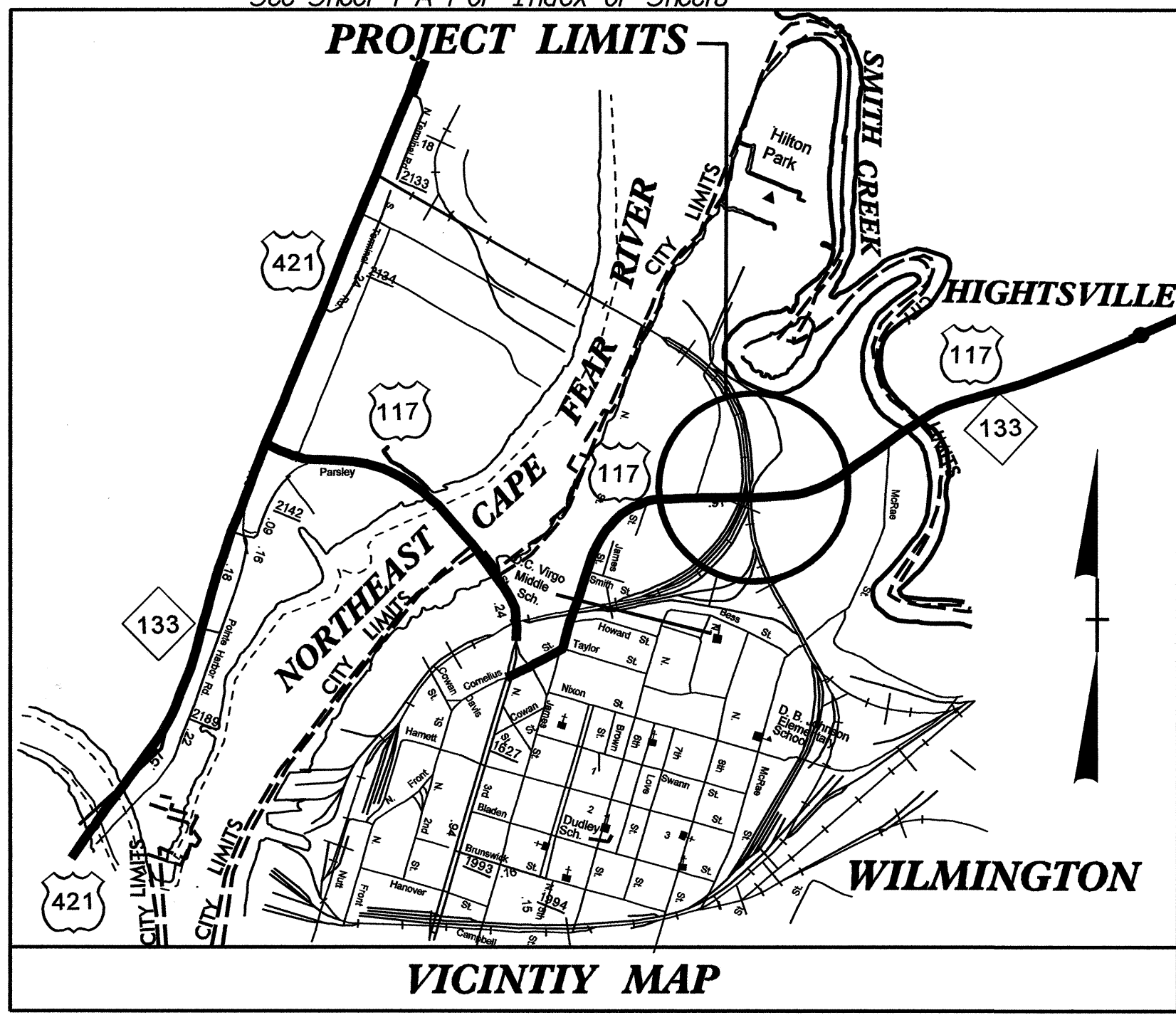


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 CONTRACT: C201921  
 TIP PROJECT: B-3881

See Sheet 1-A For Index of Sheets



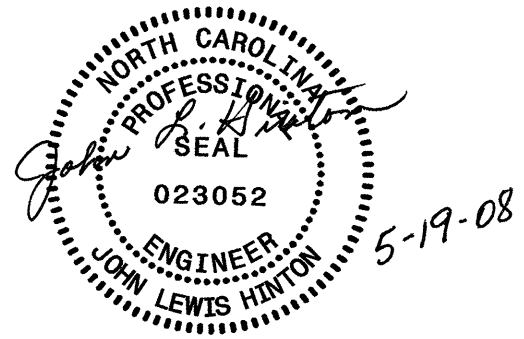
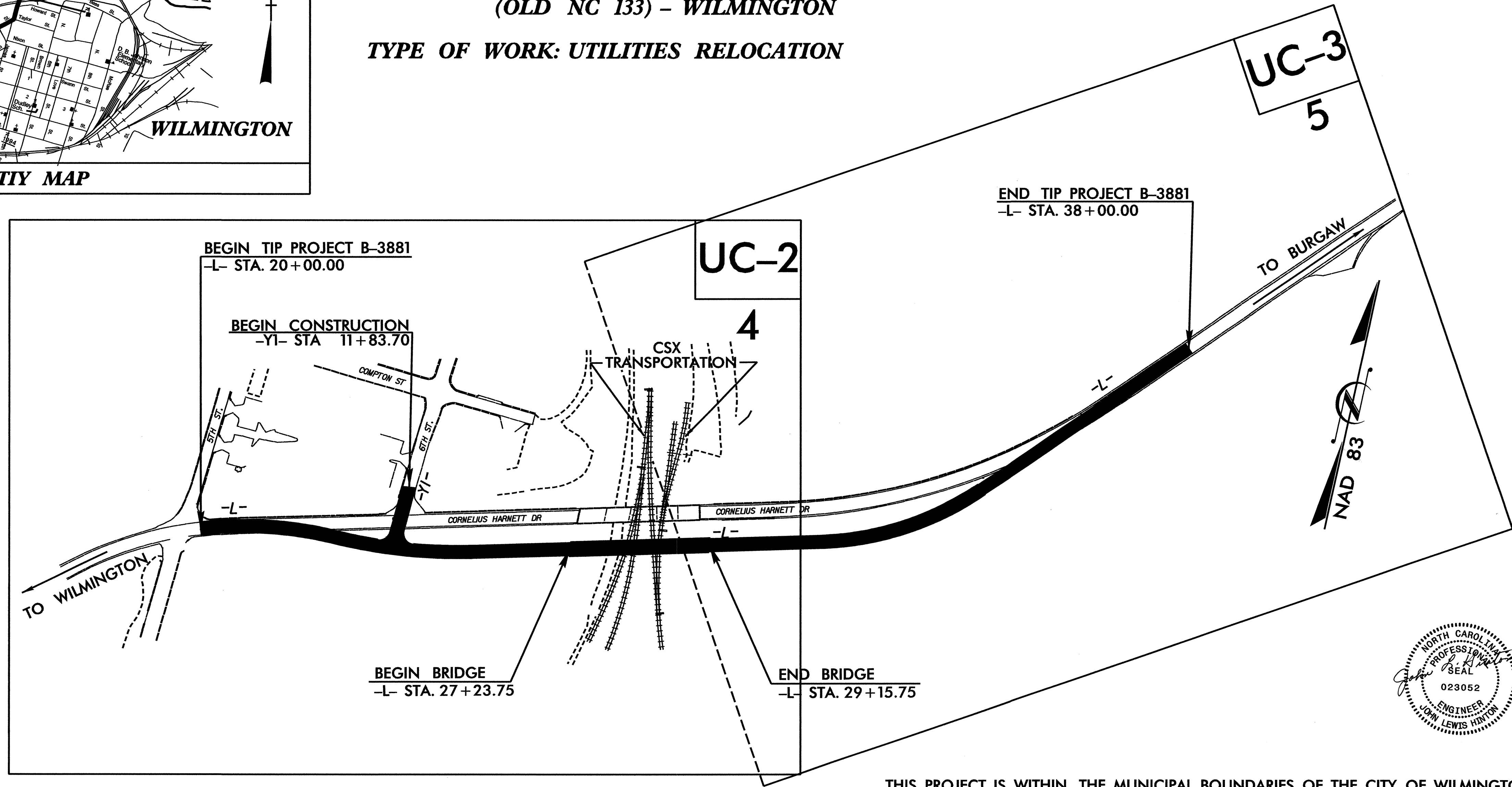
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.
N.C.	B-3881	UC-1
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION

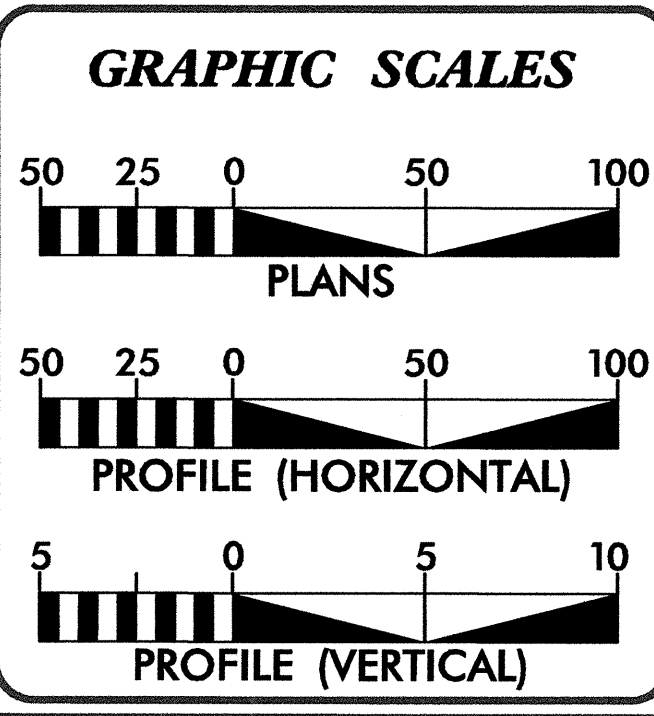
# UTILITY CONSTRUCTION PLANS NEW HANOVER COUNTY

**LOCATION: BRIDGE NO. 26 OVER CSX TRANSPORTATION  
TRACKS ON CORNELIUS HARNETT DRIVE  
(OLD NC 133) - WILMINGTON**

**TYPE OF WORK: UTILITIES RELOCATION**



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF WILMINGTON.  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III



SHEET No.	DESCRIPTION
UC-1	TITLE SHEET
UC-2 TO UC-3	UTILITY CONSTRUCTION PLAN SHEETS
UC-4	UTILITY CONSTRUCTION PROFILE SHEET
UC-5 TO UC-6	UTILITY CONSTRUCTION DETAIL SHEETS

**UTILITY OWNERS ON PROJECT**

(1.) CITY OF WILMINGTON (WATER AND SEWER)

PREPARED BY

**Municipal Services Engineering Company, P.A.**

P.O. BOX 97 GARNER, N.C. 27529 P.O. BOX 349 BOONE, N.C. 28607  
 (919) 772-5293 (828) 262-1167  
 P.O. BOX 276 MOREHEAD CITY, N.C. 28557  
 (252) 726-9481

