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STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

UTILITIES PLAN SHEET SYMBOLS

PROPOSED WATER SYMBOLS

Water Line (Sized as Shown)	
11 1/4 Degree Bend	
22 1/2 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	

NOTE
PAY ITEM

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)

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 Client Folder: Structure/RE752/Utilities/Engineering/UC/Proj/R5752-Utilities/UC2-pshdgn
 Rev: 2/1/2012

UTILITY CONSTRUCTION

PROJECT REFERENCE NO.		SHEET NO.	
R-5752		UC-3	
DESIGNED BY:	WPS		7/31/2017 SEAL 039150
DRAWN BY:	KAP		
CHECKED BY:	WPS		
APPROVED BY:	MKS		
REVISED:			
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION		UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	

UTILITY CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 ROBESON COUNTY .

3. ALL WATER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER RESOURCES, PUBLIC WATER SUPPLY SECTION. ALL SEWER LINES TO BE INSTALLED WITHIN COMPLIANCE OF THE RULES AND REGULATIONS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER RESOURCES, WATER QUALITY SECTION. PERFORM ALL WORK IN ACCORDANCE WITH THE APPLICABLE PLUMBING CODES.

4. THE UTILITY OWNER OWNS THE EXISTING UTILITY FACILITIES AND WILL OWN THE NEW UTILITY FACILITIES AFTER ACCEPTANCE BY THE DEPARTMENT. THE DEPARTMENT OWNS THE CONSTRUCTION CONTRACT AND HAS ADMINISTRATIVE AUTHORITY. COMMUNICATIONS AND DECISIONS BETWEEN THE CONTRACTOR AND UTILITY OWNER ARE NOT BINDING UPON THE DEPARTMENT OR THIS CONTRACT UNLESS AUTHORIZED BY THE ENGINEER. AGREEMENTS BETWEEN THE UTILITY OWNER AND CONTRACTOR FOR THE WORK THAT IS NOT PART OF THIS CONTRACT OR IS SECONDARY TO THIS CONTRACT ARE ALLOWED, BUT ARE NOT BINDING UPON THE DEPARTMENT.

5. PROVIDE ACCESS FOR THE DEPARTMENT PERSONNEL AND THE OWNER'S REPRESENTATIVES TO ALL PHASES OF CONSTRUCTION. NOTIFY DEPARTMENT PERSONNEL AND THE UTILITY OWNER TWO WEEKS PRIOR TO COMMENCEMENT OF ANY WORK AND ONE WEEK PRIOR TO SERVICE INTERRUPTION. KEEP UTILITY OWNERS' REPRESENTATIVES INFORMED OF WORK PROGRESS AND PROVIDE OPPORTUNITY FOR INSPECTION OF CONSTRUCTION AND TESTING.

6. THE PLANS DEPICT THE BEST AVAILABLE INFORMATION FOR THE LOCATION, SIZE, AND TYPE OF MATERIAL FOR ALL EXISTING UTILITIES. MAKE INVESTIGATIONS FOR DETERMINING THE EXACT LOCATION, SIZE, AND TYPE MATERIAL OF THE EXISTING FACILITIES AS NECESSARY FOR THE CONSTRUCTION OF THE PROPOSED UTILITIES AND FOR AVOIDING DAMAGE TO EXISTING FACILITIES. REPAIR ANY DAMAGE INCURRED TO EXISTING FACILITIES TO THE ORIGINAL OR BETTER CONDITION AT NO ADDITIONAL COST TO THE DEPARTMENT.

7. MAKE FINAL CONNECTIONS OF THE NEW WORK TO THE EXISTING SYSTEM WHERE INDICATED ON THE PLANS, AS REQUIRED TO FIT THE ACTUAL CONDITIONS, OR AS DIRECTED.

8. MAKE CONNECTIONS BETWEEN EXISTING AND PROPOSED UTILITIES AT TIMES MOST CONVENIENT TO THE PUBLIC, WITHOUT ENDANGERING THE UTILITY SERVICE, AND IN ACCORDANCE WITH THE UTILITY OWNER'S REQUIREMENTS. MAKE CONNECTIONS ON WEEKENDS, AT NIGHT, AND ON HOLIDAYS IF NECESSARY.

9. ALL UTILITY MATERIALS SHALL BE APPROVED PRIOR TO DELIVERY TO THE PROJECT. SEE 1500-7, " SUBMITTALS AND RECORDS" IN SECTION 1500 OF THE STANDARD SPECIFICATIONS.

10. GEOTECHNICAL BORING INFORMATION IS AVAILABLE UPON REQUEST.

PROJECT SPECIFIC NOTES:

1. CONTRACTOR SHALL NOT IMPACT WATER SERVICE TO BUSINESSES OR RESIDENCES FOR MORE THAN 8 HOURS OR THE CONTRACTOR SHALL PROVIDE TEMPORARY WATER IN ACCORDANCE WITH ROBESON COUNTY PUBLIC WORKS TO IMPACTED CUSTOMERS AT THE CONTRACTOR'S EXPENSE.

2. CONTRACTOR SHALL COORDINATE WITH ROBESON COUNTY PUBLIC WORKS A MINIMUM OF 14 DAYS PRIOR TO PERFORMING ANY WATERLINE CONNECTIONS OR IMPACTING WATER SERVICE TO ANY RESIDENCES OR BUSINESSES.

3. ALL PIPE FOR OPEN TRENCH CONSTRUCTION SHALL BE SDR 21.

4. PVC PIPE JOINTS SHALL BE PUSH ON TYPE HAVING BELLS MADE AS AN INTEGRAL PART OF THE PIPE CONFORMING TO ASTM D3139.

5. RESTRAINED PVC PIPE SHALL BE RESTRAINED USING APPROVED HARNESS RESTRAINTS THAT ARE COMPATIBLE WITH ASTM 2241 PVC.

6. ALL FITTINGS SHALL BE MECHANICAL JOINT AND RESTRAINED WITH APPROVED RETAINER GLANDS THAT ARE COMPATIBLE WITH ASTM 2241 PVC.

7. REFER TO THE RESTRAINED JOINT DETAIL ON SHEET UC-3B FOR RESTRAINED JOINT LENGTHS.

8. ALL HDPE PIPE AND FITTINGS SHALL BE MANUFACTURED IN STRICT ACCORDANCE WITH AWWA C906 AND SHALL BE FROM A SINGLE MANUFACTURER WHO IS FULLY EXPERIENCED, REPUTABLE AND QUALIFIED IN THE MANUFACTURE OF THE POLYETHYLENE PIPE AND FITTINGS TO BE FURNISHED.

