

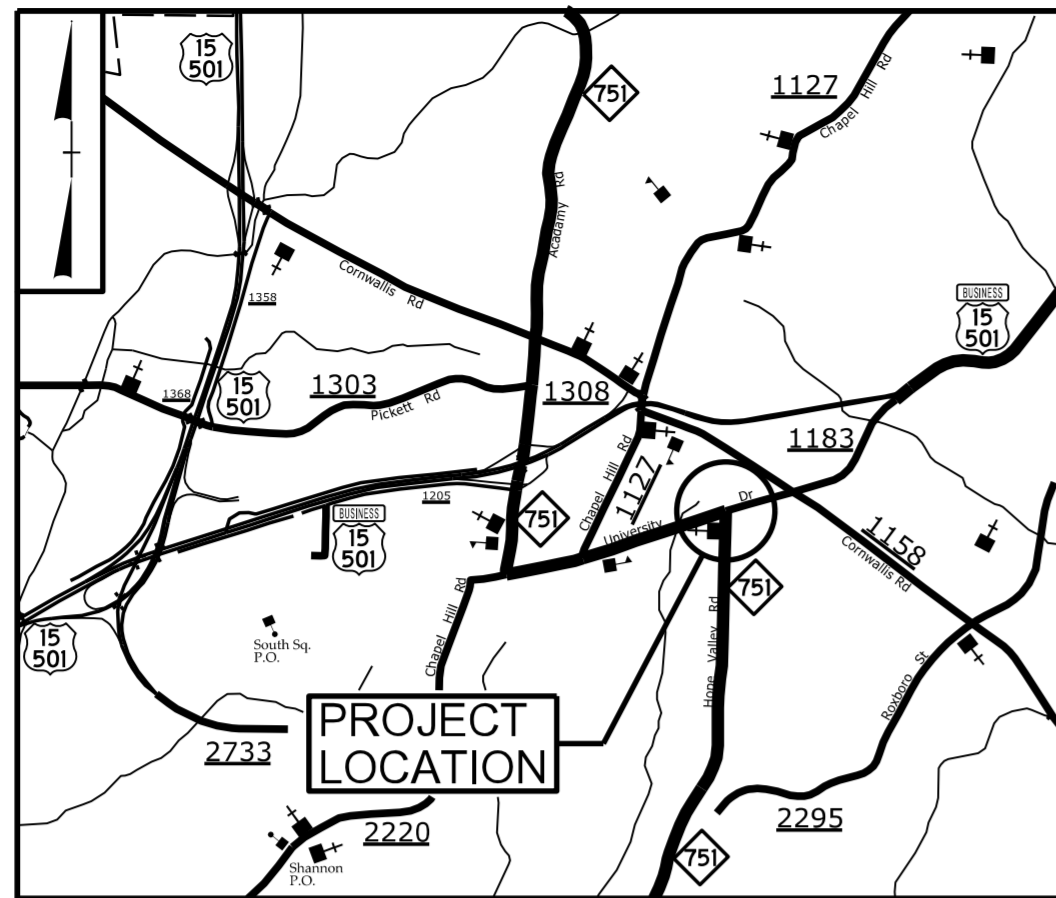
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09/08/99

TIP PROJECT: U-5745



VICINITY MAP

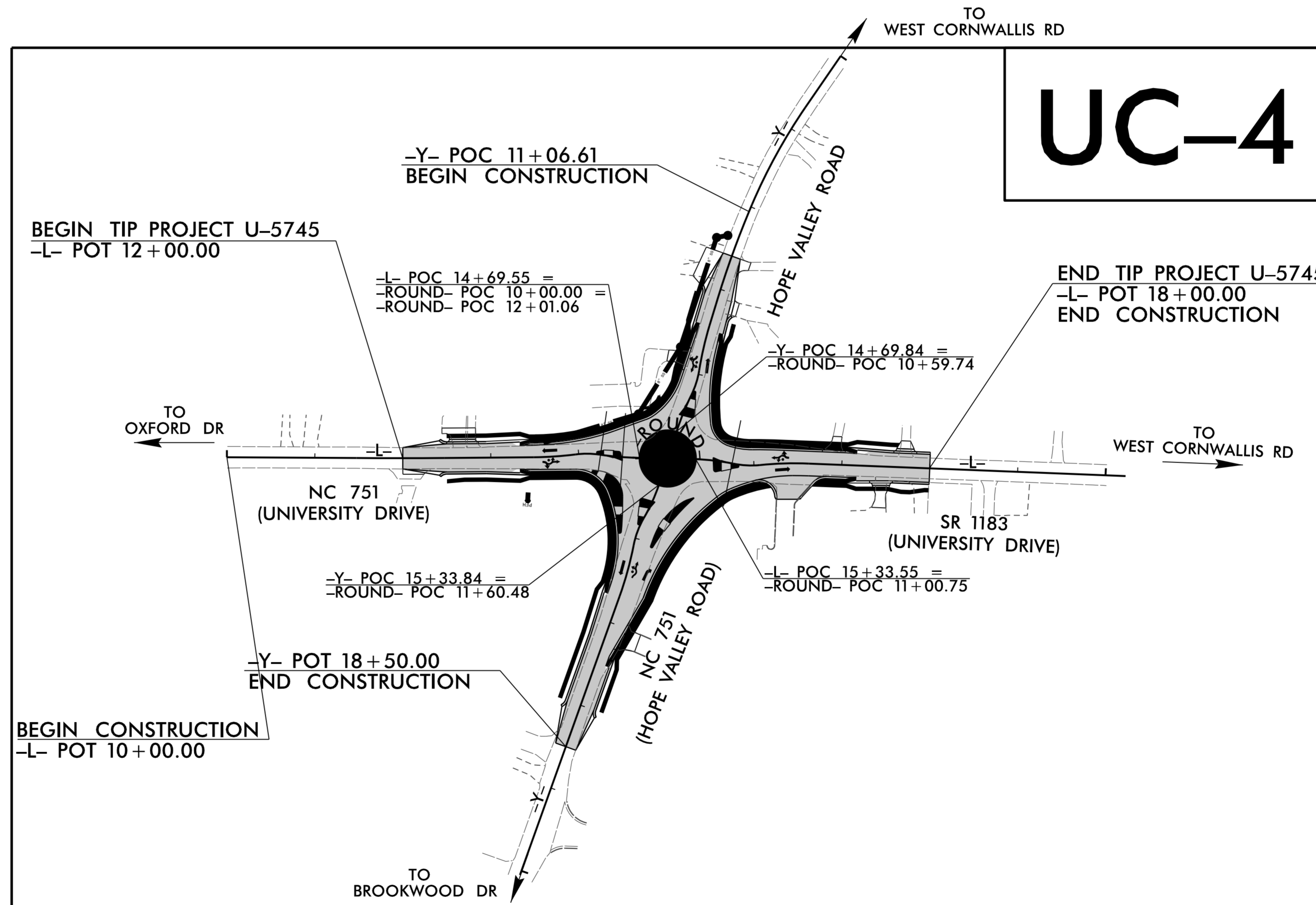
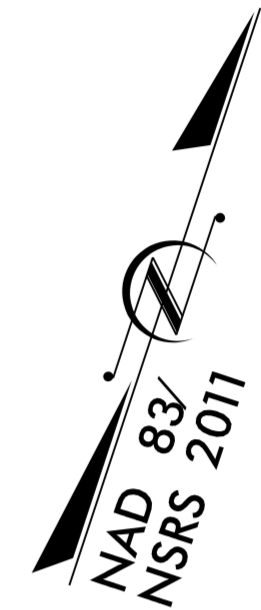
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UTILITIES CONSTRUCTION PLANS
DURHAM COUNTY

LOCATION: ROUNDABOUT AT NC 751 (HOPE VALLEY ROAD) AND
SR 1183 (UNIVERSITY DRIVE) IN DURHAM

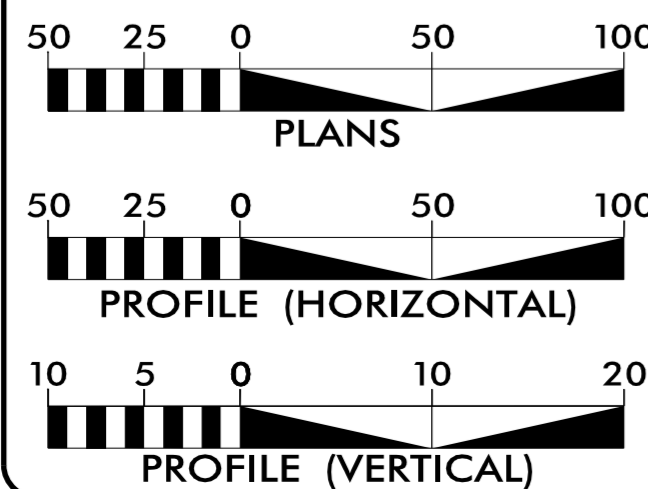
TYPE OF WORK: WATER & SEWER RELOCATION

| | |
|------------|-----------|
| T.I.P. NO. | SHEET NO. |
| U-5745 | UC-1 |



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UNTIL ALL SIGNATURES ARE COMPLETED