UTILITY DESIGN ENGINEER **JOHN L. HINTON, P.E.**

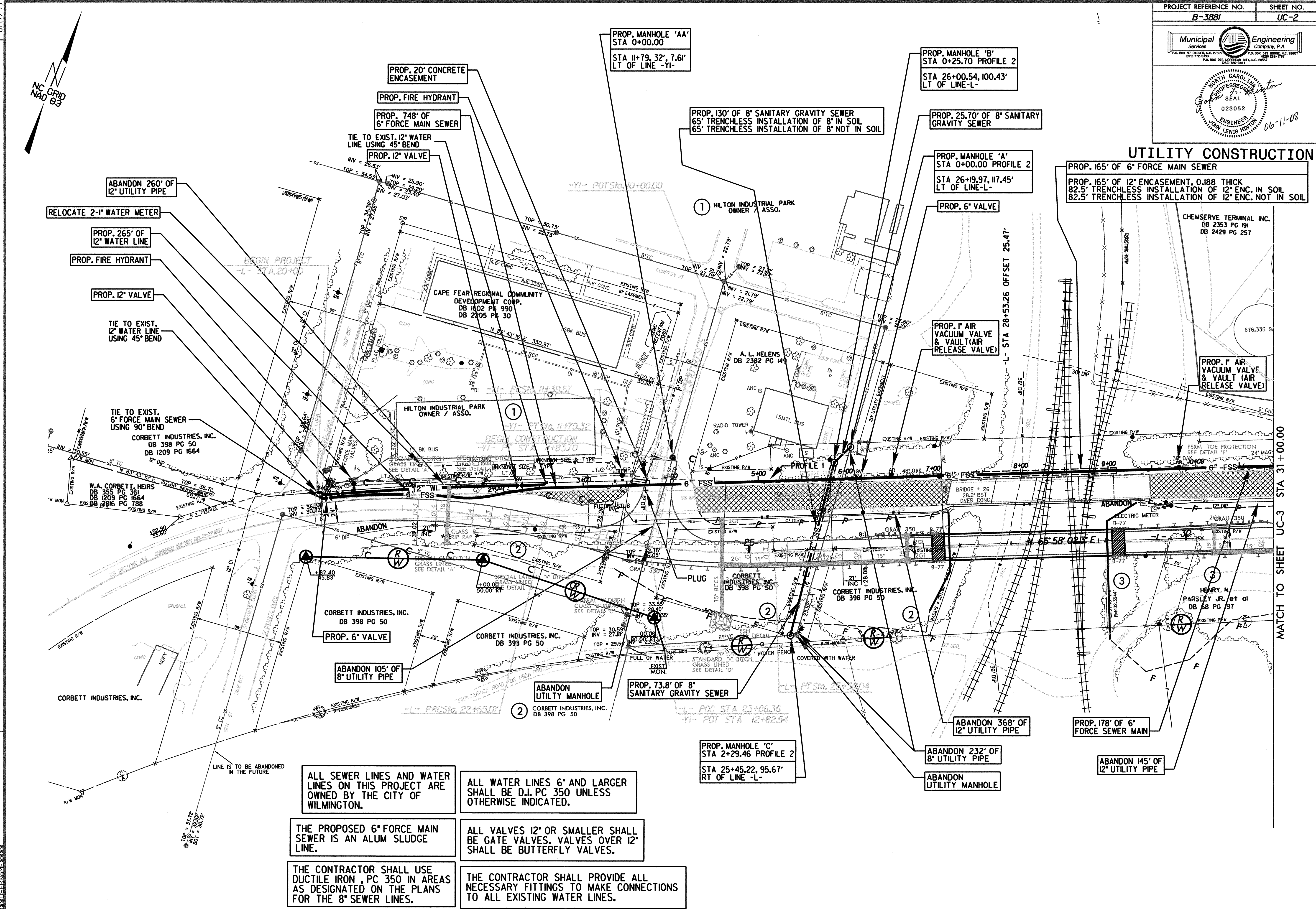
PREPARED IN THE OFFICE OF:  
DIVISION OF HIGHWAYS  
DESIGN SERVICES  
UTILITY SECTION

1591 MAIL SERVICES CENTER  
RALEIGH, NC 27699-1591  
PHONE (919) 258-4128  
FAX (919) 258-4119

**Roger Worthington, P.E.** UTILITIES SECTION ENGINEER  
**Steve McKee, P.E.** UTILITIES SQUAD LEADER PROJECT ENGINEER  
**Alonza Yancey** UTILITIES PROJECT DESIGNER



**UTILITY CONSTRUCTION**



R/W Rev. - Corrected parcel / owner name and deed reference and removed the temporary construction easement. Added additional tracks of land, unconstructed platted streets, and revised the guardrail design. BCK 8-1-06

8/17/99

REVISIONS



ALL SEWER LINES AND WATER LINES ON THIS PROJECT ARE OWNED BY THE CITY OF WILMINGTON.

ALL WATER LINES 6" AND LARGER SHALL BE D.I. PC 350 UNLESS OTHERWISE INDICATED.

THE PROPOSED 6" FORCE MAIN SEWER IS AN ALUM SLUDGE LINE.

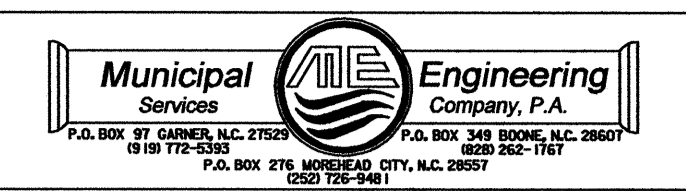
ALL VALVES 12" OR SMALLER SHALL BE GATE VALVES. VALVES OVER 12" SHALL BE BUTTERFLY VALVES.

THE CONTRACTOR SHALL USE DUCTILE IRON, PC 350 IN AREAS AS DESIGNATED ON THE PLANS FOR THE 8" SEWER LINES.

THE CONTRACTOR SHALL PROVIDE ALL NECESSARY FITTINGS TO MAKE CONNECTIONS TO ALL EXISTING WATER LINES.

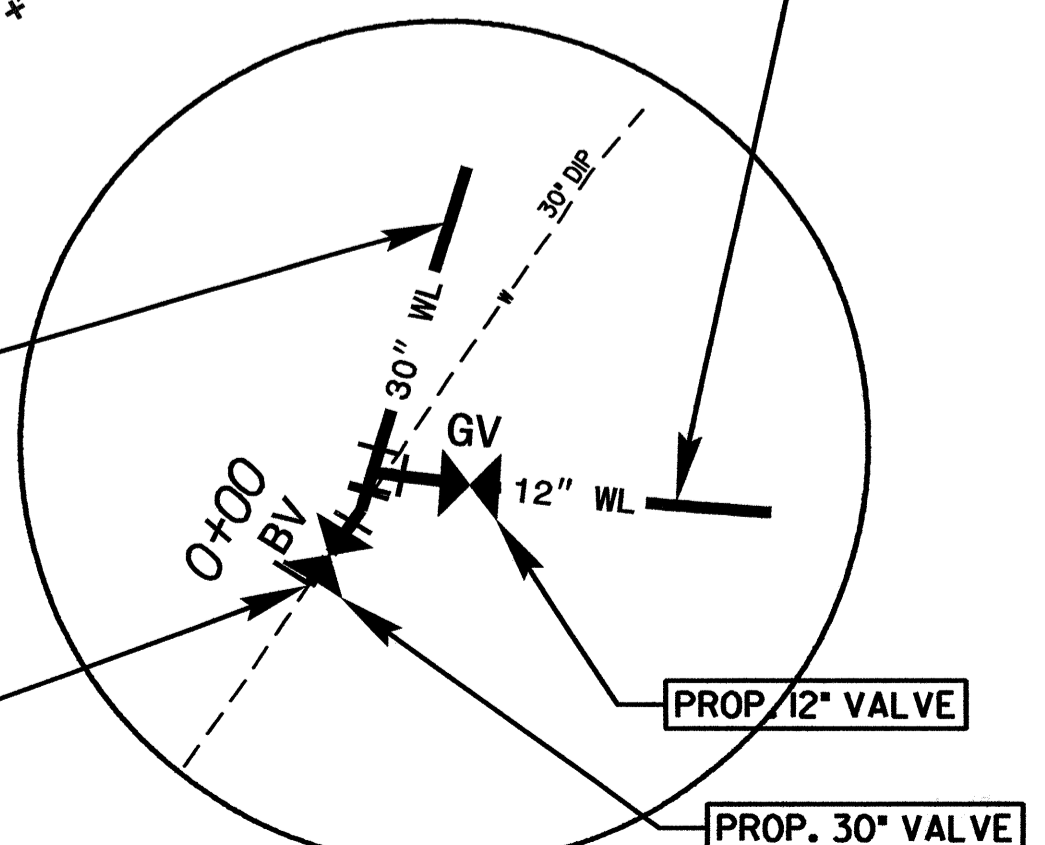
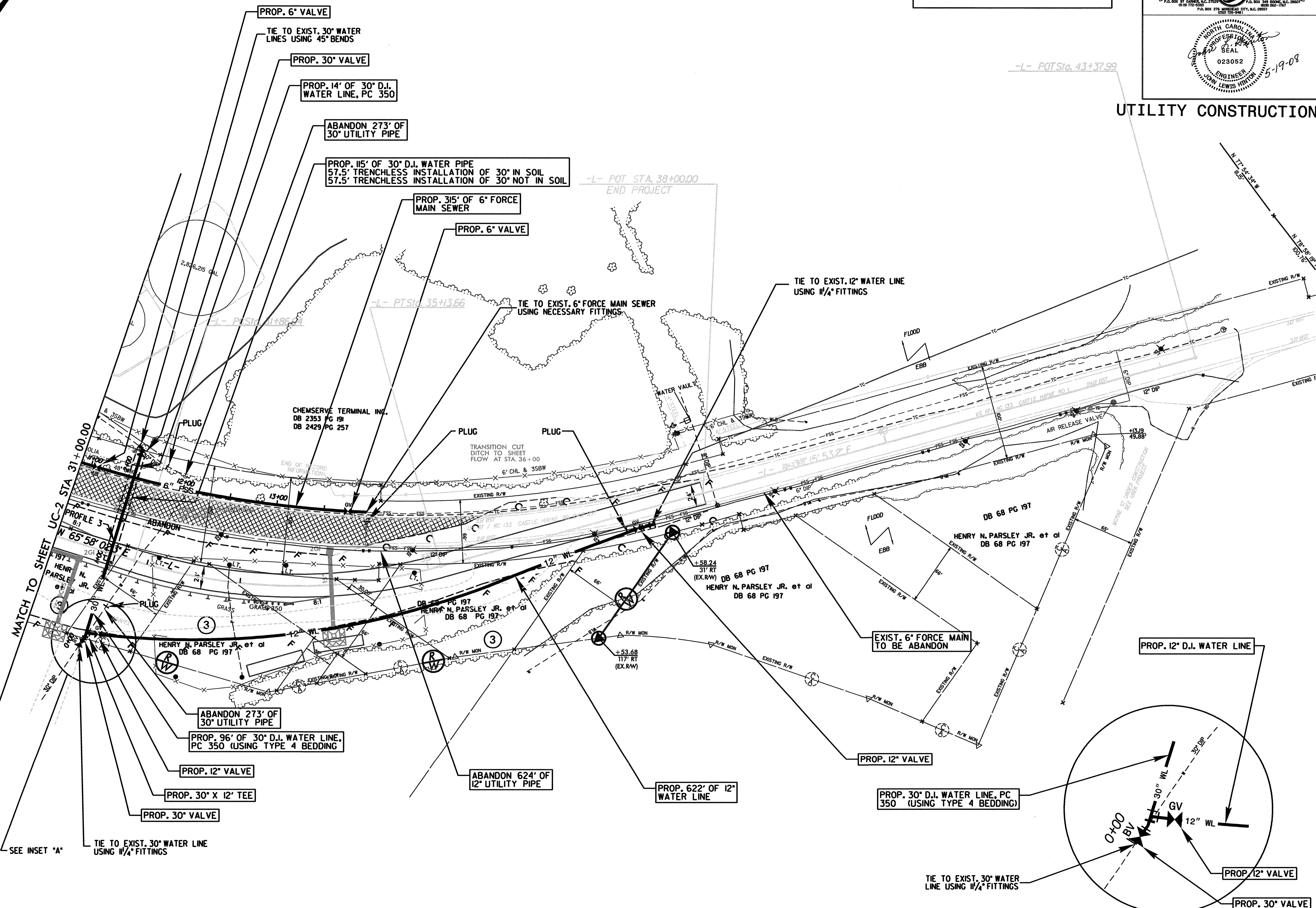
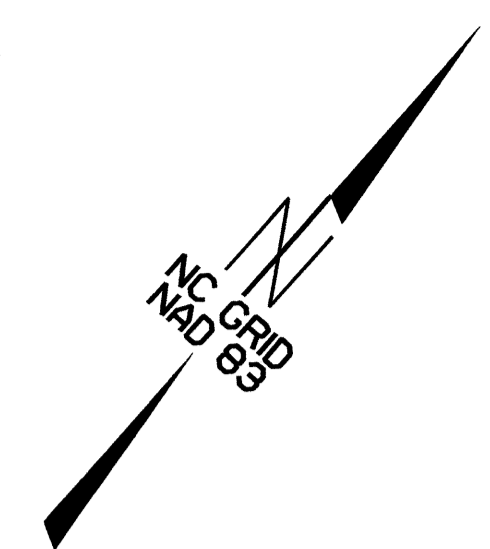
MATCH TO SHEET UC-3 STA 31+00.00





ALL VALVES 12" OR SMALLER SHALL BE GATE VALVES. VALVES OVER 12" SHALL BE BUTTERFLY VALVES.

