

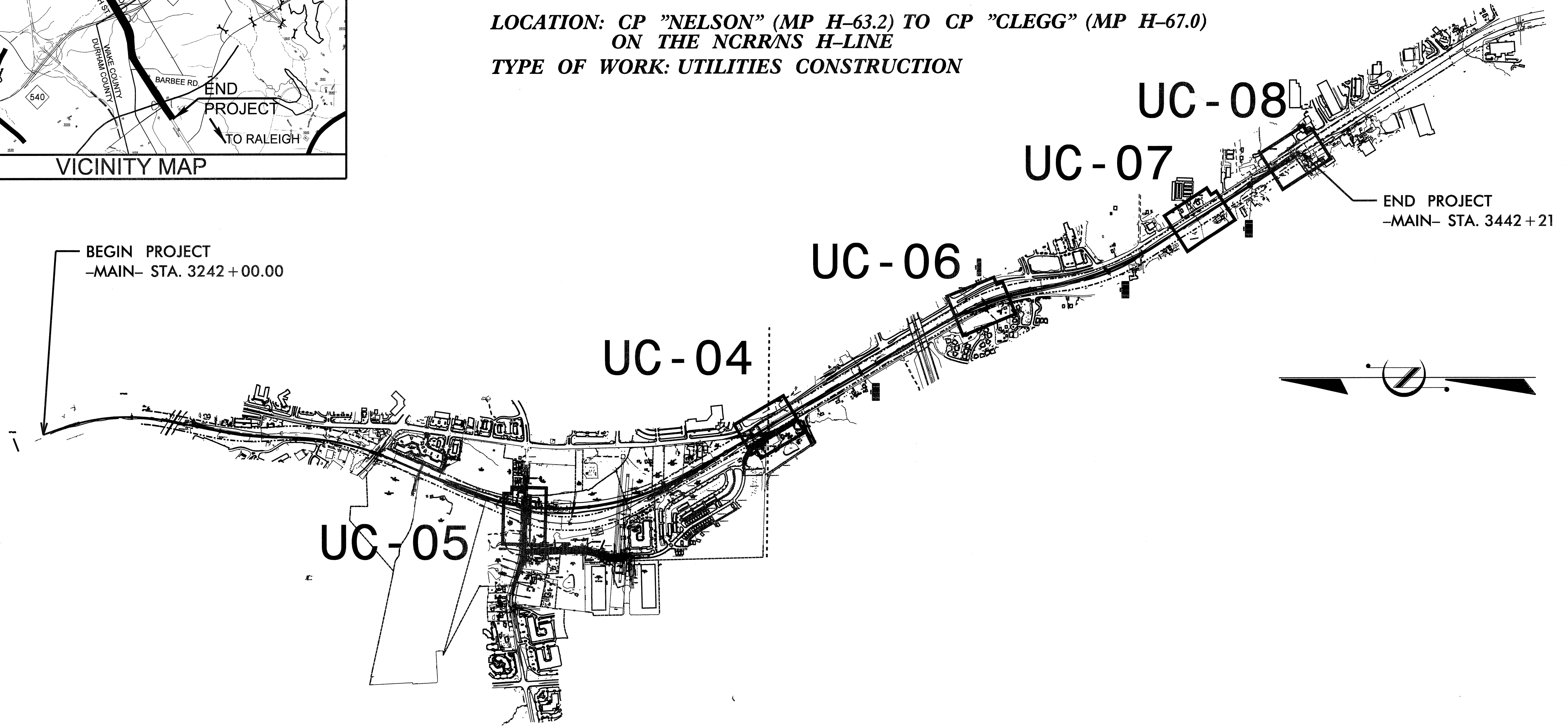
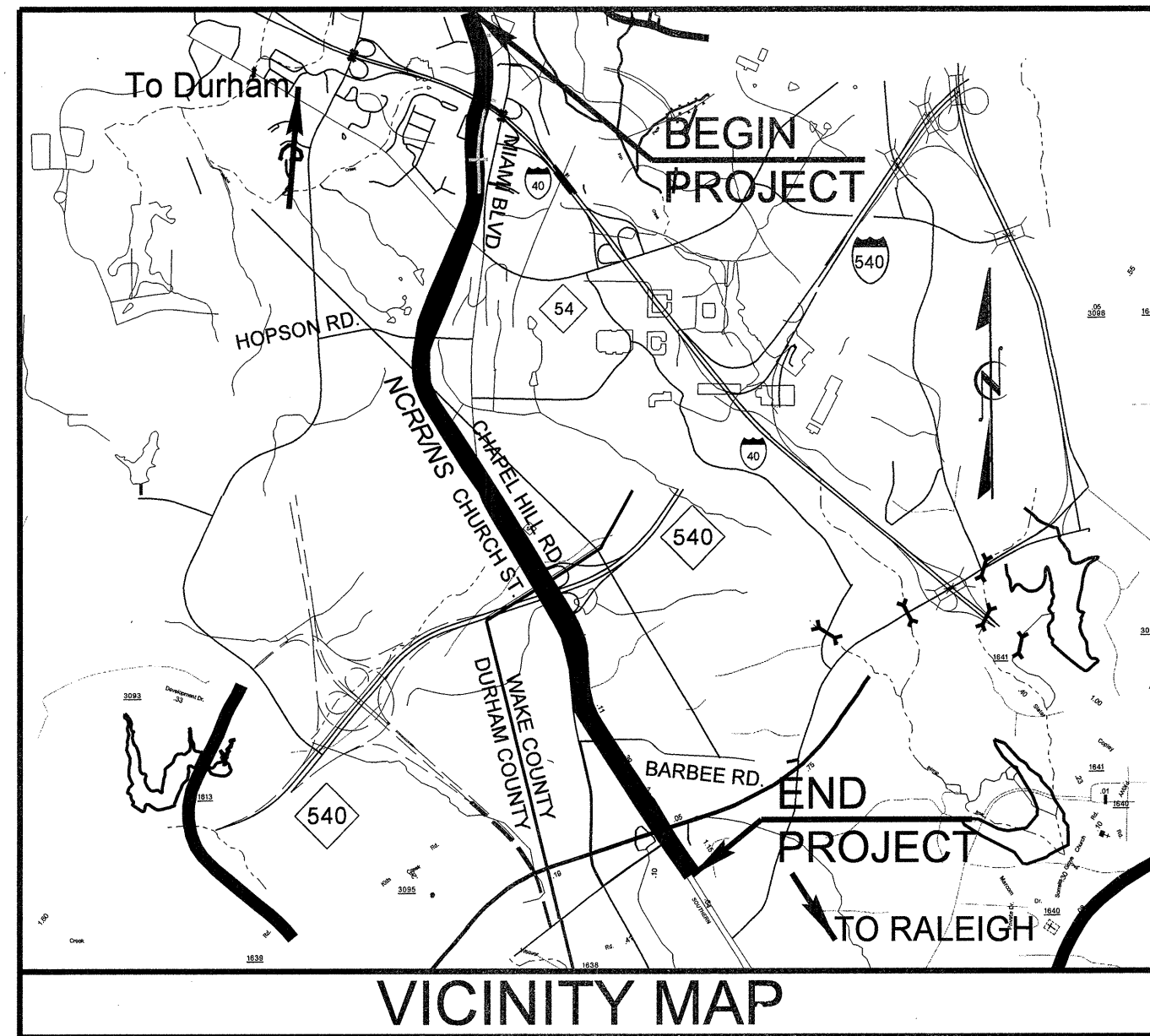
TIP PROJECT: U-4716AC

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4716AC	UC-1	

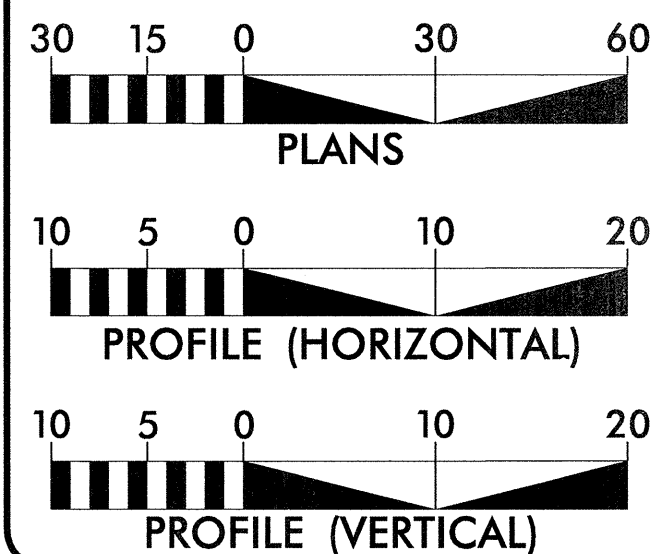
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE & DURHAM COUNTIES

LOCATION: CP "NELSON" (MP H-63.2) TO CP "CLEGG" (MP H-67.0)
ON THE NCR/NS H-LINE
TYPE OF WORK: UTILITIES CONSTRUCTION



GRAPHIC SCALES



INDEX OF SHEETS

SHEET NO.	DESCRIPTION
UC-1	TITLE SHEET
UC-2	SYMBOLGY SHEET
UC-3	GENERAL NOTES SHEET
UC-4 TO UC-8	PLAN SHEETS
UC-9 TO UC-12	WATER PROFILES
UC-13 TO UC-14	SEWER PROFILES
UC-15 TO UC-19	DETAILS

UTILITY OWNERS ON THIS PROJECT:

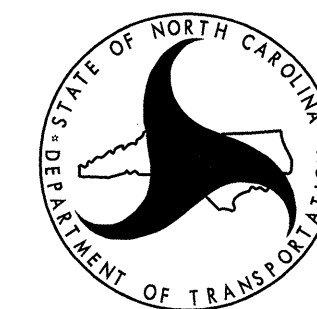
WATER - CITY OF DURHAM
TOWN OF CARY

SEWER - DURHAM COUNTY

UTILITY DESIGN ENGINEER



2012-07-31



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: 1556 MAIL SERVICE CENTER RALEIGH, NC 27699-1556
DELIVERY: 860 CAPITAL BOULEVARD RALEIGH, NC 27603
PHONE: (919) 715-8803
FAX: (919) 715-8804

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	

0371DEL P17-18

716\UC_6\31\2012\4716AC\U-4716AC-UC-02.dgn

PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-3
SCALE: 1" = 30 FT	
UTILITY DESIGN ENGINEER	
	
2012-07-31	
	
598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	

UTILITY OWNERS ON THIS PROJECT:

- | | |
|--|--|
| 1. TOWN OF CARY
UTILITY: 12" WATER LINE
CONTACT: GLEN HARRELL
PHONE: 919-460-4933 | 3. DURHAM COUNTY
UTILITY: 18" SAN. FORCE MAIN
CONTACT: TED CREDLE
PHONE: 919-544-8280 |
| 2. CITY OF DURHAM
UTILITY: 12" WATER LINE
16" WATER LINE
CONTACT: ERIC HALSTEAD
PHONE: 919-560-4326 x30259 | |

GENERAL NOTES:

- THESE PLANS ONLY ADDRESS RELOCATIONS FOR THE FOLLOWING UTILITIES: WATER AND SANITARY FORCE MAIN.
- UTILITY OWNERS FOR ALL OTHER UTILITIES (TELEPHONE, POWER, GAS, CABLE TV, FIBER OPTIC, ETC.) SHALL PROVIDE THEIR OWN RELOCATION PLANS.
- REFER TO PLANS BY HNTB FOR ALL DESIGN AND DETAIL INFORMATION FOR PROPOSED DRAINAGE STRUCTURES, DITCHES, RAILROAD ALIGNMENT, AND ROAD ALIGNMENT.
- THE LOCATION, SIZE, AND MATERIAL TYPE OF THE EXISTING UTILITIES SHOWN ON THE PLANS HAVE BEEN OBTAINED FROM THE BEST AVAILABLE DATA AT THE TIME. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION, ELEVATION, SIZE, DIRECTION, AND MATERIAL TYPE OF ALL EXISTING UTILITIES PRIOR TO ORDERING HIS MATERIALS.
- CONTRACTOR SHALL NOTIFY NC ONE-CALL AT 1-800-632-4949 PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY SUCH THAT ALL EXISTING UTILITIES CAN BE MARKED. FURTHERMORE, THE CONTRACTOR SHALL MAKE EVERY EFFORT TO CONTACT ANY UTILITY OWNERS THAT ARE NOT MEMBERS OF NC ONE-CALL AND HAVE FACILITIES RESIDING WITHIN THE PROJECT LIMITS.
- THE EXISTING WATER AND SEWER FACILITIES ARE TO REMAIN IN PLACE AND FUNCTIONING UNTIL NEW FACILITIES ARE CERTIFIED AS COMPLETE BY THE NCDOT RESIDENT ENGINEER.
- ALL WATER AND SEWER IMPROVEMENTS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND STANDARD DRAWINGS OF THE NCDOT, DATED JULY 2012.
- CONTRACTOR IS REQUIRED TO COMPLY WITH 15A NCAC 18C.906 - RELATION OF WATER MAINS TO SEWERS.
- WATER AND SEWER IMPROVEMENTS SHALL BE CONSTRUCTED BY A NC LICENSED UTILITY CONTRACTOR.
- CONTRACTOR SHALL NOTIFY THE UTILITY OWNER 7 BUSINESS DAYS IN ADVANCE OF PERFORMING ANY TIE-IN WORK. CONTRACTOR SHALL NOTIFY ALL AFFECTED CUSTOMERS 24 HOURS IN ADVANCE OF SERVICE INTERRUPTIONS. CONTRACTOR SHALL NOTIFY ALL AFFECTED CRITICAL FACILITIES (I.E., CORRECTIONAL FACILITY, HOSPITAL, SCHOOLS, MEDICAL FACILITIES, DAY CARE CENTERS, ETC.) 72 HOURS IN ADVANCE OF SERVICE INTERRUPTION.
- CONTRACTOR SHALL NOT OPERATE ANY VALVES ON THE EXISTING WATER SYSTEM. CONTRACTOR SHALL CONTACT TOWN OF CARY OR CITY OF DURHAM TO CONDUCT STRATEGIC OPERATION OF WATER VALVES FOR SERVICE INTERRUPTION IN ORDER TO PERFORM SPECIFIC TIE IN OPERATIONS.
- CONTRACTOR SHALL NOT OPERATE ANY VALVES ON THE EXISTING SANITARY FORCE MAIN SYSTEMS. CONTRACTOR SHALL CONTACT DURHAM COUNTY TO CONDUCT STRATEGIC SHUT DOWN OF PUMP STATIONS AND/OR OPERATION OF SEWER VALVES FOR SERVICE INTERRUPTION IN ORDER TO PERFORM SPECIFIC TIE-IN OPERATIONS.
- UTILITY CARRIER PIPE INSTALLED WITHIN AN ENCASUREMENT PIPE SHALL BE DUCTILE IRON WITH RESTRAINED JOINT CONSTRUCTION.
- WHERE POURED IN PLACE CONCRETE THRUST BLOCKS ARE UTILIZED FOR THRUST RESTRAINT OF PIPE, THE CONTRACTOR SHALL NOT PRESSURIZE THE LINE FOR TESTING UNTIL THE CONCRETE REACHES ACCEPTABLE STRENGTH.

WATER LINE NOTES:

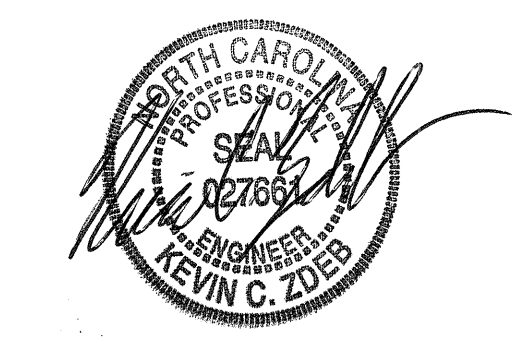
- ALL WATER LINE PIPE SHALL BE DUCTILE IRON WITH RESTRAINED JOINT CONSTRUCTION.
- ALL WATER LINE FITTINGS, 4-INCHES THROUGH 18-INCHES IN DIAMETER, SHALL BE DUCTILE IRON PIPE (CLASS 350).
- ALL FITTINGS (BENDS, TEES, CROSSES, REDUCERS, PLUGS, ETC.) SHALL BE ADEQUATELY RESTRAINED BY THE USE OF RESTRAINED JOINT CONSTRUCTION AND /OR CAST IN PLACE CONCRETE THRUST RESTRAINTS AS DETAILED ON THESE DRAWINGS, OR AS DIRECTED BY THE RESIDENT ENGINEER.
- ALL WATER SERVICES, 2-INCHES IN DIAMETER AND SMALLER, SHALL BE INSTALLED UNDER ACTIVE ROADS BY TRENCHLESS METHOD, AS DIRECTED BY THE NCDOT RESIDENT ENGINEER.
- ALL EXISTING WATER METERS TO REMAIN SHALL BE "RECONNECTED" TO THE PROPOSED WATER MAIN WITH NEW WATER SERVICE LINES.
- ALL EXISTING WATER METERS TO BE RELOCATED SHALL BE DIRECTLY CONNECTED TO THE EXISTING OR PROPOSED WATER MAIN WITH NEW SERVICE LINES.
- ALL NEW WATER SERVICE LINES SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION OF NEW WATER METERS; RELOCATION OF EXISTING WATER METERS; AND RECONNECTION OF EXISTING WATER METERS.
- ALL NEW WATER METERS SHALL BE LOCATED AT THE RIGHT-OF-WAY LINE.
- CONTRACTOR SHALL CONNECT THE OUTLET SIDE OF RELOCATED WATER METER TO THE EXISTING CUSTOMER SERVICE LINE OUTSIDE OF THE RIGHT-OF-WAY LINE.
- CONTRACTOR SHALL RETURN ALL REMOVED WATER METERS TO THE UTILITY OWNER. CONTRACTOR SHALL PROPERLY DISPOSE OF ALL OTHER PARTS, PIPING, AND METER BOXES.
- EXISTING WATER SERVICE LINES BETWEEN THE EXISTING WATER MAIN AND THE REMOVED WATER METER SHALL BE ABANDONED IN PLACE OR REMOVED AS NEEDED, AS PER NCDOT SPECIFICATIONS.
- ALL HYDRANTS, RELOCATED OR PROPOSED, SHALL BE LOCATED INSIDE THE (PROPOSED OR EXISTING) RIGHT-OF-WAY LINE AS NOTED PER THE INSTALLATION DETAIL.
- HYDRANTS, LABELED HEREIN, TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR FOR PROPER DISPOSAL. THESE HYDRANTS SHALL NOT BE USED AS NEW HYDRANTS IN THE PROPOSED CONSTRUCTION, UNLESS OTHERWISE DIRECTED BY THE TOWN OF CARY OR CITY OF DURHAM REPRESENTATIVE.
- RELOCATED HYDRANTS SHALL BE TESTED AFTER RELOCATION TO INSURE THE HYDRANT IS IN PROPER WORKING ORDER. IF THE RELOCATED HYDRANT DOES NOT OPERATE PROPERLY, THEN THE CONTRACTOR SHALL REMOVE THE RELOCATED HYDRANT AND INSTALL A NEW HYDRANT.

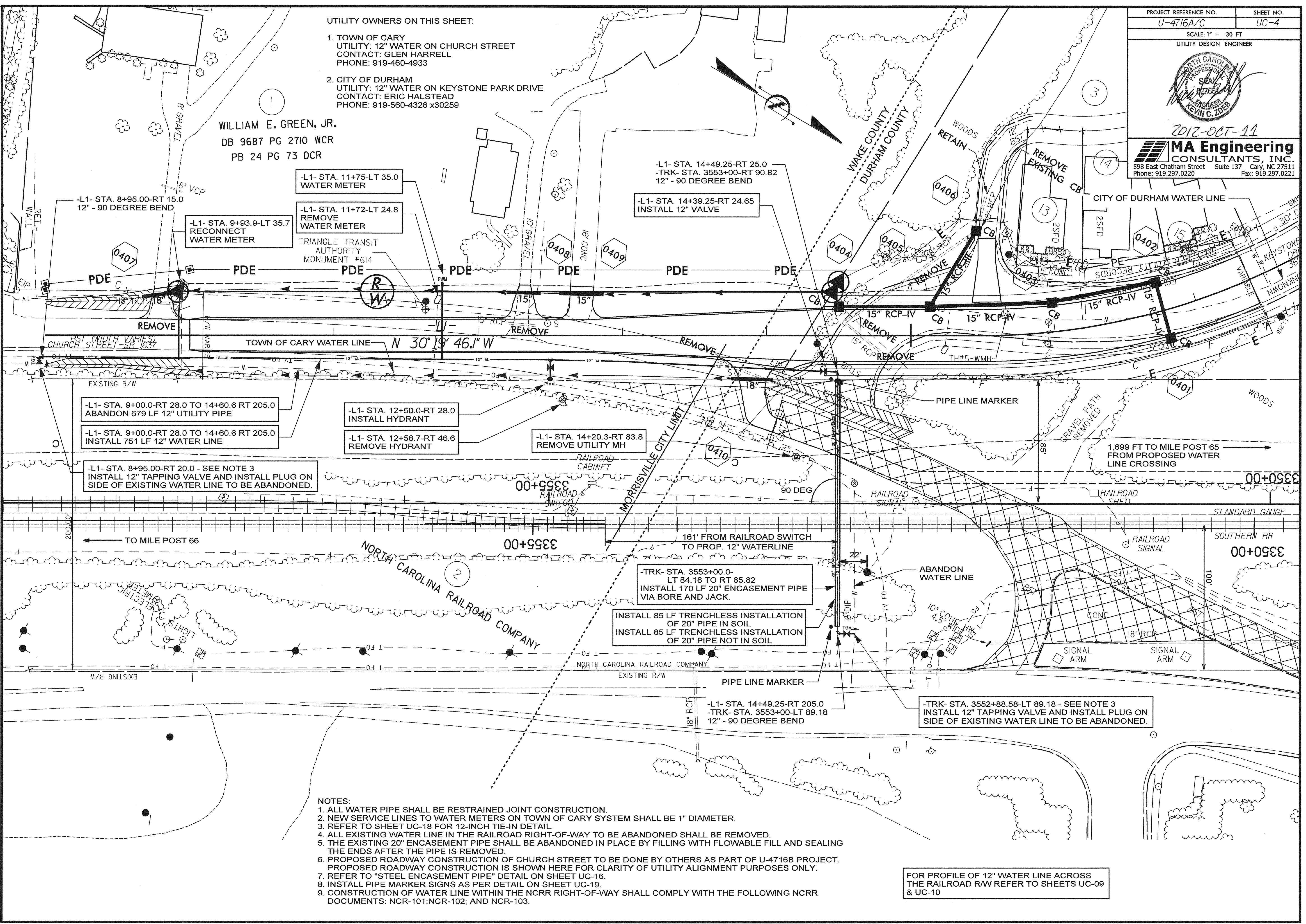
SANITARY FORCE MAIN NOTES:

- ALL PROPOSED SANITARY FORCE MAIN SHALL BE DUCTILE IRON WITH RESTRAINED JOINT CONSTRUCTION.
- WHEN NECESSARY, THE CONTRACTOR SHALL EMPLOY A PUMP AND HAUL METHOD TO BYPASS SECTIONS OF SANITARY FORCE MAIN UNDER CONSTRUCTION. CONTRACTOR SHALL PUMP WASTE FROM THE WET WELL OF THE PUMP STATION, UPSTREAM OF THE CONSTRUCTION, INTO A TANKER AND REINTRODUCE THE WASTE BACK INTO THE SAME SYSTEM AT A MANHOLE DOWNSTREAM OF THE CONSTRUCTION. CONTRACTOR SHALL COORDINATE ALL ASPECTS OF THIS OPERATION WITH DURHAM COUNTY PRIOR TO BEGINNING ANY SAID WORK. ALL TRANSPORTING OF WASTEWATER SHALL BE IN ACCORDANCE WITH THE RULES AND REGULATIONS OF NCDOT, THE LOCAL MUNICIPALITY, AND OTHER AGENCIES WITH JURISDICTION.