9. HDPE PIPE SHALL BE PE 4710 WITH A MINIMUM DR 9 SUITABLE FOR 250 PSI.

10. WATERLINE PIPING JOINT DEFLECTION SHALL BE LIMITED TO 75% OF THE MANUFACTURER'S ALLOWABLE DEFLECTION.

11. HORIZONTAL DIRECTIONAL DRILLING (HDD) WATER MAIN PIPE IS 10-INCH DIAMETER HDPE DR 9. TOTAL LENGTH OF THE HDD AS SHOWN ON THE DRAWINGS IS APPROXIMATELY 560 LF. THIS LENGTH IS BASED ON A DESIGN USING AVAILABLE SUBSURFACE INFORMATION. AS STATED BELOW THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ADDITIONAL SUBSURFACE DATA TO CONFIRM SUBSURFACE CONDITIONS AS PRESENTED ON THE DRAWINGS AND/OR MAKE MODIFICATIONS TO THE HDD ALIGNMENT OR PIPE STRENGTH REQUIREMENTS BASED ON THE ADDITIONAL INFORMATION OBTAINED.

12. ALL HDD DESIGN SUBMITTALS MUST BE SIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NORTH CAROLINA.

13. SUBMITTALS FOR DESIGN OF HDD

A. HDD DESIGN BY THE CONTRACTOR'S ENGINEER SHALL INCLUDE A GEOTECHNICAL EXPLORATION AND LABORATORY TESTING PROGRAM TO ADEQUATELY DEFINE THE SUBSURFACE CONDITIONS. THIS SUPPLEMENTAL INFORMATION TO THE INFORMATION PROVIDED IN THESE DOCUMENTS SHALL BE USED AS THE BASIS OF THE HDD DESIGN AND ANY MODIFICATIONS TO THE PROPOSED LAYOUT AS SHOWN.

B. SUBMIT CALCULATIONS IDENTIFYING THE CRITICAL DOWNHOLE PRESSURE THAT WOULD CAUSE HYDROFRACTURE. THE CALCULATIONS SHALL IDENTIFY ALL PARAMETERS USED AND STATE ALL ASSUMPTIONS MADE IN THE CALCULATIONS. CALCULATIONS FOR PIPE STRESSES DUE TO PULLBACK, BENDING, FLUID BUCKLING LOADS, EARTH LOADS, GROUNDWATER LOADS, AND ANY OTHER INSTALLATION AND SERVICE LOADS. LIST ALL ASSUMPTIONS MADE IN THE CALCULATIONS, INCLUDING THE RADIUS OF CURVATURE, ASSUMED DRILLING FLUID WEIGHTS, WHETHER PIPE IS ASSUMED TO BE FILLED OR EMPTY DURING PULLBACK, AND TEMPERATURE.

C. PROVIDE RECORDS OF EQUIPMENT CALIBRATIONS AND CERTIFICATIONS FOR ALL EQUIPMENT USED FOR DOWNHOLE SURVEYS AND TRACKING OF THE DRILL HEAD. PROCEDURES FOR OPERATING THE DOWNHOLE SURVEY TOOLS SHALL BE DESCRIBED, INCLUDING MEASURES TO VERIFY THE ACCURACY OF THE EQUIPMENT READINGS.

D. SUBMIT PLANS FOR DISPOSAL OF WASTE MATERIALS RESULTING FROM THE PIPELINE CONSTRUCTION, INCLUDING DRILLING FLUIDS, CUTTINGS, WASTE OIL, FUEL, DISCHARGE WATER, ETC. IDENTIFY THE DISPOSAL SITE AND SUBMIT A LETTER INDICATING WILLINGNESS AND LEGAL AUTHORITY OF RECIPIENT TO ACCEPT THE DESCRIBED AND ANTICIPATED WASTE PRODUCTS.

E. SUBMIT A CONTINGENCY PLAN FOR REMEDIATION OF POTENTIAL PROBLEMS THAT MAY BE ENCOUNTERED DURING THE DRILLING OPERATIONS. THE CONTINGENCY PLANS SHALL ADDRESS THE OBSERVATIONS THAT WOULD LEAD TO THE DISCOVERY OF THE PROBLEM AND THE METHODS THAT WOULD BE USED TO MITIGATE THE PROBLEM. CONTRACTOR SHALL BE CAPABLE OF IMPLEMENTING THE PLAN IMMEDIATELY SHOULD AN INADVERTENT RETURN OR SURFACE SPILL OCCUR DURING THE HDD WORK.

14. SUBMITTALS AND AS-BUILT HDD SUBMITTALS

A. THE CONTRACTOR SHALL DOCUMENT ANY VARIATIONS BETWEEN THE ACTUAL CONTRACT DRAWINGS AND PROFILE OF THE BORE PATH AND THE LOCATION SHOWN ON THE CONTRACT DRAWINGS. THE CONTRACTOR SHALL NOTIFY IN WRITING AND BY TELEPHONE THE ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY DEVIATIONS. SUBMIT DESCRIPTIONS OF METHODS, EQUIPMENT, AND MATERIALS TO BE USED FOR CONTACT GROUTING ANY AREAS WHERE OVER-EXCAVATION, ANNULUS BETWEEN THE FINAL REAMED BORE DIAMETER AND THE CARRIER PIPE, ABORTED BORES, VOIDS, OR CAVITIES ARE CREATED OR ENCOUNTERED DURING CONSTRUCTION.

B. THE FOLLOWING SHALL BE SUBMITTED AS CONSTRUCTION PROGRESSES AND AT THE COMPLETION OF CONSTRUCTION: MAXIMUM DRILLING SPEEDS AND REAMING RATES FOR PILOT BORE AND EACH REAMING PASS; MEASURED MUD AND/OR DRILLING FLUID WEIGHTS USED DURING PILOT BORING AND REAMING OF THE BORE MEASURED AT A MINIMUM OF THREE TIMES PER SHIFT OR AT LEAST ONCE PER 200 FEET OF DRILLED OR REAMED LENGTH, WHICHEVER IS MORE FREQUENT, WITH AT LEAST TWO (2) HOURS BETWEEN READINGS; ALL PRESSURE TEST RECORDS FOR BOTH THE PRE-INSTALLATION AND POST-INSTALLATION TESTS; AS-BUILT PROFILE OF THE PILOT BORE WITHIN 24 HOURS OF COMPLETION OF THE PILOT BORE.