UTILITY CONSTRUCTION



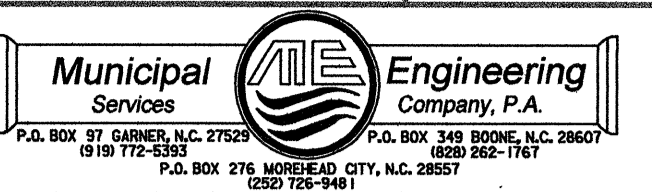
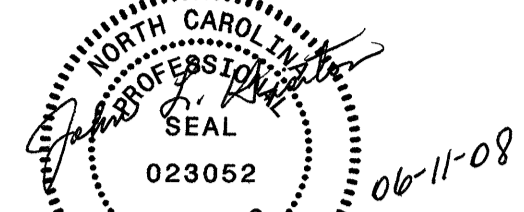
REVISIONS  
 R/W Rev. - Added unconstructed platted streets and revised the guardrail design. BCK B-1-06

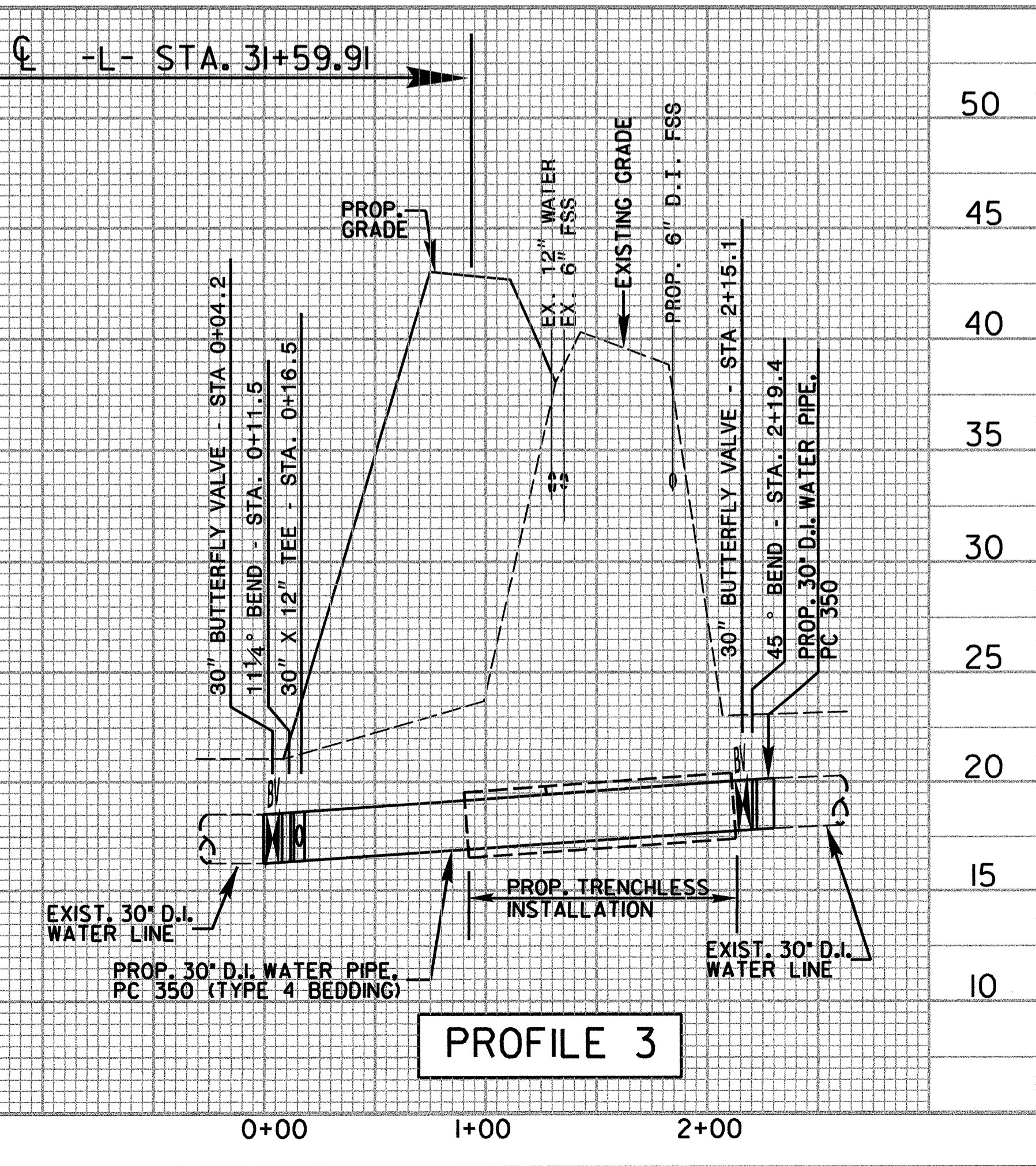
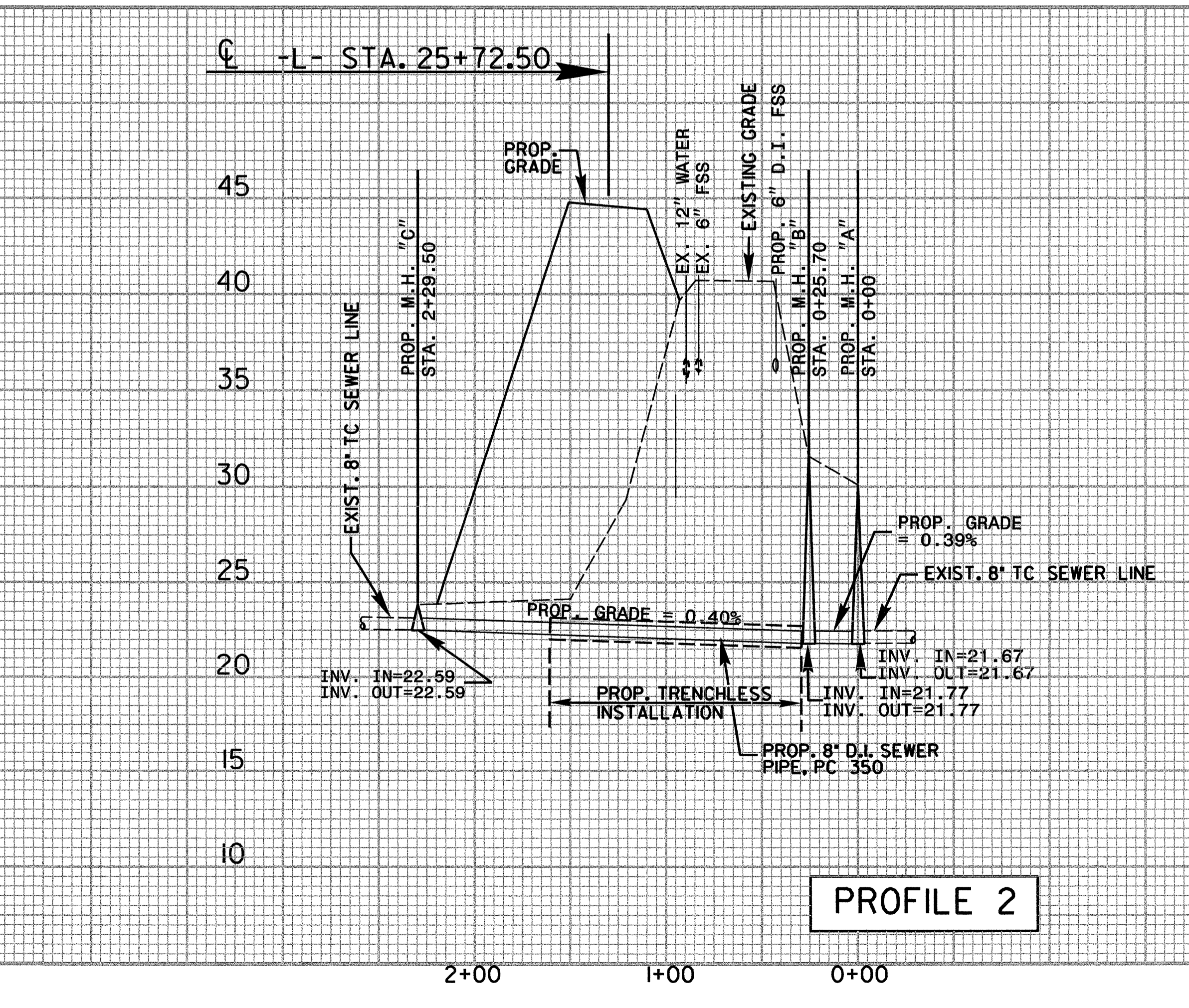
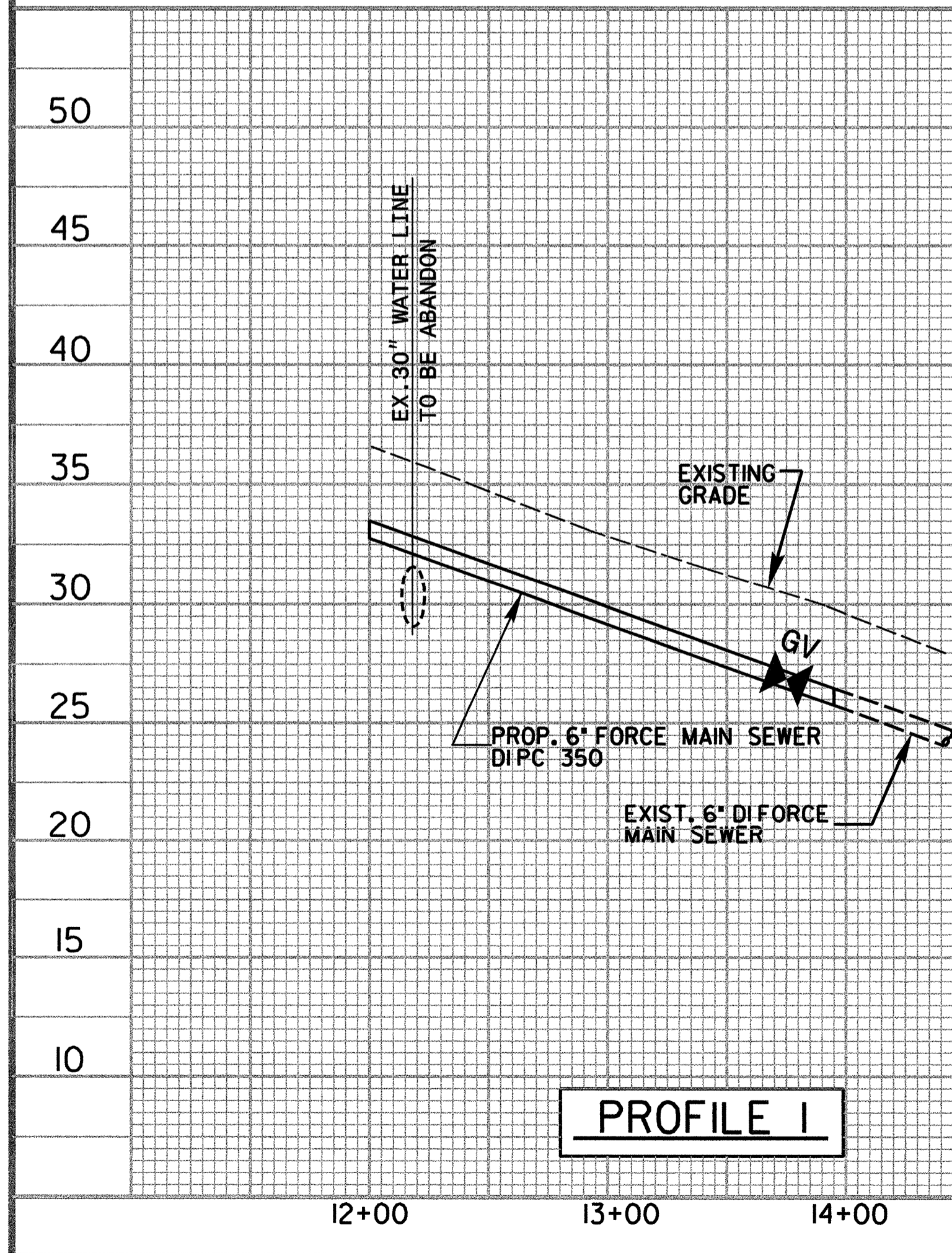
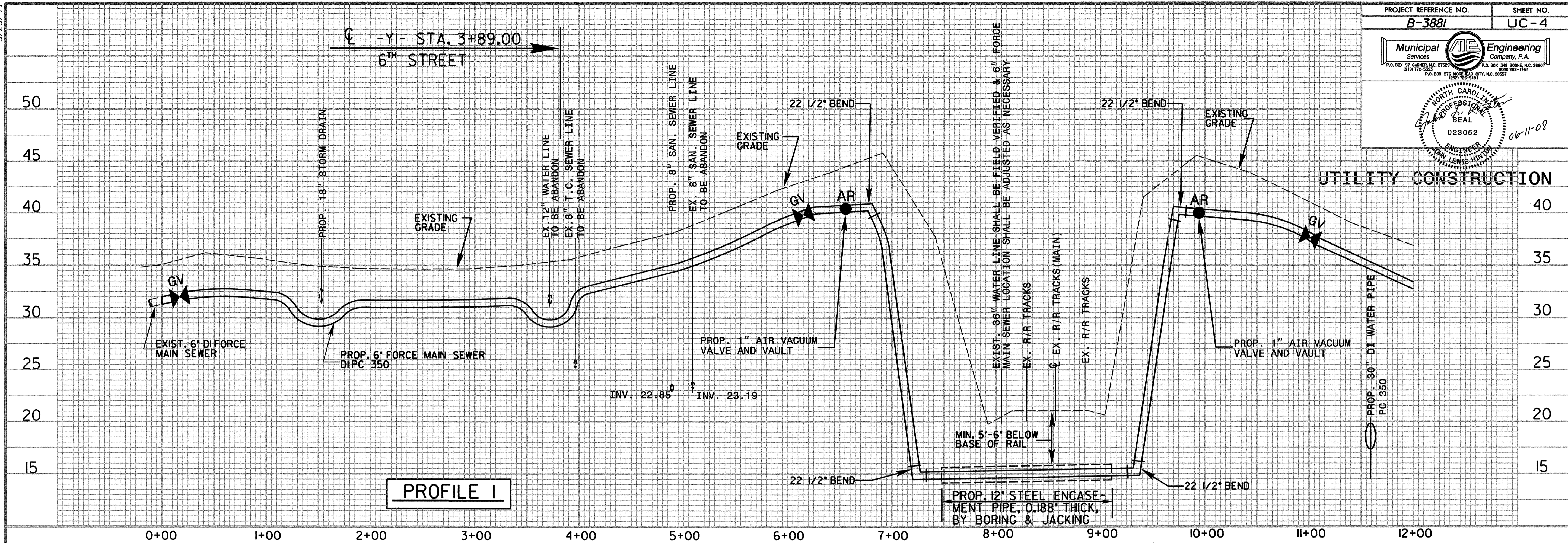
8/17/99

SYSTEMS DESIGN  
 CONSULTING  
 ENGINEERS  
 P.A.