UTILITY OWNERS ON THIS SHEET:

- 1. TOWN OF CARY
UTILITY: 12" WATER ON CHURCH STREET
CONTACT: GLEN HARRELL
PHONE: 919-460-4933
- 2. CITY OF DURHAM
UTILITY: 12" WATER ON KEYSTONE PARK DRIVE
CONTACT: ERIC HALSTEAD
PHONE: 919-560-4326 x30259

PROJECT REFERENCE NO. U-4716A/C SHEET NO. UC-4
 SCALE: 1" = 30 FT
 UTILITY DESIGN ENGINEER

 2012-OCT-11
MA Engineering CONSULTANTS, INC.
 598 East Chatham Street Suite 137 Cary, NC 27511
 Phone: 919.297.0220 Fax: 919.297.0221



WILLIAM E. GREEN, JR.
 DB 9687 PG 2710 WCR
 PB 24 PG 73 DCR

- L1- STA. 8+95.00-RT 15.0
12" - 90 DEGREE BEND
- L1- STA. 9+93.9-LT 35.7
RECONNECT WATER METER
- L1- STA. 11+75-LT 35.0
WATER METER
- L1- STA. 11+72-LT 24.8
REMOVE WATER METER

- L1- STA. 14+49.25-RT 25.0
- TRK- STA. 3553+00-RT 90.82
12" - 90 DEGREE BEND

- L1- STA. 9+00.0-RT 28.0 TO 14+60.6 RT 205.0
ABANDON 679 LF 12" UTILITY PIPE
- L1- STA. 9+00.0-RT 28.0 TO 14+60.6 RT 205.0
INSTALL 751 LF 12" WATER LINE
- L1- STA. 8+95.00-RT 20.0 - SEE NOTE 3
INSTALL 12" TAPPING VALVE AND INSTALL PLUG ON
SIDE OF EXISTING WATER LINE TO BE ABANDONED.

- L1- STA. 12+50.0-RT 28.0
INSTALL HYDRANT
- L1- STA. 12+58.7-RT 46.6
REMOVE HYDRANT

- L1- STA. 14+20.3-RT 83.8
REMOVE UTILITY MH

- TRK- STA. 3553+00.0-
LT 84.18 TO RT 85.82
INSTALL 170 LF 20" ENCASEMENT PIPE
VIA BORE AND JACK.

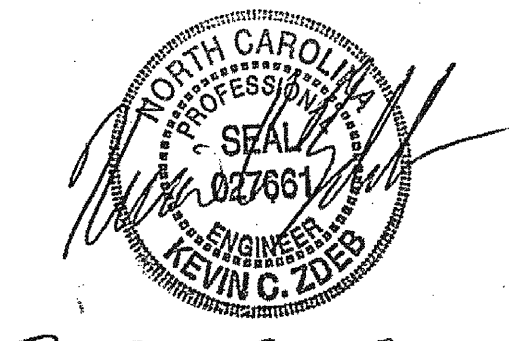

- INSTALL 85 LF TRENCHLESS INSTALLATION
OF 20" PIPE IN SOIL
- INSTALL 85 LF TRENCHLESS INSTALLATION
OF 20" PIPE NOT IN SOIL

- L1- STA. 14+49.25-RT 205.0
- TRK- STA. 3553+00-LT 89.18
12" - 90 DEGREE BEND

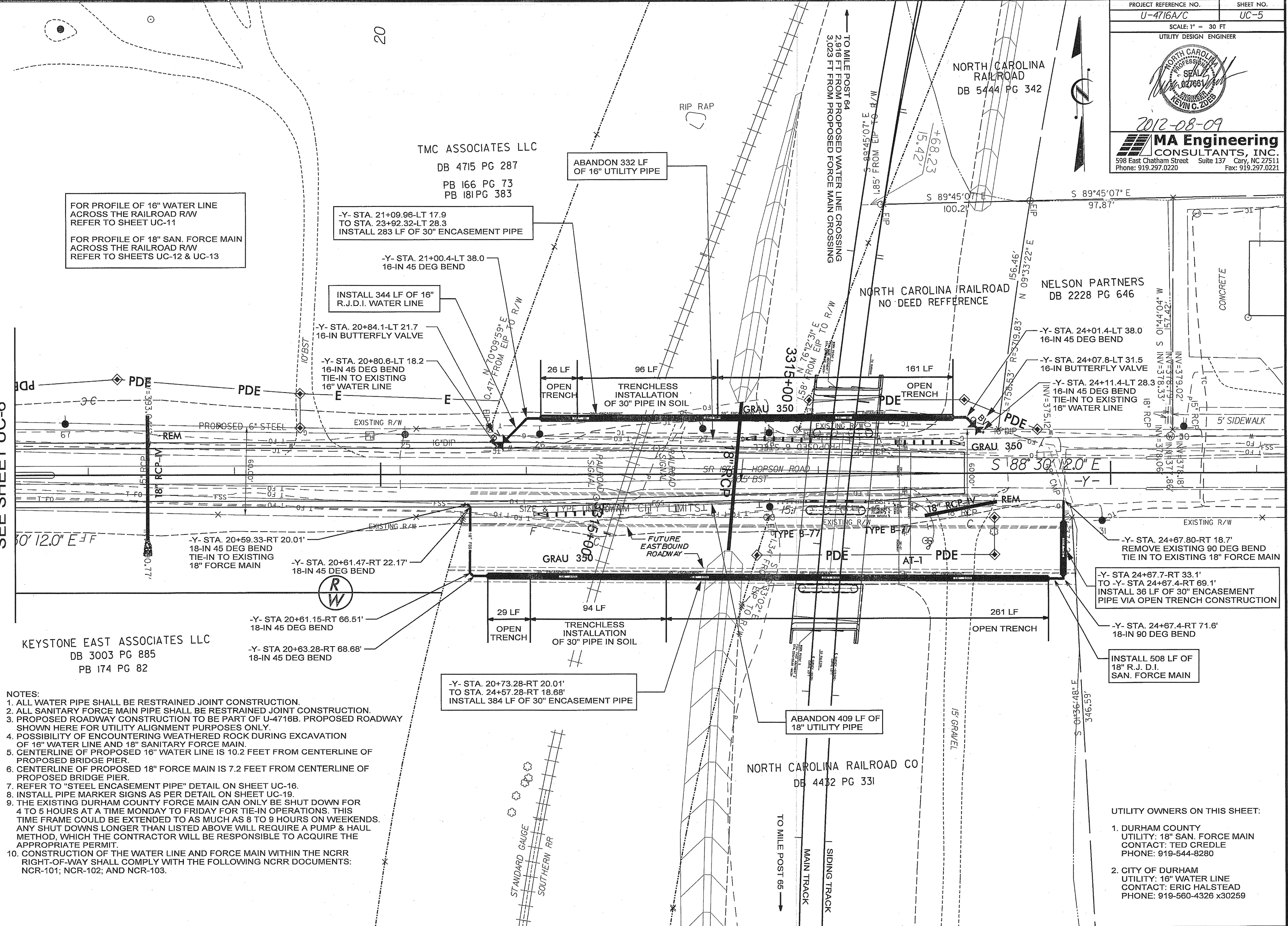
- TRK- STA. 3552+88.58-LT 89.18 - SEE NOTE 3
INSTALL 12" TAPPING VALVE AND INSTALL PLUG ON
SIDE OF EXISTING WATER LINE TO BE ABANDONED.

- NOTES:
1. ALL WATER PIPE SHALL BE RESTRAINED JOINT CONSTRUCTION.
 2. NEW SERVICE LINES TO WATER METERS ON TOWN OF CARY SYSTEM SHALL BE 1" DIAMETER.
 3. REFER TO SHEET UC-18 FOR 12-INCH TIE-IN DETAIL.
 4. ALL EXISTING WATER LINE IN THE RAILROAD RIGHT-OF-WAY TO BE ABANDONED SHALL BE REMOVED.
 5. THE EXISTING 20" ENCASEMENT PIPE SHALL BE ABANDONED IN PLACE BY FILLING WITH FLOWABLE FILL AND SEALING THE ENDS AFTER THE PIPE IS REMOVED.
 6. PROPOSED ROADWAY CONSTRUCTION OF CHURCH STREET TO BE DONE BY OTHERS AS PART OF U-4716B PROJECT. PROPOSED ROADWAY CONSTRUCTION IS SHOWN HERE FOR CLARITY OF UTILITY ALIGNMENT PURPOSES ONLY.
 7. REFER TO "STEEL ENCASEMENT PIPE" DETAIL ON SHEET UC-16.
 8. INSTALL PIPE MARKER SIGNS AS PER DETAIL ON SHEET UC-19.
 9. CONSTRUCTION OF WATER LINE WITHIN THE NCCR RIGHT-OF-WAY SHALL COMPLY WITH THE FOLLOWING NCCR DOCUMENTS: NCR-101; NCR-102; AND NCR-103.

FOR PROFILE OF 12" WATER LINE ACROSS
 THE RAILROAD R/W REFER TO SHEETS UC-09
 & UC-10

PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-5
SCALE: 1" = 30 FT UTILITY DESIGN ENGINEER	
	
2012-08-09	
	
598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	

MATCH LINE -Y- STA. 17+50
SEE SHEET UC-6



FOR PROFILE OF 16" WATER LINE
ACROSS THE RAILROAD R/W
REFER TO SHEET UC-11

FOR PROFILE OF 18" SAN. FORCE MAIN
ACROSS THE RAILROAD R/W
REFER TO SHEETS UC-12 & UC-13

-Y- STA. 21+09.96-LT 17.9
TO STA. 23+92.32-LT 28.3
INSTALL 283 LF OF 30" ENCASUREMENT PIPE

-Y- STA. 21+00.4-LT 38.0
16-IN 45 DEG BEND

INSTALL 344 LF OF 16"
R.J.D.I. WATER LINE

-Y- STA. 20+84.1-LT 21.7
16-IN BUTTERFLY VALVE

-Y- STA. 20+80.6-LT 18.2
16-IN 45 DEG BEND
TIE-IN TO EXISTING
16" WATER LINE

26 LF
OPEN TRENCH

96 LF
TRENCHLESS
INSTALLATION
OF 30" PIPE IN SOIL

161 LF
OPEN TRENCH

NELSON PARTNERS
DB 2228 PG 646

-Y- STA. 24+01.4-LT 38.0
16-IN 45 DEG BEND

-Y- STA. 24+07.8-LT 31.5
16-IN BUTTERFLY VALVE

-Y- STA. 24+11.4-LT 28.3
16-IN 45 DEG BEND
TIE-IN TO EXISTING
16" WATER LINE

-Y- STA. 20+59.33-RT 20.01'
18-IN 45 DEG BEND
TIE-IN TO EXISTING
18" FORCE MAIN

-Y- STA. 20+61.47-RT 22.17'
18-IN 45 DEG BEND

-Y- STA 20+61.15-RT 66.51'
18-IN 45 DEG BEND

-Y- STA 20+63.28-RT 68.68'
18-IN 45 DEG BEND

-Y- STA. 20+73.28-RT 20.01'
TO STA. 24+67.28-RT 18.68'
INSTALL 384 LF OF 30" ENCASUREMENT PIPE

ABANDON 409 LF OF
18" UTILITY PIPE


-Y- STA 24+67.7-RT 33.1'
TO -Y- STA 24+67.4-RT 69.1'
INSTALL 36 LF OF 30" ENCASUREMENT
PIPE VIA OPEN TRENCH CONSTRUCTION

-Y- STA. 24+67.4-RT 71.6'
18-IN 90 DEG BEND

INSTALL 508 LF OF
18" R.J. D.I.
SAN. FORCE MAIN

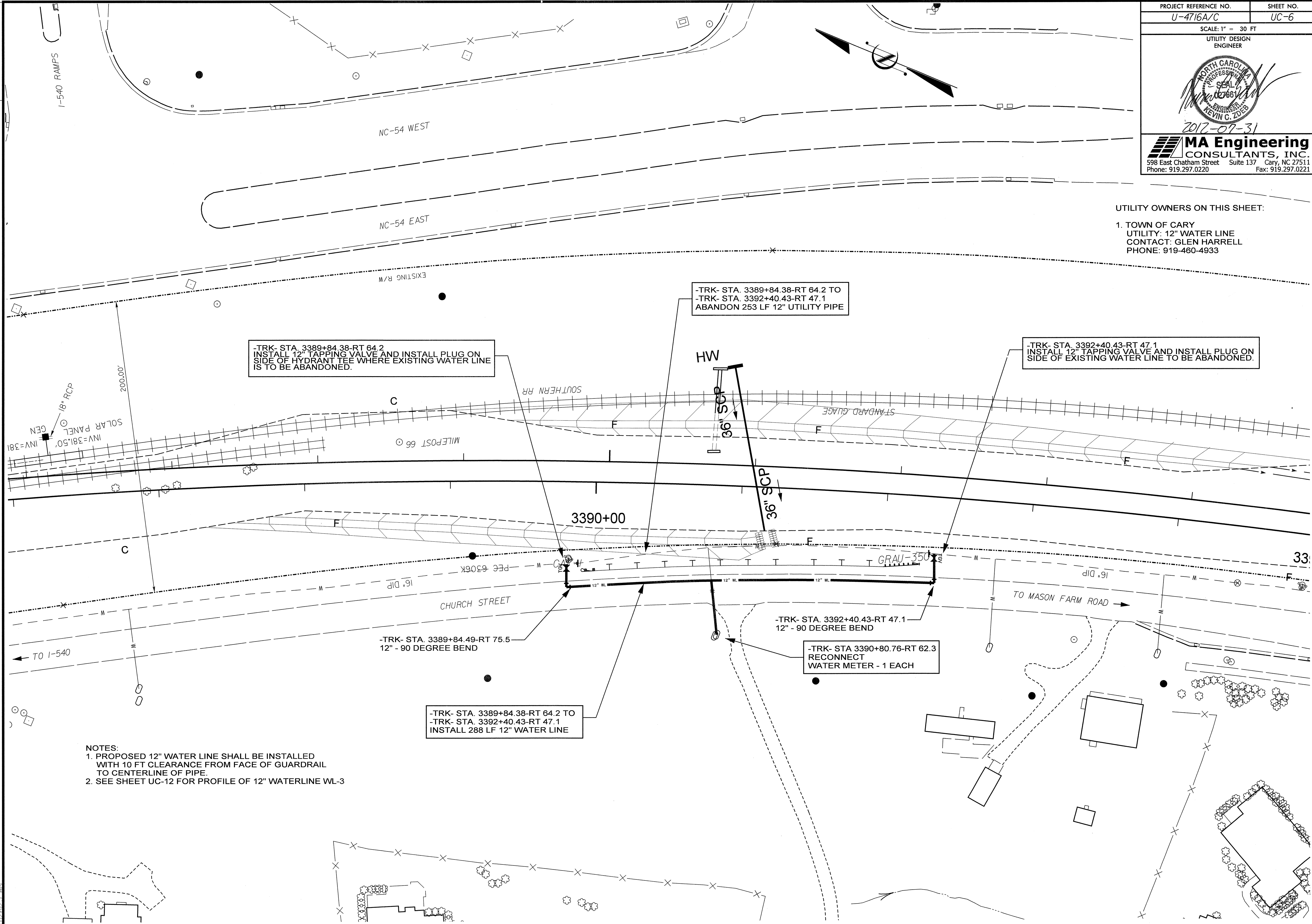
- NOTES:
- ALL WATER PIPE SHALL BE RESTRAINED JOINT CONSTRUCTION.
 - ALL SANITARY FORCE MAIN PIPE SHALL BE RESTRAINED JOINT CONSTRUCTION.
 - PROPOSED ROADWAY CONSTRUCTION TO BE PART OF U-4716B. PROPOSED ROADWAY SHOWN HERE FOR UTILITY ALIGNMENT PURPOSES ONLY.
 - POSSIBILITY OF ENCOUNTERING WEATHERED ROCK DURING EXCAVATION OF 16" WATER LINE AND 18" SANITARY FORCE MAIN.
 - CENTERLINE OF PROPOSED 16" WATER LINE IS 10.2 FEET FROM CENTERLINE OF PROPOSED BRIDGE PIER.
 - CENTERLINE OF PROPOSED 18" FORCE MAIN IS 7.2 FEET FROM CENTERLINE OF PROPOSED BRIDGE PIER.
 - REFER TO "STEEL ENCASUREMENT PIPE" DETAIL ON SHEET UC-16.
 - INSTALL PIPE MARKER SIGNS AS PER DETAIL ON SHEET UC-19.
 - THE EXISTING DURHAM COUNTY FORCE MAIN CAN ONLY BE SHUT DOWN FOR 4 TO 5 HOURS AT A TIME MONDAY TO FRIDAY FOR TIE-IN OPERATIONS. THIS TIME FRAME COULD BE EXTENDED TO AS MUCH AS 8 TO 9 HOURS ON WEEKENDS. ANY SHUT DOWNS LONGER THAN LISTED ABOVE WILL REQUIRE A PUMP & HAUL METHOD, WHICH THE CONTRACTOR WILL BE RESPONSIBLE TO ACQUIRE THE APPROPRIATE PERMIT.
 - CONSTRUCTION OF THE WATER LINE AND FORCE MAIN WITHIN THE NCRR RIGHT-OF-WAY SHALL COMPLY WITH THE FOLLOWING NCRR DOCUMENTS: NCR-101; NCR-102; AND NCR-103.

- UTILITY OWNERS ON THIS SHEET:
- DURHAM COUNTY
UTILITY: 18" SAN. FORCE MAIN
CONTACT: TED CREDLE
PHONE: 919-544-8280
 - CITY OF DURHAM
UTILITY: 16" WATER LINE
CONTACT: ERIC HALSTEAD
PHONE: 919-560-4326 x30259

PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-6
SCALE: 1" = 30 FT	
UTILITY DESIGN ENGINEER	
	
2017-07-31	
MA Engineering CONSULTANTS, INC. 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	


UTILITY OWNERS ON THIS SHEET:

- TOWN OF CARY
 UTILITY: 12" WATER LINE
 CONTACT: GLEN HARRELL
 PHONE: 919-460-4933



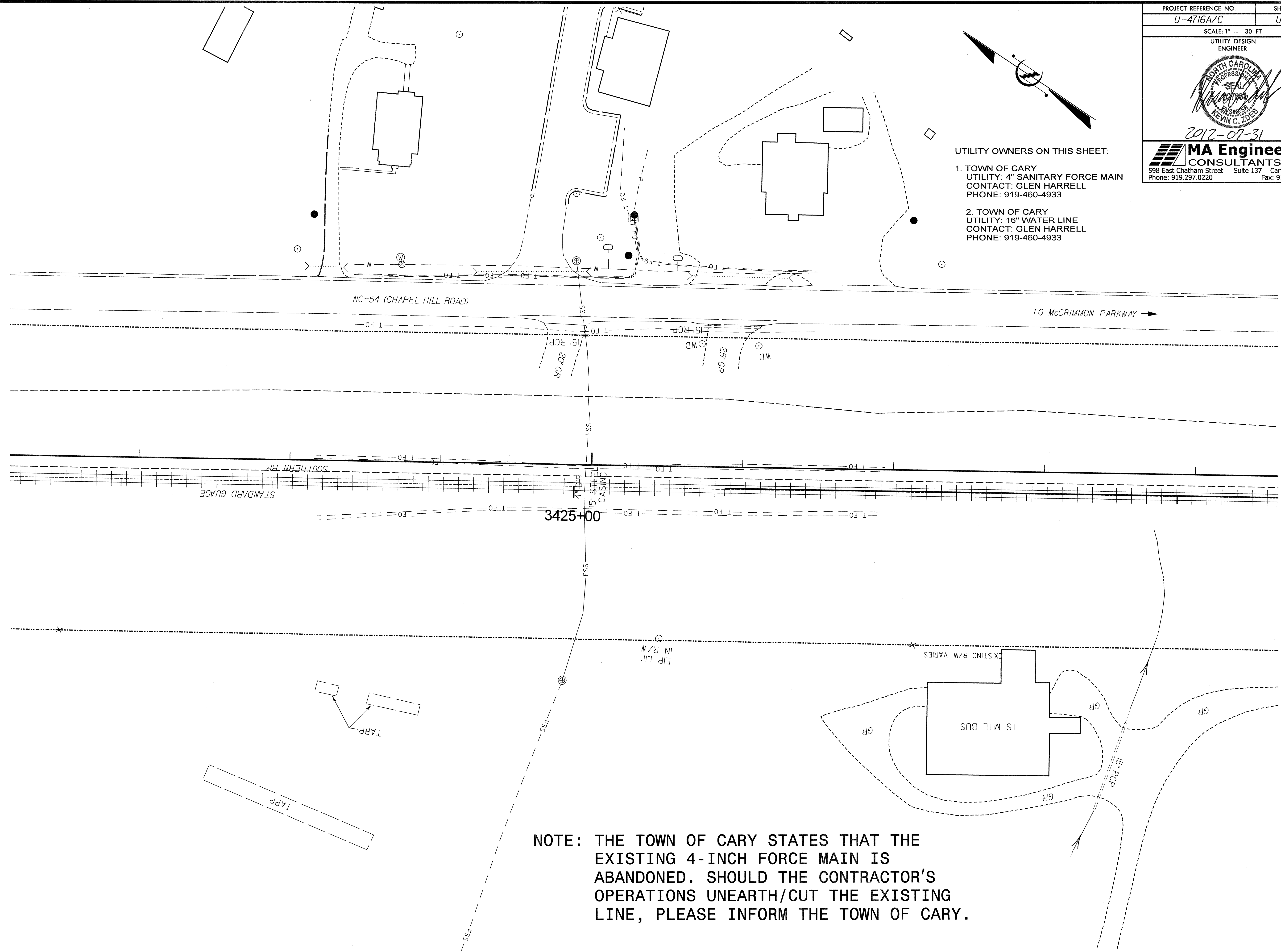
NOTES:
 1. PROPOSED 12" WATER LINE SHALL BE INSTALLED WITH 10 FT CLEARANCE FROM FACE OF GUARDRAIL TO CENTERLINE OF PIPE.
 2. SEE SHEET UC-12 FOR PROFILE OF 12" WATERLINE WL-3

7/30/2017 P:\UC065\0696\015\U4716\UC_Plan_Revisions\MAEC_Design\U-4716AC\U-4716AC_UC-06.dgn

PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-7
SCALE: 1" = 30 FT	
UTILITY DESIGN ENGINEER	
 2012-07-31	
MA Engineering CONSULTANTS, INC. 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	

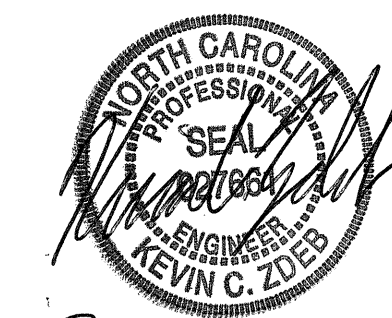

UTILITY OWNERS ON THIS SHEET:

1. TOWN OF CARY
UTILITY: 4" SANITARY FORCE MAIN
CONTACT: GLEN HARRELL
PHONE: 919-460-4933
2. TOWN OF CARY
UTILITY: 16" WATER LINE
CONTACT: GLEN HARRELL
PHONE: 919-460-4933



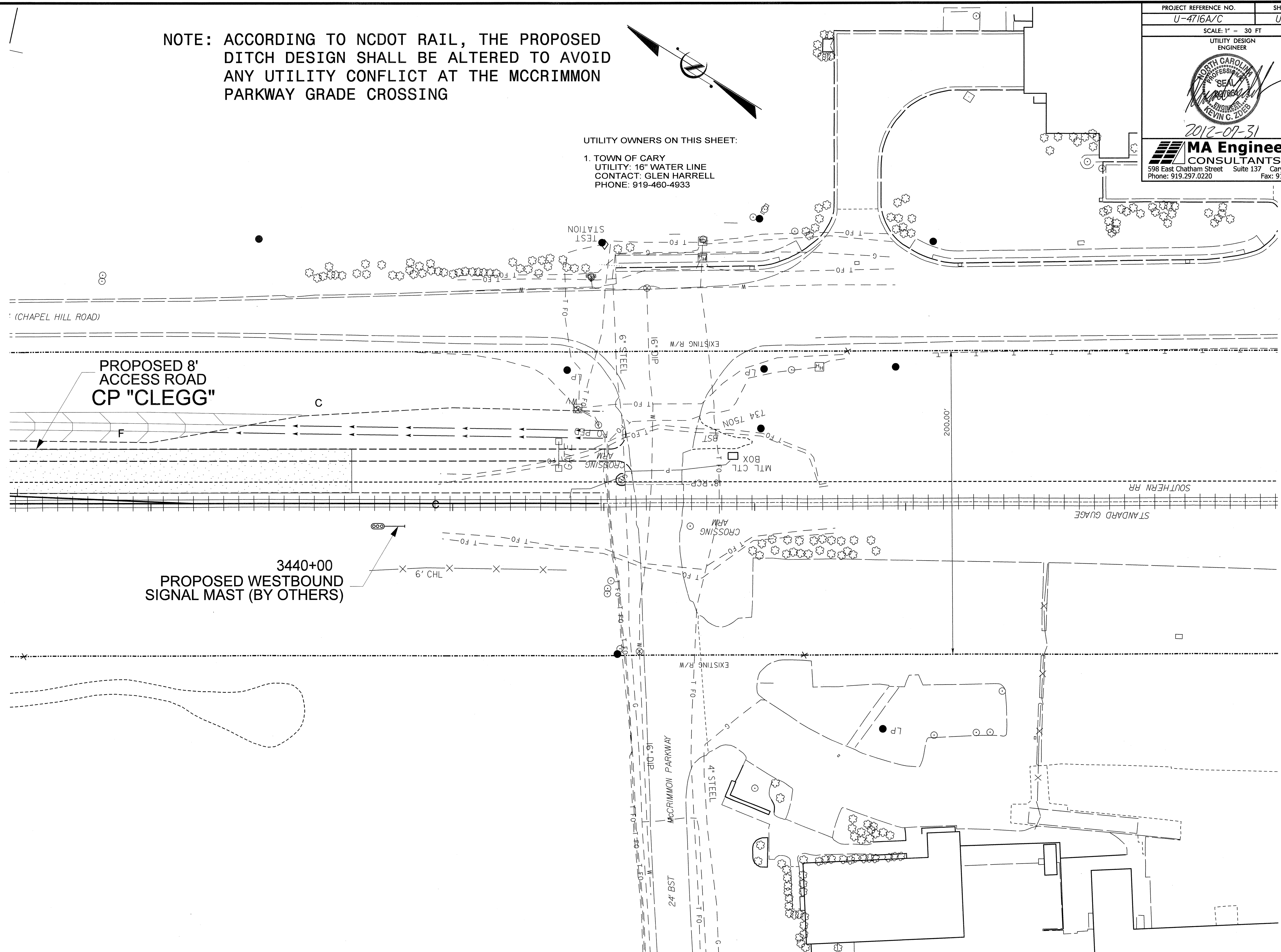
NOTE: THE TOWN OF CARY STATES THAT THE EXISTING 4-INCH FORCE MAIN IS ABANDONED. SHOULD THE CONTRACTOR'S OPERATIONS UNEARTH/CUT THE EXISTING LINE, PLEASE INFORM THE TOWN OF CARY.

NOTE: ACCORDING TO NCDOT RAIL, THE PROPOSED DITCH DESIGN SHALL BE ALTERED TO AVOID ANY UTILITY CONFLICT AT THE MCCRIMMON PARKWAY GRADE CROSSING

PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-8
SCALE: 1" = 30 FT	
UTILITY DESIGN ENGINEER	
	
2012-07-31	
	
598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	



UTILITY OWNERS ON THIS SHEET:

1. TOWN OF CARY
UTILITY: 16" WATER LINE
CONTACT: GLEN HARRELL
PHONE: 919-460-4933

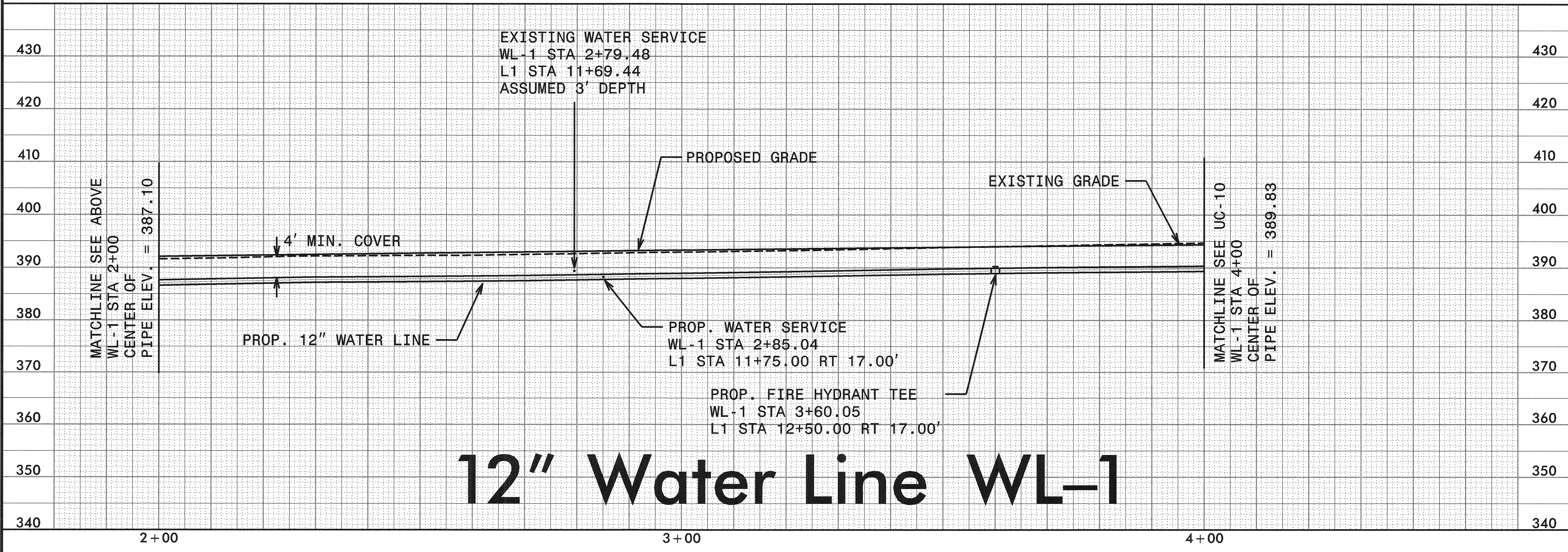
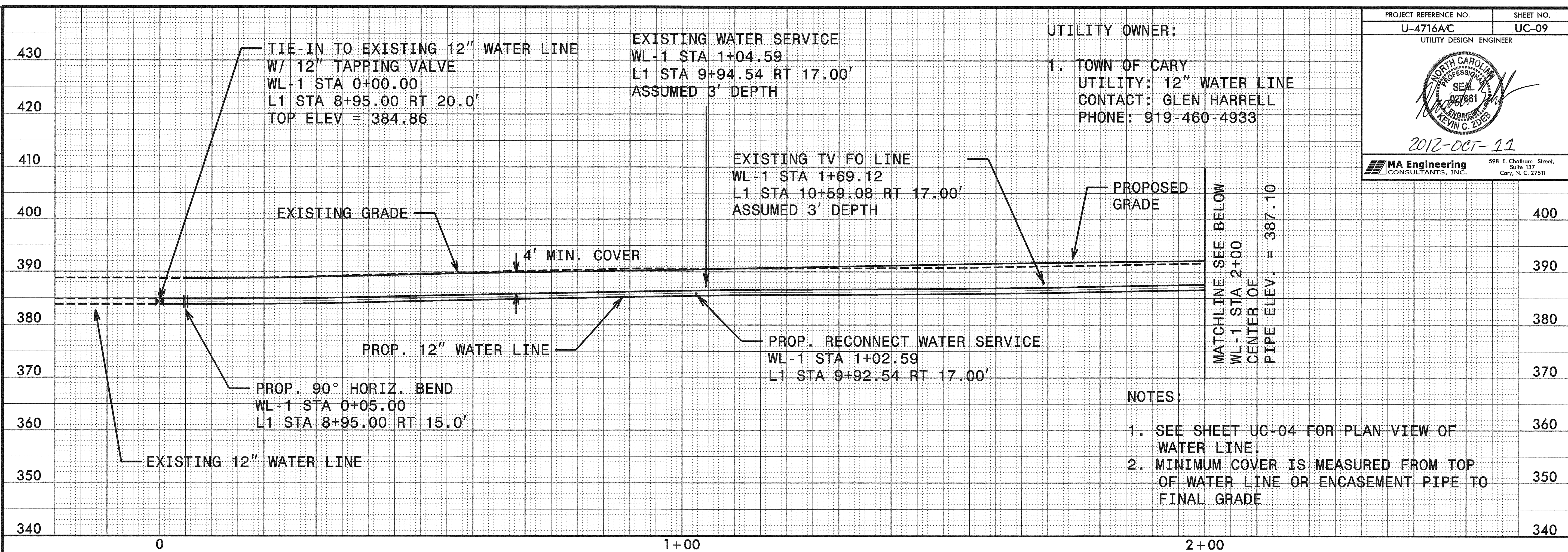


PROPOSED 8' ACCESS ROAD CP "CLEGG"

3440+00 PROPOSED WESTBOUND SIGNAL MAST (BY OTHERS)

PROJECT REFERENCE NO. U-4716AC	SHEET NO. UC-09
UTILITY DESIGN ENGINEER	
	
2012-OCT-11	
	
598 E. Chatham Street, Suite 137, Cary, N.C. 27511	

UTILITY OWNER:
1. TOWN OF CARY
UTILITY: 12" WATER LINE
CONTACT: GLEN HARRELL
PHONE: 919-460-4933



12" Water Line WL-1

10/11/2012
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NOTES:

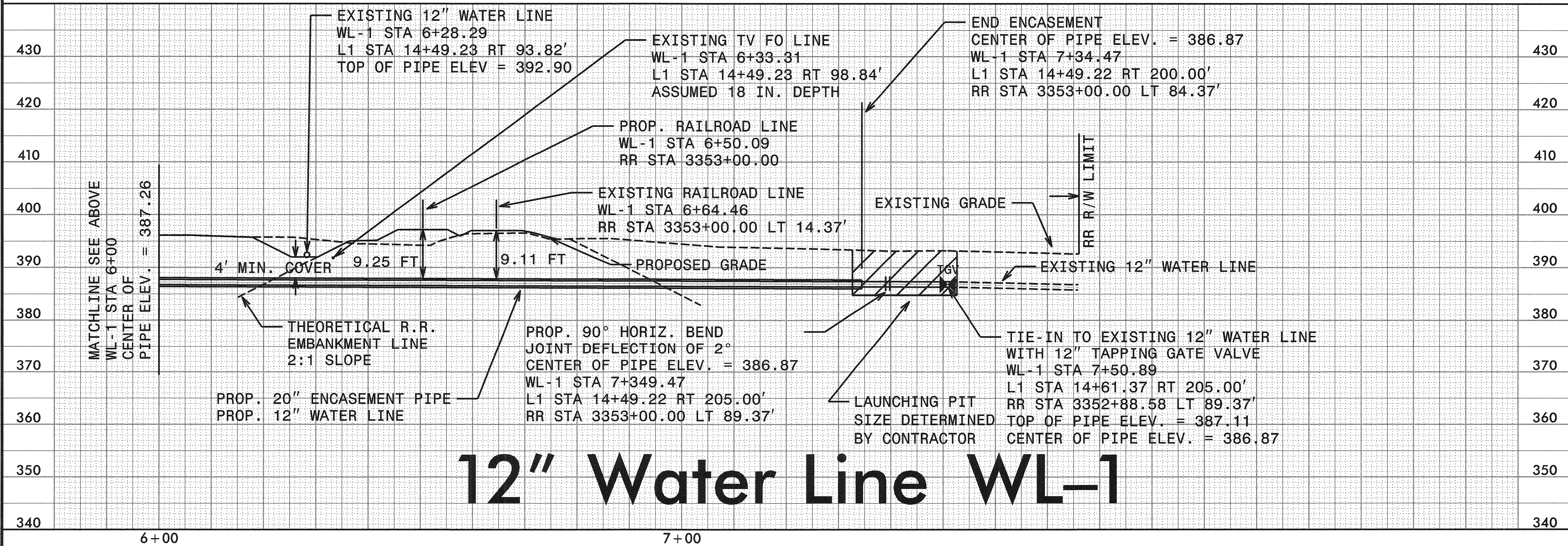
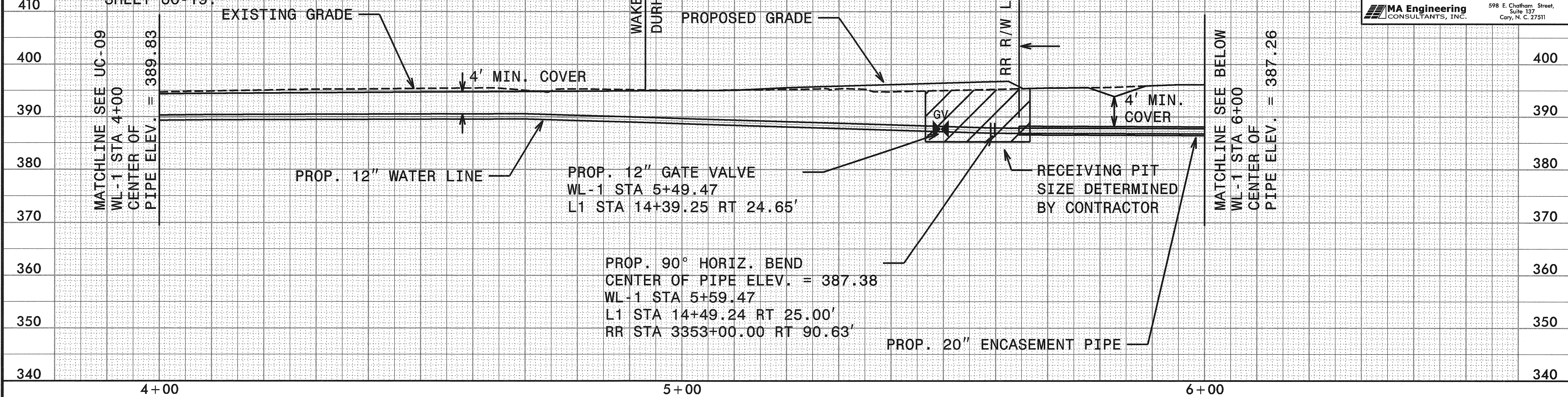
- 1. SEE SHEET UC-04 FOR PLAN VIEW OF WATER LINE.
- 2. MINIMUM COVER IS MEASURED FROM TOP OF WATER LINE OR ENCASEMENT PIPE TO FINAL GRADE.
- 3. CONSTRUCTION OF WATER LINE WITHIN THE NCRR RIGHT-OF-WAY SHALL COMPLY WITH THE FOLLOWING NCRR DOCUMENTS: NCR-101; NCR-102; AND NCR-103.
- 4. INSTALL PIPE MARKER SIGNS AS PER DETAIL ON SHEET UC-19.

BEGIN ENCASEMENT
 CENTER OF PIPE ELEV. = 387.36
 WL-1 STA 5+64.47
 L1 STA 14+49.24 RT 30.00'
 RR STA 3353+00.00 RT 85.63'

UTILITY OWNER:

1. TOWN OF CARY
 UTILITY: 12" WATER LINE
 CONTACT: GLEN HARRELL
 PHONE: 919-460-4933

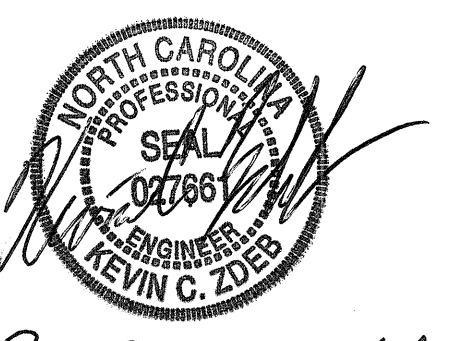

PROJECT REFERENCE NO. U-4716AC	SHEET NO. UC-10
UTILITY DESIGN ENGINEER	
	
2012-OCT-11	
	
598 E. Chatham Street, Suite 137, Cary, N.C. 27511	



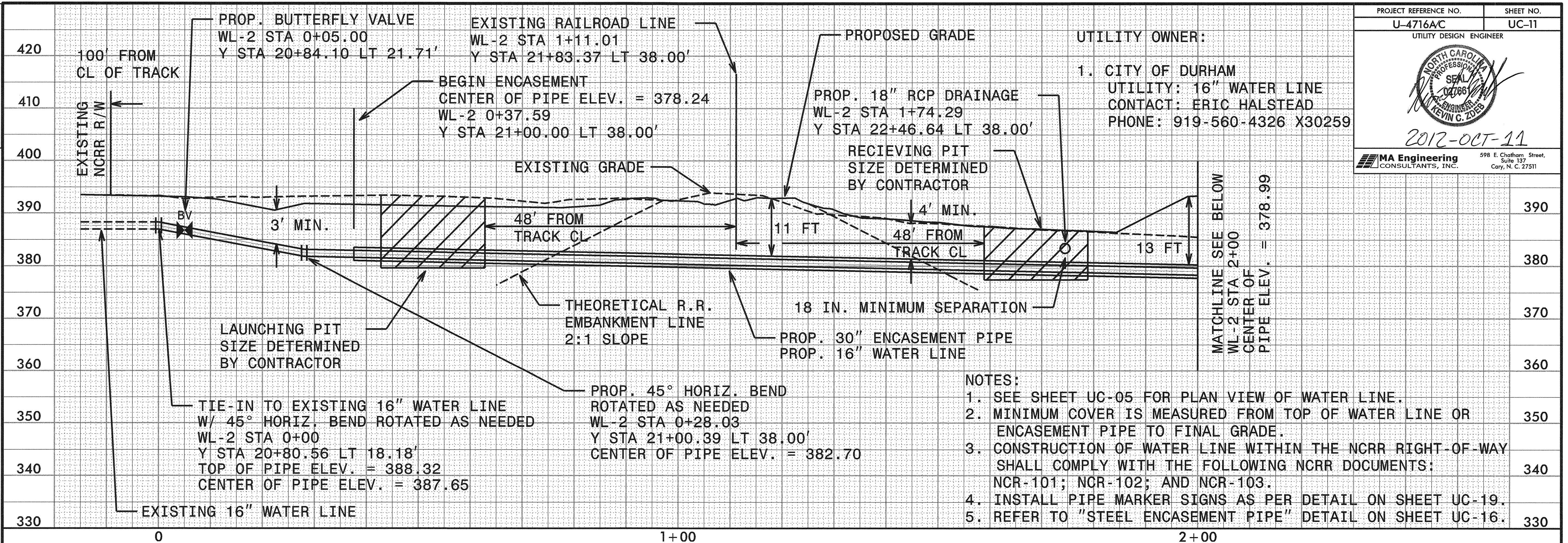
12" Water Line WL-1

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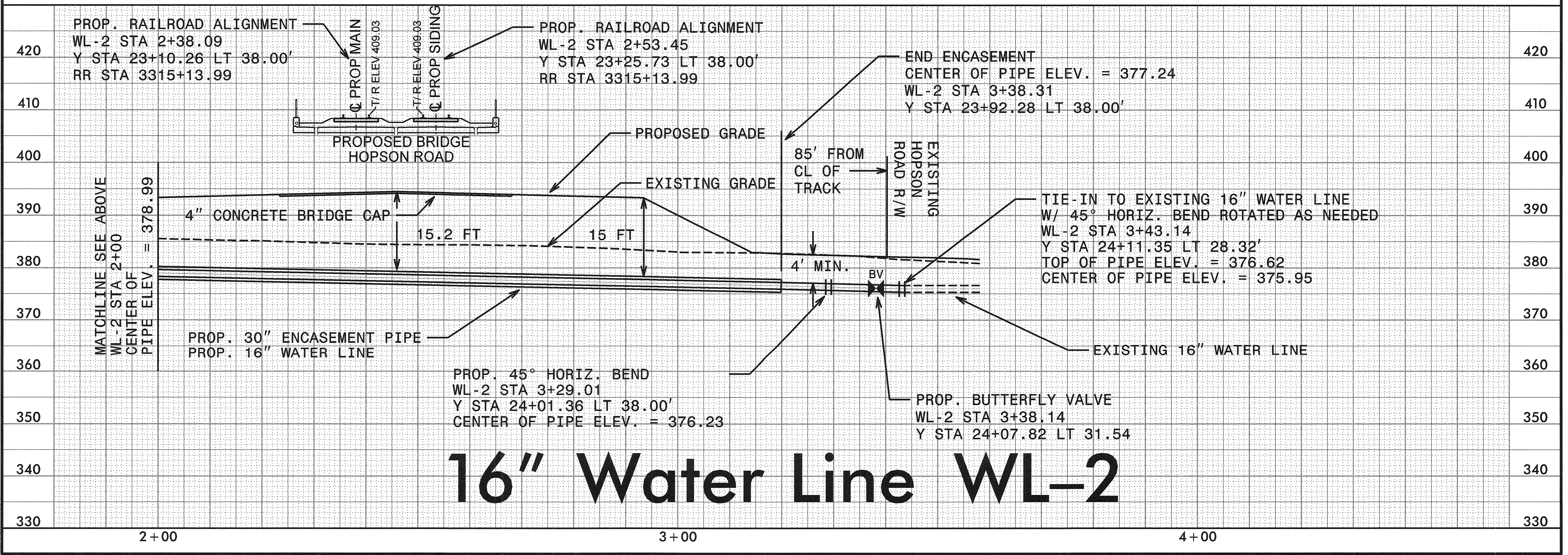
0371DEL_P17-18

PROJECT REFERENCE NO. U-4716AC	SHEET NO. UC-11
UTILITY DESIGN ENGINEER	
	
2012-OCT-11	
	
598 E. Chatham Street, Suite 137, Cary, N.C. 27511	

UTILITY OWNER:
1. CITY OF DURHAM
UTILITY: 16" WATER LINE
CONTACT: ERIC HALSTEAD
PHONE: 919-560-4326 X30259



- NOTES:
1. SEE SHEET UC-05 FOR PLAN VIEW OF WATER LINE.
 2. MINIMUM COVER IS MEASURED FROM TOP OF WATER LINE OR ENCASUREMENT PIPE TO FINAL GRADE.
 3. CONSTRUCTION OF WATER LINE WITHIN THE NCRR RIGHT-OF-WAY SHALL COMPLY WITH THE FOLLOWING NCRR DOCUMENTS: NCR-101; NCR-102; AND NCR-103.
 4. INSTALL PIPE MARKER SIGNS AS PER DETAIL ON SHEET UC-19.
 5. REFER TO "STEEL ENCASUREMENT PIPE" DETAIL ON SHEET UC-16.