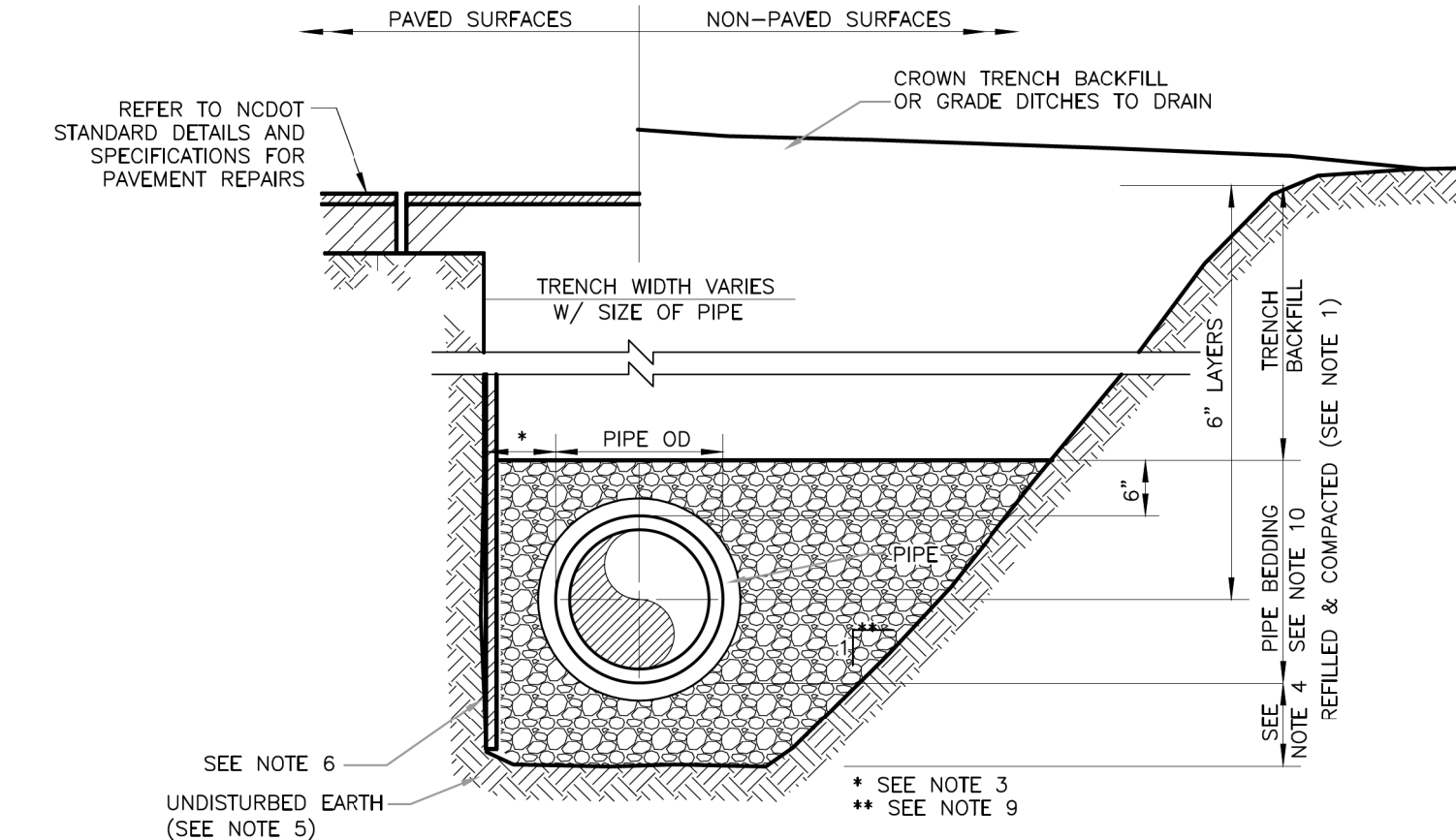
5/14/99

PROJECT TYPICAL DETAILS

PROJECT REFERENCE NO.	SHEET NO.
R-5752	UC-3A
DESIGNED BY: WPS	
DRAWN BY: KAP	
CHECKED BY: WPS	
APPROVED BY: MKS	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	
UTILITY CONSTRUCTION PLANS ONLY	