5/28/99

PROJECT REFERENCE NO. <b>B-3881</b>	SHEET NO. <b>UC-4</b>
	
	

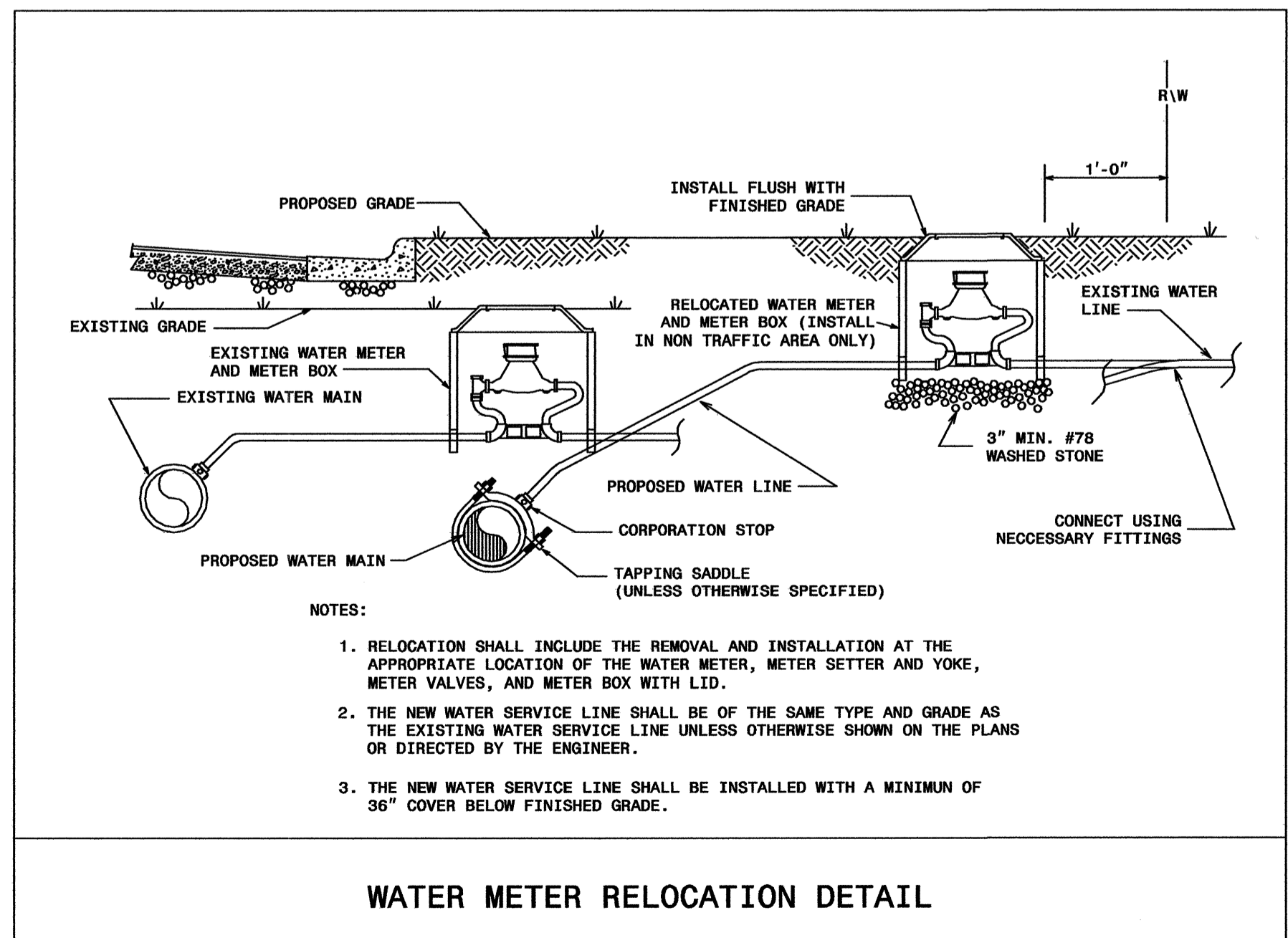
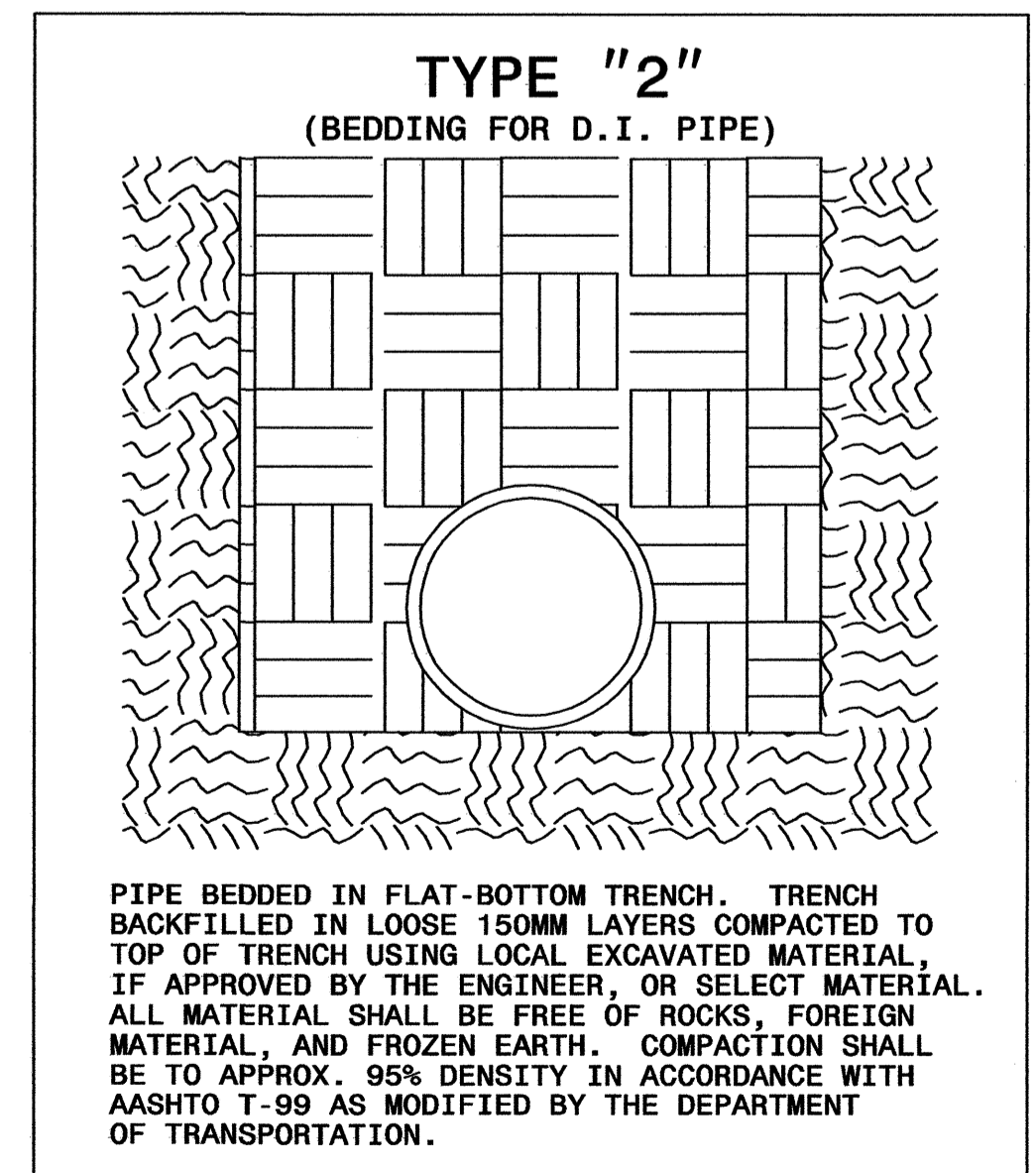
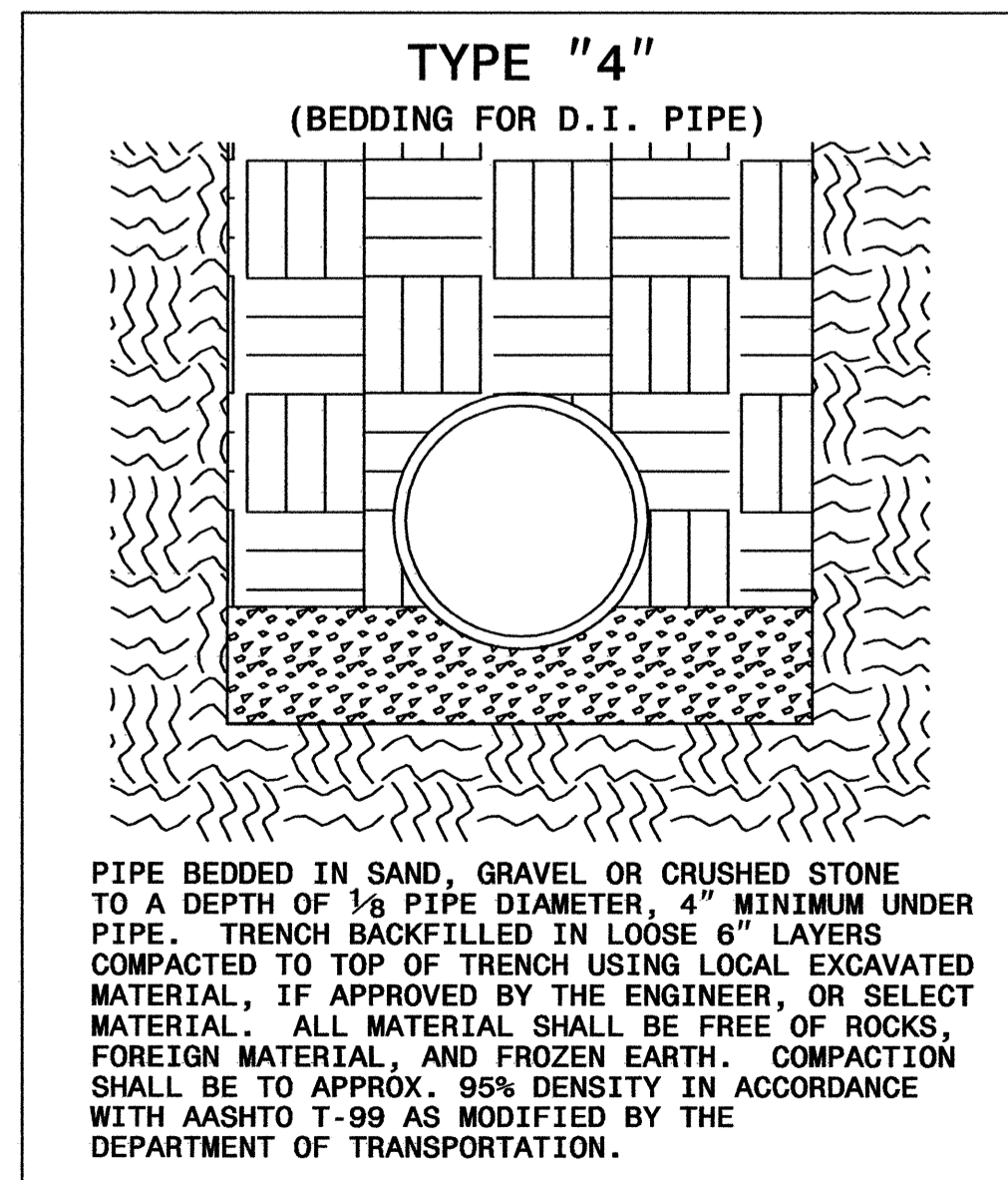