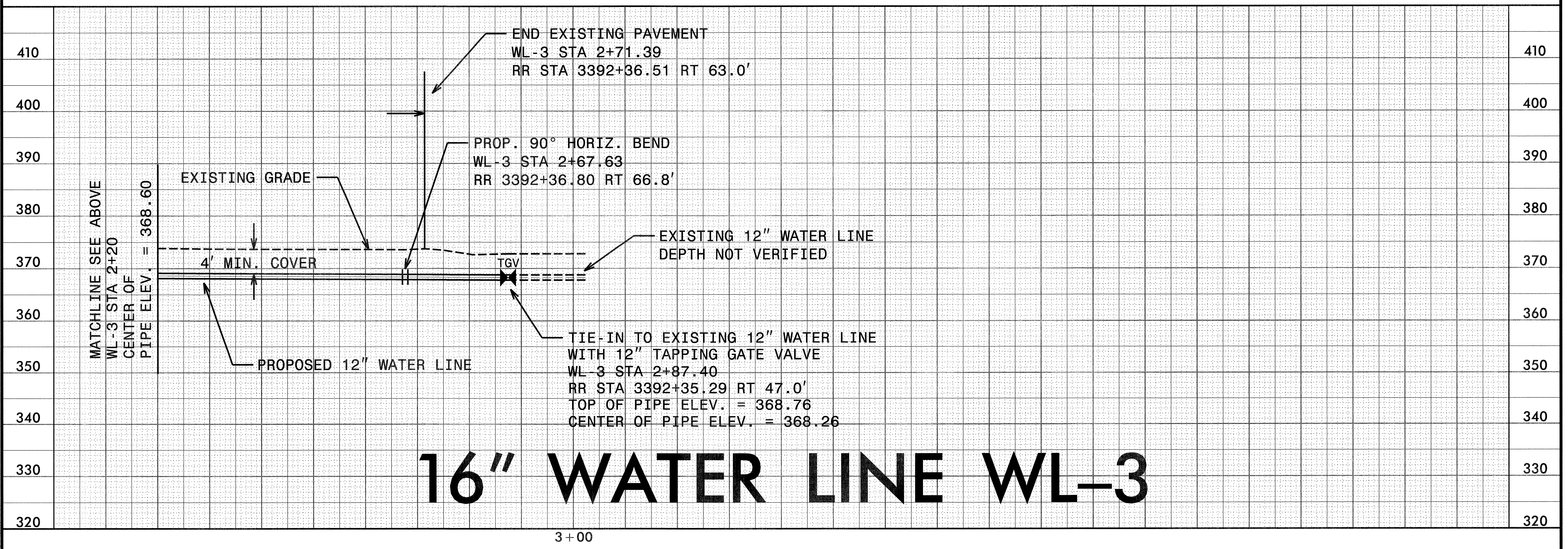
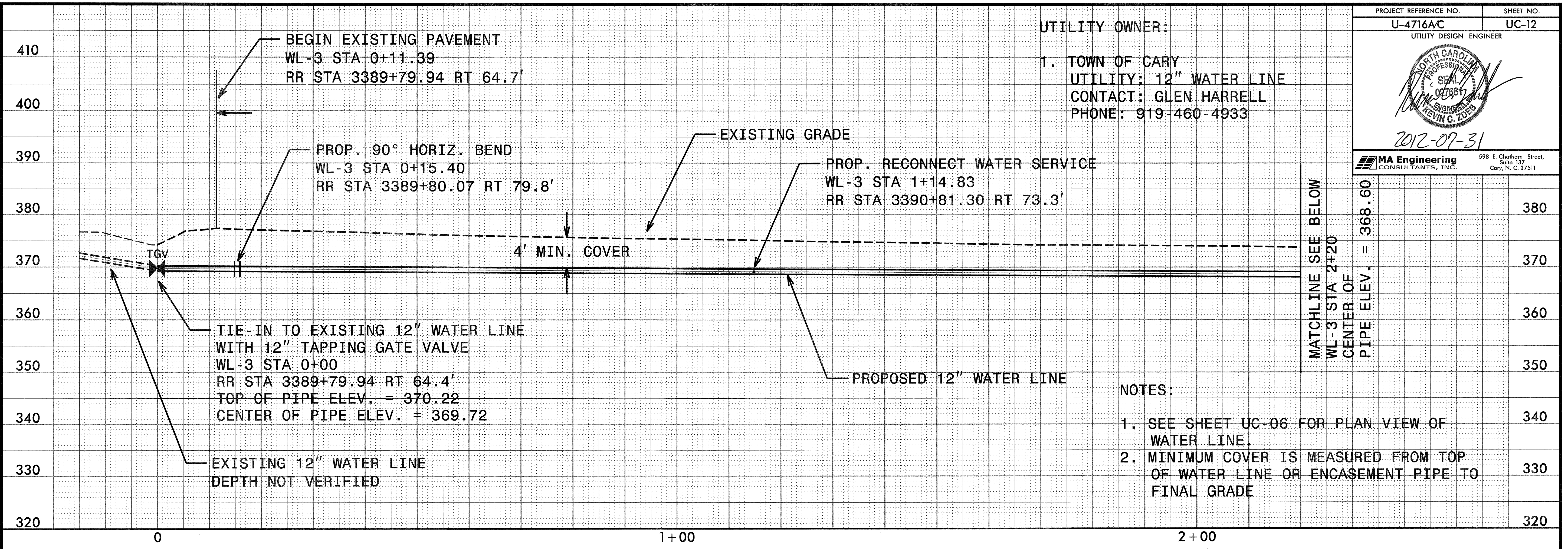
16" Water Line WL-2

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0371DEL_P17-18

UTILITY OWNER:
 1. TOWN OF CARY
 UTILITY: 12" WATER LINE
 CONTACT: GLEN HARRELL
 PHONE: 919-460-4933

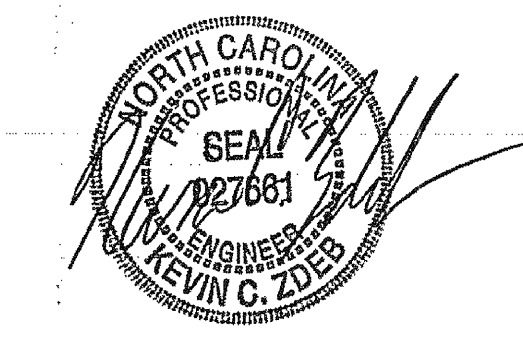

PROJECT REFERENCE NO. U-4716AC	SHEET NO. UC-12
UTILITY DESIGN ENGINEER	
	
2012-07-31	
	
598 E. Chatham Street, Suite 137 Cary, N. C. 27511	

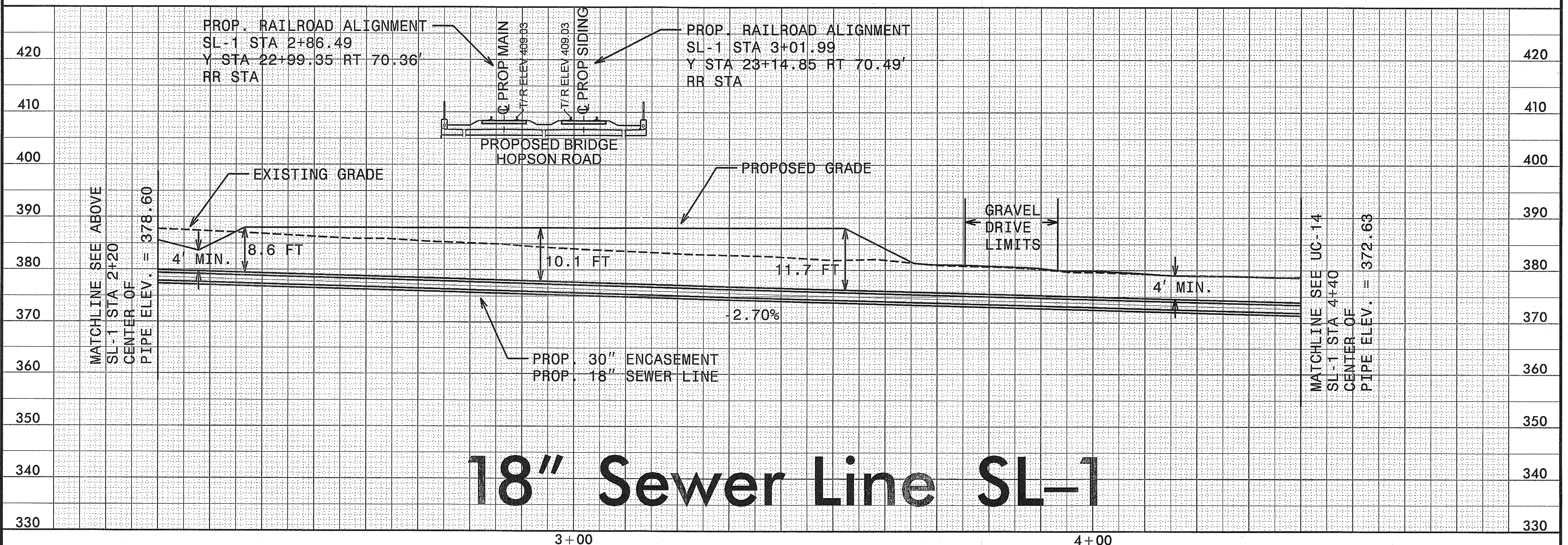
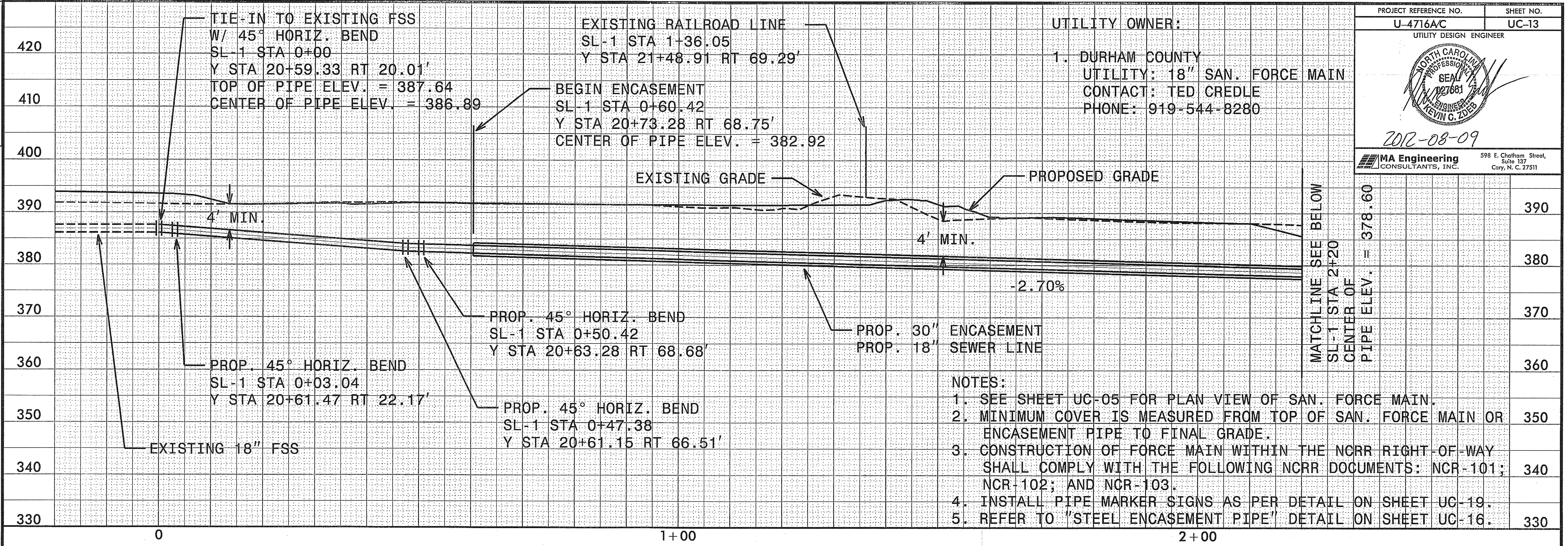


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PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-13
UTILITY DESIGN ENGINEER	
	
2012-08-09	
	
598 E. Chatham Street, Cary, N. C. 27511	





18" Sewer Line SL-1

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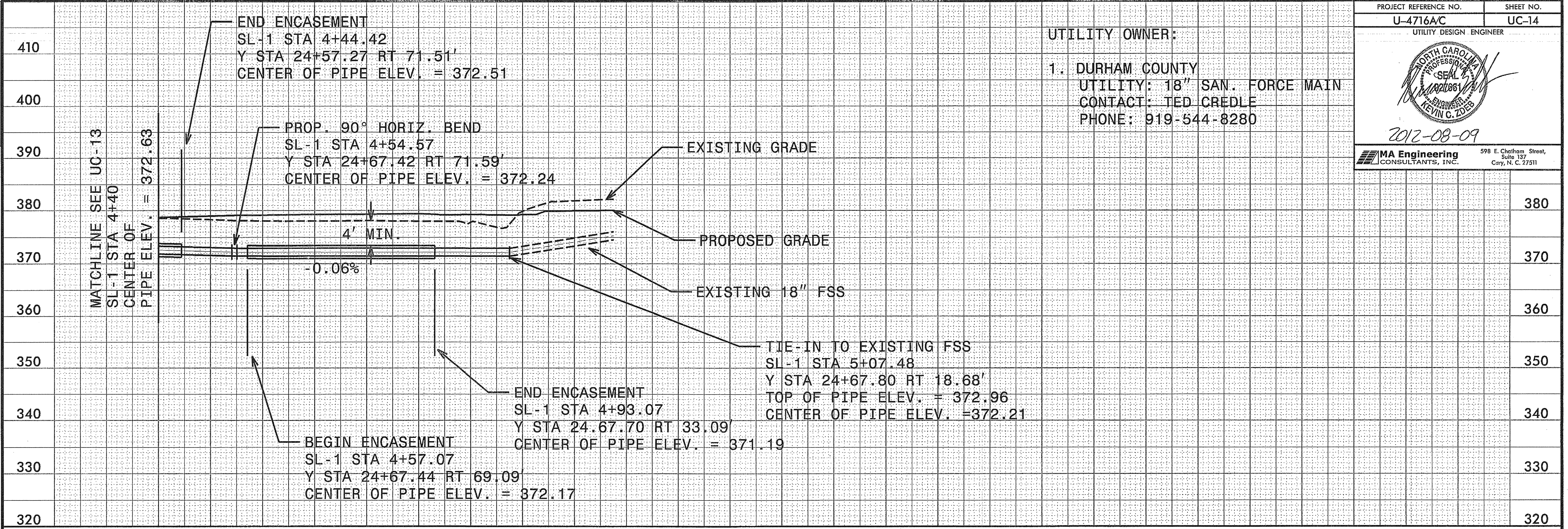
PCN

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PROJECT REFERENCE NO. U-4716AC	SHEET NO. UC-14
UTILITY DESIGN ENGINEER	
	
2012-08-09	
	
598 E. Chatham Street, Suite 137, Cary, N. C. 27511	

UTILITY OWNER:



1. DURHAM COUNTY
 UTILITY: 18" SAN. FORCE MAIN
 CONTACT: TED CREDLE
 PHONE: 919-544-8280

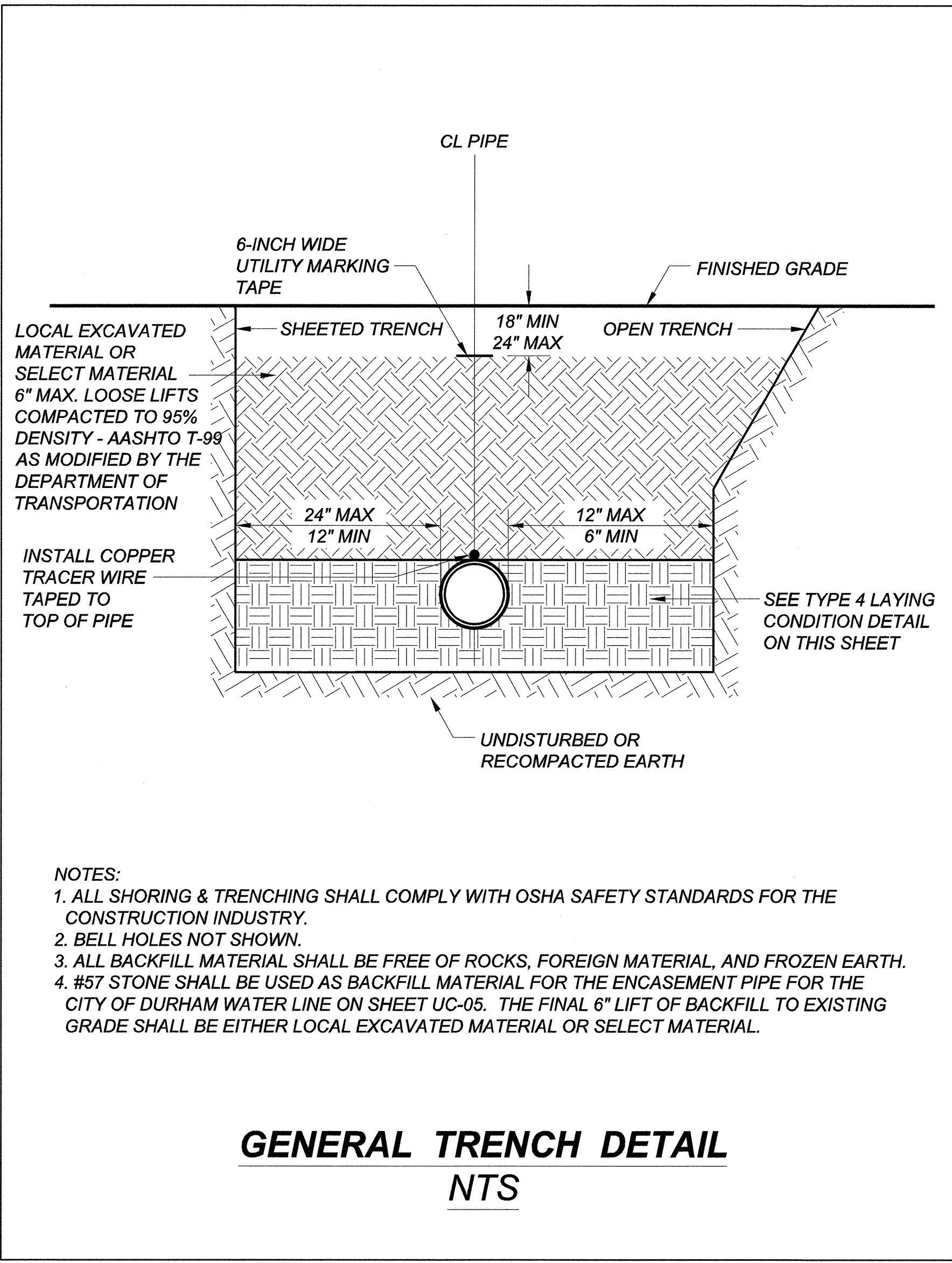


- NOTES:
1. SEE SHEET UC-05 FOR PLAN VIEW OF SAN. FORCE MAIN.
 2. MINIMUM COVER IS MEASURED FROM TOP OF SAN. FORCE MAIN OR ENCASEMENT PIPE TO FINAL GRADE.
 3. CONSTRUCTION OF FORCE MAIN WITHIN THE NCR RIGHT-OF-WAY SHALL COMPLY WITH THE FOLLOWING NCR DOCUMENTS: NCR-101; NCR-102; AND NCR-103.
 4. INSTALL PIPE MARKER SIGNS AS PER DETAIL ON SHEET UC-19.
 5. REFER TO "STEEL ENCASEMENT PIPE" DETAIL ON SHEET UC-16.