UTILITY CONSTRUCTION

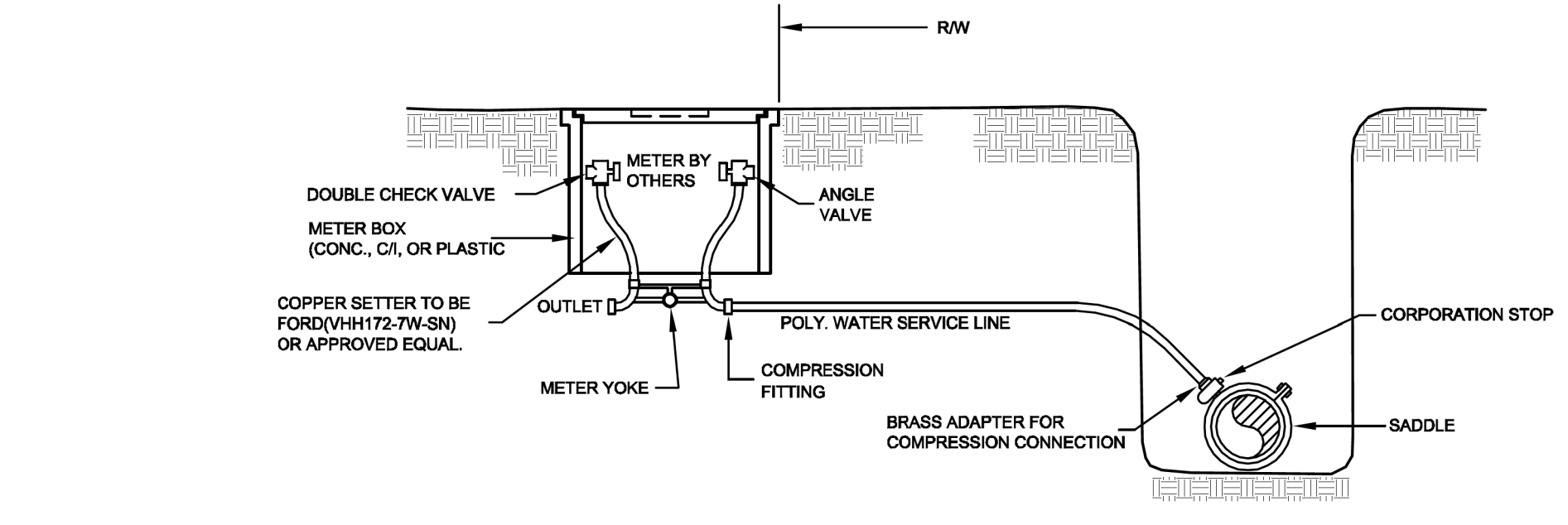
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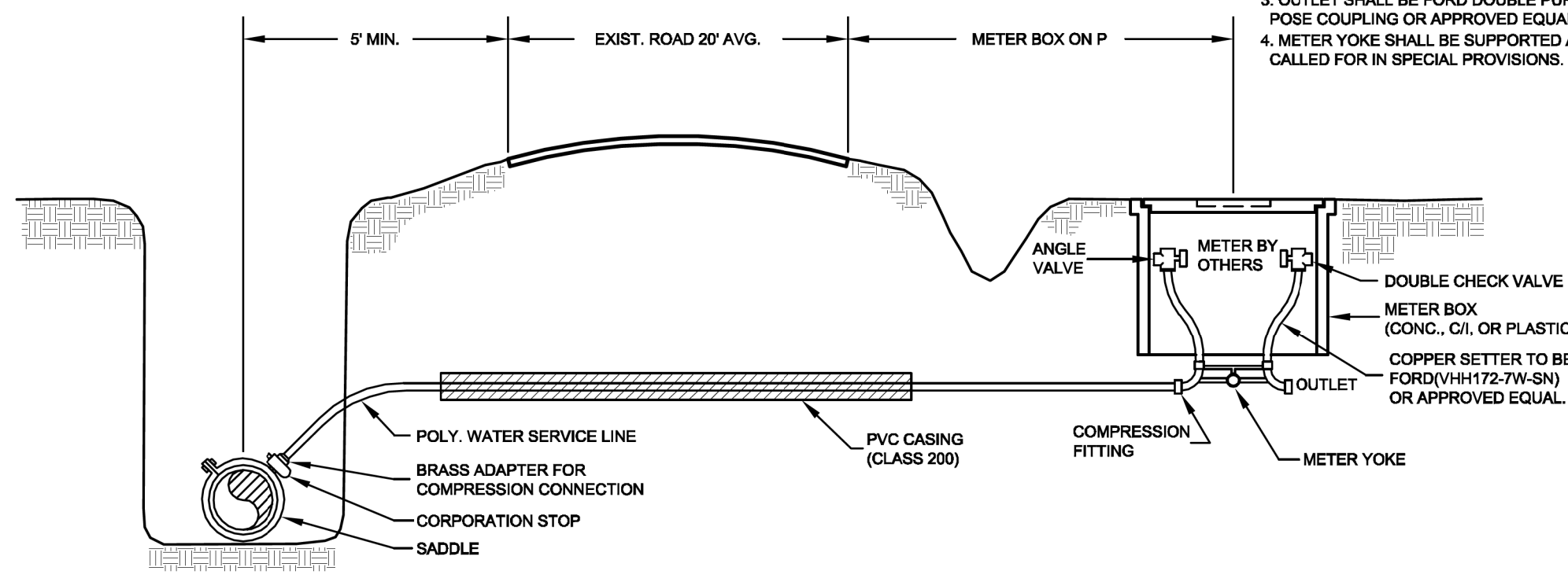
- NOTES:**
- PIPE BEDDING & TRENCH BACKFILL - COMPACTED IN LAYERS TO 95% MAXIMUM DENSITY AS PER ASTM D698 (STANDARD PROCTOR) AND 98% IN AREAS UNDER PAVEMENT IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY THE NC DEPARTMENT OF TRANSPORTATION
 - WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION. DEWATER AS NECESSARY.
 - MINIMUM 18" BEYOND PIPE OD.
 - MINIMUM 6" LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.
 - PLACE FOUNDATION CONDITIONING MATERIAL (SELECT MATERIAL) BELOW BEDDING IF REQUIRED OR AS DIRECTED BY ENGINEER. FOUNDATION CONDITIONING MATERIAL SHALL BE ENCAPSULATED WITH GEOTEXTILE FABRIC AS SPECIFIED.
 - SHEETING SHALL BE DRIVEN BELOW THE UTILITY INVERT IF REQUIRED FOR LATERAL SUPPORT OR UNSUITABLE MATERIAL REMOVAL. WHERE DRIVEN BELOW PIPE SPRINGLINE, SHEETING SHALL BE CUT OFF A MIN OF 12" ABOVE TOP OF PIPE OR HIGHER, AS AUTHORIZED BY THE ENGINEER, AND LEFT IN PLACE. IN NO CASE SHALL SHEETING LEFT IN PLACE EXTEND HIGHER THAN 18" BELOW SURFACE GRADE UNLESS SPECIFICALLY APPROVED. BRACING SHALL BE PROVIDED AS REQUIRED.
 - EXCAVATED MATERIALS MIXED WITH DELETERIOUS SUBSTANCES DURING CONSTRUCTION SHALL NOT BE USED FOR BACKFILLING.
 - FOR INSTALLATIONS IN PAVEMENT, ALL EXISTING PAVEMENT SHALL BE CUT SQUARELY WITH A SAW. WEARING SURFACE SHALL BE SAME TYPE AND THICKNESS AS THE EXISTING PAVEMENT.
 - TRENCH SLOPES SHALL BE AS REQUIRED BY OSHA AND SHALL NOT EXCEED 1:1 NEXT TO ROADS - USE ACTIVE SHORING AS REQUIRED.
 - SELECT BACKFILL MATERIAL CLASS III OR CLASS II, TYPE 1 INSTALLED AND COMPACTED IN 6" LIFTS.
 - TRENCH BOXES SHALL NOT EXTEND BELOW THE SPRINGLINE OF THE PIPE, UNLESS APPROVED BY THE ENGINEER ON A PER-CASE BASIS.

PIPE BEDDING DETAIL

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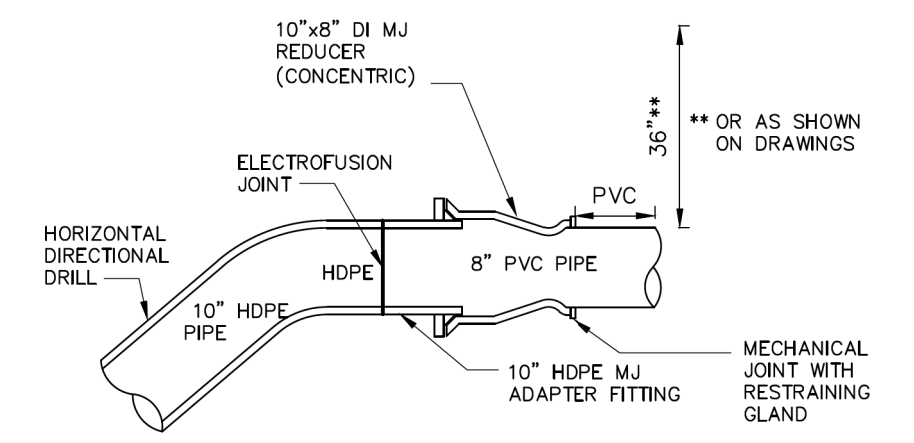


- NOTES:**
- INLETS WILL HAVE A BRASS ADAPTOR AS REQUIRED FOR A COMPRESSION FITTING TO 1"PS" WATER SERVICE PIPE.
 - YOKE WILL HAVE CHECK VALVE THAT SHALL HAVE SPRING-ASSISTED SEATING, AND THE SEAT SHALL BE OF BUNA-N-RUBBER.
 - OUTLET SHALL BE FORD DOUBLE PURPOSE COUPLING OR APPROVED EQUAL.
 - METER YOKE SHALL BE SUPPORTED AS CALLED FOR IN SPECIAL PROVISIONS.