GRAPHIC SCALES



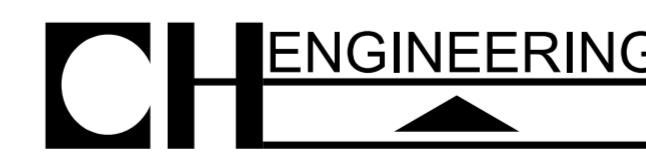
INDEX OF SHEETS

| SHEET NO.: | DESCRIPTION: |
|------------|------------------|
| UC-1 | TITLE SHEET |
| UC-2 | SYMBOLOLOGY |
| UC-3 | WATER DETAILS |
| UC-3A | SEWER DETAILS |
| UC-4 | WATER PLAN SHEET |
| UC-4A | SEWER PLAN SHEET |
| UC-5 | PROFILE SHEET |

WATER AND SEWER
OWNER ON PROJECT

(A) WATER: CITY OF DURHAM
(B) SANITARY SEWER: CITY OF DURHAM

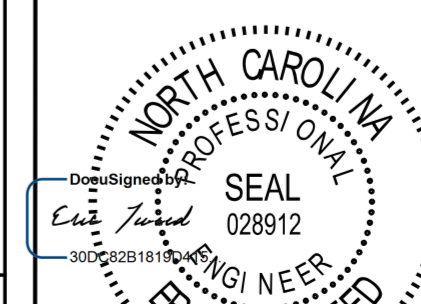
PREPARED IN THE OFFICE OF



3220 GLEN ROYAL RD. RALEIGH, NC 27617
TELE 919.788.0224 FAX 919.788.0232
NC LICENSE #P-0189

ERIC TWEED, PE DESIGN ENGINEER
 MARY JO LEE, PE PROJECT ENGINEER
 BRIAN WILES, PE PROJECT MANAGER

SEAL



12/14/2018



DIVISION OF HIGHWAYS
DIVISION 5

2612 N. DUKE STREET
DURHAM, NC 27704

S. REID DAVIDSON, PE DDC ENGINEER
 DON PROPER DIVISION UTILITY ENGINEER
 MONROE BROWN DIVISION UTILITY COORDINATOR

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UTILITIES PLAN SHEET SYMBOLS

PROPOSED WATER SYMBOLS

| | |
|---------------------------------|--------|
| Water Line (Sized as Shown) | |
| 11¼ Degree Bend | |
| 22½ Degree Bend | |
| 45 Degree Bend | |
| 90 Degree Bend | |
| Plug | |
| Tee | |
| Cross | |
| Reducer | |
| Gate Valve | |
| Butterfly Valve | |
| Tapping Valve | |
| Line Stop | |
| Line Stop with Bypass | |
| Blow Off | |
| Fire Hydrant | |
| Relocate Fire Hydrant | |
| Remove Fire Hydrant | REM FH |
| Water Meter | |
| Relocate Water Meter | |
| Remove Water Meter | REM WM |
| Water Pump Station | |
| RPZ Backflow Preventer | |
| DCV Backflow Preventer | |
| Relocate RPZ Backflow Preventer | |
| Relocate DCV Backflow Preventer | |

PROPOSED SEWER SYMBOLS

| | |
|--|--|
| Gravity Sewer Line (Sized as Shown) | |
| Force Main Sewer Line (Sized as Shown) | |
| Manhole (Sized per Note) | |
| Sewer Pump Station | |

PROPOSED MISCELLANEOUS UTILITIES SYMBOLS

| | |
|--|--|
| Power Pole | |
| Telephone Pole | |
| Joint Use Pole | |
| Telephone Pedestal | |
| Utility Line by Others (Type as Shown) | |
| Trenchless Installation | |
| Encasement by Open Cut | |
| Encasement | |

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

EXISTING UTILITIES SYMBOLS

| | | | |
|--|--------|---|--------------------|
| Power Pole | | *Underground Power Line | |
| Telephone Pole | | *Underground Telephone Cable | |
| Joint Use Pole | | *Underground Telephone Conduit | |
| Utility Pole | | *Underground Fiber Optics Telephone Cable | |
| Utility Pole with Base | | *Underground TV Cable | |
| H-Frame Pole | | *Underground Fiber Optics TV Cable | |
| Power Transmission Line Tower | | *Underground Gas Pipeline | |
| Water Manhole | | Aboveground Gas Pipeline | A/G Gas |
| Power Manhole | | *Underground Water Line | |
| Telephone Manhole | | Aboveground Water Line | A/G Water |
| Sanitary Sewer Manhole | | *Underground Gravity Sanitary Sewer Line | ss |
| Hand Hole for Cable | | Aboveground Gravity Sanitary Sewer Line | A/G Sanitary Sewer |
| 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. | | |
| Temporary Construction Easement | E | | |
| Permanent Utility Easement | PUE | | |

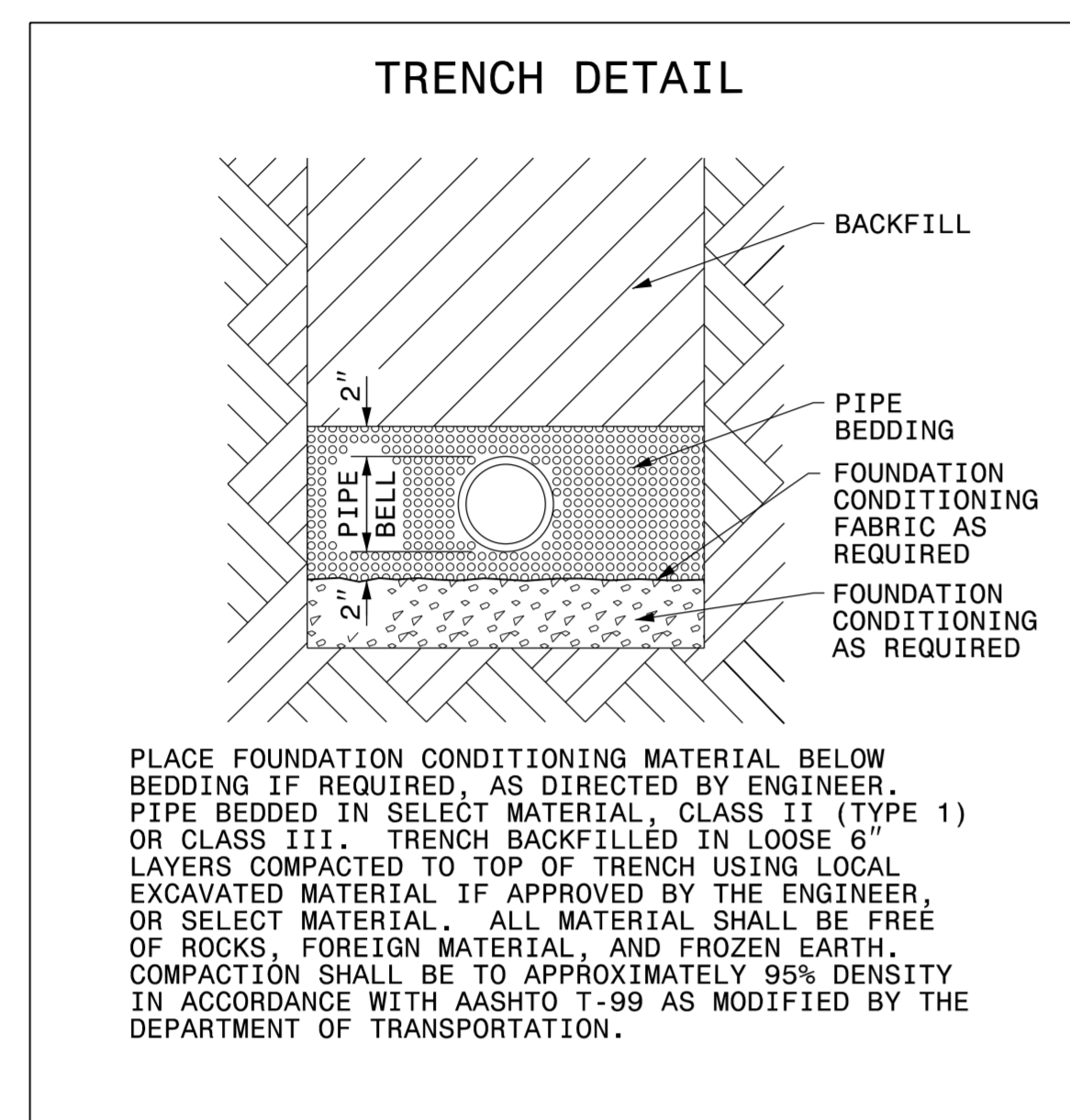
*For Existing Utilities
 Utility Line Drawn from Record (Type as Shown)
 Designated Utility Line (Type as Shown)