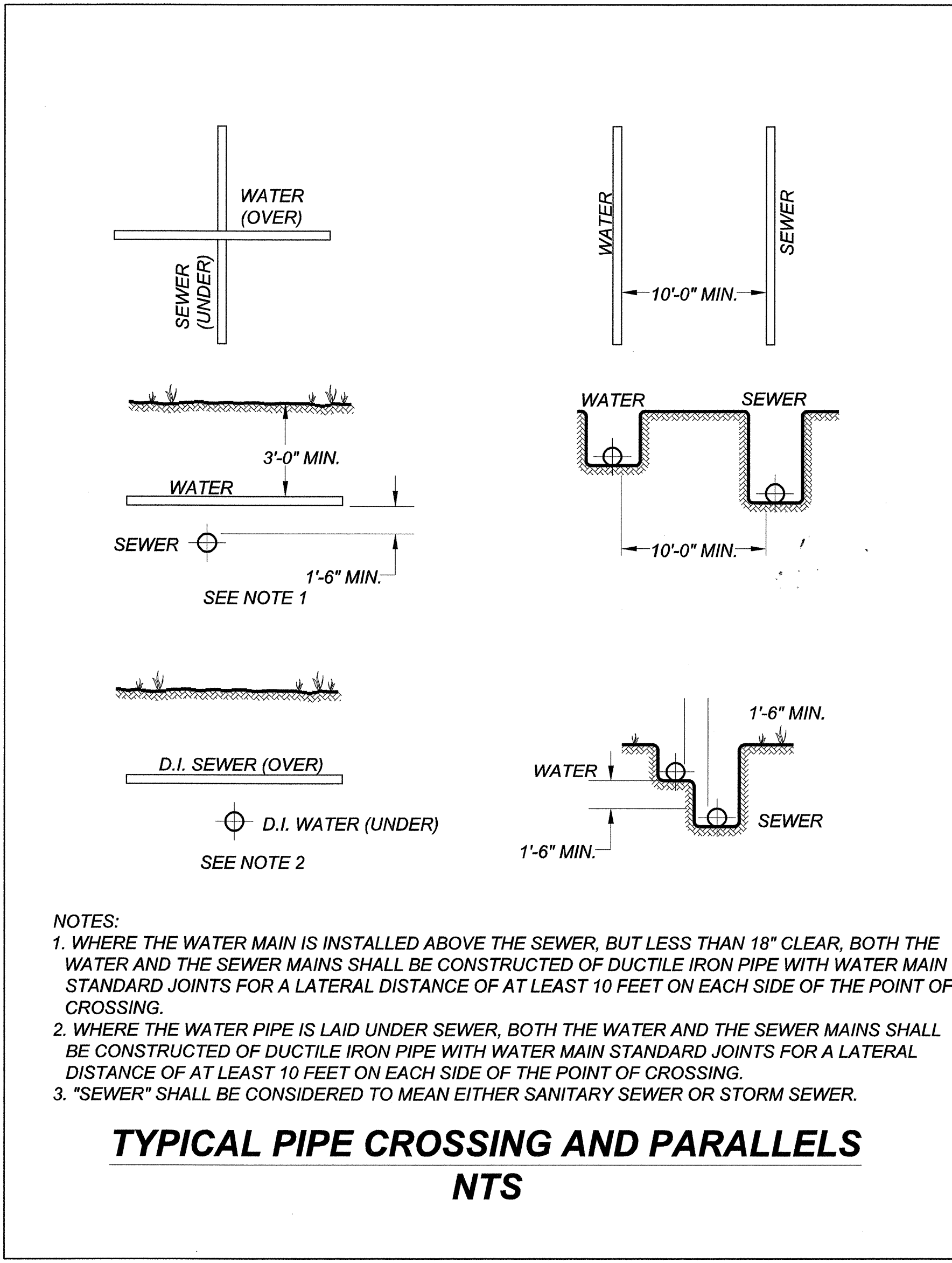
18" Sewer Line SL-1

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PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-15
UTILITY DESIGN ENGINEER	
	
2012-OCT-16	
	
598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	

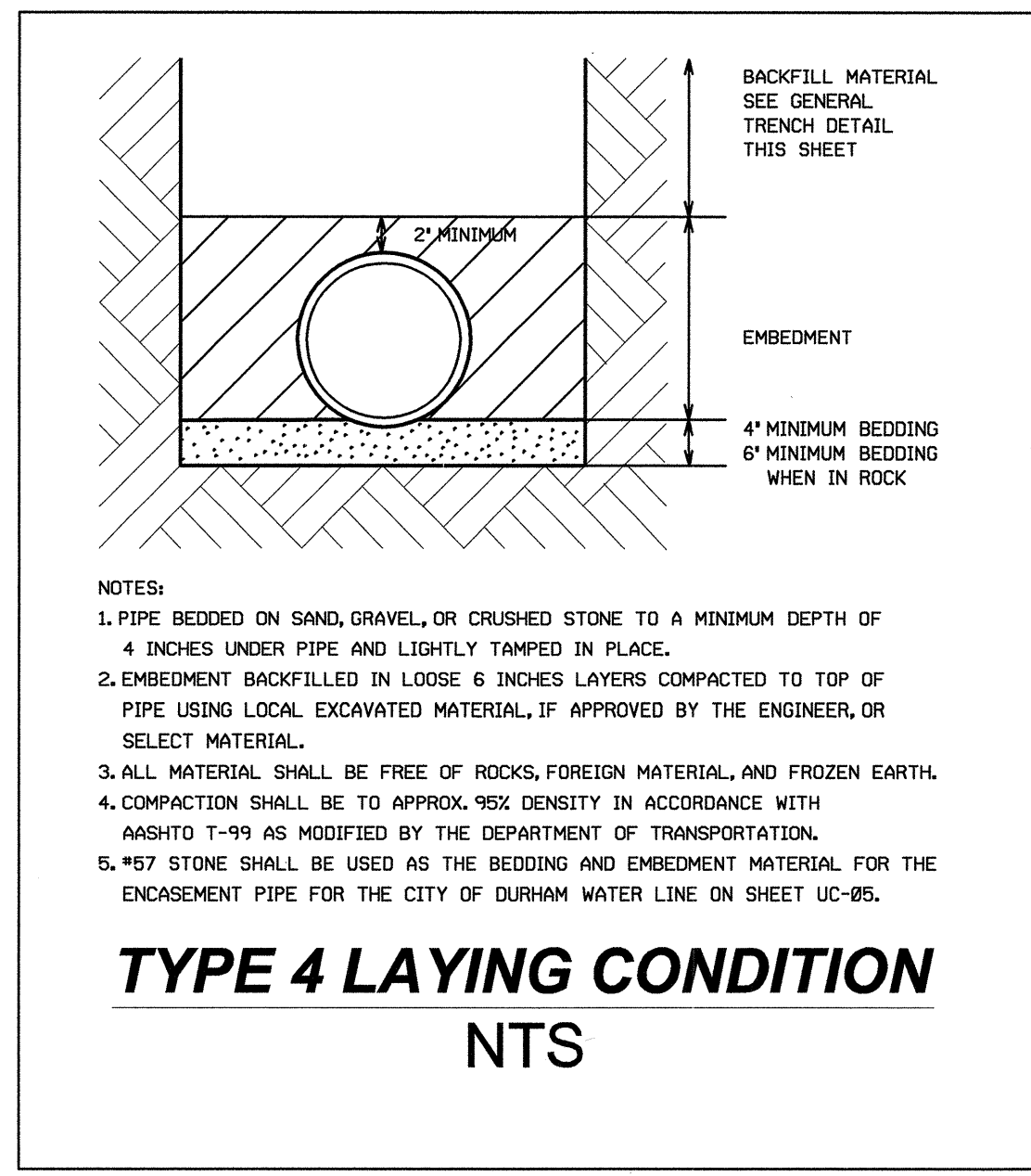


- NOTES:
1. ALL SHORING & TRENCHING SHALL COMPLY WITH OSHA SAFETY STANDARDS FOR THE CONSTRUCTION INDUSTRY.
 2. BELL HOLES NOT SHOWN.
 3. ALL BACKFILL MATERIAL SHALL BE FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH.
 4. #57 STONE SHALL BE USED AS BACKFILL MATERIAL FOR THE ENCASEMENT PIPE FOR THE CITY OF DURHAM WATER LINE ON SHEET UC-05. THE FINAL 6" LIFT OF BACKFILL TO EXISTING GRADE SHALL BE EITHER LOCAL EXCAVATED MATERIAL OR SELECT MATERIAL.



- NOTES:
1. WHERE THE WATER MAIN IS INSTALLED ABOVE THE SEWER, BUT LESS THAN 18" CLEAR, BOTH THE WATER AND THE SEWER MAINS SHALL BE CONSTRUCTED OF DUCTILE IRON PIPE WITH WATER MAIN STANDARD JOINTS FOR A LATERAL DISTANCE OF AT LEAST 10 FEET ON EACH SIDE OF THE POINT OF CROSSING.
 2. WHERE THE WATER PIPE IS LAID UNDER SEWER, BOTH THE WATER AND THE SEWER MAINS SHALL BE CONSTRUCTED OF DUCTILE IRON PIPE WITH WATER MAIN STANDARD JOINTS FOR A LATERAL DISTANCE OF AT LEAST 10 FEET ON EACH SIDE OF THE POINT OF CROSSING.
 3. "SEWER" SHALL BE CONSIDERED TO MEAN EITHER SANITARY SEWER OR STORM SEWER.

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		



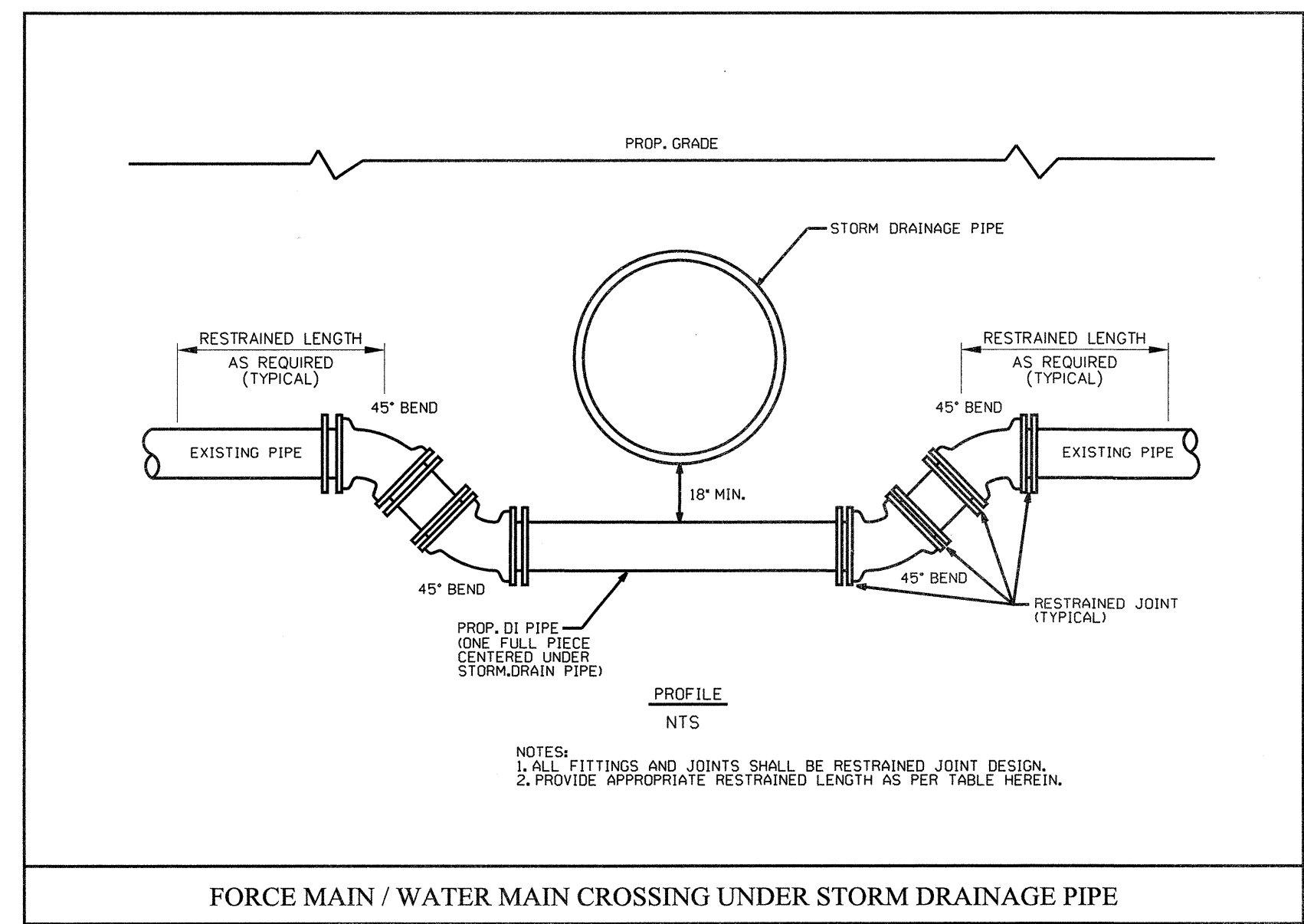
- NOTES:
1. PIPE BEDDED ON SAND, GRAVEL, OR CRUSHED STONE TO A MINIMUM DEPTH OF 4 INCHES UNDER PIPE AND LIGHTLY TAMPED IN PLACE.
 2. EMBEDMENT BACKFILLED IN LOOSE 6 INCHES LAYERS COMPACTED TO TOP OF PIPE USING LOCAL EXCAVATED MATERIAL, IF APPROVED BY THE ENGINEER, OR SELECT MATERIAL.
 3. ALL MATERIAL SHALL BE FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH.
 4. COMPACTION SHALL BE TO APPROX. 95% DENSITY IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY THE DEPARTMENT OF TRANSPORTATION.
 5. #57 STONE SHALL BE USED AS THE BEDDING AND EMBEDMENT MATERIAL FOR THE ENCASEMENT PIPE FOR THE CITY OF DURHAM WATER LINE ON SHEET UC-05.

UTILITY DESIGN ENGINEER

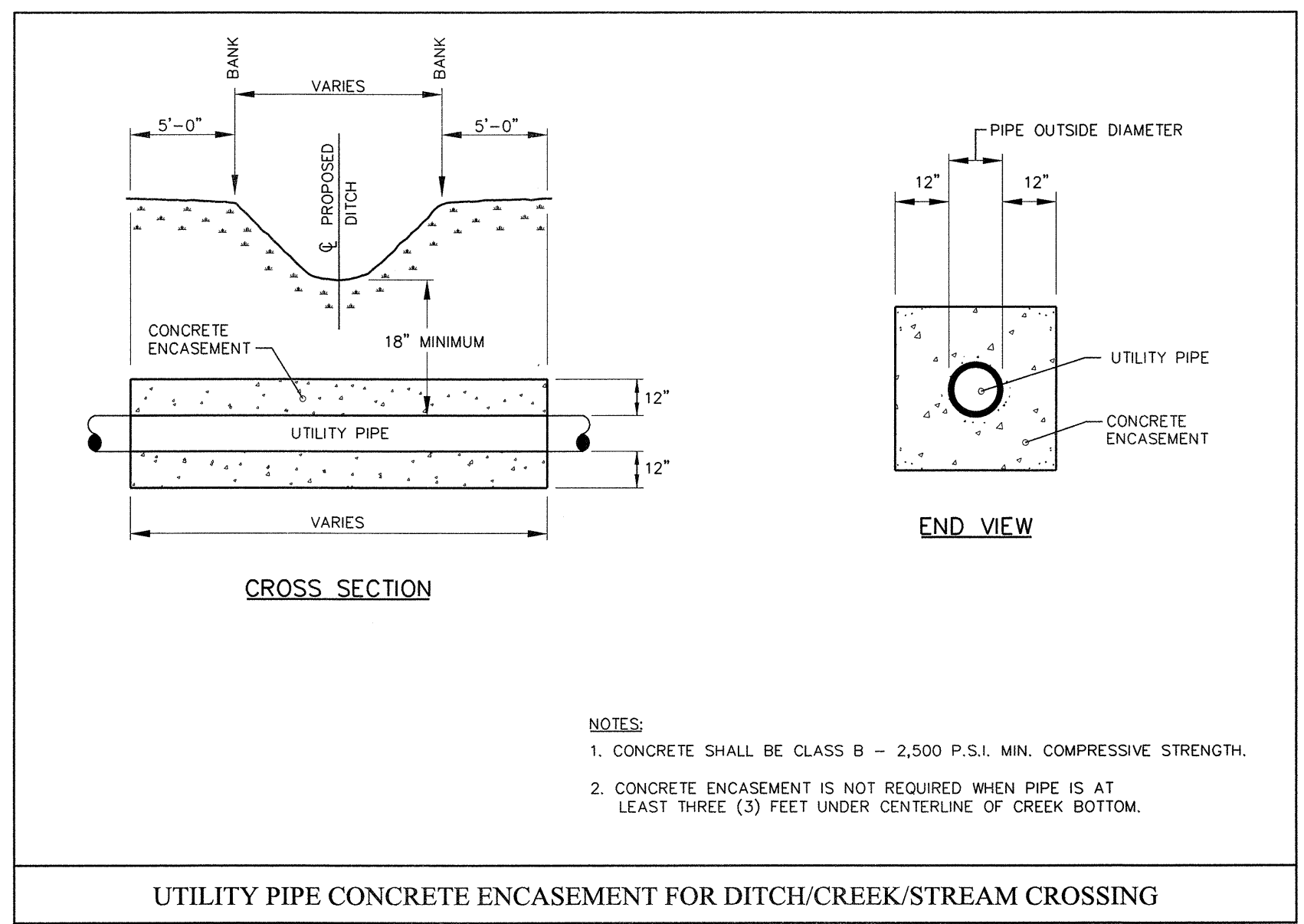


2012-08-09

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

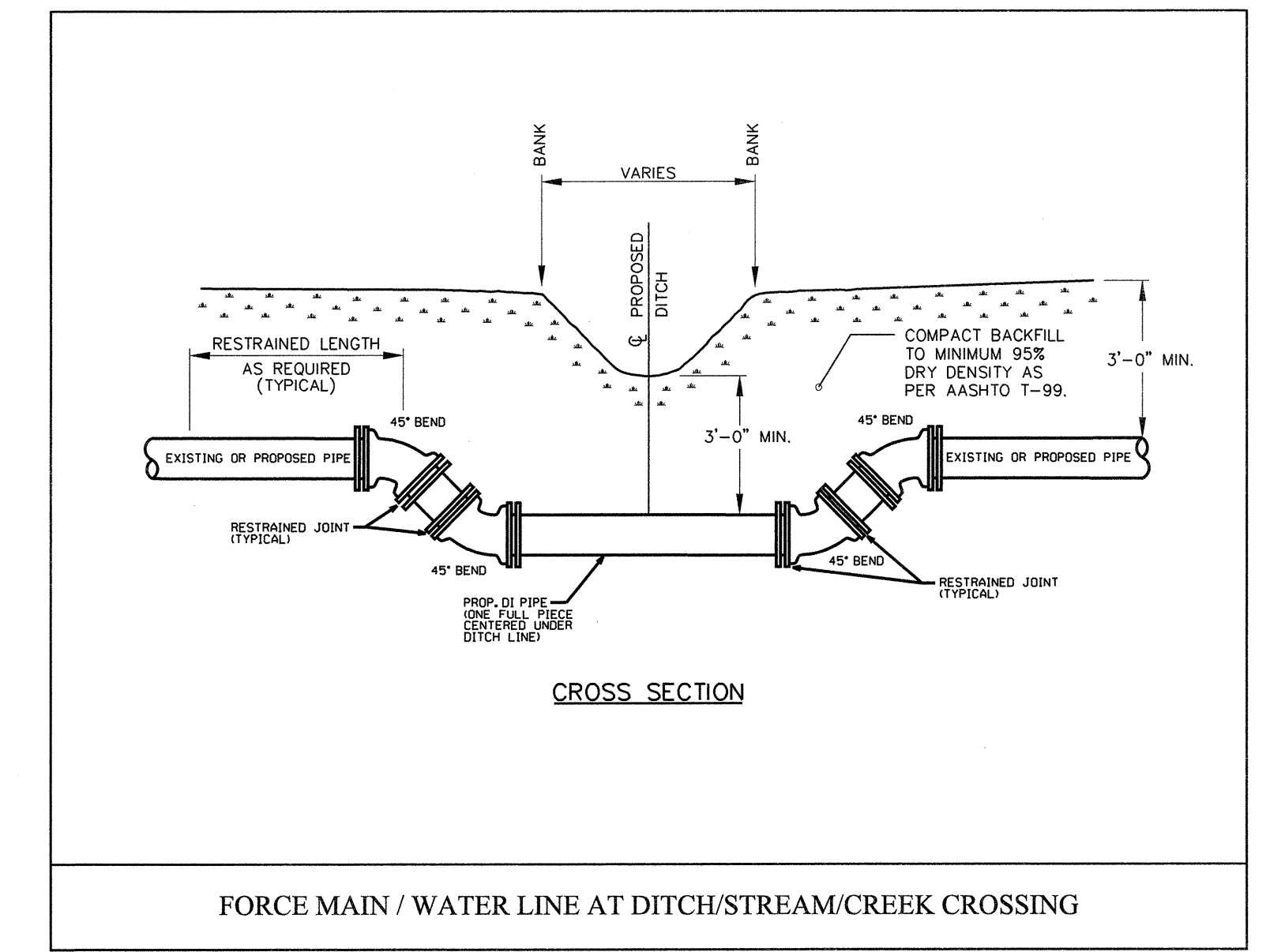


FORCE MAIN / WATER MAIN CROSSING UNDER STORM DRAINAGE PIPE

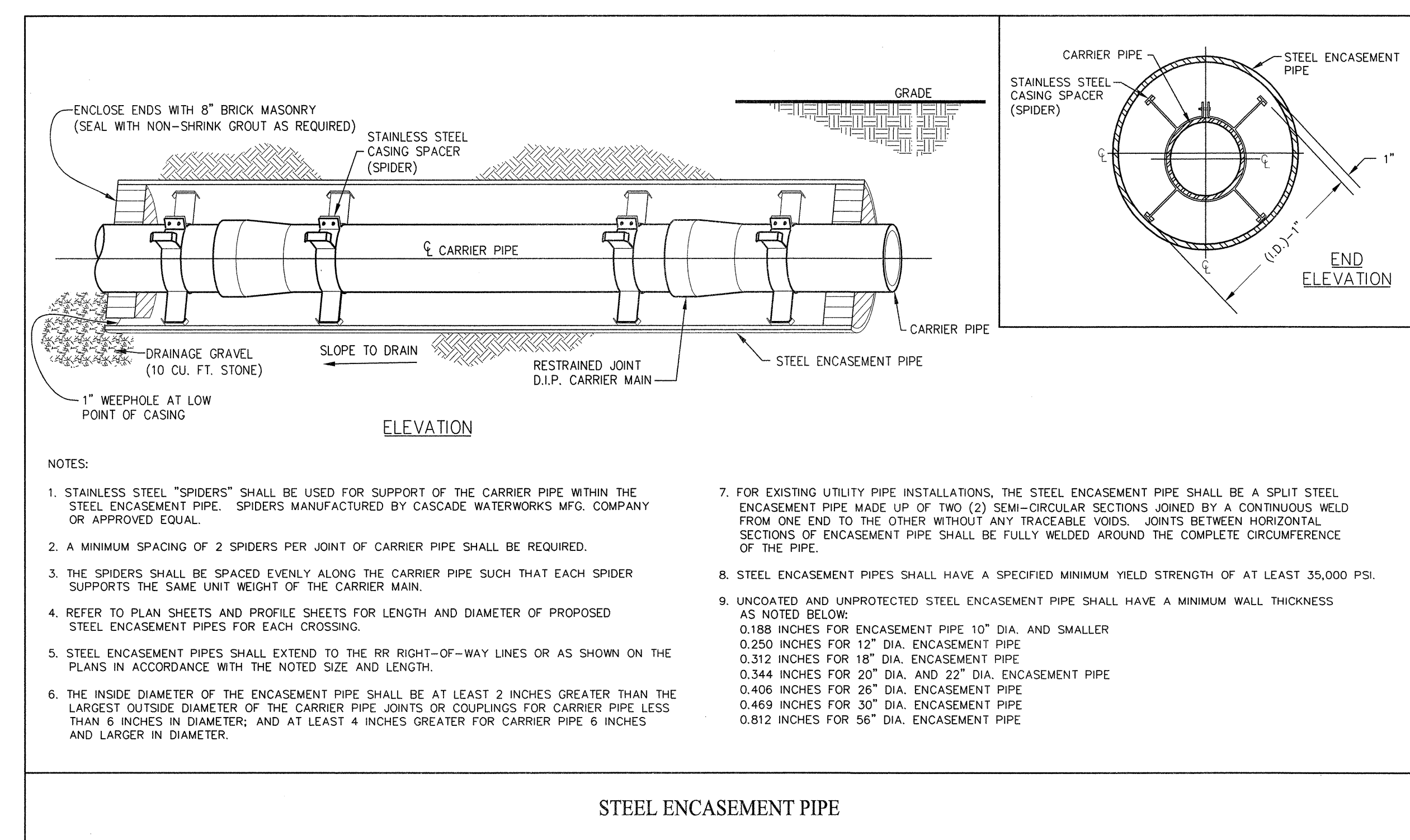


UTILITY PIPE CONCRETE ENCASEMENT FOR DITCH/CREEK/STREAM CROSSING

- NOTES:
1. CONCRETE SHALL BE CLASS B - 2,500 P.S.I. MIN. COMPRESSIVE STRENGTH.
 2. CONCRETE ENCASEMENT IS NOT REQUIRED WHEN PIPE IS AT LEAST THREE (3) FEET UNDER CENTERLINE OF CREEK BOTTOM.