TYPICAL HOUSE SERVICE DETAIL

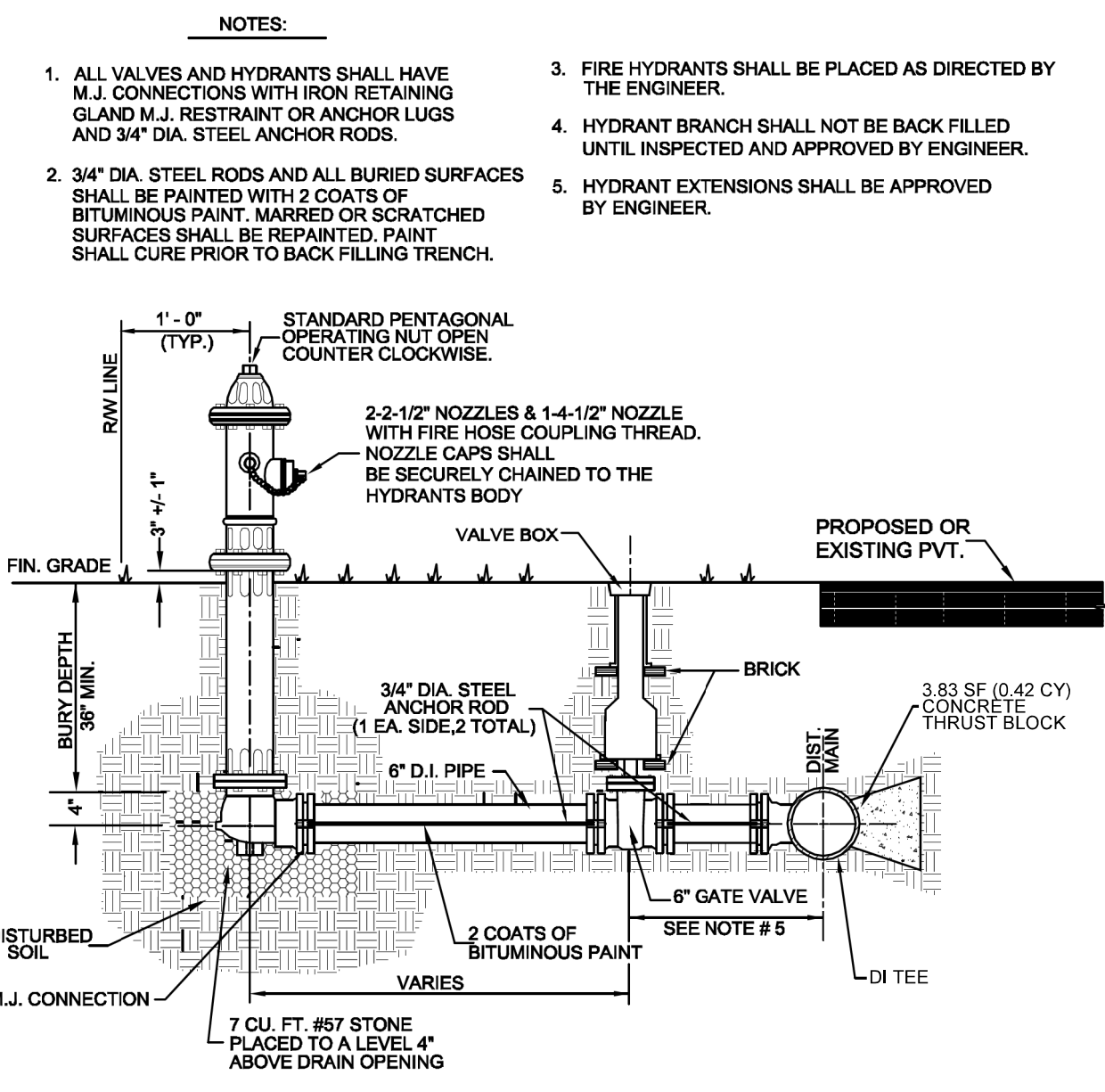
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- NOTES:**
- HDPE AND PVC SIZE SHALL BE AS NOTED ON THE DRAWINGS AT EACH TRANSITION. PIPE CLASS AND THICKNESS AS SPECIFIED.
 - SEE DRAWING NOTES AND SPECIFICATIONS FOR DI FITTING CLASS.
 - TRANSITION TO PVC SHALL OCCUR AFTER HDD ALIGNMENT HAS REACHED NEAR HORIZONTAL SLOPE.