5/14/99
12/21/2017
U:\Projects\UC\Projects\UC02\UC02.psh.dgn
REV: 2/1/2012

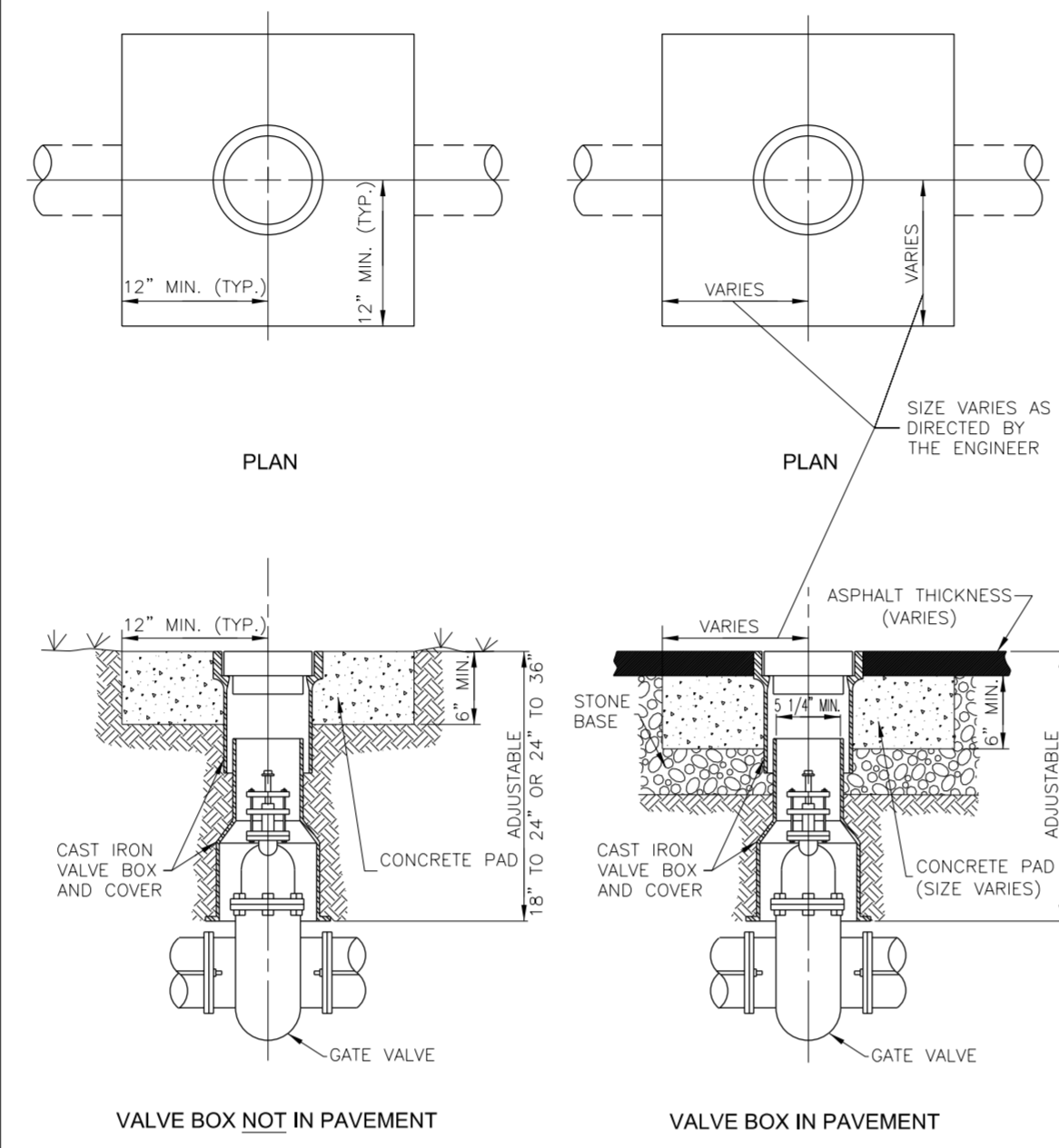
PROJECT TYPICAL DETAILS

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UTILITY CONSTRUCTION

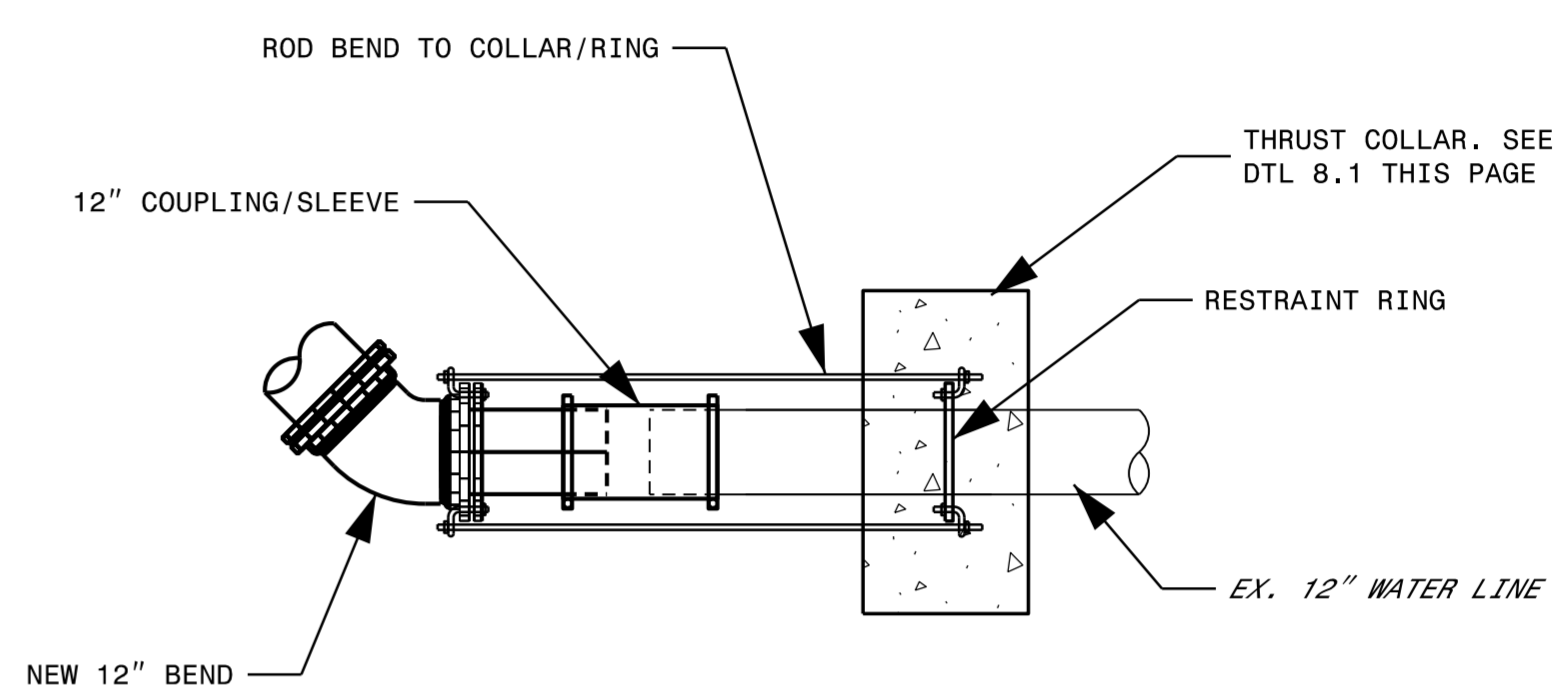


PLACE FOUNDATION CONDITIONING MATERIAL BELOW BEDDING IF REQUIRED AS DIRECTED BY ENGINEER. PIPE BEDDED IN SELECT MATERIAL, CLASS II (TYPE 1) OR CLASS III. TRENCH BACKFILLED IN LOOSE 6\"/>