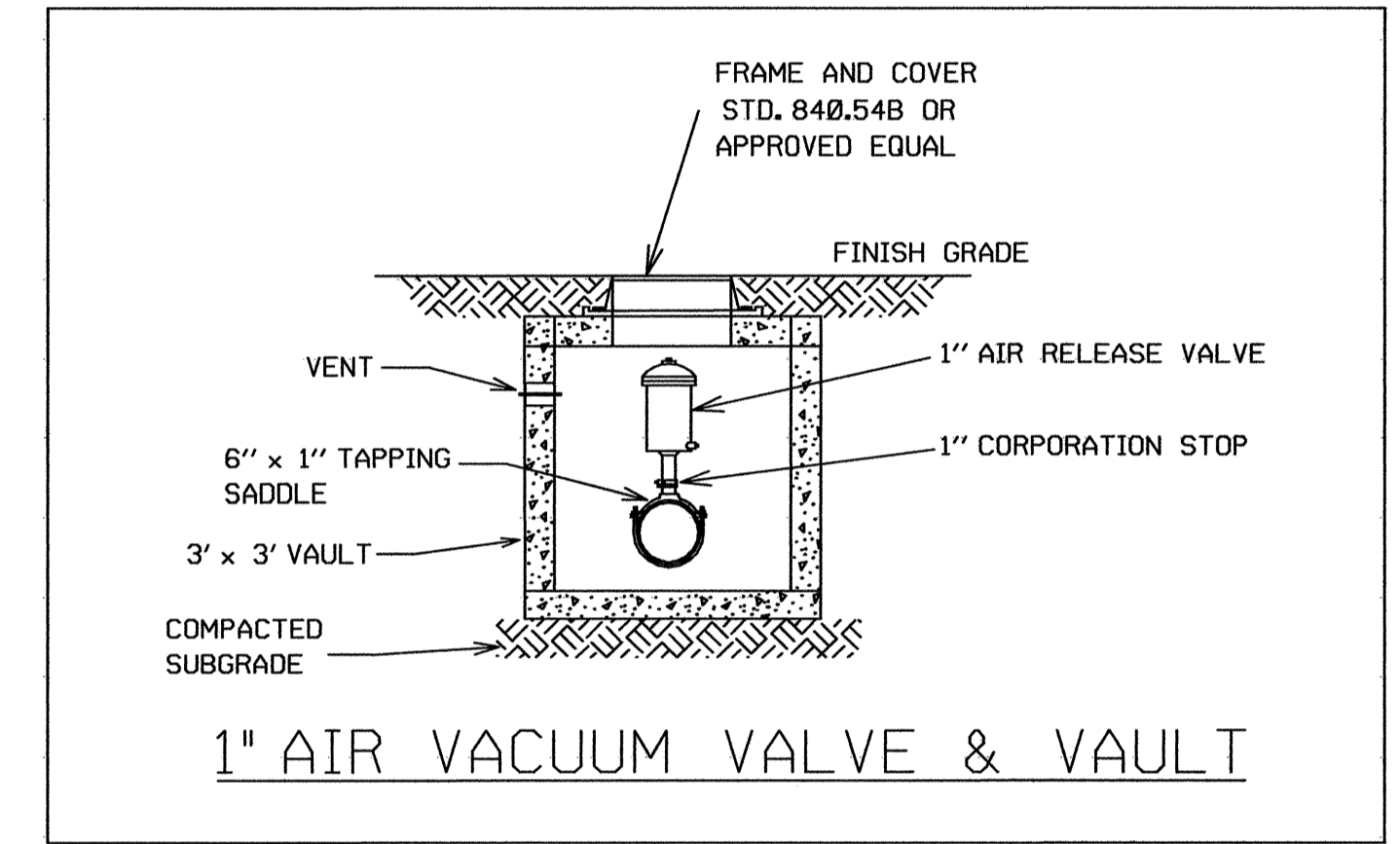
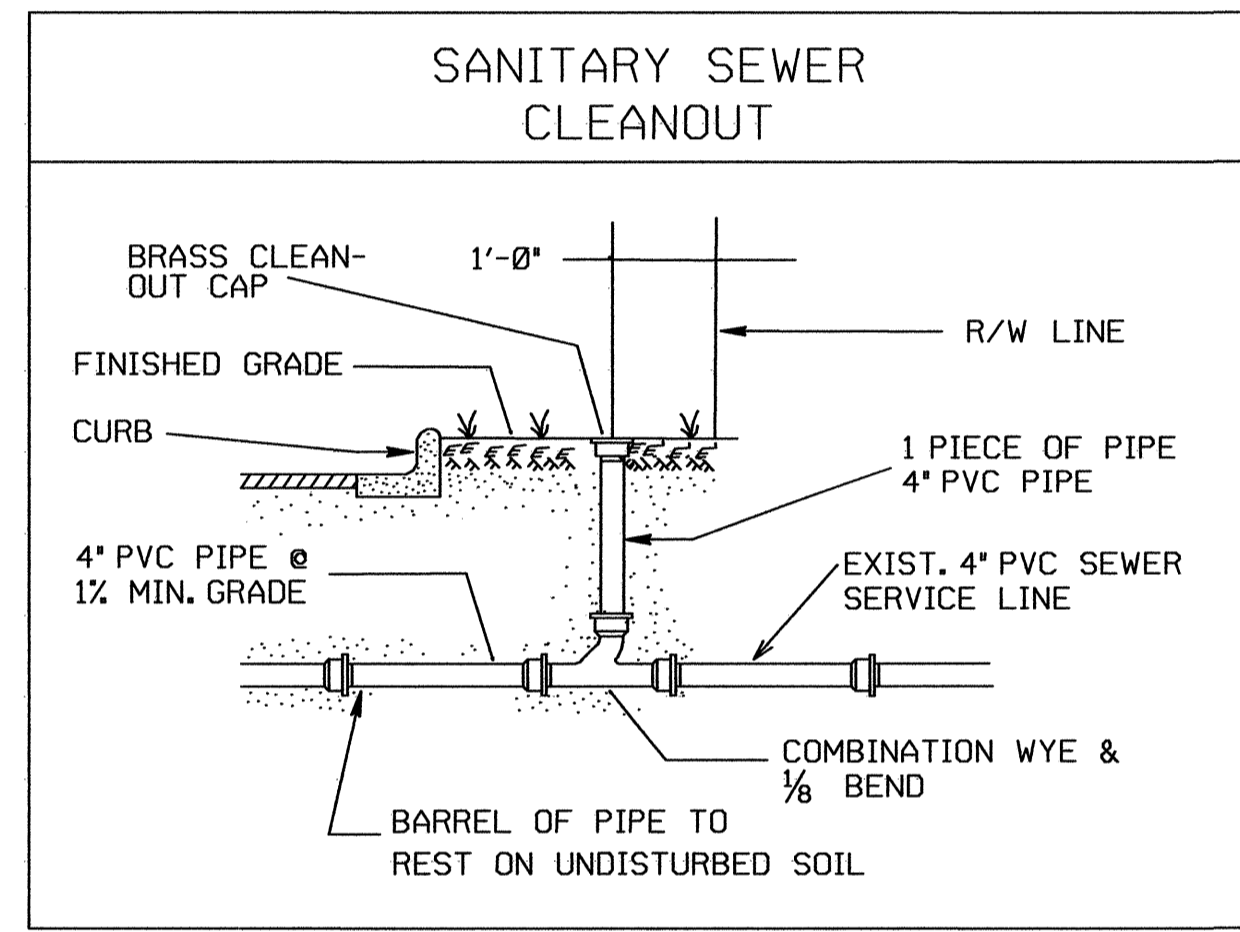
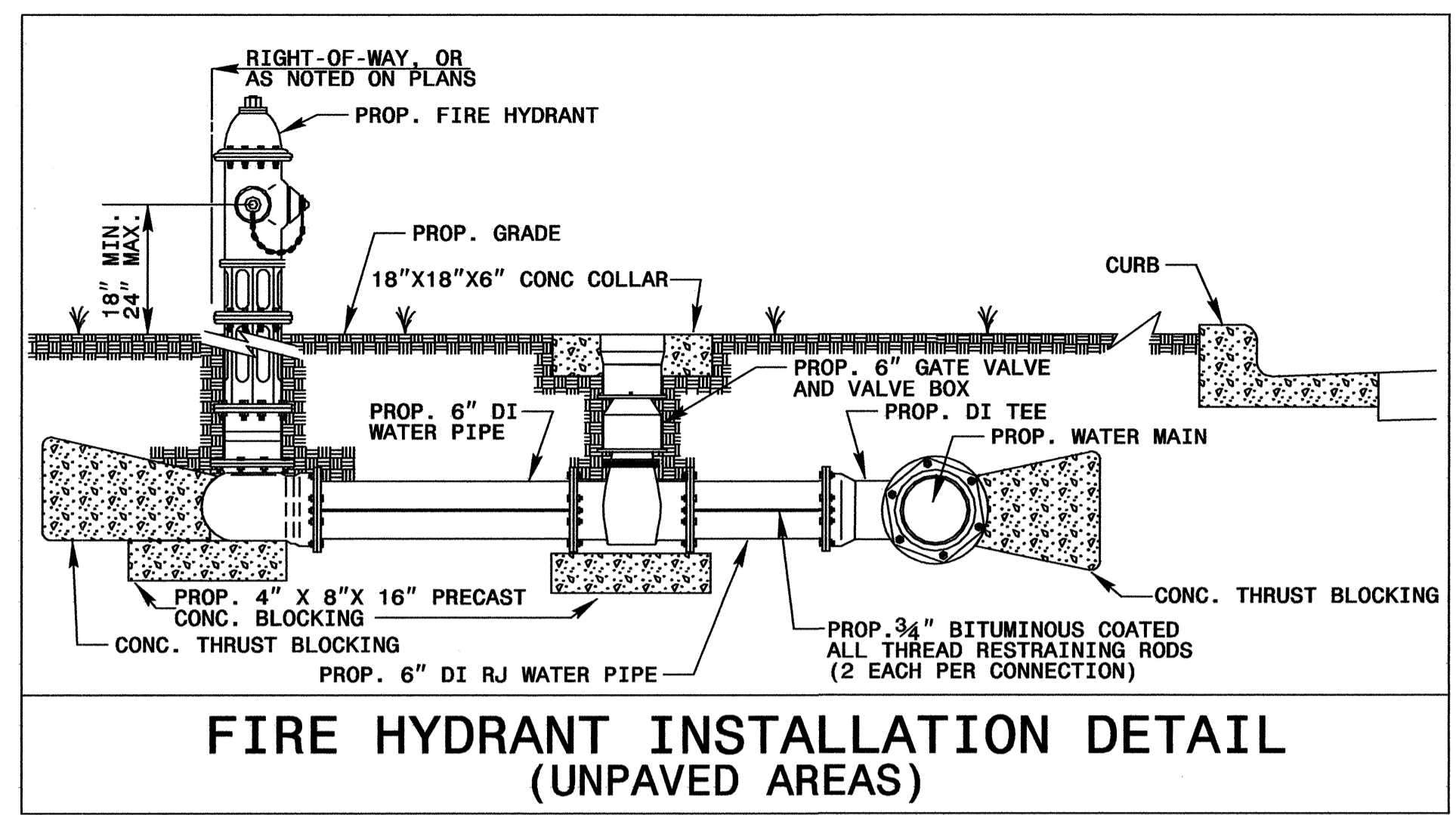
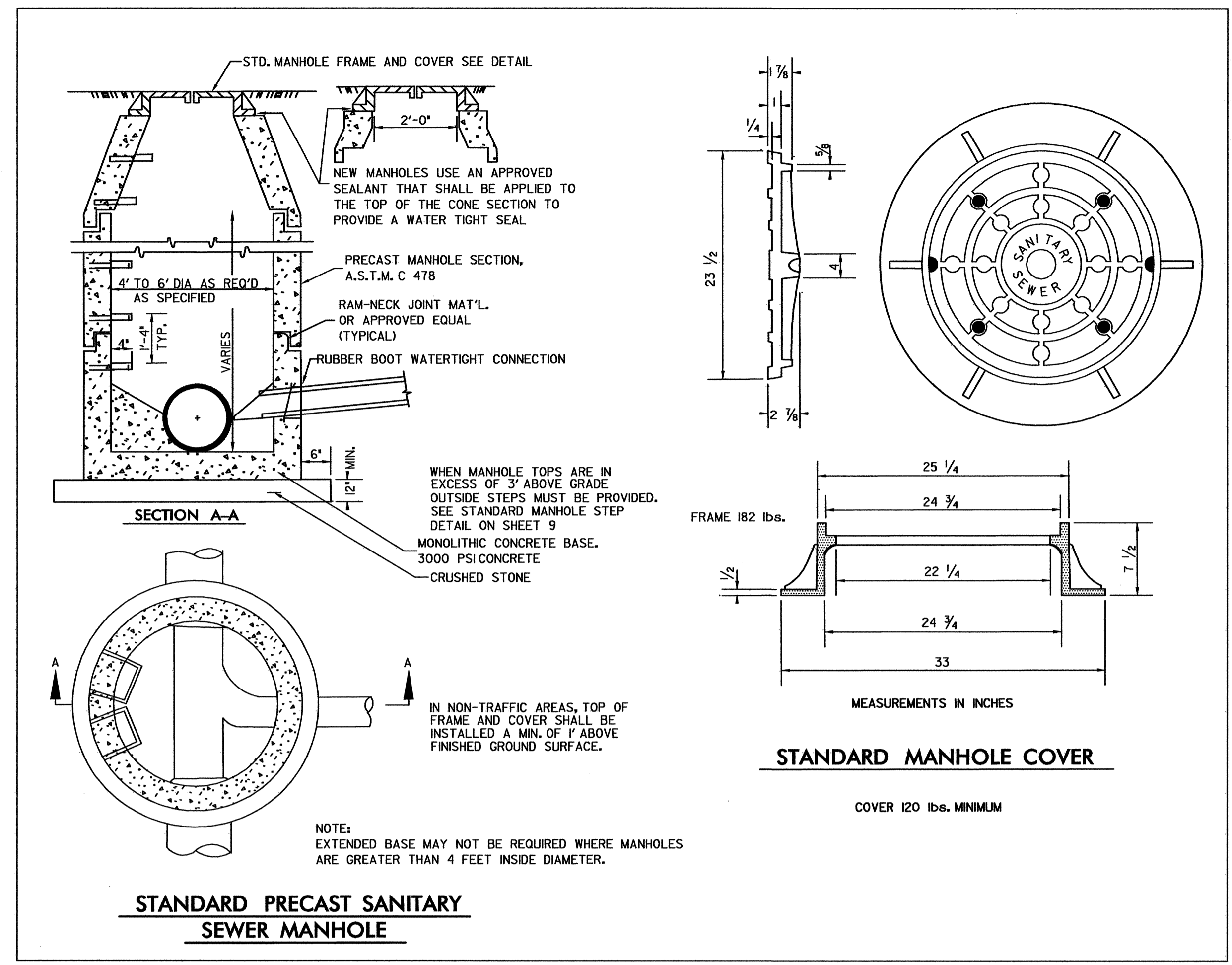