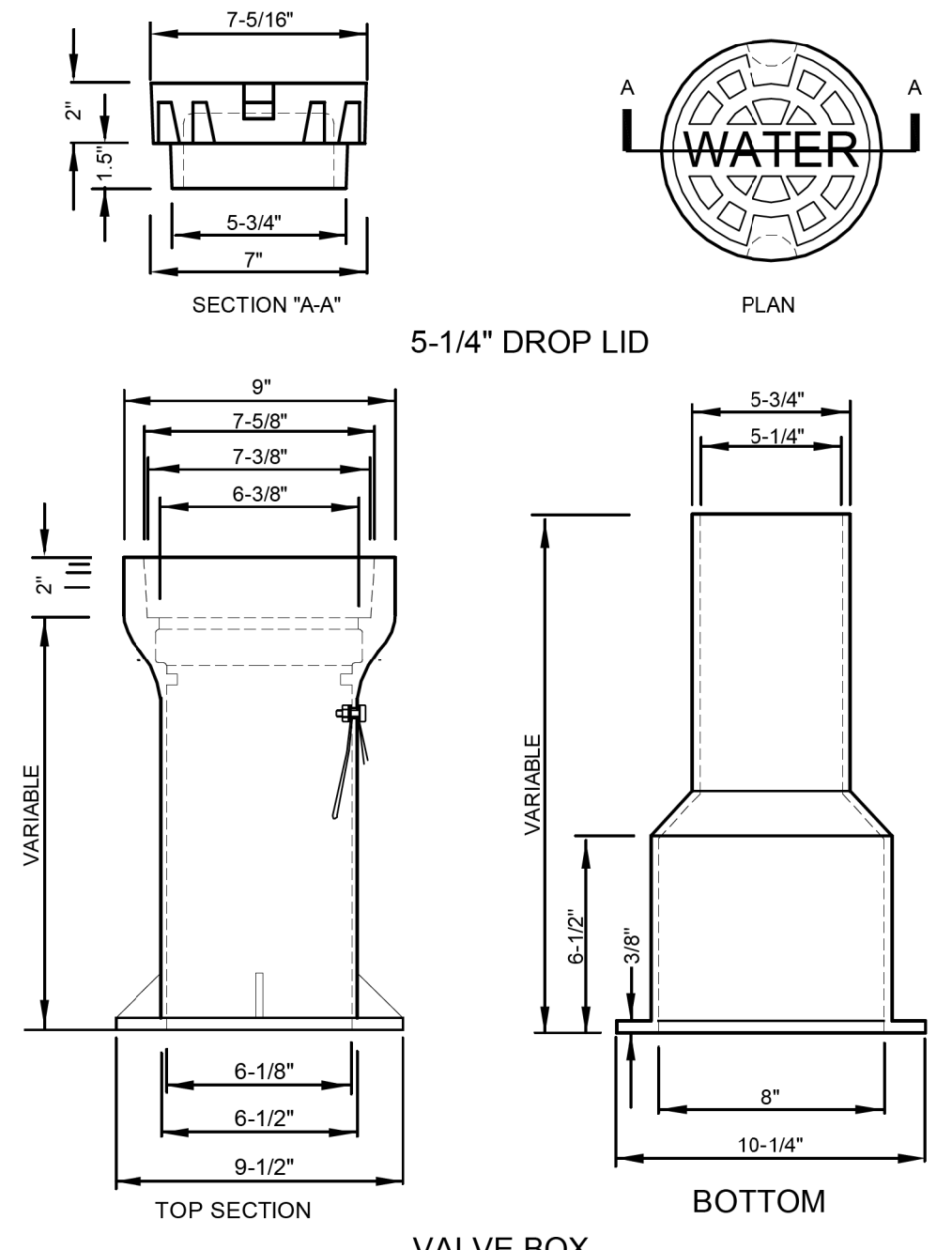
PVC/HDPE TRANSITION DETAIL

NTS

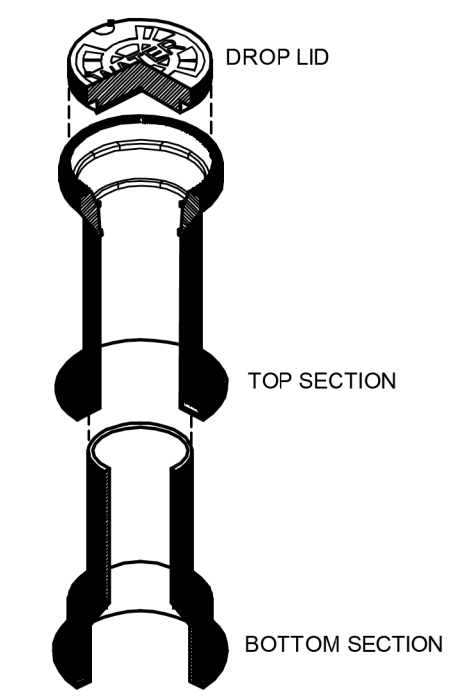


HYDRANT DETAIL

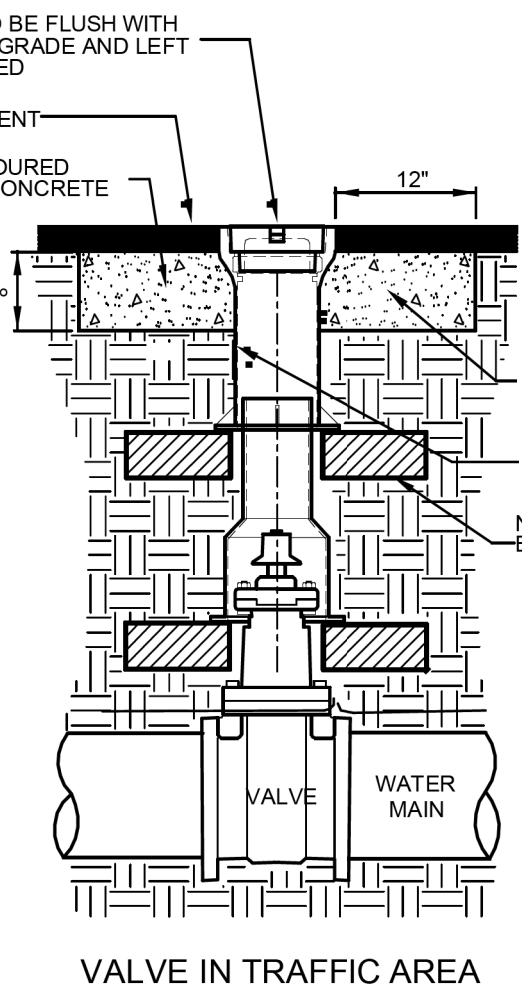
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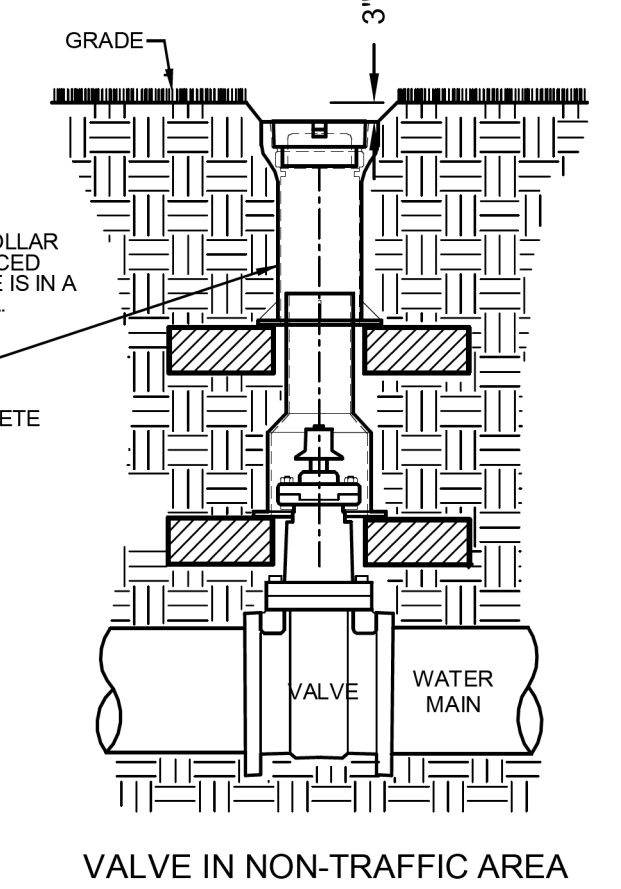
VALVE BOX