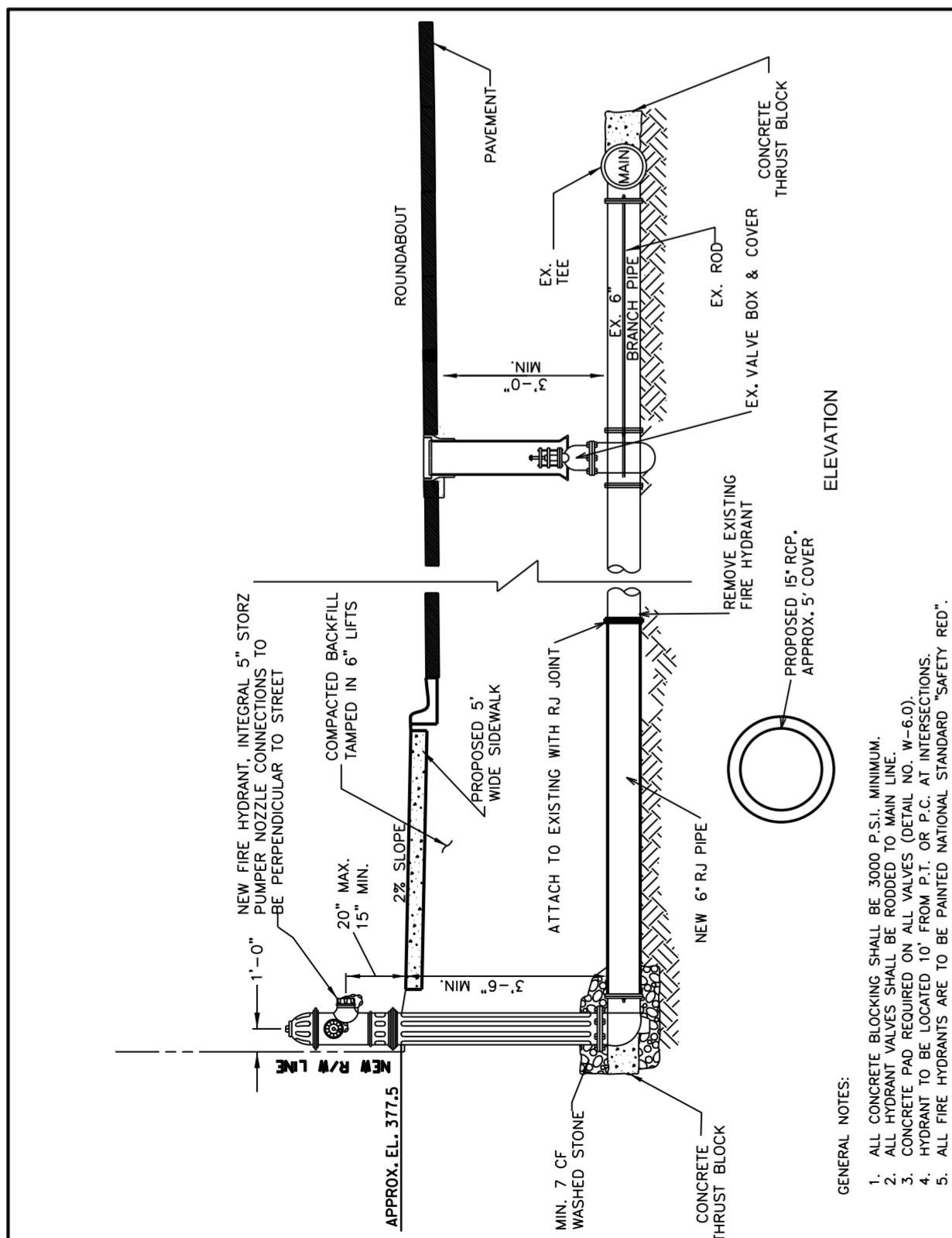
PROVIDE HDPE INSERTS IN ALL VALVE BOXES BASED ON SPECIFICATIONS DESCRIBED IN DETAIL P-6.0

| | | |
|--|--|---------------------|
| | WATER VALVE BOX INSTALLATION FOR 4", 6", 8", AND 12" GATE VALVES | SCALE: NTS |
| | REVISION DATE: 09/24/2010 | DETAIL NO. W-6.0 |

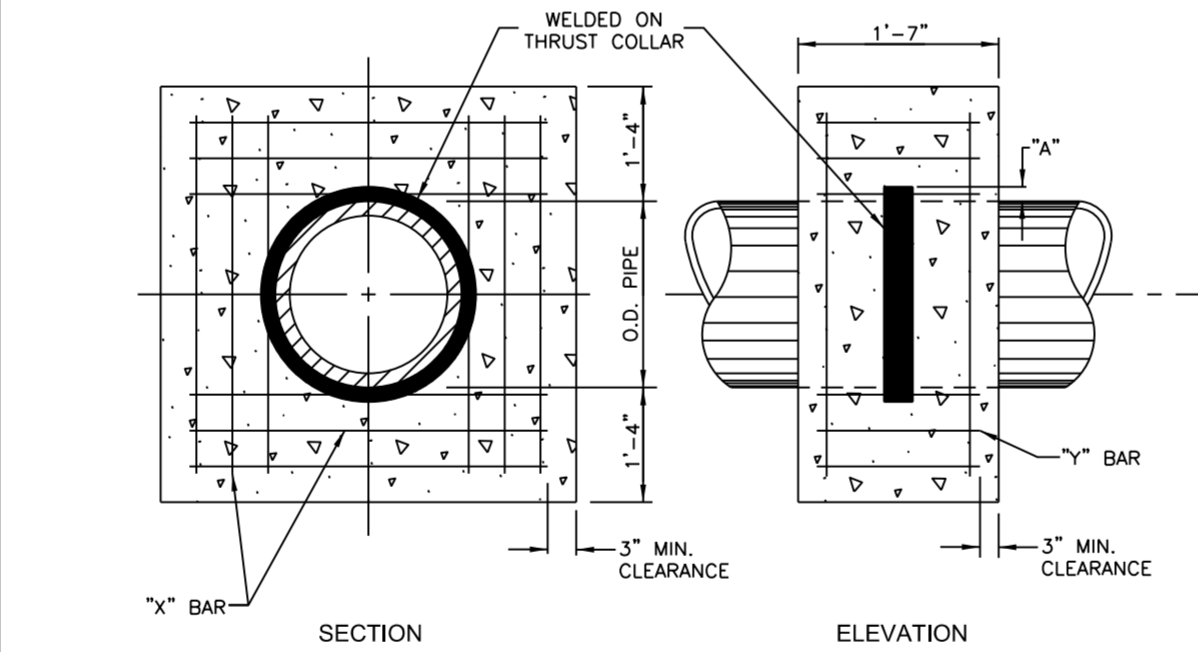


COORDINATE WITH CITY TO TURN OFF VALVES. GIVE 1 WEEK OF NOTICE TO CITY PRIOR TO TIE-IN TO ALLOW FOR COORDINATION.
 CONCRETE THRUST COLLAR SHALL HAVE 24 HRS TO SET UP BEFORE CUTTING THE EXISTING LINE FOR THE TIE-IN.

TYPICAL TIE-IN DETAIL ON 12" WL
NO SCALE



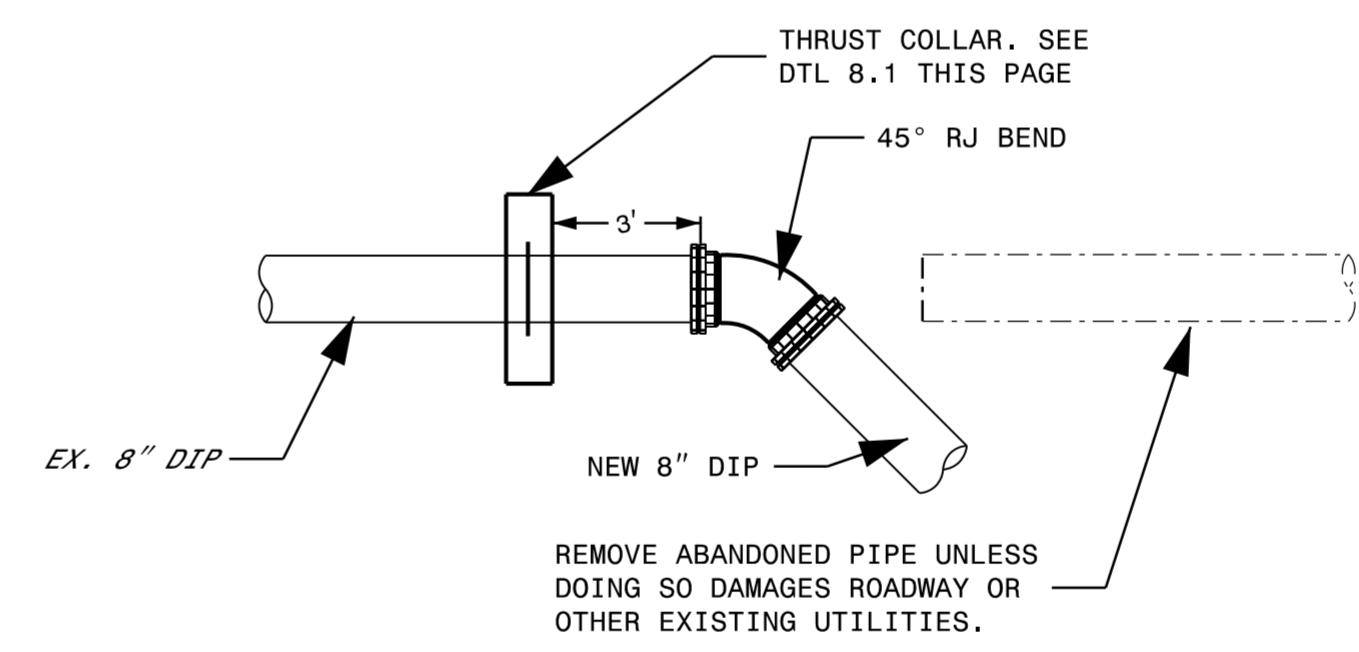
| | |
|--|---------------|
| FIRE HYDRANT INSTALLATION AT ROUNDABOUT | SCALE: NTS |
|--|---------------|