**Municipal Engineering**  
 Services Company, P.A.  
 P.O. BOX 87 CARMEL, N.C. 27521 P.A. BOX 349 BOONE, N.C. 28607  
 (919) 772-5330 (800) 952-1167  
 P.O. BOX 276 MOREHEAD CITY, N.C. 28557 (252) 775-9811

Professional Engineer  
 State of North Carolina  
 License No. 023052  
 Date: 5-19-08

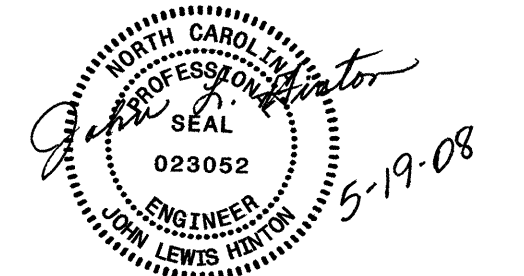
**UTILITY CONSTRUCTION**



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		





**UTILITY CONSTRUCTION**

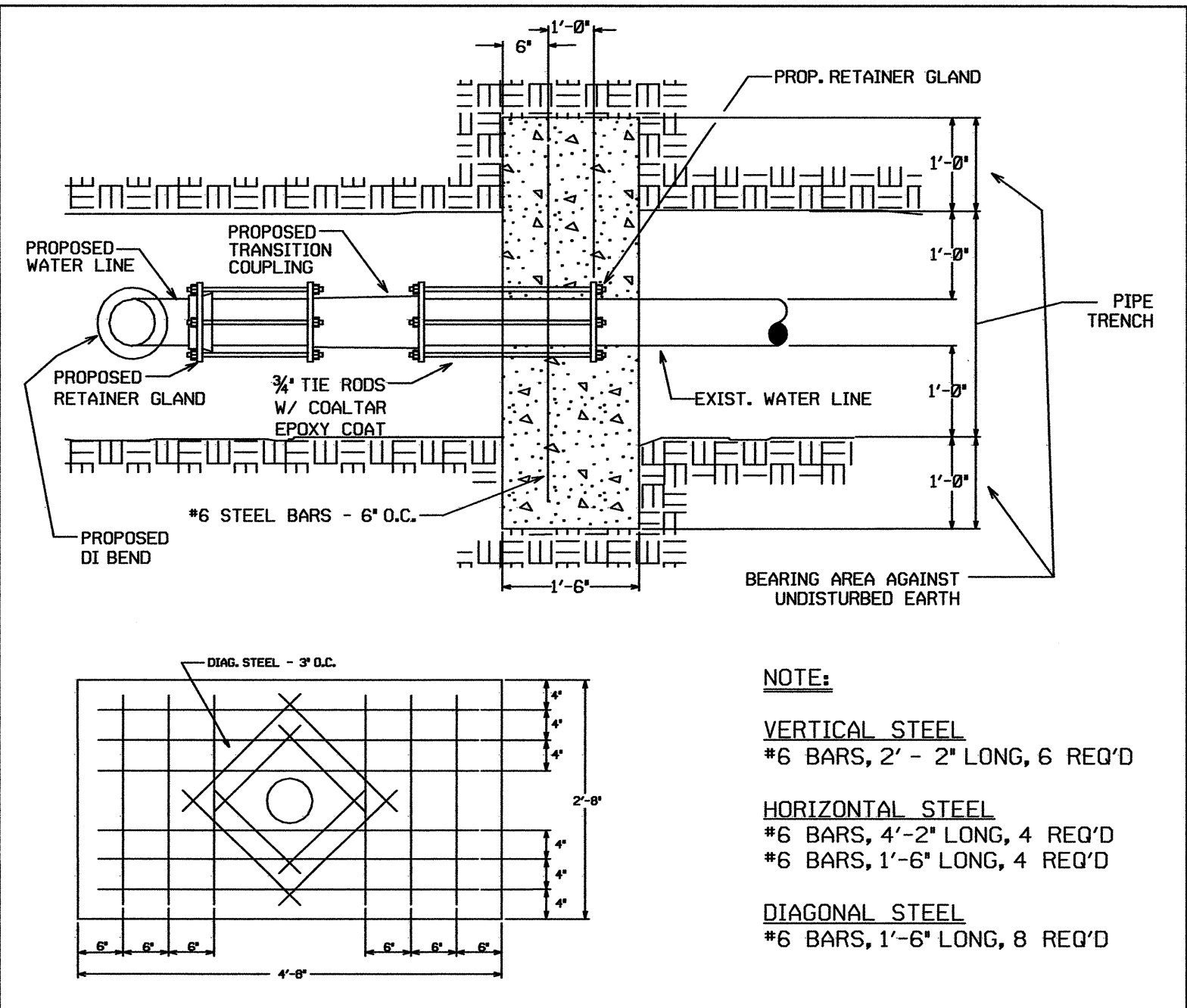
**REACTION BEARING AREAS FOR HORIZONTAL WATER PIPE BENDS**  
 BASED ON TEST PRESSURE OF 200 P.S.I.  
 ALL AREAS GIVEN IN SQUARE FEET.

SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	MODERATELY DRY CLAY 4000 LBS./FT <sup>2</sup>	SOFT CLAY 2000 LBS./FT <sup>2</sup>	GRAVEL / COARSE SAND 4000 LBS./FT <sup>2</sup>	DRY CLAY - ALWAYS DRY 8000 LBS./FT <sup>2</sup>	SAND - COMPACT FIRM 4000 LBS./FT <sup>2</sup>	SAND - CLEAN DRY 8000 LBS./FT <sup>2</sup>	QUICKSAND - VERY POOR SOIL 1000 LBS./FT <sup>2</sup>	ROCK 10,000 LBS./FT <sup>2</sup>
<b>6"</b>									
11 1/4°	1,108	1	1	1	1	1	2	1	
22 1/2°	2,207	1	2	2	1	1	3	1	
45°	4,328	2	3	3	1	1	2	5	1
90°	7,996	2	4	5	1	1	2	8	1
PLUG	5,655	2	3	4	1	1	2	6	1
<b>8"</b>									
11 1/4°	1,970	1	1	2	1	1	2	1	
22 1/2°	3,922	1	2	3	1	1	4	1	
45°	7,694	2	4	5	1	1	2	8	1
90°	14,215	4	8	9	2	2	4	15	2
PLUG	10,053	3	5	6	2	2	3	10	1
<b>12"</b>									
11 1/4°	4,433	2	3	3	1	1	2	5	1
22 1/2°	8,826	3	5	6	2	2	3	9	1
45°	17,312	5	9	11	3	3	5	18	2
90°	31,983	8	16	19	4	4	8	32	4
PLUG	22,619	6	12	14	3	3	6	23	3
<b>16"</b>									
11 1/4°	7,881	2	4	5	1	1	2	8	1
22 1/2°	15,691	4	8	10	2	2	4	16	2
45°	30,779	8	16	19	4	4	8	31	4
90°	56,861	15	29	35	8	8	15	57	6
PLUG	40,213	10	21	25	5	5	10	41	5

REACTION BEARING AREAS ARE IN SQUARE FEET MEASURED IN A VERTICAL PLANE IN THE TRENCH SIDE AT AN ANGLE OF 90° TO THE THRUST VECTOR.  
 USE 6° - 90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR.

DWG. NO.	REVISIONS	DATE	REVISIONS	DATE
D.W.C.		5-23-93		

**THRUST RESTRAINT WITH RETAINER GLANDS FOR PROP. PIPE TO EXIST. PIPE**



**NOTE:**  
**VERTICAL STEEL**  
 #6 BARS, 2' - 2" LONG, 6 REQ'D  
**HORIZONTAL STEEL**  
 #6 BARS, 4' - 2" LONG, 4 REQ'D  
 #6 BARS, 1' - 6" LONG, 4 REQ'D  
**DIAGONAL STEEL**  
 #6 BARS, 1' - 6" LONG, 8 REQ'D

**THRUST RESTRAINT FOR WATER MAINS**  
 STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS  
 RALEIGH, N.C.

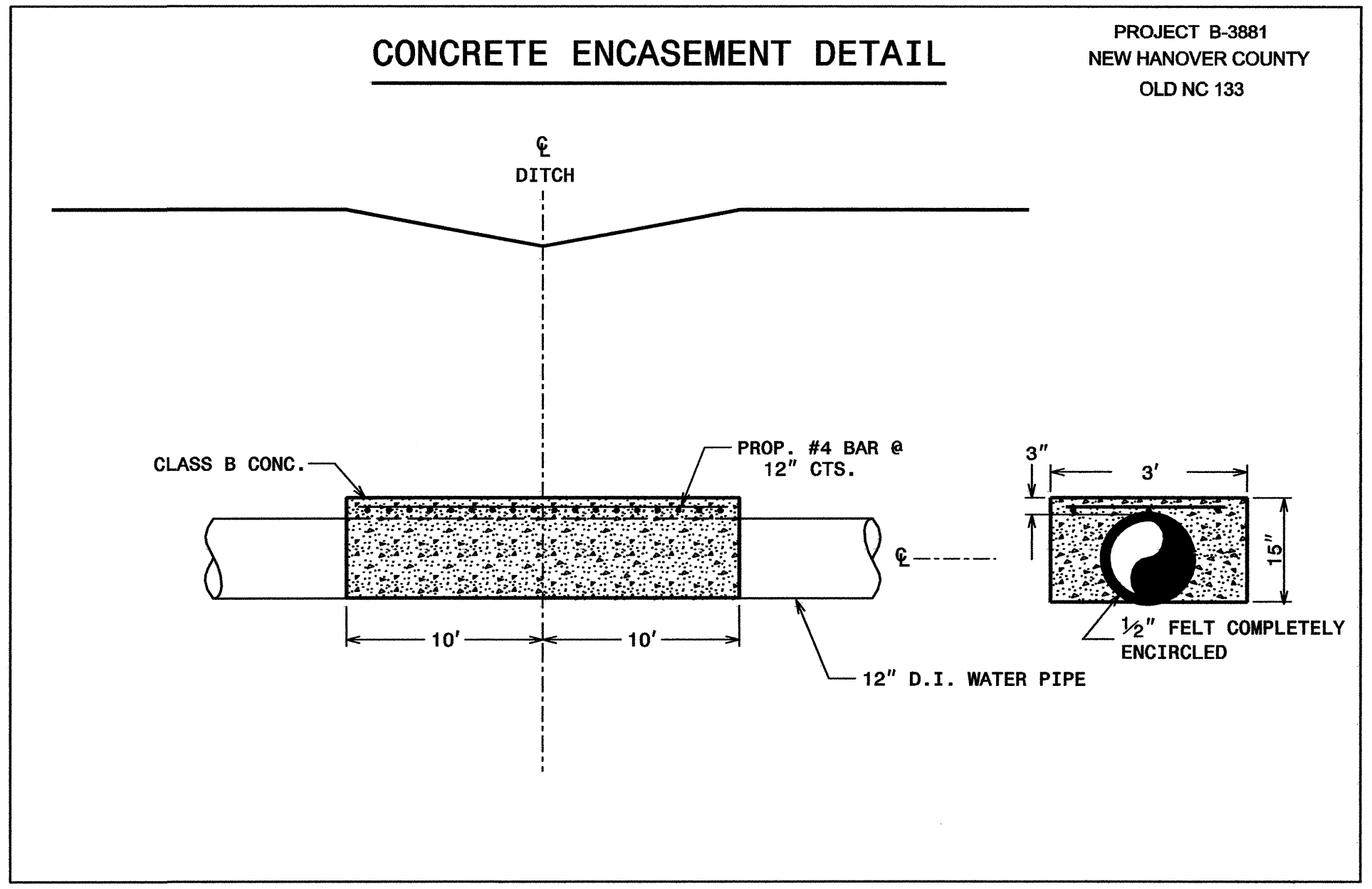
BASED ON TEST PRESSURE OF 200 P.S.I.