VALVE BOX DETAIL



VALVE IN TRAFFIC AREA



VALVE IN NON-TRAFFIC AREA

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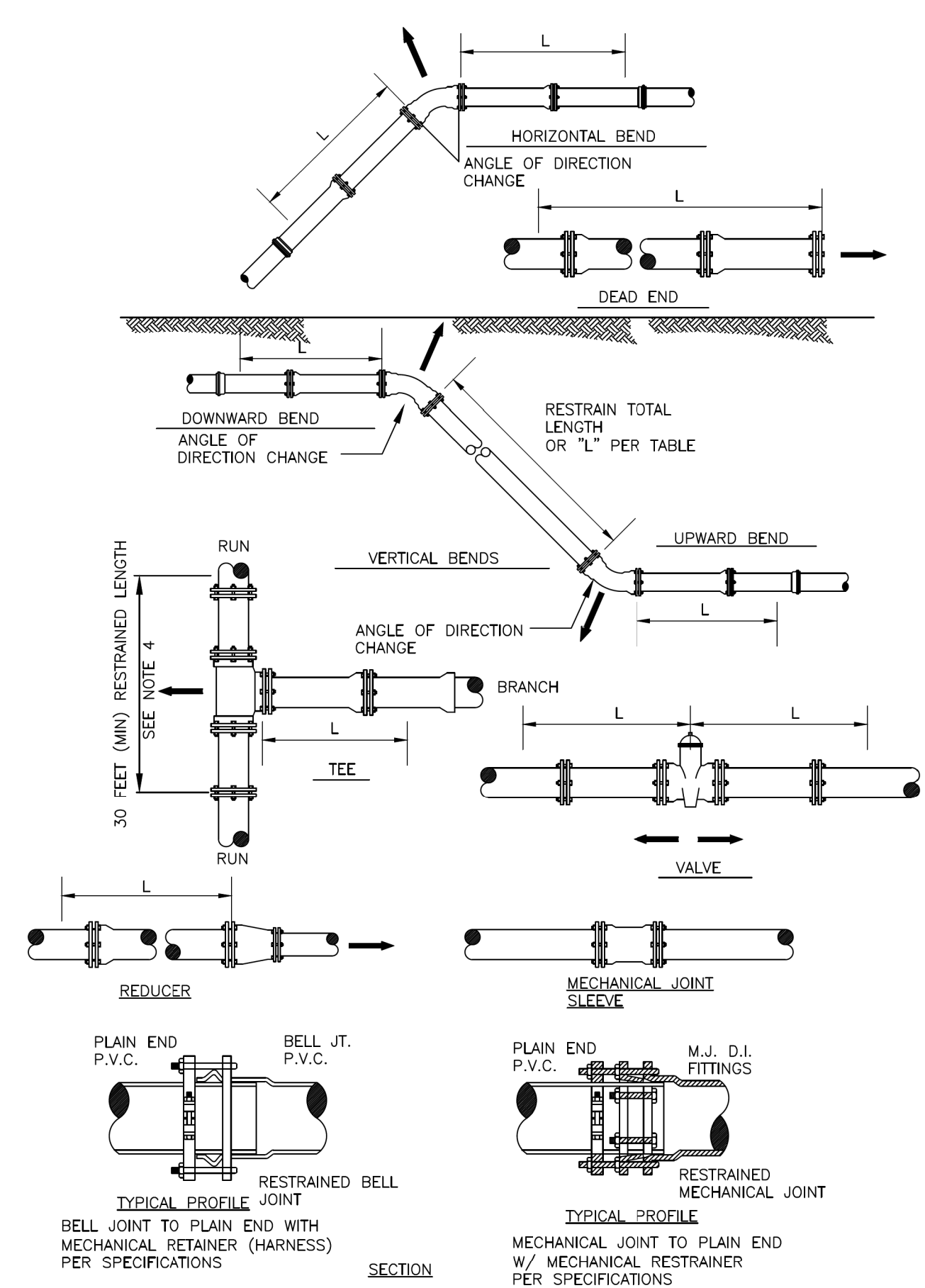
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PROJECT TYPICAL DETAILS

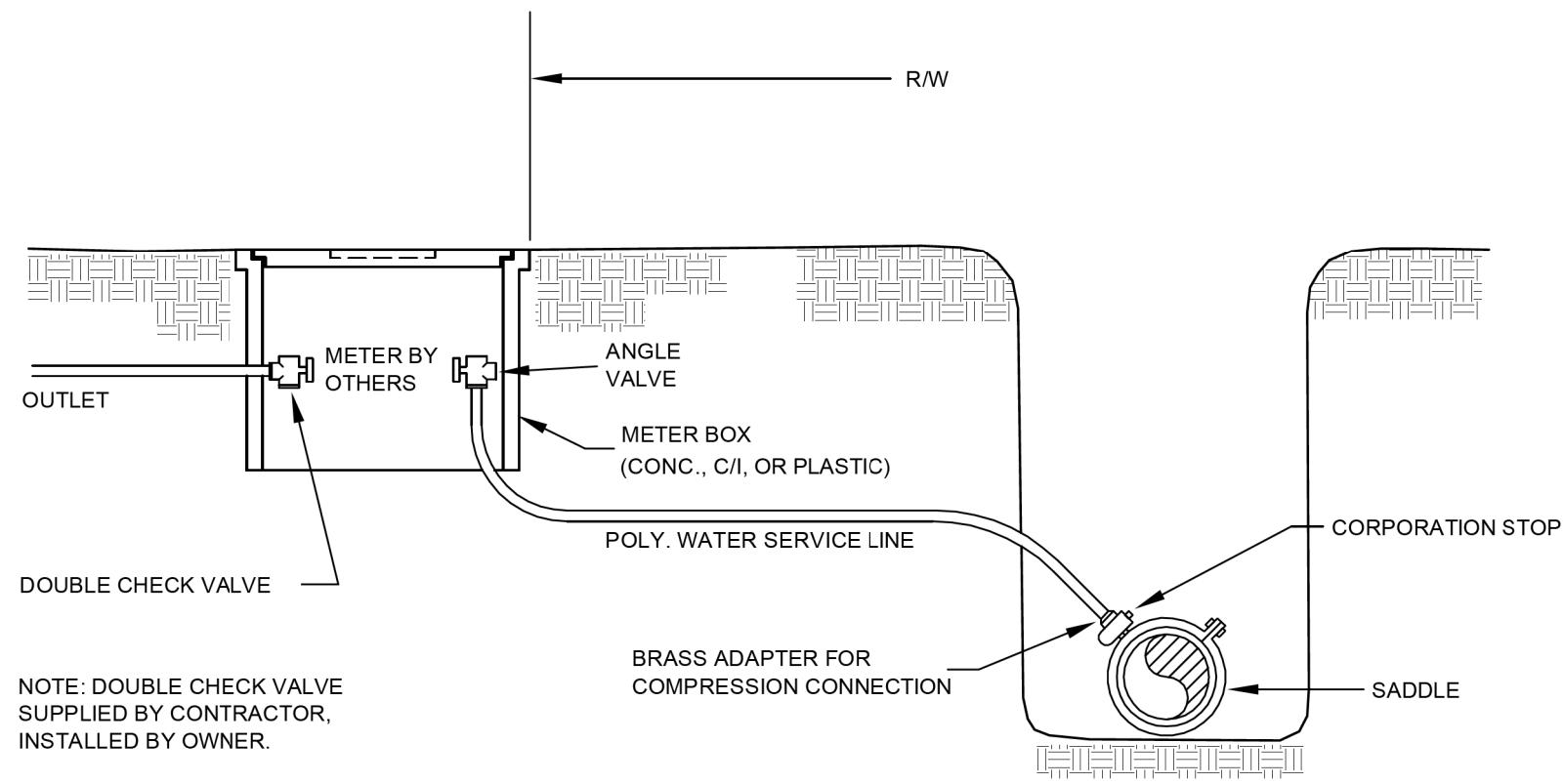
PROJECT REFERENCE NO.	SHEET NO.
R-5752	UC-3B
DESIGNED BY: WPS	
DRAWN BY: KAP	
CHECKED BY: WPS	
APPROVED BY: MKS	
REVISED:	7/31/2017
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	
UTILITIES ENGINEERING SEC. PHONE: (919) 707-6690 FAX: (919) 250-4151	