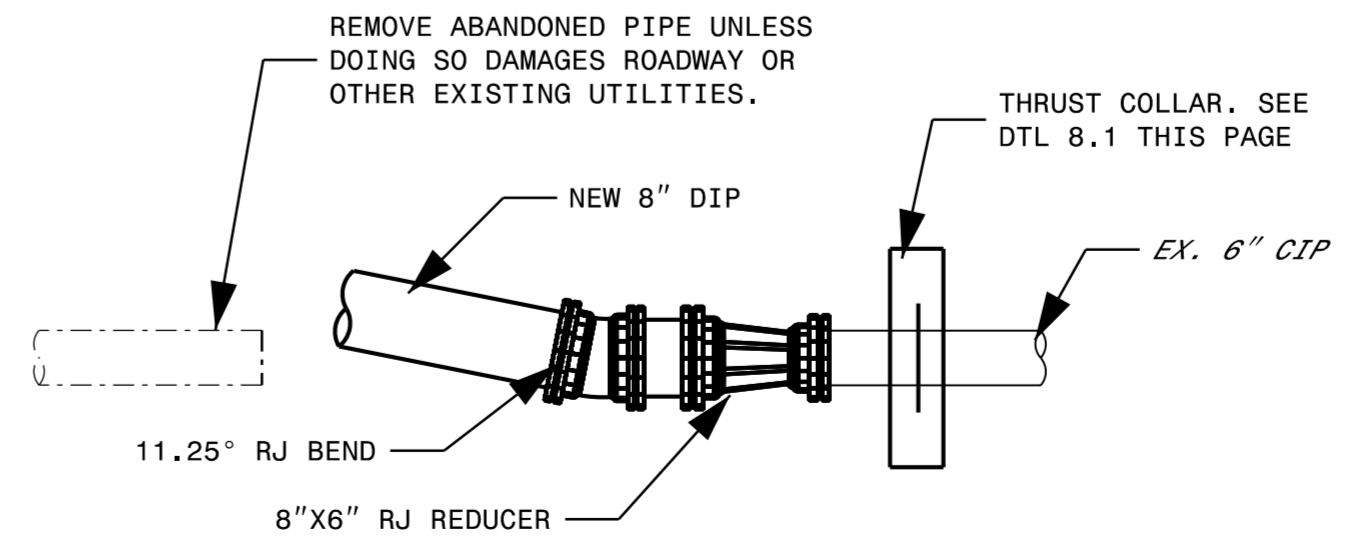
| WELDED ON THRUST COLLAR | THRUST COLLAR REINFORCING | | |
|-------------------------|---------------------------|-------------------|---------|
| | I.D. PIPE | "X" BAR | "Y" BAR |
| 6"-16" | 2" | 2'-2" + O.D. PIPE | 1'-1" |
| 20"-24" | 3" | #5 | #5 |
| 30"-36" | 4" | 24 | 12 |

- NOTES:
1. CONCRETE SHALL BE 3000 P.S.I.
 2. REINFORCING BARS SHALL BE DEFORMED, AND TIED TOGETHER.
 3. BACKFILL TAMPED IN 6" LAYERS
 4. TRENCH BOTTOM WIDTH IN VICINITY OF THRUST BLOCK(S) INSTALLATION SHALL BE THE MINIMUM WIDTH AS DESCRIBED BY THE ENGINEER.

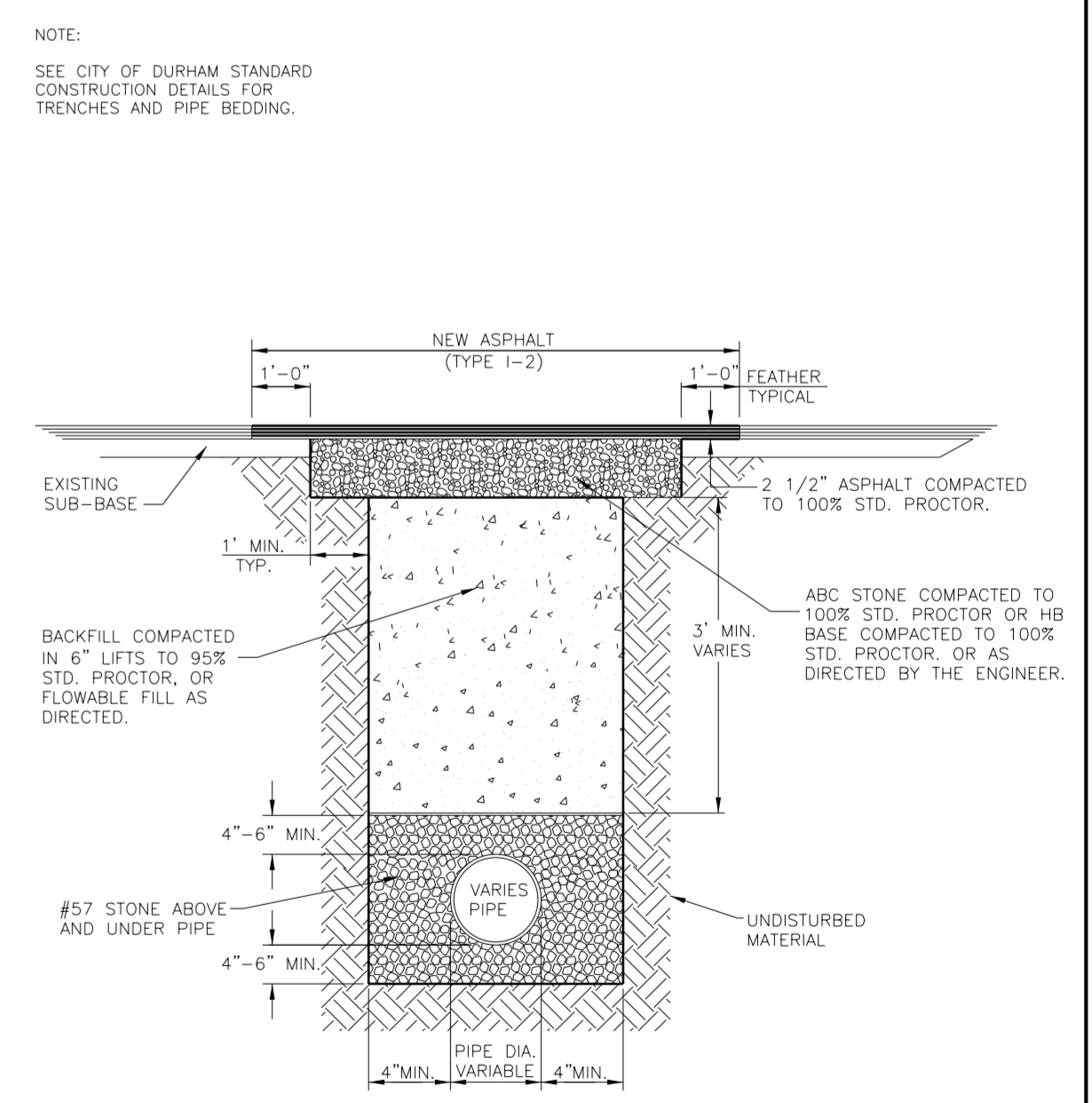
| | | |
|--|------------------------------|---------------------|
| | CONCRETE THRUST BLOCK | SCALE: NTS |
| | REVISION DATE: 12/07/2009 | DETAIL NO. W-8.1 |



TIE-IN DETAIL STA 40+50
NO SCALE



TIE-IN DETAIL STA 62+77
NO SCALE



FLOWABLE FILL TRENCH-CUT STREET, WATER, SEWER AND STORMWATER

| | | |
|--|--------------------------------|----------------------|
| | TRENCH CUT INSTALLATION | SCALE: NTS |
| | REVISION DATE: 12/07/2009 | DETAIL NO. SS-8.0 |

5/14/19

SEWER DETAILS

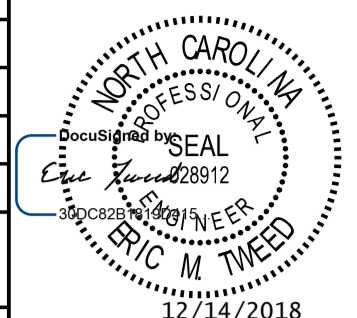
CH ENGINEERING
 3220 GLEN ROYAL RD. RALEIGH, NC 27617
 TELE 919.788.0224 FAX 919.788.0232
 NC LICENSE #P-0189