PIPE SIZE	DEGREE OF BEND	LBS. STATIC THRUST *	ALLOWABLE SOIL BEARING (PSF)							VERTICAL RESTRAINT (ALL VOLUMES GIVEN ARE IN CUBIC YARDS)**					
			1000	2000	3000	4000	5000	6000	7000	8000	PIPE SIZE	RESTRAINING RODS	DEGREE OF BEND		
4"	11 1/4°	98	1	1	1	1	1	1	1	4"	2	1/2°	0.25	0.50	0.75
	22 1/2°	196	2	2	2	2	2	2	2	6"	2	1/2°	0.50	1.0	1.75
	45°	392	3	3	3	3	3	3	3	8"	2	5/8°	0.75	1.50	3.0
	90°	784	4	4	4	4	4	4	4	10"	2	3/4°	1.25	2.25	4.50
6"	11 1/4°	144	1	1	1	1	1	1	1	12"	2	7/8°	1.75	3.25	6.50
	22 1/2°	288	2	2	2	2	2	2	2	14"	4	5/8°	2.25	4.50	8.75
	45°	576	3	3	3	3	3	3	3	16"	4	3/4°	3.0	6.0	11.50
	90°	1152	4	4	4	4	4	4	4						

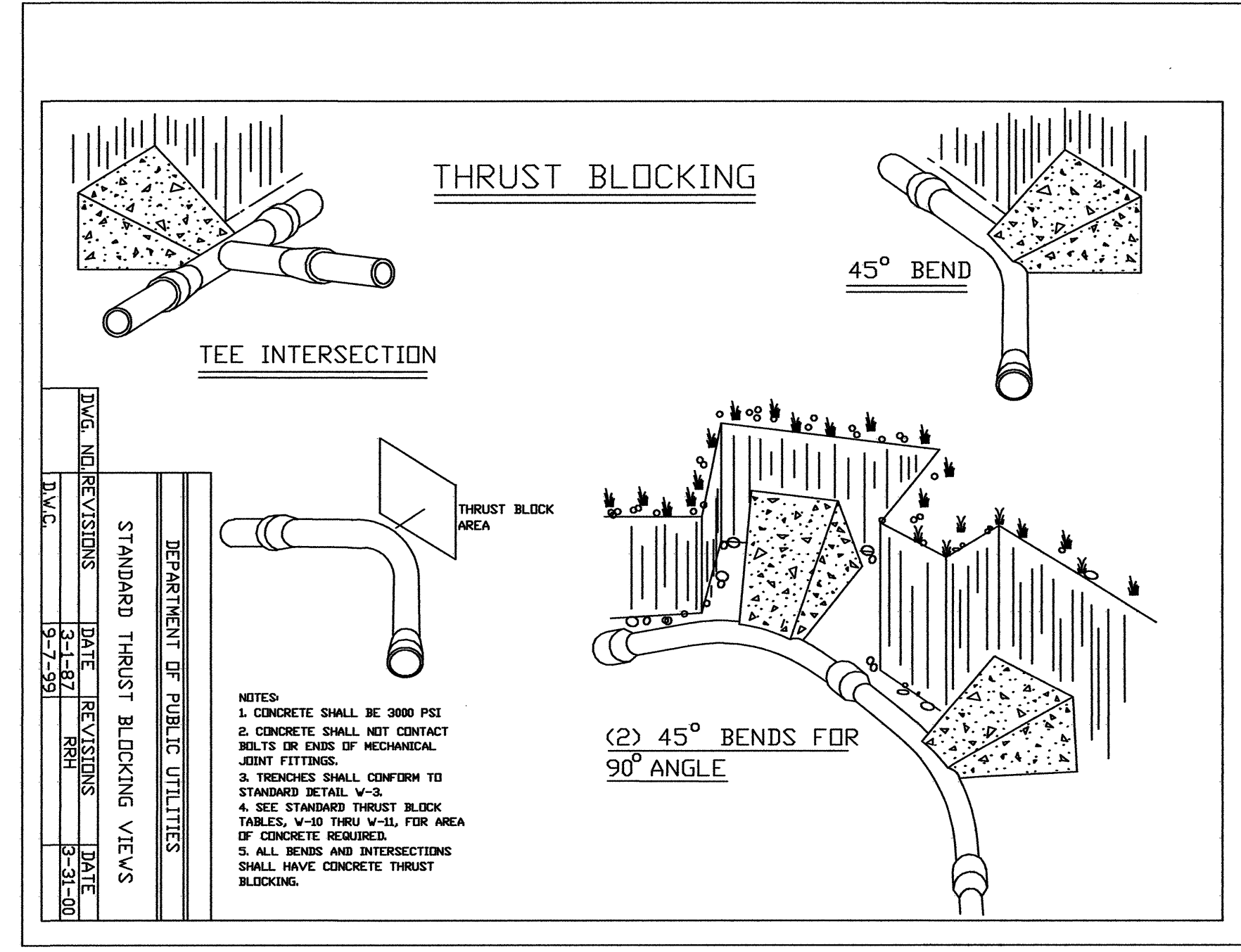
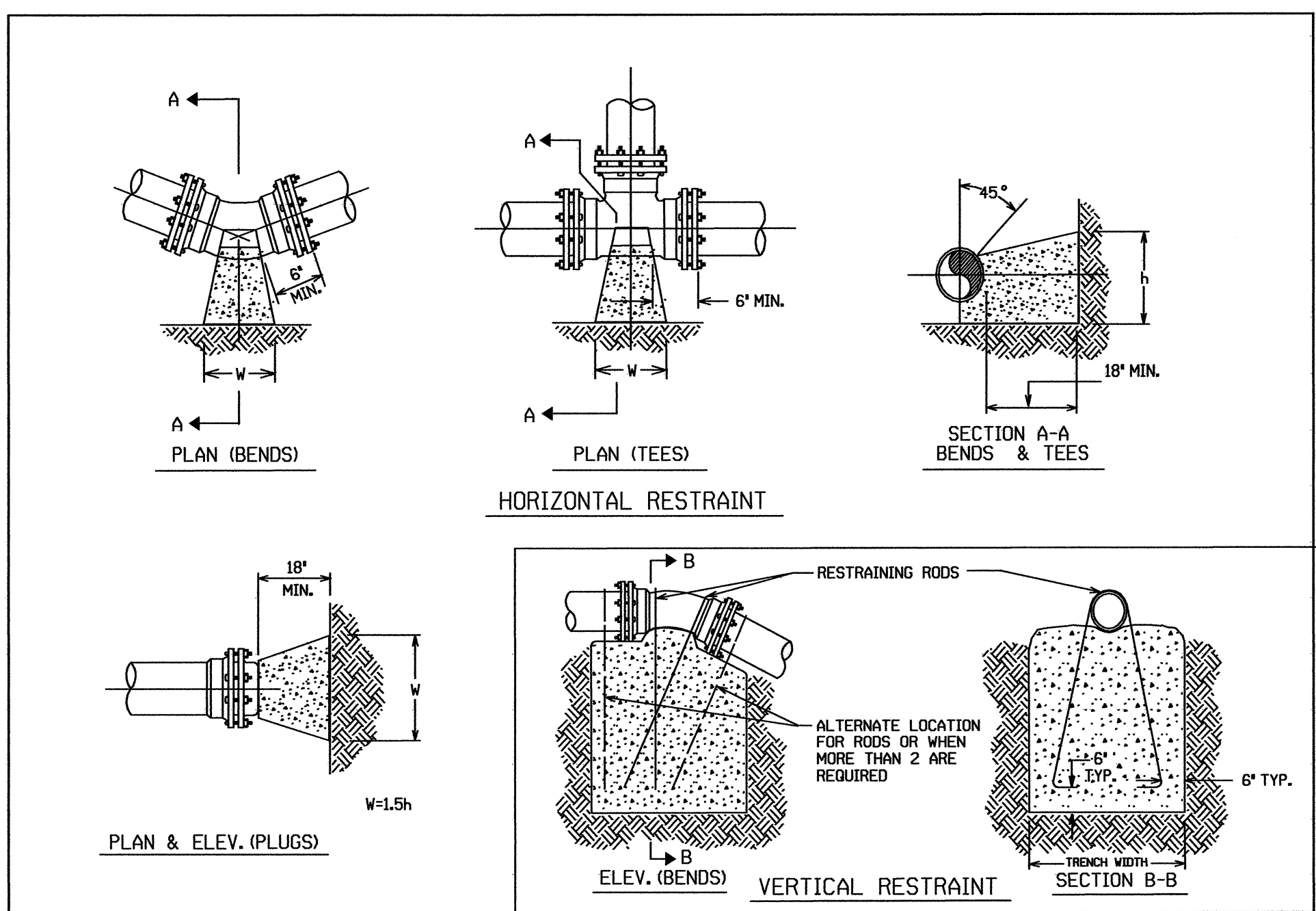
\* INCLUDES 1.25 SAFETY FACTOR  
 \*\* INCLUDES 1.50 SAFETY FACTOR

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.

NO.	DATE	REVISIONS DESCRIPTION



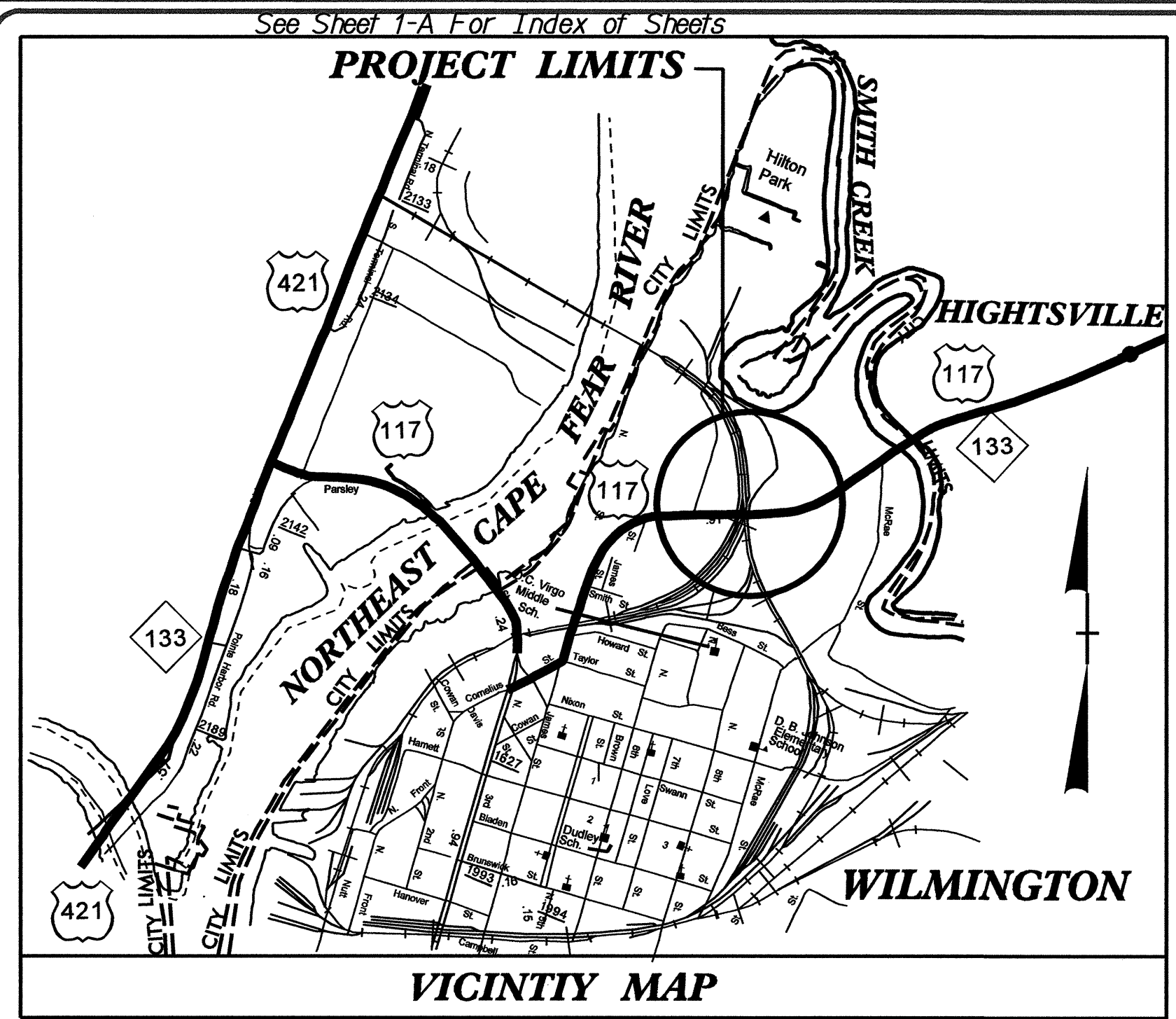
PROJECT B-3881  
 NEW HANOVER COUNTY  
 OLD NC 133