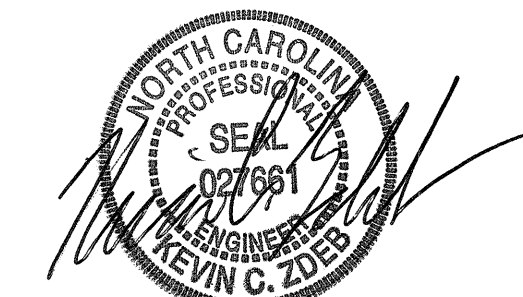

FORCE MAIN / WATER LINE AT DITCH/STREAM/CREEK CROSSING



STEEL ENCASEMENT PIPE

- NOTES:
1. STAINLESS STEEL "SPIDERS" SHALL BE USED FOR SUPPORT OF THE CARRIER PIPE WITHIN THE STEEL ENCASEMENT PIPE. SPIDERS MANUFACTURED BY CASCADE WATERWORKS MFG. COMPANY OR APPROVED EQUAL.
 2. A MINIMUM SPACING OF 2 SPIDERS PER JOINT OF CARRIER PIPE SHALL BE REQUIRED.
 3. THE SPIDERS SHALL BE SPACED EVENLY ALONG THE CARRIER PIPE SUCH THAT EACH SPIDER SUPPORTS THE SAME UNIT WEIGHT OF THE CARRIER MAIN.
 4. REFER TO PLAN SHEETS AND PROFILE SHEETS FOR LENGTH AND DIAMETER OF PROPOSED STEEL ENCASEMENT PIPES FOR EACH CROSSING.
 5. STEEL ENCASEMENT PIPES SHALL EXTEND TO THE RR RIGHT-OF-WAY LINES OR AS SHOWN ON THE PLANS IN ACCORDANCE WITH THE NOTED SIZE AND LENGTH.
 6. 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.
 7. 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.
 8. STEEL ENCASEMENT PIPES SHALL HAVE A SPECIFIED MINIMUM YIELD STRENGTH OF AT LEAST 35,000 PSI.
 9. UNCOATED AND UNPROTECTED STEEL ENCASEMENT PIPE SHALL HAVE A MINIMUM WALL THICKNESS AS NOTED BELOW:
0.188 INCHES FOR ENCASEMENT PIPE 10" DIA. AND SMALLER
0.250 INCHES FOR 12" DIA. ENCASEMENT PIPE
0.312 INCHES FOR 18" DIA. ENCASEMENT PIPE
0.344 INCHES FOR 20" DIA. AND 22" DIA. ENCASEMENT PIPE
0.406 INCHES FOR 26" DIA. ENCASEMENT PIPE
0.469 INCHES FOR 30" DIA. ENCASEMENT PIPE
0.612 INCHES FOR 56" DIA. ENCASEMENT PIPE

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PROJECT REFERENCE NO. U-4716A/C	SHEET NO. UC-17
UTILITY DESIGN ENGINEER	
	
2012-07-31	
	
598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	

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
4"	11 1/4°	616	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
	45°	2,452	2	2	2	2	2	2	2	2	2	2	2
6"	11 1/4°	1,643	2	2	2	2	2	2	2	2	2	2	2
	22 1/2°	3,285	3	3	3	3	3	3	3	3	3	3	3
	45°	6,569	5	5	5	5	5	5	5	5	5	5	5
8"	11 1/4°	2,464	3	3	3	3	3	3	3	3	3	3	3
	22 1/2°	4,928	4	4	4	4	4	4	4	4	4	4	4
	45°	9,856	6	6	6	6	6	6	6	6	6	6	6
10"	11 1/4°	3,285	4	4	4	4	4	4	4	4	4	4	4
	22 1/2°	6,570	5	5	5	5	5	5	5	5	5	5	5
	45°	13,140	7	7	7	7	7	7	7	7	7	7	7
12"	11 1/4°	4,106	5	5	5	5	5	5	5	5	5	5	5
	22 1/2°	8,212	6	6	6	6	6	6	6	6	6	6	6
	45°	16,424	8	8	8	8	8	8	8	8	8	8	8
14"	11 1/4°	4,928	6	6	6	6	6	6	6	6	6	6	6
	22 1/2°	9,856	7	7	7	7	7	7	7	7	7	7	7
	45°	19,712	9	9	9	9	9	9	9	9	9	9	9
16"	11 1/4°	5,750	7	7	7	7	7	7	7	7	7	7	7
	22 1/2°	11,500	8	8	8	8	8	8	8	8	8	8	8
	45°	23,000	10	10	10	10	10	10	10	10	10	10	10

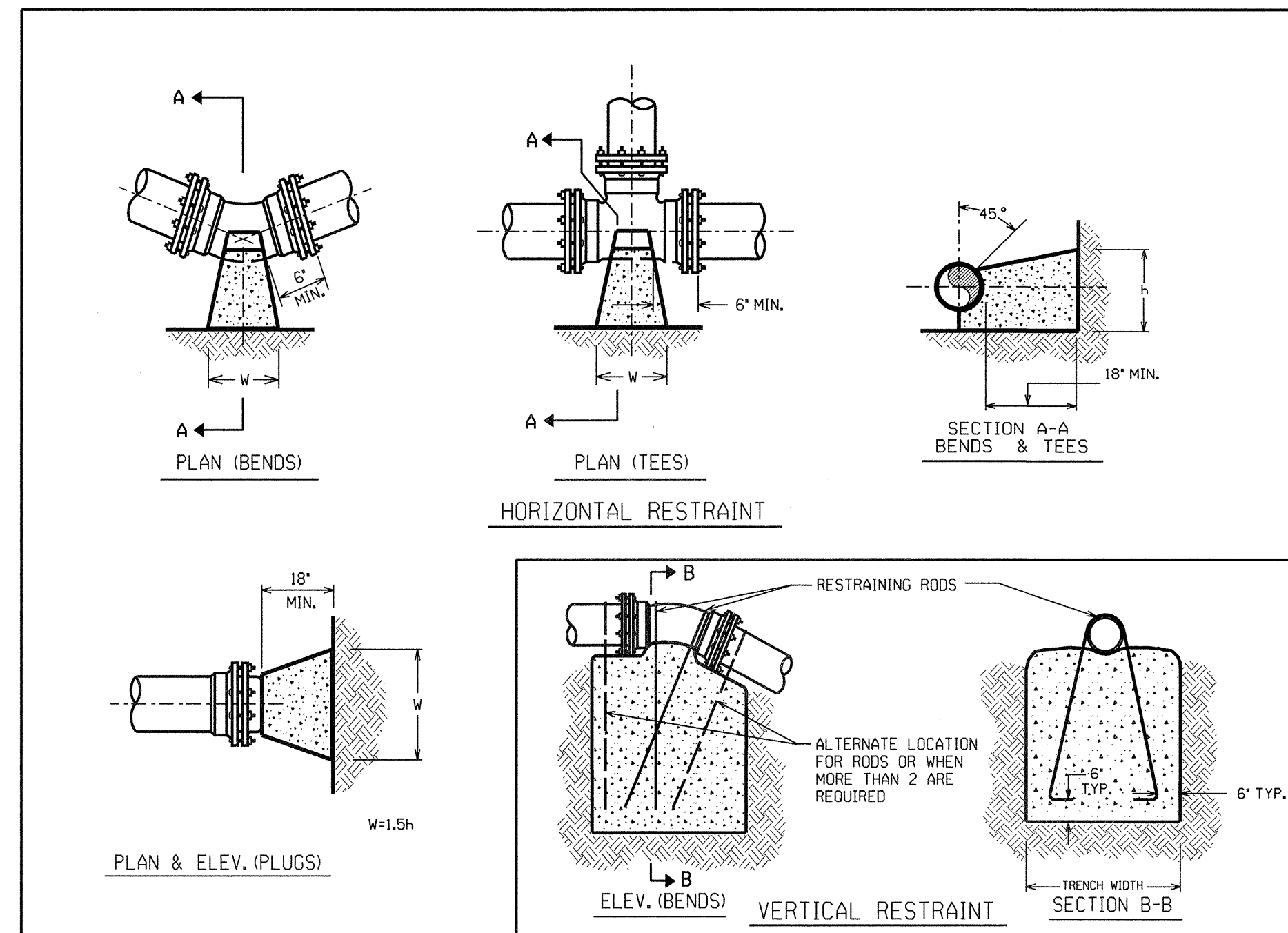
* INCLUDES 1.25 SAFETY FACTOR **INCLUDES 1.50 SAFETY FACTOR

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

SHEET 2 OF 2

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



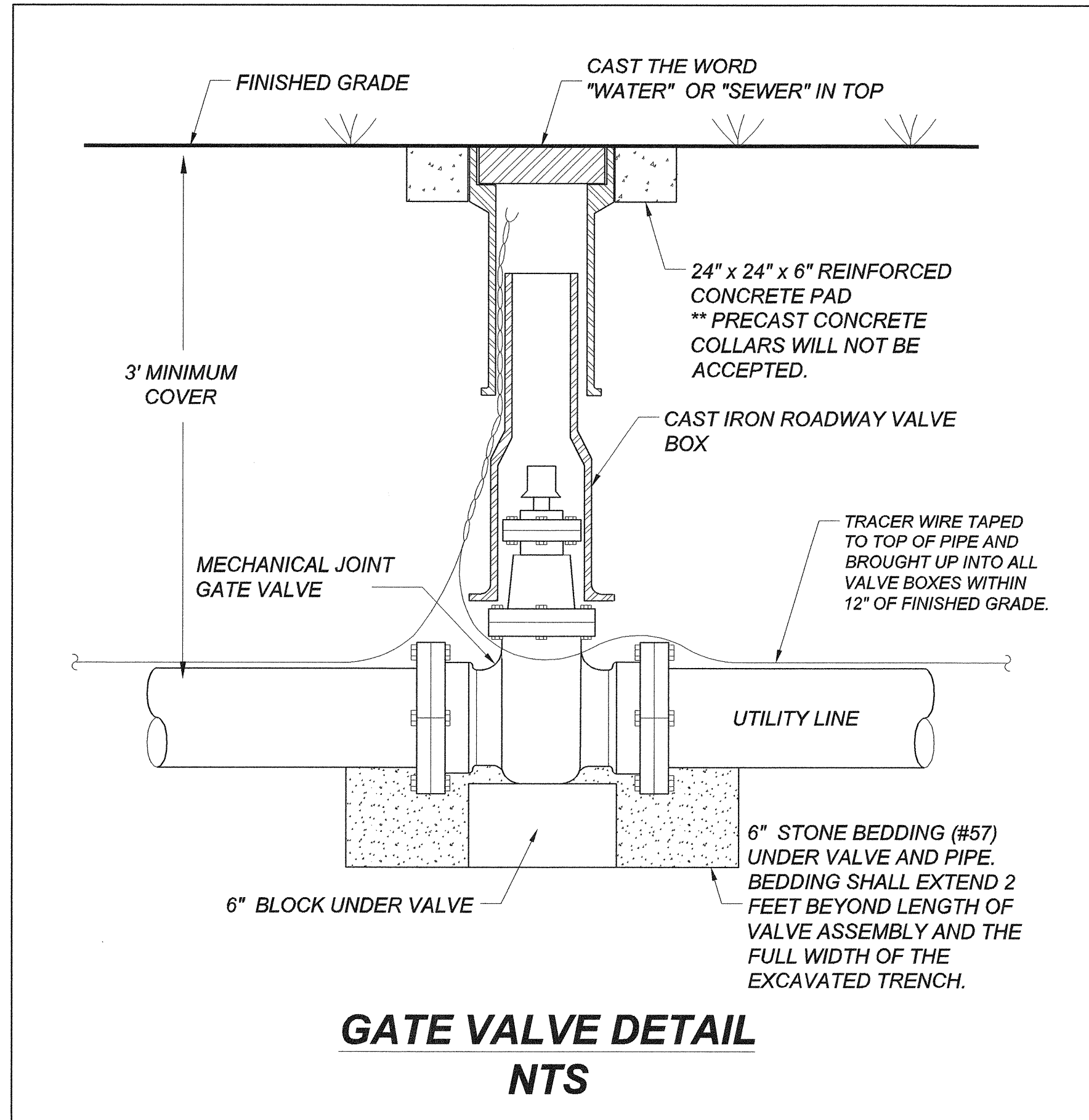
RESTRAINED JOINT DESIGN TABLE

FITTING	REQUIRED RESTRAINED LENGTH (FT) 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
HORIZONTAL BENDS								
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
18 INCH DIA - 11.25 DEG	7	6	5	5	4	4	4	3
18 INCH DIA - 22.5 DEG	13	12	10	9	8	8	7	7
18 INCH DIA - 45 DEG	28	24	22	19	18	16	15	14
VERTICAL BENDS - DOWN								
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
18 INCH DIA - 11.25 DEG	20	17	15	14	12	11	10	10
18 INCH DIA - 22.5 DEG	40	34	30	27	25	23	21	19
18 INCH DIA - 45 DEG	83	72	63	57	52	47	43	40
VERTICAL BENDS - UP								
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
18 INCH DIA - 11.25 DEG	7	6	5	5	4	4	4	3
18 INCH DIA - 22.5 DEG	13	12	10	9	8	8	7	7
18 INCH DIA - 45 DEG	28	24	22	19	18	16	15	14

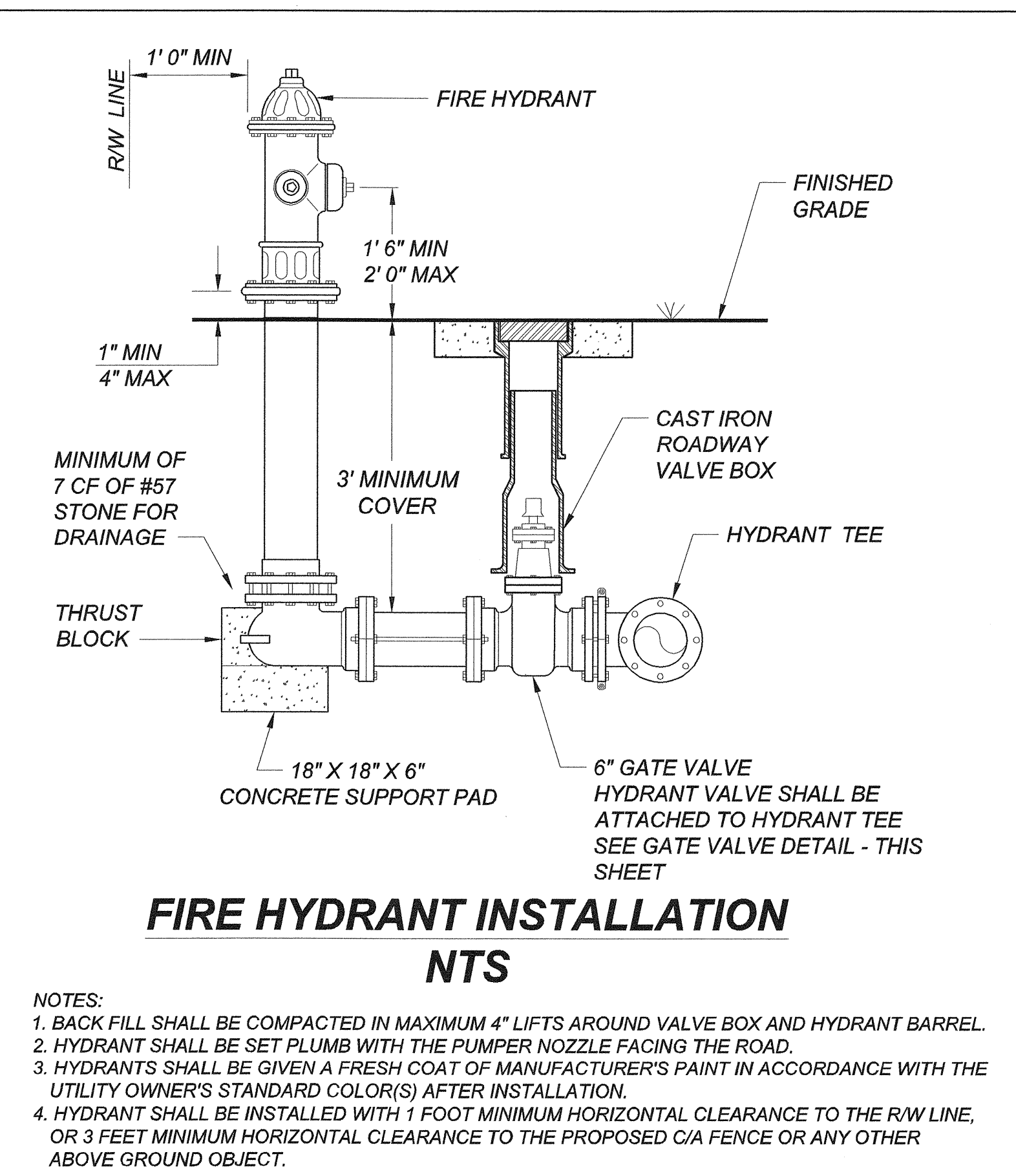
ASSUMPTIONS
 LAYING PIPE CONDITION = TYPE 4 DESIGN PRESSURE = 200 PSI (TEST PRESSURE)
 SOIL DESIGNATION = GC = COHESIVE-GRANULAR SAFETY FACTOR = 1.5

- NOTES:**
- RESTRAINED LENGTH IS MEASURED FROM THE CENTER OF THE BEND AS FOLLOWS:
 - HORIZONTAL AND VERTICAL BENDS: ALONG EACH BEND
 - HORIZONTAL AND VERTICAL BENDS - OFFSET OR COMBINED: ALONG THE OUTER SIDE OF EACH BEND.
 ALL PIPE BETWEEN THE TWO BENDS SHALL BE RESTRAINED JOINT WHEN THE DISTANCE BETWEEN THEM IS EQUAL TO OR LESS THAN THE REQUIRED RESTRAINED LENGTH. WHEN THE DISTANCE BETWEEN BENDS IS LESS THAN REQUIRED, THE BALANCE OF THE REQUIRED RESTRAINED LENGTH SHALL BE ADDED ON TO THE LENGTH ALONG THE OUTSIDE OF EACH BEND RESPECTIVELY TO MAKE UP FOR THE DEFICIENCY IN THAT DIRECTION.

HORIZONTAL BEND EXAMPLE...
 INSTALL A 12 INCH 45 DEG B END AND A 22.5 DEG BEND WITH 10 FEET BETWEEN BENDS AND 7 FEET OF COVER. THE CONTRACTOR SHALL PROVIDE AN ADDITIONAL 1 FOOT OF RESTRAINED LENGTH BEYOND THE 45 DEGREE BEND (FOR A TOTAL OF 13 FEET) AND AN ADDITIONAL 7 FEET OF RESTRAINED LENGTH BEYOND THE 22.5 DEGREE BEND (FOR A TOTAL OF 13 FEET).
 - 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.

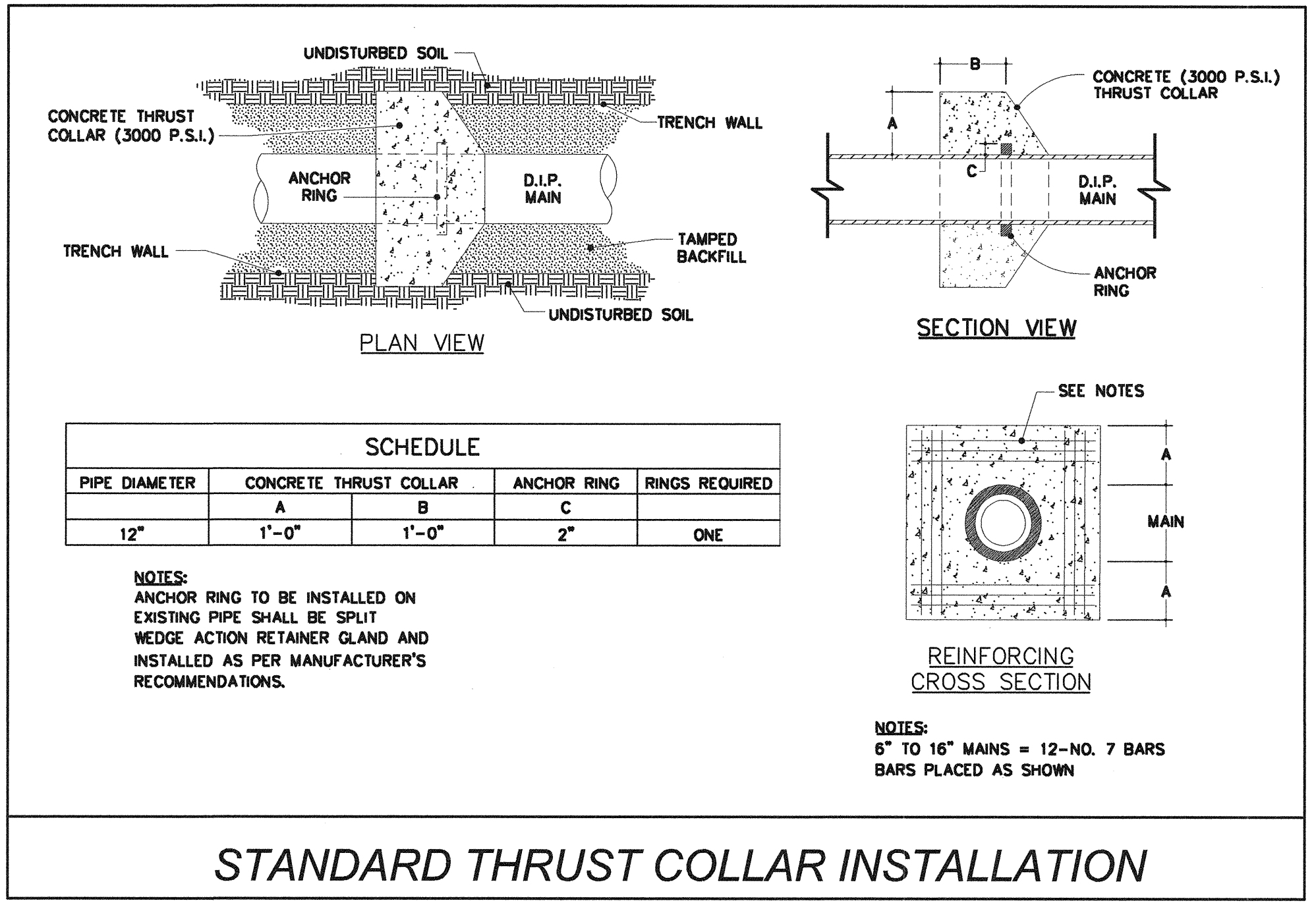


**GATE VALVE DETAIL
NTS**

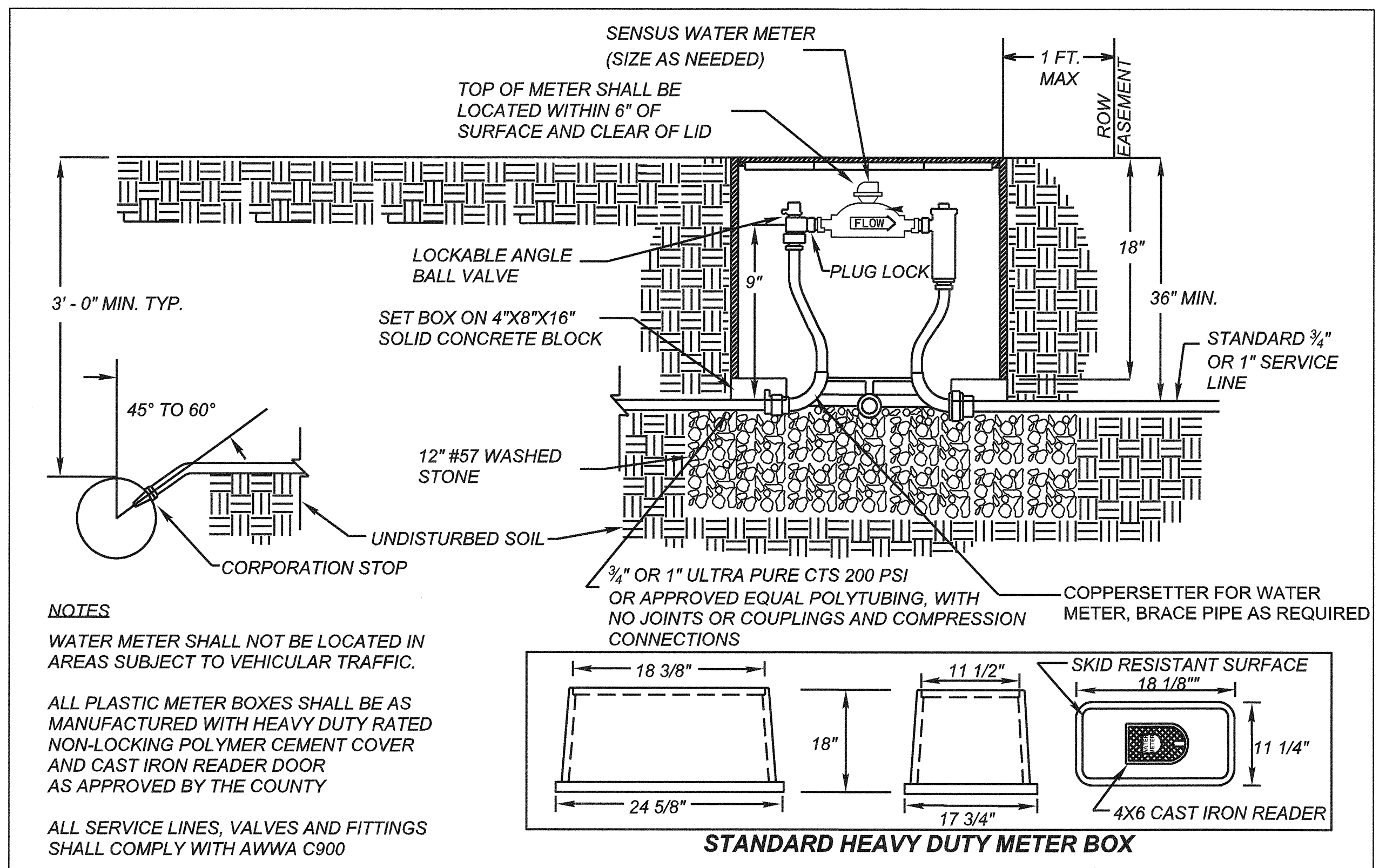


**FIRE HYDRANT INSTALLATION
NTS**

- NOTES:
 1. BACK FILL SHALL BE COMPACTED IN MAXIMUM 4" LIFTS AROUND VALVE BOX AND HYDRANT BARREL.
 2. HYDRANT SHALL BE SET PLUMB WITH THE PUMPER NOZZLE FACING THE ROAD.
 3. HYDRANTS SHALL BE GIVEN A FRESH COAT OF MANUFACTURER'S PAINT IN ACCORDANCE WITH THE UTILITY OWNER'S STANDARD COLOR(S) AFTER INSTALLATION.
 4. HYDRANT SHALL BE INSTALLED WITH 1 FOOT MINIMUM HORIZONTAL CLEARANCE TO THE R/W LINE, OR 3 FEET MINIMUM HORIZONTAL CLEARANCE TO THE PROPOSED C/A FENCE OR ANY OTHER ABOVE GROUND OBJECT.