PROJECT REFERENCE NO. **U-5745** SHEET NO. **UC-3A**

DESIGNED BY: _____
 DRAWN BY: _____
 CHECKED BY: _____
 APPROVED BY: _____
 REVISED: _____

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151

UTILITY CONSTRUCTION PLANS ONLY



**DOCUMENT NOT CONSIDERED FINAL
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UTILITY CONSTRUCTION

- NOTES:**
- All precast concrete manholes shall conform to the latest revision of ASTM C478.
 - Concrete shall be 4000 psi at 28 days minimum.
 - Steel reinforcement shall be grade 60 billet steel conforming to the latest revision of ASTM A185 for wall reinforcement, and the latest revision of ASTM A615 for the base reinforcement.
 - Standard joints shall be sealed with putty type plastic cement per Fed. Spec SS C153 or an O-ring type joint conforming to the latest revision of ASTM C443.
 - Manhole inlets and outlets shall be cast in place flexible rubber sleeve and boots with stainless steel expanding rings per the latest revision of ASTM C923.
 - Inverts to be constructed of precast concrete or brick with a concrete bench (Detail 732.02)
 - All services entering manhole shall tie into the manhole at the bench.
 - Pipes entering MH will be grouted inside and out.
 - See detail 732.01 for typical invert shaping.
 - Lubricate the following: Pipe exterior, boot interior, boot exterior. s.s. bands (Top and bottom).

Details Provided by APPIAN Consulting Engineers - www.appianengineers.com

NOTES:

- Foundation stone shall be required when soil conditions are unsuitable.
- An additional 1 inch depth of bedding material will be required for each additional 2 feet of trench depth in excess of 16 feet up to a maximum of 12 inches.
- See specifications 31 23 17 section 3.12 bedding requirements as bedding depth relates to pipe material.
- See Detail C01.01 where trench rock is encountered for required clearances. Increase depth at bottom relates to bury. (Note 2 above)

City of Durham, NC
 Dept. of Water Management
 1600 Mist Lake Dr.
 Durham, N.C. 27704
 Voice (919) 560-4381
 www.durhamnc.gov

SANITARY SEWER LINE TRENCH (TRAFFIC AND NON-TRAFFIC AREAS)
 SCALE: Not To Scale
 DETAIL # 732.01
 REVISION DATE: Feb. 2017
 SHEET # 1 of 1

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City of Durham, NC
 Dept. of Water Management
 1600 Mist Lake Dr.
 Durham, N.C. 27704
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TYPICAL SEWER INVERT SCHEMATIC FOR MANHOLES
 SCALE: Not To Scale
 DETAIL # 732.01
 REVISION DATE: Feb. 2017
 SHEET # 1 of 2

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STANDARD ECCENTRIC CONE PRECAST MANHOLE DETAIL
 SCALE: Not To Scale
 DETAIL # 732.02
 REVISION DATE: Feb. 2017
 SHEET # 1 of 2

Details Provided by APPIAN Consulting Engineers - www.appianengineers.com

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DOGHOUSE MANHOLE INSTALLATION OVER EXISTING SEWER MAIN
 SCALE: Not To Scale
 DETAIL # 732.05
 REVISION DATE: Feb. 2017
 SHEET # 1 of 2

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EXTERNAL JOINT WRAP DETAIL
 SCALE: Not To Scale
 DETAIL # 732.11
 REVISION DATE: Feb. 2017
 SHEET # 1 of 1

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TRACER WIRE and MARKER POST PLACEMENT at MANHOLES
 SCALE: Not To Scale
 DETAIL # 732.12
 REVISION DATE: Feb. 2017
 SHEET # 1 of 2

Details Provided by APPIAN Consulting Engineers - www.appianengineers.com

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TRACER WIRE PLACEMENT WHEN BURY (TO TOP OF PIPE) EXCEEDS 8 FEET
 SCALE: Not To Scale
 DETAIL # 732.13
 REVISION DATE: Feb. 2017
 SHEET # 1 of 2

Details Provided by APPIAN Consulting Engineers - www.appianengineers.com

City of Durham, NC
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STANDARD SEWER MAIN LATERAL STUB OUT
 SCALE: Not To Scale
 DETAIL # 733.01
 REVISION DATE: Feb. 2017
 SHEET # 1 of 2

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5/14/19

CONTRACTOR TO COORDINATE WITH THE OWNER FOR TURNING OF VALVES. PROVIDE SEVEN DAYS NOTICE TO OWNER BEFORE PERFORMING TIE-IN WORK. OWNER MAY REQUIRE OFF-HOURS WORK TO PERFORM TIE-INS.

THRUST COLLARS SHALL HAVE 24 HRS TO SET UP PRIOR TO TIE-IN WORK.

CITY REQUIRES CONCRETE THRUST BLOCKING ON ALL BENDS INCLUDING RJ. CONTRACTOR SHALL ACCOUNT FOR BLOCKING COST IN BID.

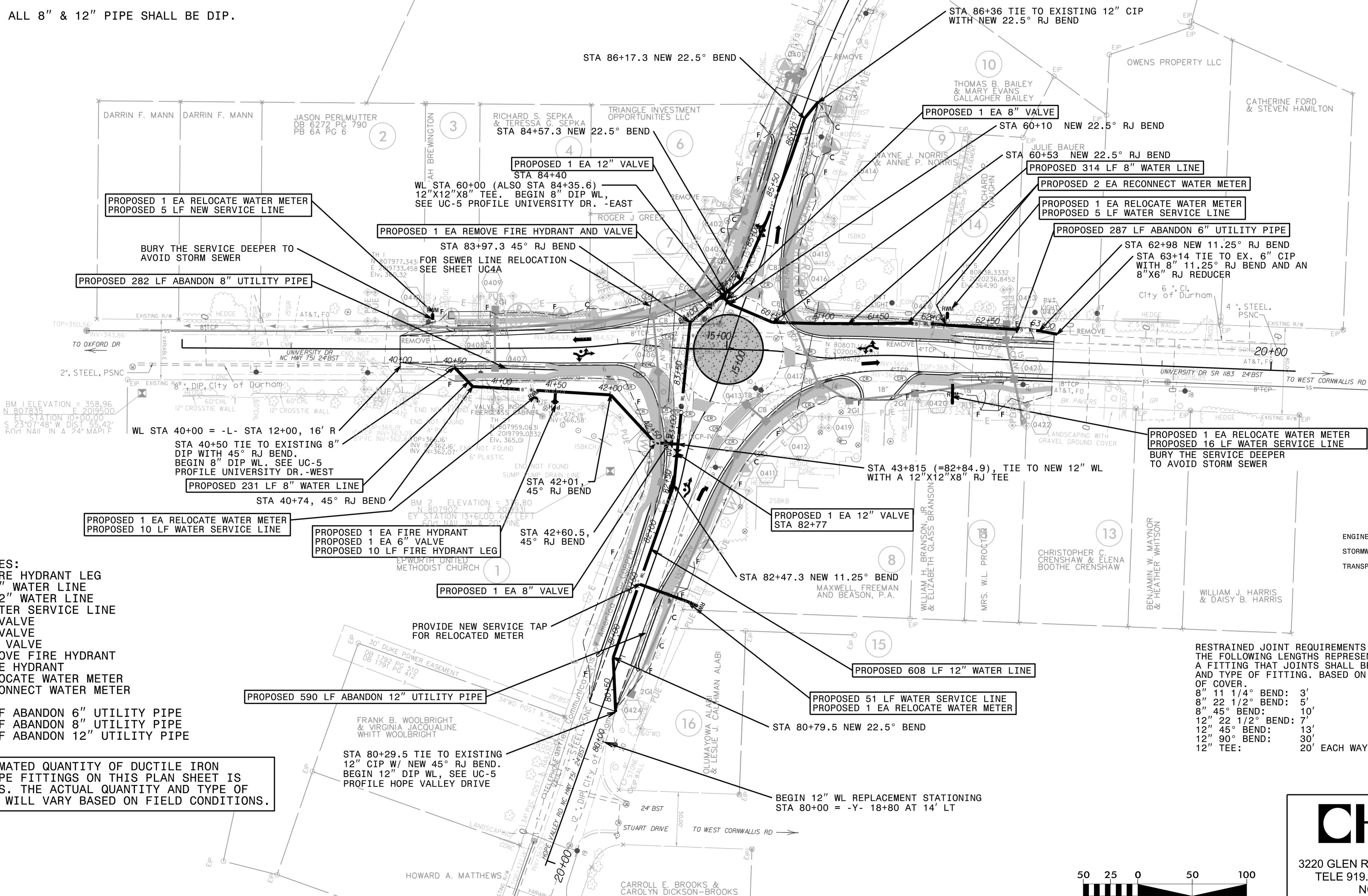
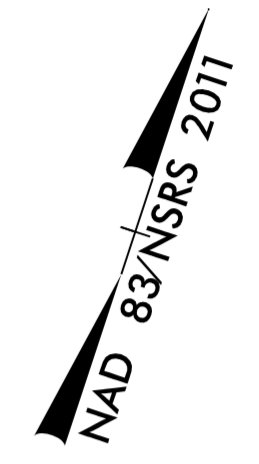
UTILITIES SHOWN ON PLANS MAY NOT FULLY ENCOMPASS ALL UTILITIES THAT ARE ON SITE. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING UTILITIES PRIOR TO CONSTRUCTION.

