOR CONCRETE REQUIREMENTS ON MAINS LARGER THAN 16 INCHES.  
 (FOR VERTICAL & HORIZONTAL BENDS)  
 4. ALLOWABLE SOIL BEARING SHALL BE DETERMINED BY THE ENGINEER.

REVISIONS	
NO.	DESCRIPTION

SHEET 2 OF 2

THRUST RESTRAINT FOR WATER MAINS



PVC TO A.C. PIPE TRANSITION DETAIL

8/17/09

PROJECT REFERENCE NO. B-4440	SHEET NO. UC-04
DESIGNED BY: JKC	
DRAWN BY: JKC	
CHECKED BY: KCZ	
APPROVED BY: KCZ	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SECTION PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY OWNERS ON THIS PROJECT  
 1. TOWN OF SHALLOTTE  
 UTILITY: 8" & 12" WATER LINE  
 CONTACT: ALBERT HUGHES  
 PHONE: 910-279-2766

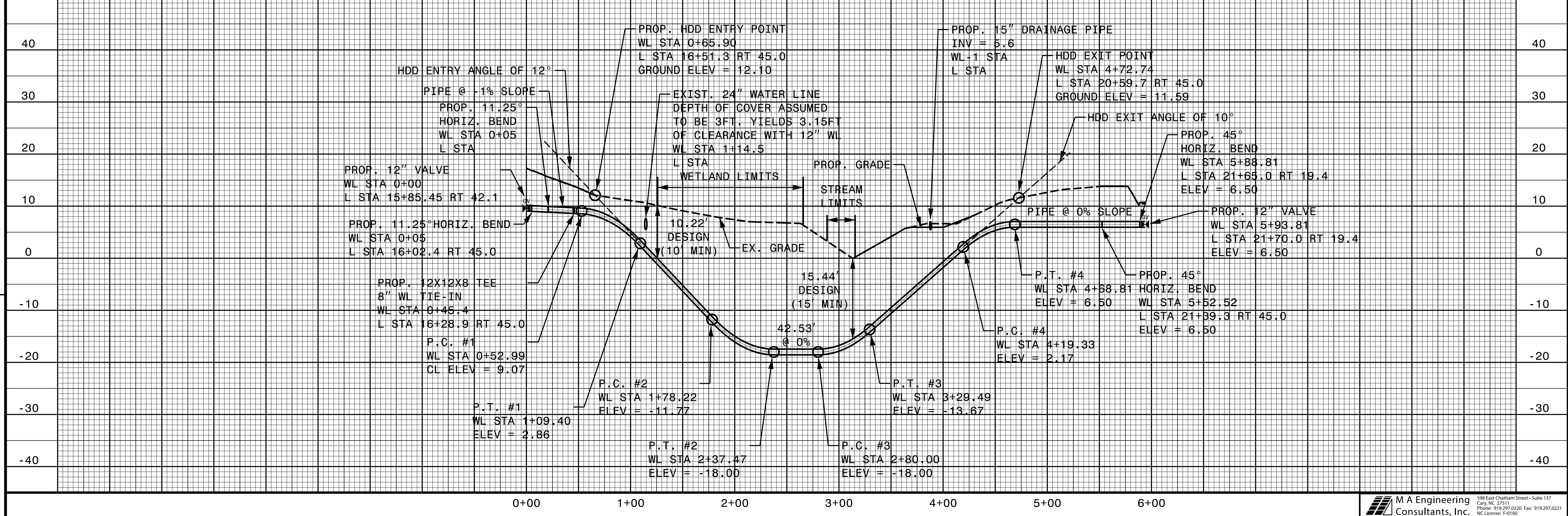
JERRY DANFORD  
 DB 206 PG 329  
 END TIP PROJECT B-4440  
 -L- POT STA 21+75.00

**UTILITY CONSTRUCTION**  
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**BEGIN CONSTRUCTION**  
 -L- STA 15+03.50

CONTRACTOR SHALL VERIFY THE LOCATION OF THE EXISTING WATER SERVICE LINE CONNECTIONS TO LOWE'S HOME CENTER AS SHOWN BY RECORD. THE RELOCATION SHALL TIE-IN TO THE EXISTING 12" WATER LINE BEFORE THE LOWE'S HOME CENTER WATER SERVICE CONNECTION POINT. CONTRACTOR SHALL ADJUST TIE-IN LOCATION AS NECESSARY.

- NOTES:  
 1. REFER TO SHEET UC-3 FOR NOTES.  
 2. REFER TO SHEETS UC-3A AND 3B FOR DETAILS.  
 3. EXTEND 8" WL AND TIE-IN TO NEW 12" WL WITH 12X8 TEE.  
 4. PIPE TIE-IN ELEVATIONS NOT VERIFIED.  
 5. WATER LINE ELEVATIONS IN PROFILE ARE TO CENTER OF PIPE.



REVISIONS