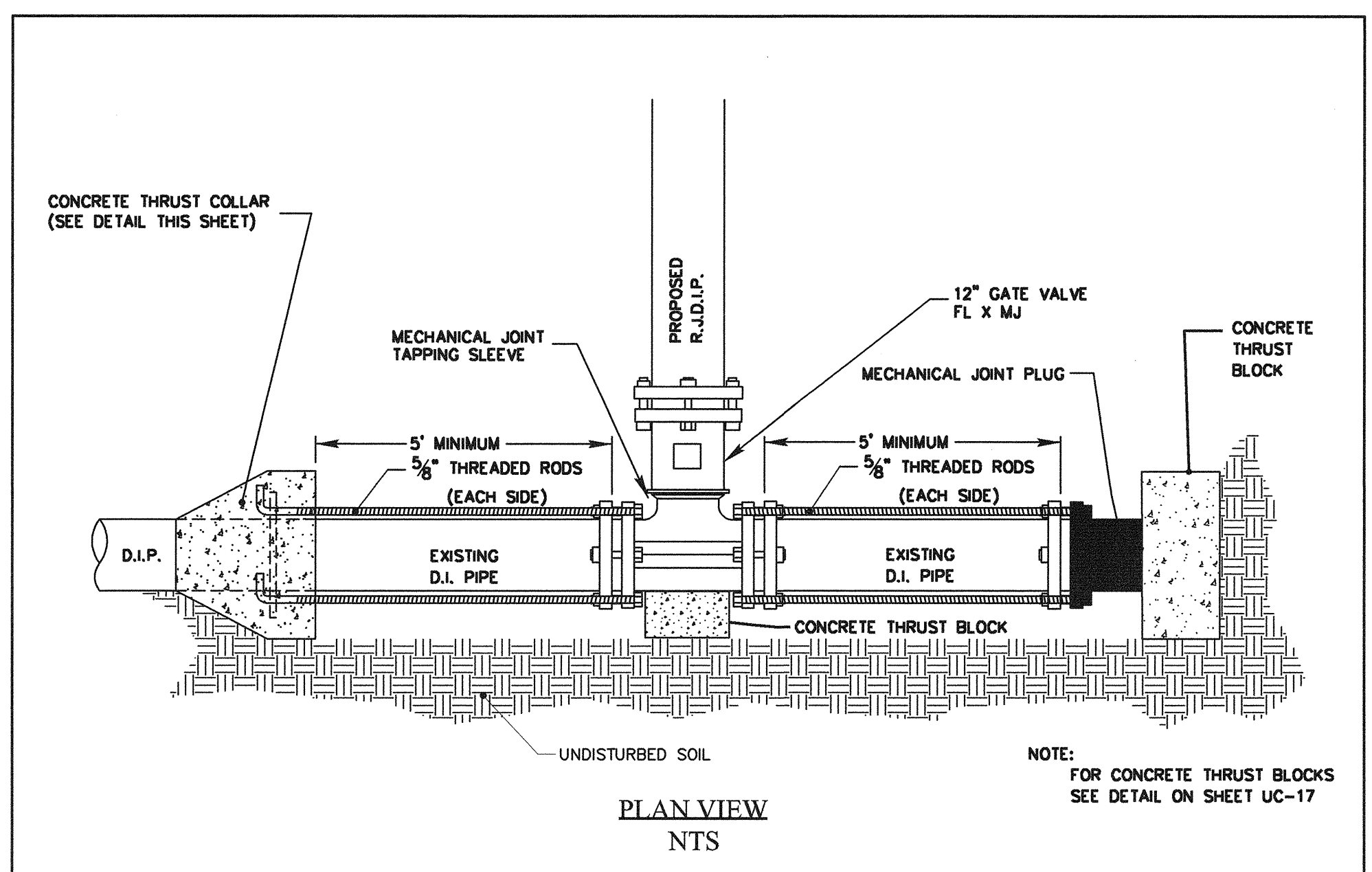


STANDARD THRUST COLLAR INSTALLATION



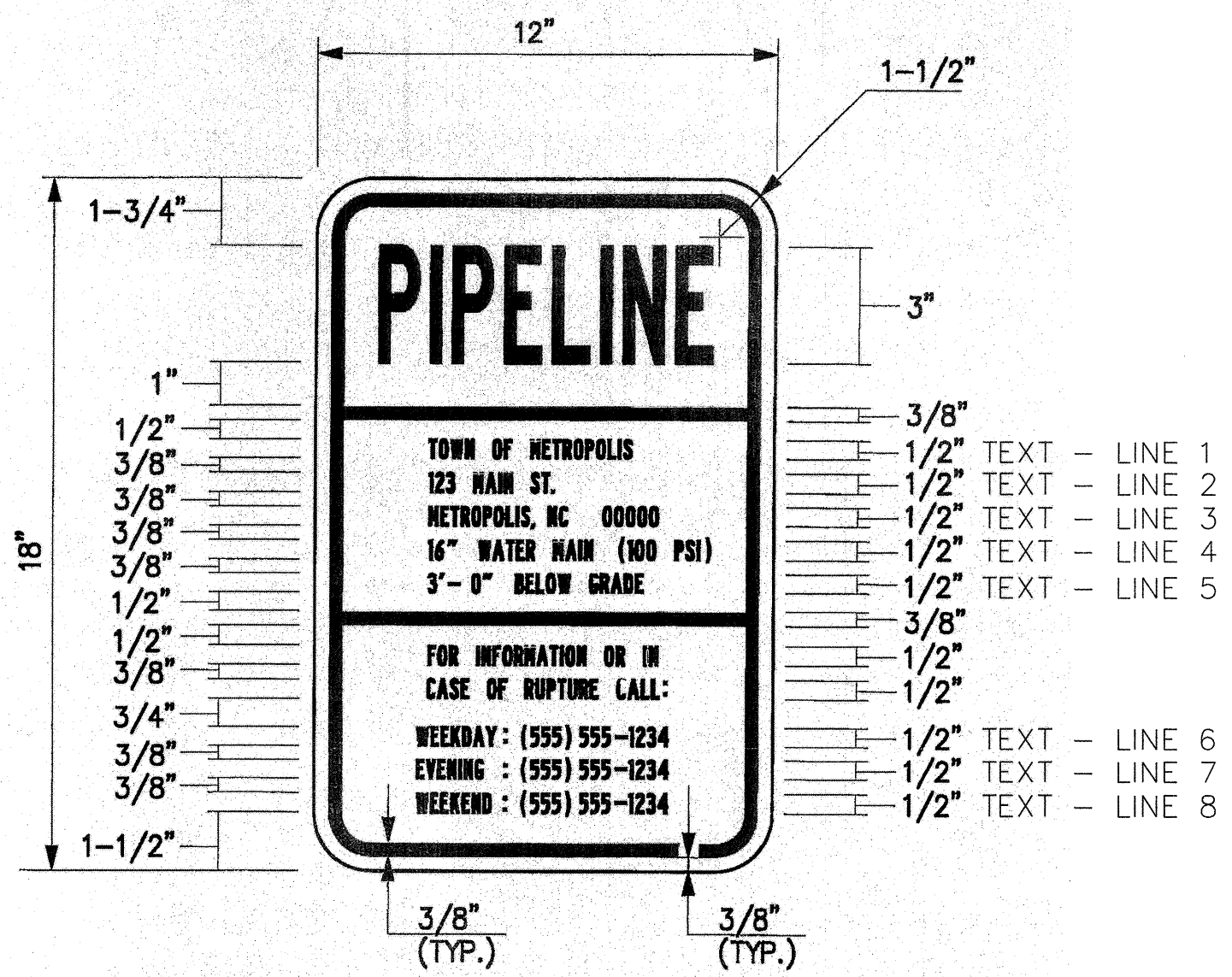
STANDARD 3/4" WATER SERVICE & METER BOX INSTALLATION

- NOTES
 WATER METER SHALL NOT BE LOCATED IN AREAS SUBJECT TO VEHICULAR TRAFFIC.
 ALL PLASTIC METER BOXES SHALL BE AS MANUFACTURED WITH HEAVY DUTY RATED NON-LOCKING POLYMER CEMENT COVER AND CAST IRON READER DOOR AS APPROVED BY THE COUNTY
 ALL SERVICE LINES, VALVES AND FITTINGS SHALL COMPLY WITH AWWA C900



12-INCH TIE-IN DETAIL

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- SIGN DATA:**
- 1/8" ALUMINUM PANEL
 - 3M SCOTCH LITE "ENGINEER GRADE" SHEETING OR APPROVED EQUAL.
 - RED COPY ON WHITE BACKGROUND
 - MOUNT SIGN PANEL 5" ABOVE GRADE (MIN.)
 - USE 2 LB/FT U-CHANNEL POST (MIN.)
 - MOUNT SIGNS BACK-TO-BACK ON POST.

TEXT NOTES FOR VARIOUS UTILITY OWNERS:

- A. TOWN OF CARY**
 LINE 1: TOWN OF CARY
 LINE 2: 316 NORTH ACADEMY STREET
 LINE 3: CARY, NC 27511
 LINE 4: 12" WATER MAIN (150 PSI)
 LINE 5: # - # BELOW GRADE
 LINE 6: (919) 469-4090
 LINE 7: (919) 469-4012
 LINE 8: (919) 469-4012

NOTES:
 1. LINE 5: CONTRACTOR SHALL NOTE THE AS-BUILT DEPTH (TO TOP OF CASING OR PIPE) AT THE SIGN LOCATION.

- B. DURHAM COUNTY PUBLIC WORKS**
 LINE 1: DURHAM COUNTY
 LINE 2: 5926 HIGHWAY 55 EAST
 LINE 3: DURHAM, NC 27713
 LINE 4: 18" SANITARY FORCE MAIN
 LINE 5: # - # BELOW GRADE
 LINE 6: (919) 544-8280
 LINE 7: (919) 544-8280
 LINE 8: (919) 544-8280

NOTE:
 1. LINE 5: CONTRACTOR SHALL NOTE THE AS-BUILT DEPTH (TO TOP OF CASING OR PIPE) AT THE SIGN LOCATION.

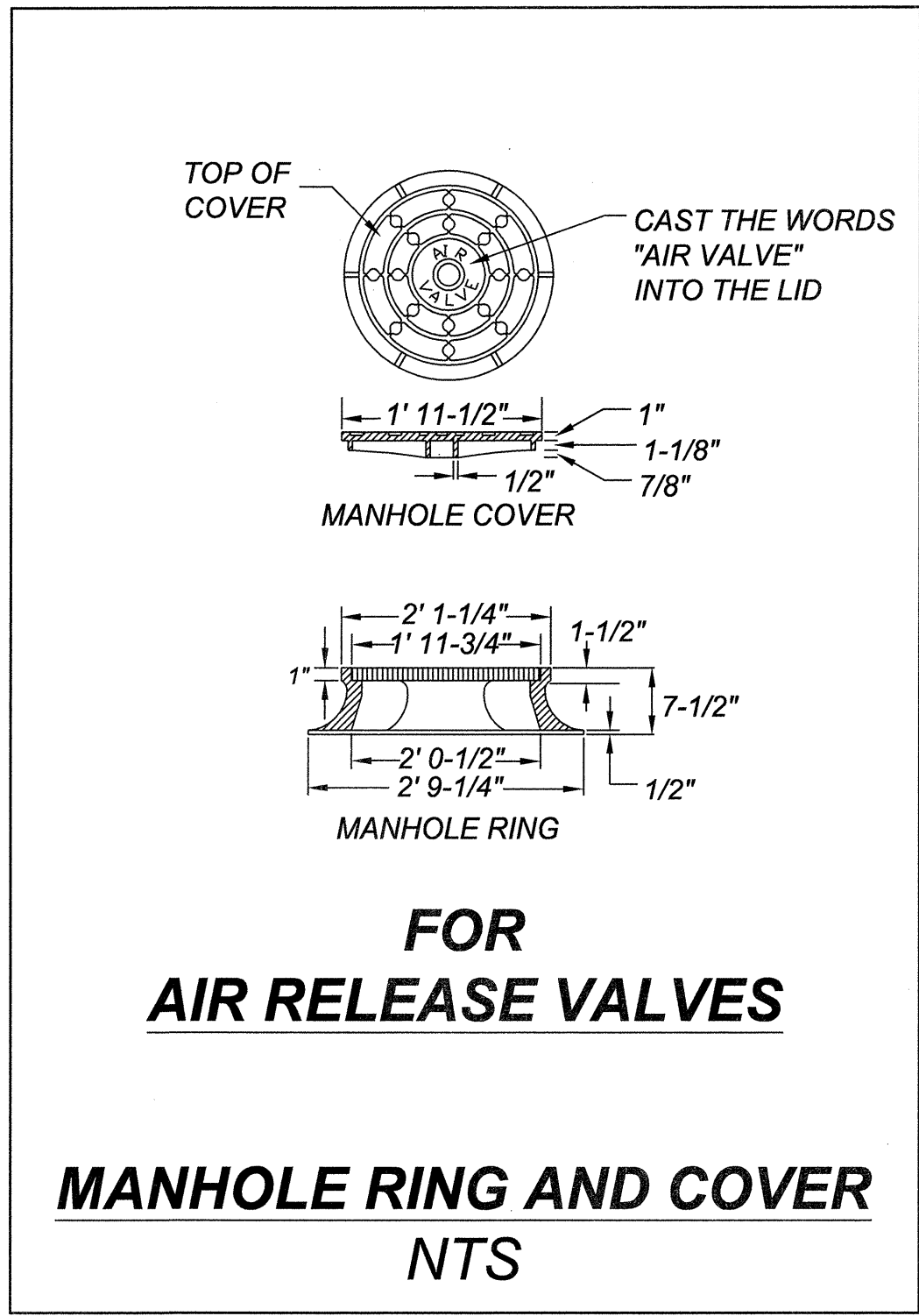
- C. CITY OF DURHAM**
 LINE 1: CITY OF DURHAM
 LINE 2: 101 CITY HALL PLAZA
 LINE 3: DURHAM, NC 27701
 LINE 4: 16" WATER MAIN (150 PSI)
 LINE 5: # - # BELOW GRADE
 LINE 6: (919) 560-4344
 LINE 7: (919) 560-4344
 LINE 8: (919) 560-4344

NOTE:
 1. LINE 5: CONTRACTOR SHALL NOTE THE AS-BUILT DEPTH (TO TOP OF CASING OR PIPE) AT THE SIGN LOCATION.

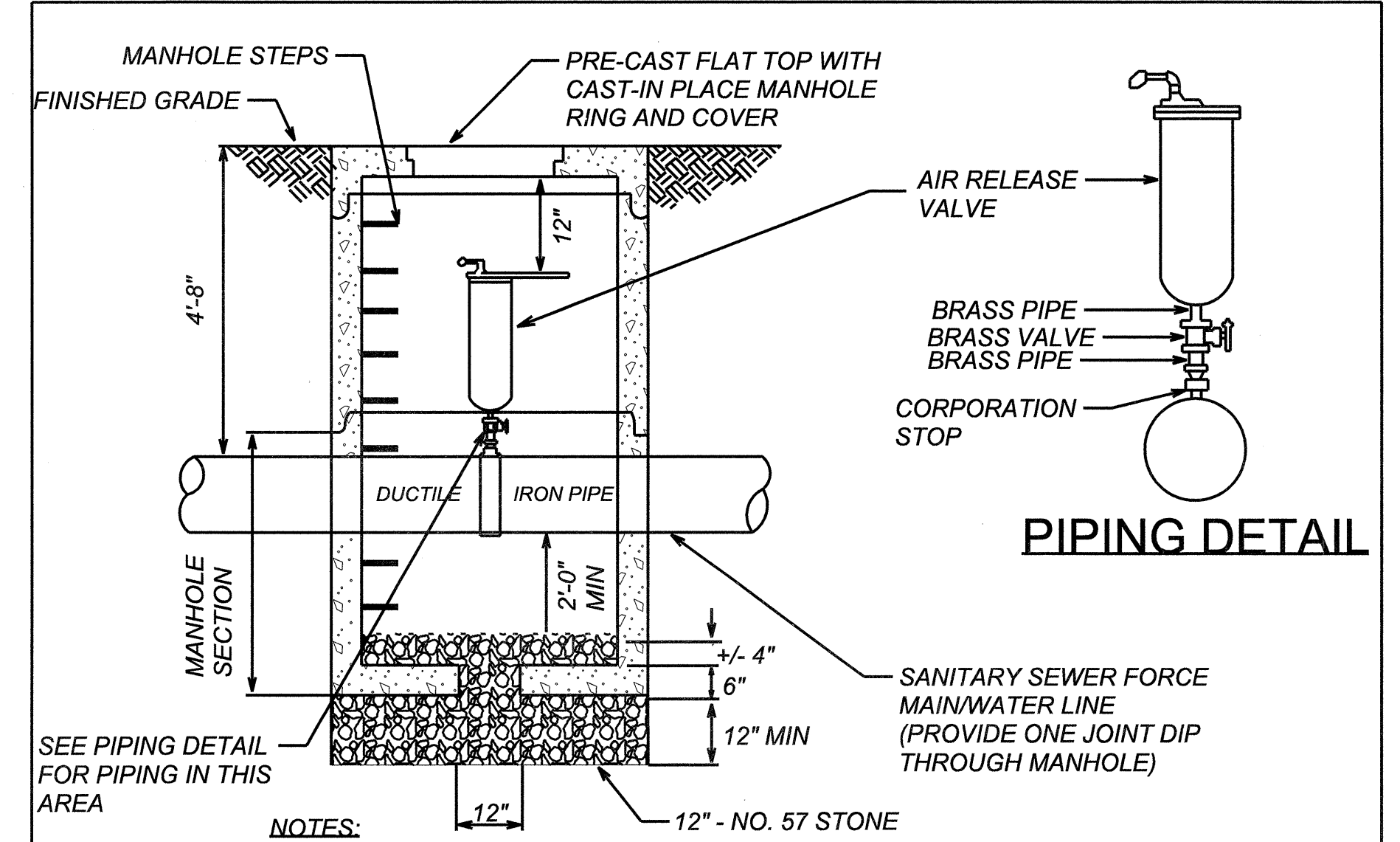
NOTES:

1. 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.
2. 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.
3. THE UTILITY OWNER MUST MAINTAIN ALL PIPE MARKER SIGNS LOCATED ON THE RR RIGHT-OF-WAY.

PIPE MARKER SIGN



FOR AIR RELEASE VALVES
MANHOLE RING AND COVER
 NTS



- NOTES:**
1. TAP PIPE AND ISOLATION VALVE TO BE SAME SIZE AS AIR RELEASE VALVE
 2. ALL PIPING AND FITTINGS IN THE MANHOLE, SHALL BE BRASS OR BRONZE UNLESS OTHERWISE NOTED.
 3. MANHOLE STEPS SHALL BE PLACED 16" O.C. WHEN DEPTH OF MANHOLE EXCEEDS 5 FEET.
 4. CENTER MANHOLE OPENING, FOR MANHOLE DEPTHS LESS THAN 5 FEET.