ALL 8" & 12" PIPE SHALL BE DIP.

CH ENGINEERING
 3220 GLEN ROYAL RD. RALEIGH, NC 27617
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 NC LICENSE #P-0189

| | | | |
|--|--------|---------------------------------|------|
| PROJECT REFERENCE NO. | U-5745 | SHEET NO. | UC-4 |
| DESIGNED BY: | EMT | | |
| DRAWN BY: | EMT | | |
| CHECKED BY: | | | |
| APPROVED BY: | | | |
| REVISED: | | | |
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| UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151 | | | |

UTILITY CONSTRUCTION-WATER
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- QUANTITIES:**
- 10 LF FIRE HYDRANT LEG
 - 545 LF 8" WATER LINE
 - 608 LF 12" WATER LINE
 - 87 LF WATER SERVICE LINE
 - 1 EA 6" VALVE
 - 2 EA 8" VALVE
 - 2 EA 12" VALVE
 - 1 EA REMOVE FIRE HYDRANT
 - 1 EA FIRE HYDRANT
 - 5 EA RELOCATE WATER METER
 - 1 EA RECONNECT WATER METER

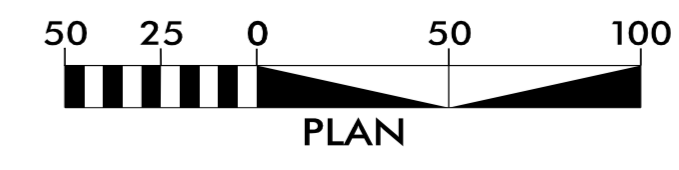
- 287 LF OF ABANDON 6" UTILITY PIPE
- 282 LF OF ABANDON 8" UTILITY PIPE
- 590 LF OF ABANDON 12" UTILITY PIPE

THE ESTIMATED QUANTITY OF DUCTILE IRON WATER PIPE FITTINGS ON THIS PLAN SHEET IS 3,805 LBS. THE ACTUAL QUANTITY AND TYPE OF FITTINGS WILL VARY BASED ON FIELD CONDITIONS.

RESTRAINED JOINT REQUIREMENTS:
 THE FOLLOWING LENGTHS REPRESENT THE MINIMUM DISTANCE FROM A FITTING THAT JOINTS SHALL BE RESTRAINED ACCORDING TO SIZE AND TYPE OF FITTING. BASED ON 200 PSI TEST PRESSURE & 3.5' OF COVER.

| | |
|-------------------|--------------|
| 8" 11 1/4" BEND: | 3' |
| 8" 22 1/2" BEND: | 5' |
| 8" 45° BEND: | 10' |
| 12" 22 1/2" BEND: | 7' |
| 12" 45° BEND: | 13' |
| 12" 90° BEND: | 30' |
| 12" TEE: | 20' EACH WAY |

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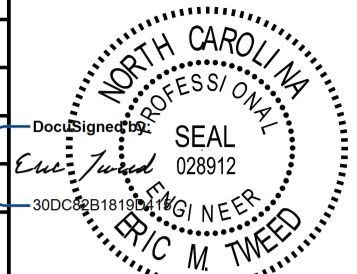
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5/14/09



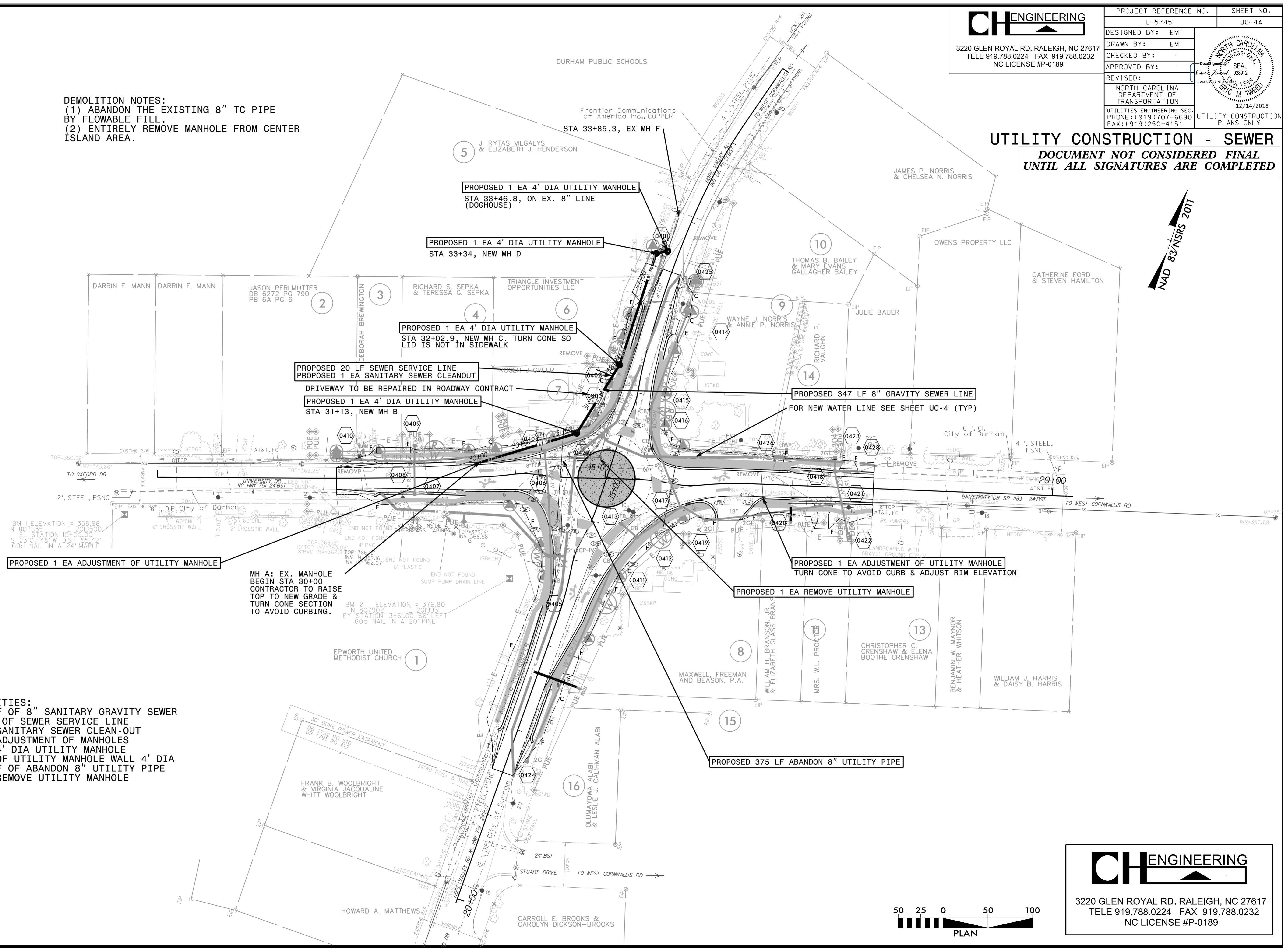
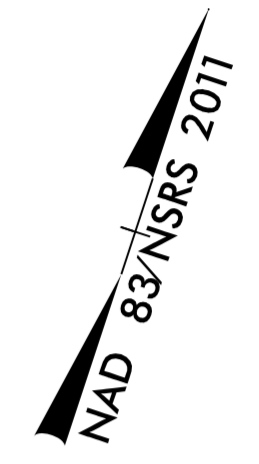
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NC LICENSE #P-0189

| | |
|---|-------|
| PROJECT REFERENCE NO. | UC-4A |
| DESIGNED BY: | EMT |
| DRAWN BY: | EMT |
| CHECKED BY: | |
| APPROVED BY: | |
| REVISED: | |
| NORTH CAROLINA DEPARTMENT OF TRANSPORTATION | |
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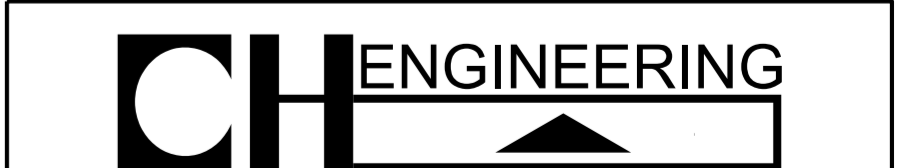
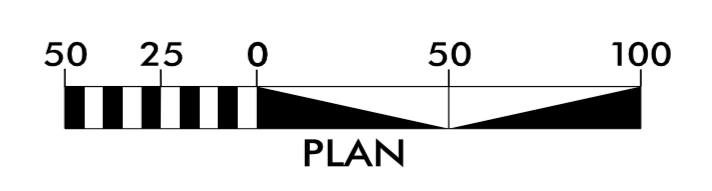
DEMOLITION NOTES:
 (1) ABANDON THE EXISTING 8" TC PIPE BY FLOWABLE FILL.
 (2) ENTIRELY REMOVE MANHOLE FROM CENTER ISLAND AREA.