CONTRACT: C201921 TIP PROJECT: B-3881  
 SYSTEMS: DGN  
 USER: NAME

CONTRACT: C201921 TIP PROJECT: B-3881



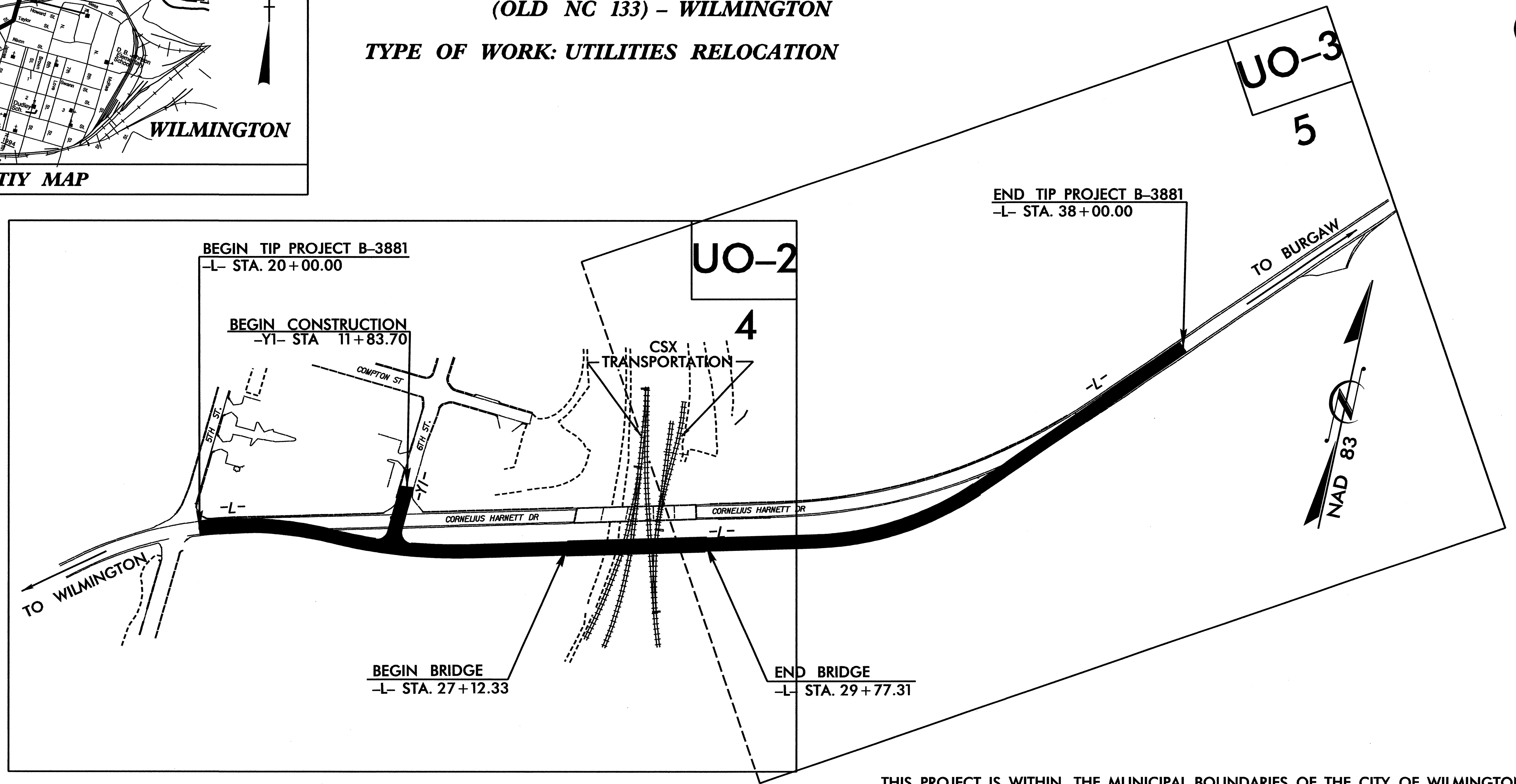
STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.
N.C.	B-3881	UO-1
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION

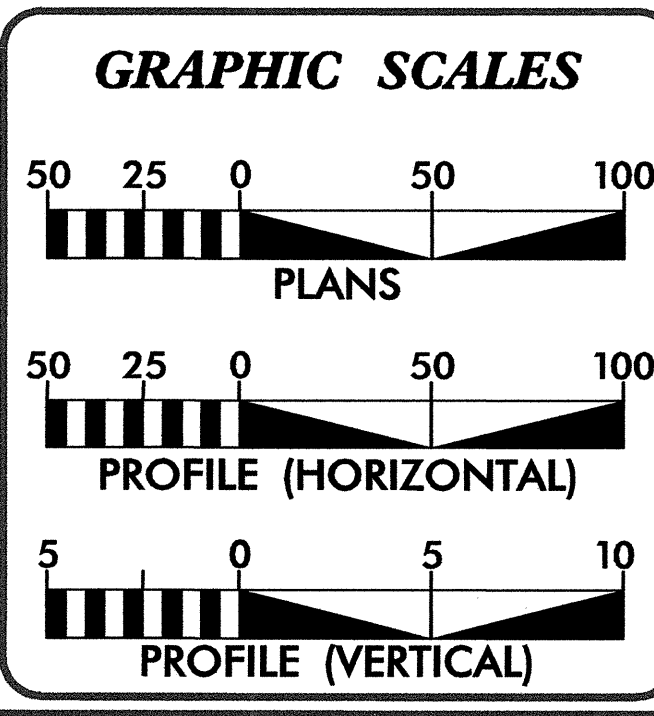
**UTILITIES BY OTHERS  
 NEW HANOVER COUNTY**

**LOCATION: BRIDGE NO. 26 OVER CSX TRANSPORTATION  
 TRACKS ON CORNELIUS HARNETT DRIVE  
 (OLD NC 133) - WILMINGTON**

**TYPE OF WORK: UTILITIES RELOCATION**



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF WILMINGTON.  
 CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III



**INDEX OF SHEETS**

SHEET No.	DESCRIPTION
UO-1	TITLE SHEET
UO-2 TO UO-3	UTILITIES BY OTHERS PLAN SHEETS

- UTILITY OWNERS ON PROJECT**
- PROGRESS ENERGY (POWER)
  - A.T. & T. (TELEPHONE)
  - PIEDMONT NATURAL GAS (GAS)
  - EMBARQ (TELEPHONE)

PREPARED BY

**Municipal Services** **Engineering Company, P.A.**

P.O. BOX 97 GARNER, N.C. 27529 P.O. BOX 349 BOONE, N.C. 28607  
 (919) 772-5383 (828) 262-1167  
 P.O. BOX 276 MOREHEAD CITY, N.C. 28557  
 (252) 726-9481

UTILITY DESIGN ENGINEER JOHN L. HINTON, P.E.

PREPARED IN THE OFFICE OF:

**DIVISION OF HIGHWAYS  
 DESIGN SERVICES  
 UTILITY SECTION**

191 MAIL SERVICES CENTER  
 RALEIGH, NC 27699-1291  
 PHONE (919) 256-4128  
 FAX (919) 256-4119

Roger Worthington, P.E. UTILITIES SECTION ENGINEER  
Steve McKee, P.E. UTILITIES SQUAD LEADER PROJECT ENGINEER  
Alonza Yancey UTILITIES PROJECT DESIGNER



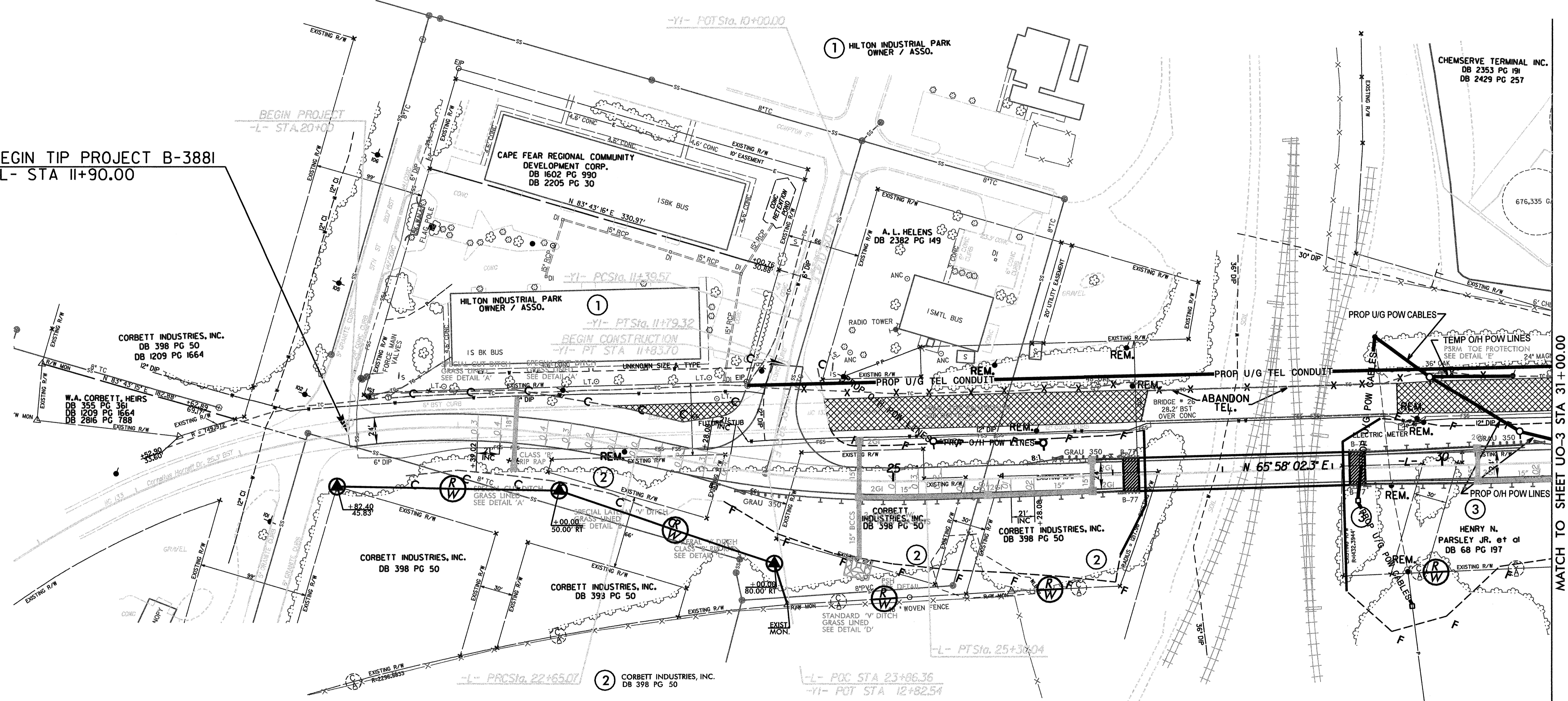
ADT  
2005  
2025

19000  
400      US 117/NC 133      19000  
800



REVISIONS  
 R/W Rev. - Corrected parcel / owner name and deed reference and removed the temporary construction easement. Added additional tracks of land, unconstructed platted streets, and revised the guardrail design. BCK 8-1-06

**BEGIN TIP PROJECT B-3881**  
-L- STA 11+90.00



MATCH TO SHEET UO-3 STA 31+00.00

8/17/99  
 C:\TIME\DRAWING\BCK\B-3881\UO-2.DWG  
 USER:NAME



PROJECT REFERENCE NO. B-3881  
SHEET NO. UO-3  
UTILITIES BY OTHERS

**Municipal Engineering**  
Services Company, P.A.  
P.O. BOX 276 SHREVEPORT, LA 71272  
P.O. BOX 348 BOONE, N.C. 28604  
P.O. BOX 276 MOREHEAD CITY, N.C. 28557

NOTE:  
ALL PROPOSED UTILITY WORK  
SHOWN ON THIS SHEET WILL  
BE DONE BY OTHERS

8/17/99

REVISIONS  
R/W Rev. - Added unconstructed platted streets and revised the guardrail design. BCK B-1-06