AIR RELEASE VALVE AND MANHOLE
 MS

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4716A/C	UO-1	4

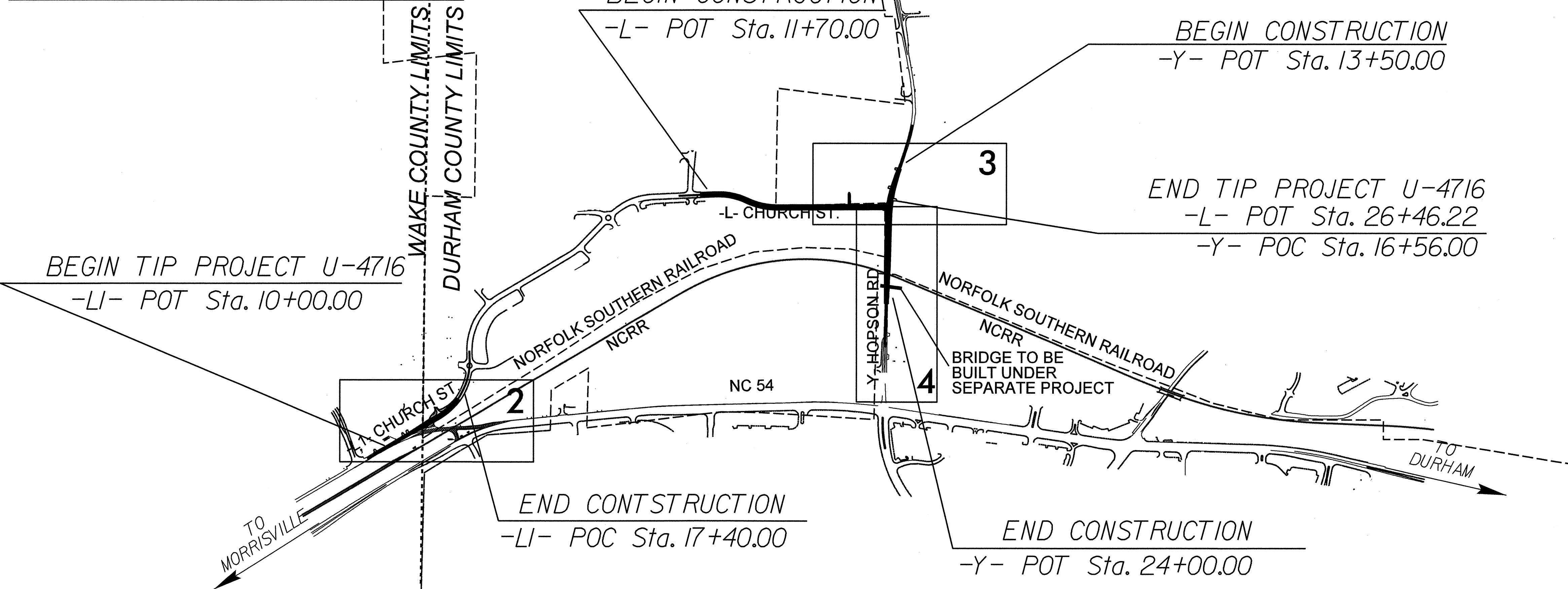
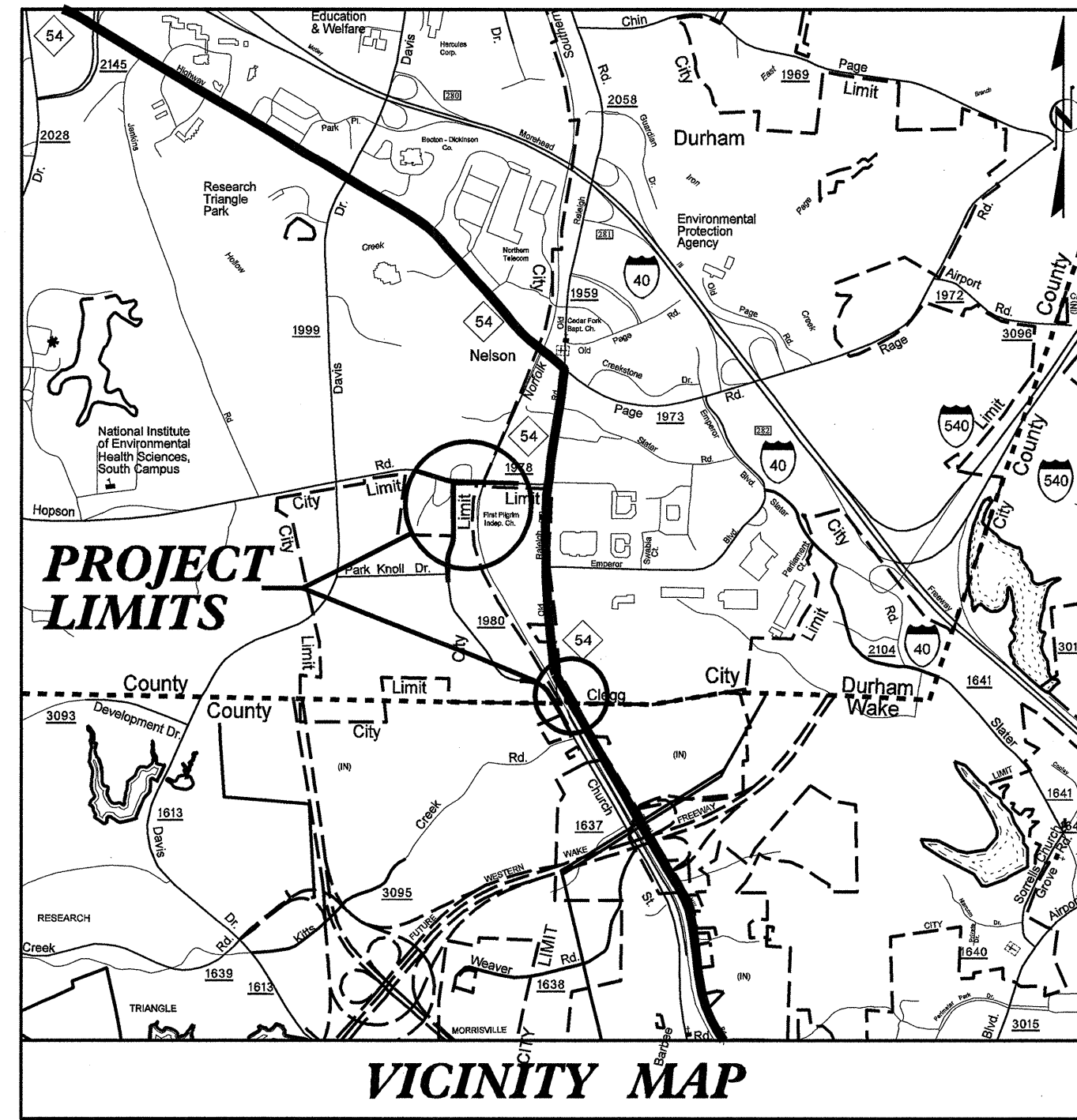
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE & DURHAM COUNTIES

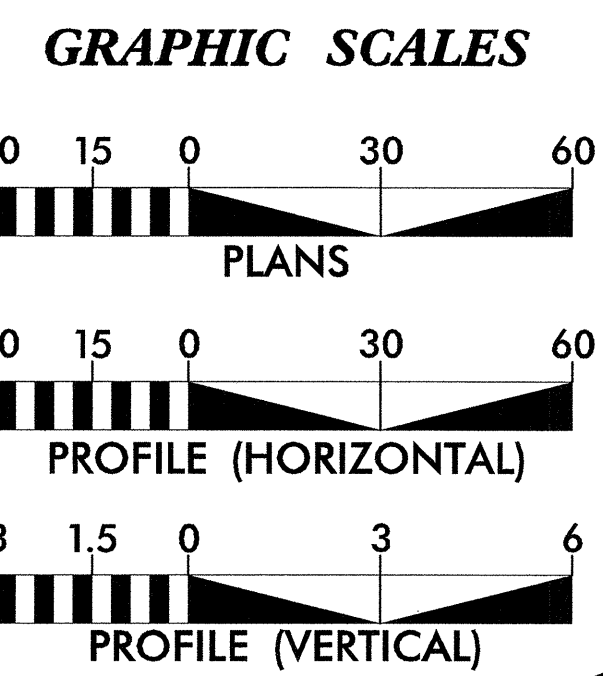
UTILITIES BY OTHERS PLANS

LOCATION: HOPSON RD. AND CHURCH ST. EXTENSION IN DURHAM

TYPE OF WORK: RELOCATION OF POWER, TELEPHONE, & CATV.



CONTRACT: WBS-40325.1.3 TIP PROJECT: U-4716A/C



INDEX OF SHEETS

SHEET NO.	DESCRIPTION
UO-1	TITLE SHEET
UO-2 TO UO-5	PLAN SHEETS

UTILITY OWNERS ON PROJECT

TELEPHONE:
 FIBERTECH NETWORKS - ROBERT ENRIGHT
 LEVEL 3 COMMUNICATIONS - DANIEL MILLER
 VERIZON BUSINESS - ERIC CRANE
 FRONTIER - MARCUS DICKINSON

CABLE TV:
 TIME WARNER CABLE - JOSEPH FAHEY

POWER:
 DUKE ENERGY - GARY VON CANNON

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

RAIL DIVISION

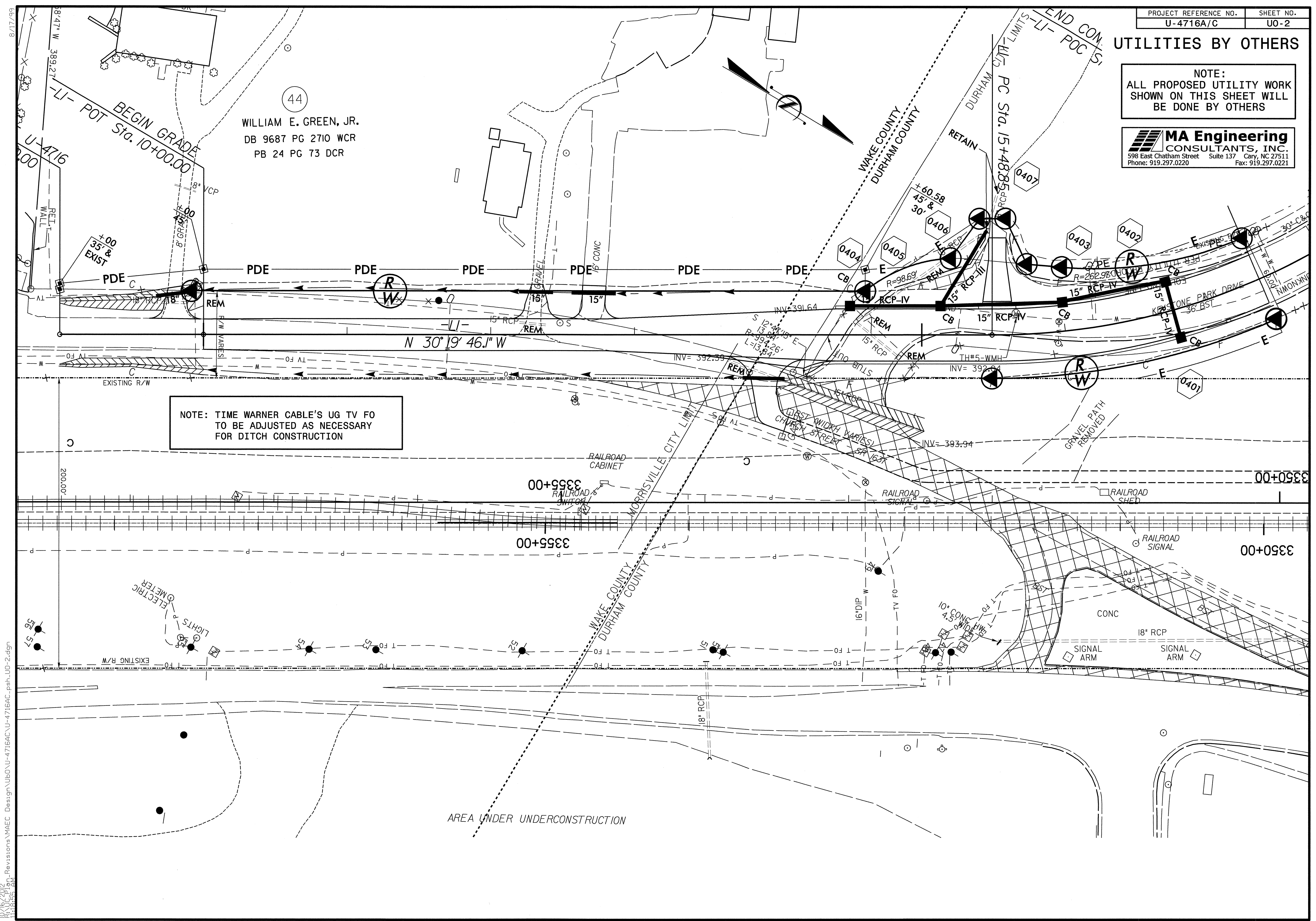
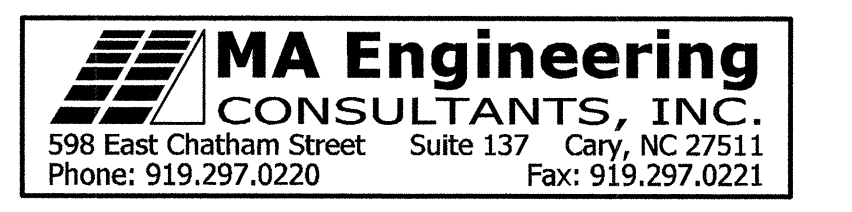
PREPARED BY:
MA Engineering CONSULTANTS, INC.
 598 East Chatham Street Suite 137 Cary, NC 27511
 Phone: 919.297.0220 Fax: 919.297.0221

Prepared for:
ENGINEERING & SAFETY BRANCH
 MAIL: 1556 MAIL SERVICE CENTER RALEIGH, NC 27603
 DELIVERY: 860 CAPITAL BOULEVARD RALEIGH, NC 27603
 PHONE: (919) 715-8803 FAX: (919) 715-8804

\$DATE\$ \$FILEL\$

UTILITIES BY OTHERS

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



NOTE: TIME WARNER CABLE'S UG TV FO TO BE ADJUSTED AS NECESSARY FOR DITCH CONSTRUCTION

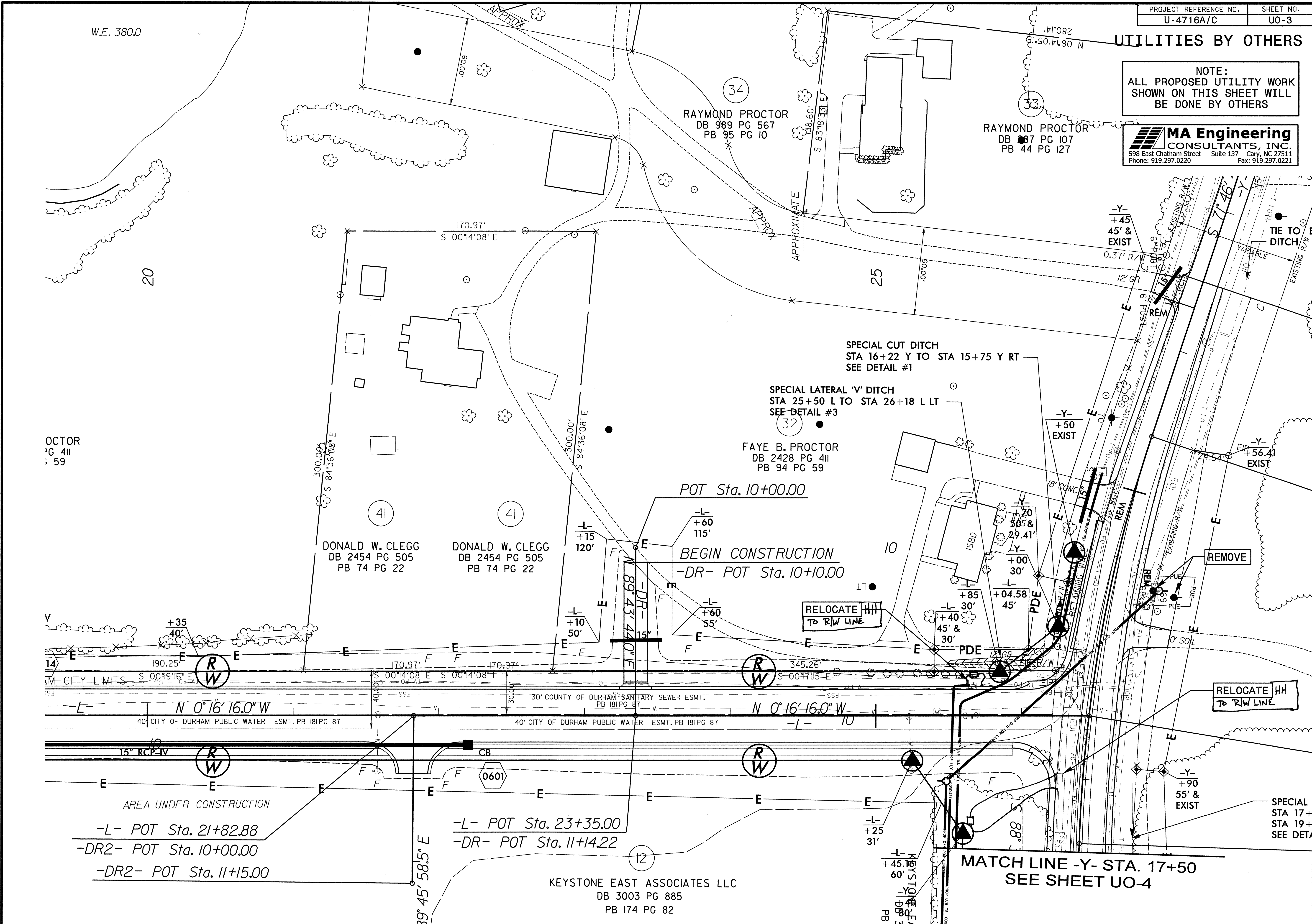
AREA UNDER UNDERCONSTRUCTION

8/17/09
 10/16/2012
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 10/16/2012
 10/16/2012

UTILITIES BY OTHERS

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

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



W.E. 380.0

RAYMOND PROCTOR
DB 989 PG 567
PB 95 PG 10

RAYMOND PROCTOR
DB 87 PG 107
PB 44 PG 127

OCTOR
PG 411
; 59

DONALD W. CLEGG
DB 2454 PG 505
PB 74 PG 22

DONALD W. CLEGG
DB 2454 PG 505
PB 74 PG 22

FAYE B. PROCTOR
DB 2428 PG 411
PB 94 PG 59

KEYSTONE EAST ASSOCIATES LLC
DB 3003 PG 885
PB 174 PG 82

CITY LIMITS

AREA UNDER CONSTRUCTION

-L- POT Sta. 21+82.88
-DR2- POT Sta. 10+00.00
-DR2- POT Sta. 11+15.00

-L- POT Sta. 23+35.00
-DR- POT Sta. 11+14.22

MATCH LINE -Y- STA. 17+50
SEE SHEET UO-4

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UTILITIES BY OTHERS

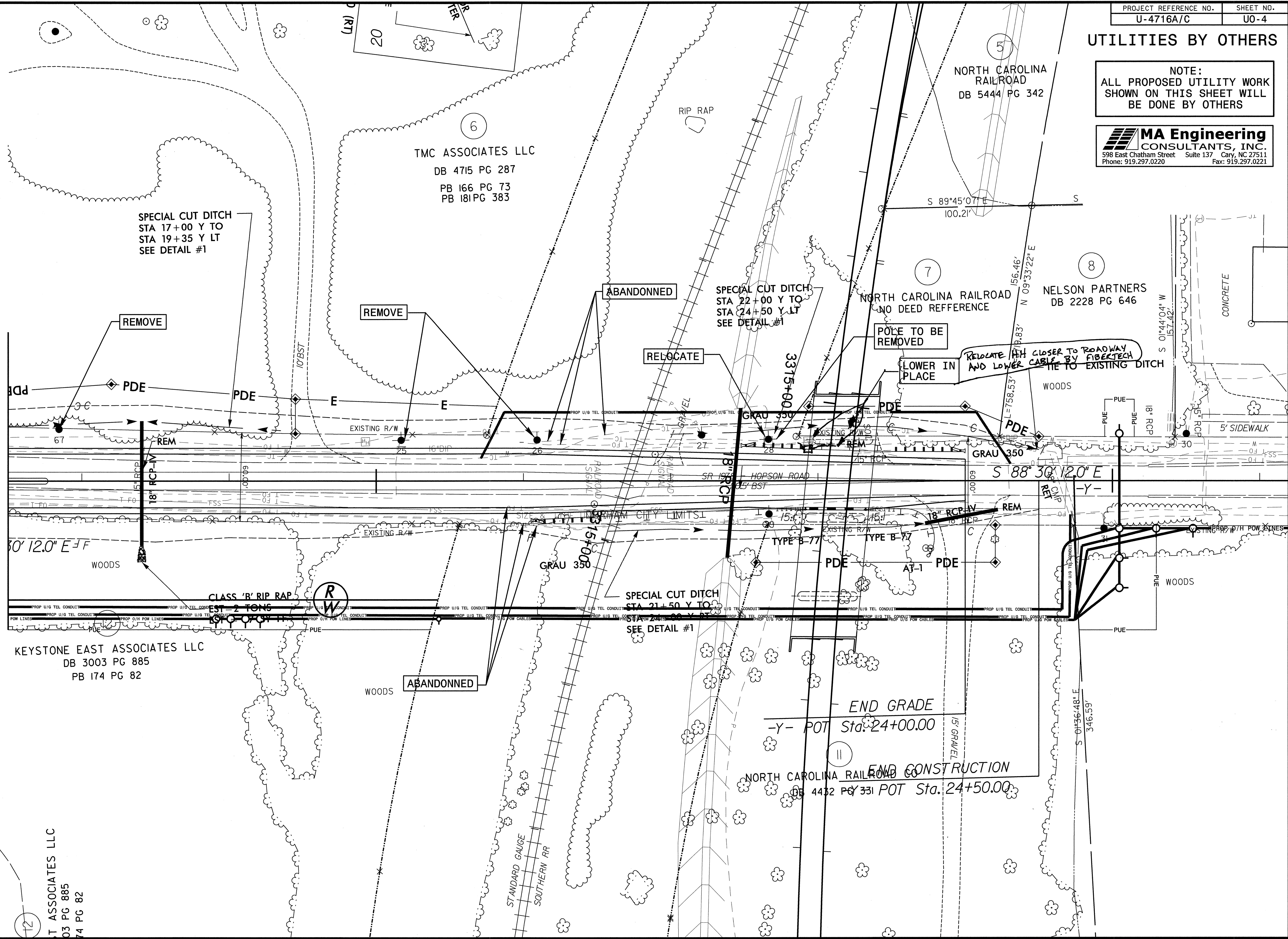
NOTE:
ALL PROPOSED UTILITY WORK
SHOWN ON THIS SHEET WILL
BE DONE BY OTHERS

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

8/17/99

MATCH LINE -Y- STA. 17+50
SEE SHEET UO-3

10/16/2012
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T ASSOCIATES LLC
03 PG 885
74 PG 82

KEYSTONE EAST ASSOCIATES LLC
DB 3003 PG 885
PB 174 PG 82

TMC ASSOCIATES LLC
DB 4715 PG 287
PB 166 PG 73
PB 181 PG 383

NORTH CAROLINA RAILROAD
DB 5444 PG 342

NELSON PARTNERS
DB 2228 PG 646

NORTH CAROLINA RAILROAD CO
DB 4432 PG 331 POT Sta. 24+50.00

SPECIAL CUT DITCH
STA 17+00 Y TO
STA 19+35 Y LT
SEE DETAIL #1

SPECIAL CUT DITCH
STA 22+00 Y TO
STA 24+50 Y LT
SEE DETAIL #1

SPECIAL CUT DITCH
STA 21+50 Y TO
STA 24+50 Y LT
SEE DETAIL #1

RELOCATE WITH CLOSER TO ROADWAY
AND LOWER CABLE BY FIBERTECH
TIE TO EXISTING DITCH

END GRADE
-Y- POT Sta. 24+00.00

END CONSTRUCTION
-Y- POT Sta. 24+50.00

REMOVE

REMOVE

ABANDONED

RELOCATE

POLE TO BE REMOVED

LOWER IN PLACE

ABANDONED

CLASS 'B' RIP RAP
EST. 2 TONS
15' x 10' x 4'

PDE

REM

PDE

EXISTING R/W

E

E

GRAU 350

TYPE B-77

PDE

TYPE B-77

PDE

REM

PUE

PUE

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