UTILITY CONSTRUCTION - SEWER
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PROPOSED 1 EA ADJUSTMENT OF UTILITY MANHOLE
 MH A: EX. MANHOLE BEGIN STA 30+00 CONTRACTOR TO RAISE TOP TO NEW GRADE & TURN CONE SECTION TO AVOID CURBING.

QUANTITIES:
 347 LF OF 8" SANITARY GRAVITY SEWER
 20 LF OF SEWER SERVICE LINE
 1 EA SANITARY SEWER CLEAN-OUT
 2 EA ADJUSTMENT OF MANHOLES
 4 EA 4' DIA UTILITY MANHOLE
 6 LF OF UTILITY MANHOLE WALL 4' DIA
 375 LF OF ABANDON 8" UTILITY PIPE
 1 EA REMOVE UTILITY MANHOLE

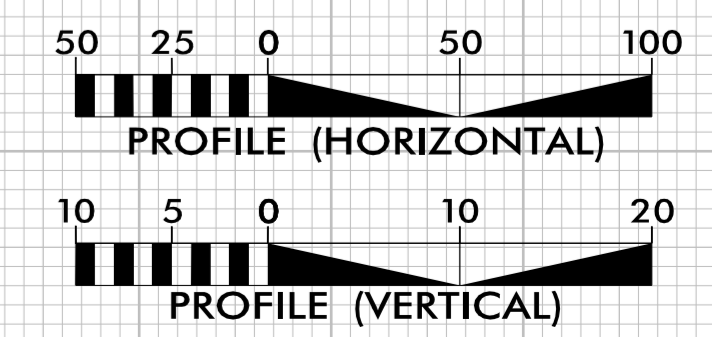
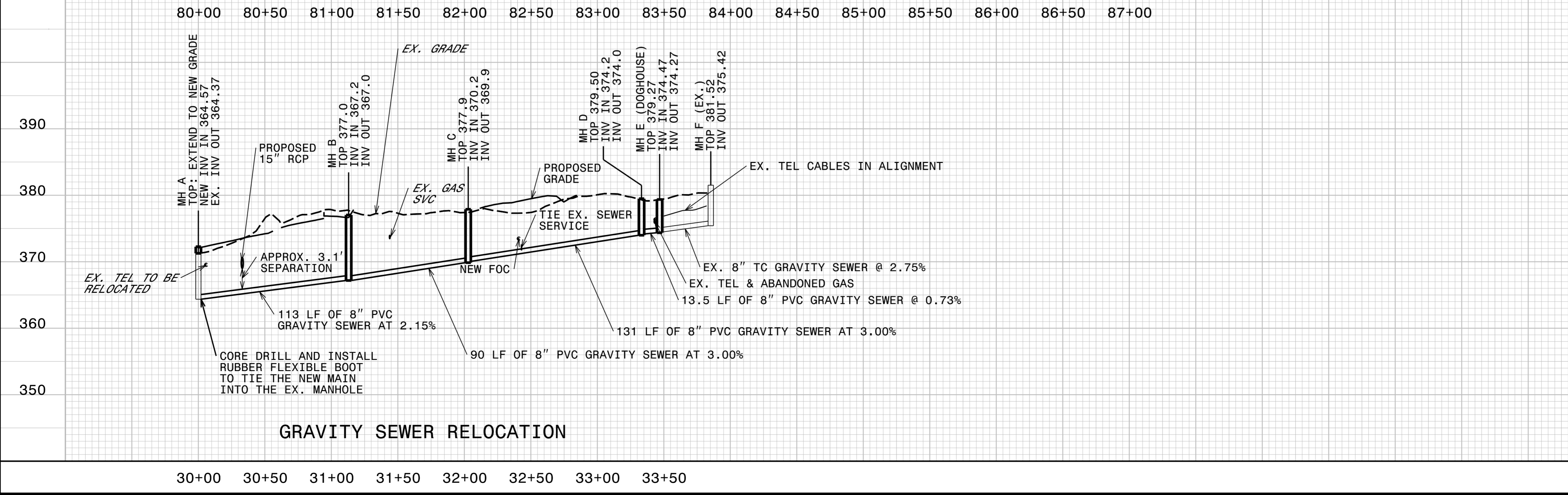
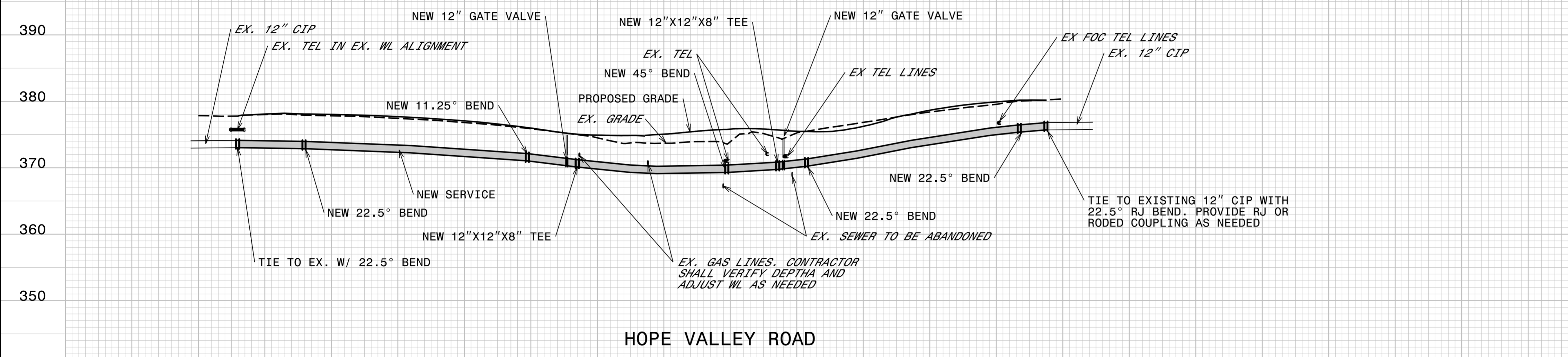
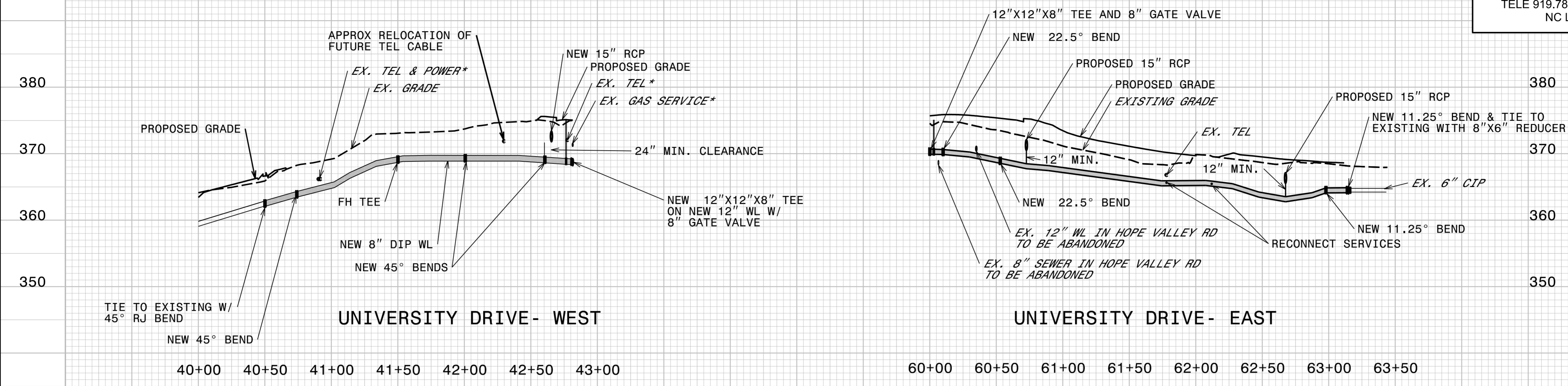


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UTILITY CONSTRUCTION

NOTES:
 1. MAINTAIN 42" MINIMUM COVER OVER WATER LINE.
 2. EXISTING UTILITIES SHOWN ARE APPROXIMATE AND CONTRACTOR SHALL FIELD VERIFY THE LOCATION AND DEPTH. DEPTHS ARE UNKNOWN AND MAY REQUIRE ADJUSTMENTS TO THE WATER LINE DEPTH TO AVOID THE EXISTING UTILITIES.



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