UTILITY CONSTRUCTION

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- PVC PIPE RESTRAINT NOTES:**
- THE "PVC PIPE RESTRAINT JOINT SCHEDULE" SHALL BE UTILIZED ON ALL PVC PIPING.
 - ASSUMPTIONS: PVC PIPE SAFETY FACTOR=1.5, TEST PRESSURE=200PSI, SOIL=GW, TRENCH TYPE S, DEPTH OF COVER=36 INCHES. CALCULATIONS DONE IN ACCORDANCE WITH ANWA M23 AND M41 MANUALS.
 - BENDS AND VALVES: SHALL BE RESTRAINED ON EACH SIDE OF FITTING W/MECHANICAL JOINT AND BELL RESTRAINT WHERE APPLICABLE.
 - TEES, BLOW-OFF, ARV, AND FIRE HYDRANT FITTINGS: TOTAL LENGTH BETWEEN FIRST JOINTS OR RESTRAINED LENGTH ON EITHER SIDE OF TEE OR FITTING (RUN) SHALL BE A TOTAL DISTANCE OF 30 FEET (MIN). SEE SCHEDULE FOR RESTRAINED LENGTH ON TEE "BRANCH" LINE.
 - HDPE TO PVC TRANSITIONS: THE PVC PIPE SIDE SHALL BE RESTRAINED 35 FT (MIN).
 - CONTRACTOR SHALL USE FULL (20 FT NOMINAL) LENGTH JOINTS OF PVC PIPE INTO AND OUT OF EACH FITTING UNLESS OTHERWISE DIRECTED. WHERE SHORTER JOINTS ARE REQUIRED ON EITHER SIDE OF A FITTING ADDITIONAL JOINT RESTRAINT MAY BE REQUIRED BY USE OF HARNESS ASSEMBLIES PER THE SPECIFICATION.
 - WHERE THE CALCULATED RESTRAINED JOINT LENGTH IS LESS THAN OR EQUAL TO 20 FEET (NOMINAL LENGTH OF ONE JOINT OF PIPE) THE FITTING ONLY SHALL BE RESTRAINED BY USE OF A MECHANICAL JOINT RETAINER GLAND DESIGNED FOR USE WITH PVC PIPING IN ACCORDANCE WITH THE SPECIFICATIONS.
 - WHERE THE CALCULATED RESTRAINED JOINT LENGTH IS GREATER THAN OR EQUAL TO 20 FEET THE FITTING SHALL BE RESTRAINED BY USE OF A MECHANICAL JOINT RETAINER GLAND DESIGNED FOR USE WITH PVC PIPING IN ACCORDANCE WITH THE SPECIFICATIONS. IN ADDITION TO THE FITTING THE FOOTAGE SPECIFIED IN THE TABLE UPSTREAM/DOWNSTREAM OF THE FITTING SHALL BE RESTRAINED BY USE OF HARNESS ASSEMBLIES (BELL RESTRAINT SYSTEMS) DESIGNED FOR USE WITH PVC PIPE IN ACCORDANCE WITH THE SPECIFICATIONS.
 - WHERE NON-STANDARD CIRCUMSTANCES ARISE IN THE FIELD CONSULT THE ENGINEER PRIOR TO INSTALLATION OF RESTRAINT SYSTEMS. FAILURE TO CONSULT THE ENGINEER MAY REQUIRE EXCAVATION AND ADJUSTMENT TO THE RESTRAINED JOINT ASSEMBLIES.
 - ALL FITTINGS SHALL BE DUCTILE IRON MECHANICAL RESTRAINED JOINT FITTINGS IN ACCORDANCE WITH THE SPECIFICATIONS.
 - THE INSTALLATION OF BELL HARNESS RESTRAINTS AT PVC JOINTS SHALL BE COMPLETED PER THE MANUFACTURERS RECOMMENDATION, WHICH INCLUDES NOT OVER TIGHTENING THE PARALLEL RODS/NUTS. THESE NUTS SHOULD ONLY BE SNUG TIGHT. THE HOME MARKS ON THE PIPE SHOULD ALWAYS BE VISIBLE AFTER THE RESTRAINT IS INSTALLED.
 - WHERE ADJACENT OR OFFSET BENDS (NOT INCLUDING VALVES, OR DEADENDS) HAVE OVERLAPPING RESTRAINED LENGTHS, ALL PIPE BETWEEN THE BENDS SHALL BE RESTRAINED. RESTRAINED LENGTH FOR THE OUTERMOST BENDS SHALL BE TWICE THE SELECTED LENGTH FROM THE STANDARD LENGTHS TABLE INCLUDED IN THIS DETAIL FOR PVC PIPE.



2" SERVICE CONNECTION DETAIL

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NOMINAL PIPE SIZE (IN)	SUMMARY TABLE - PVC PIPE RESTRAINED JOINT LENGTHS									
	HORIZONTAL BENDS			VERTICAL BENDS				VALVES		
	45° BENDS L (FT)	22.5° BENDS L (FT)	11.25° BENDS L (FT)	VERTICAL UP BEND	VERTICAL DN BEND	VERTICAL UP BEND	VERTICAL DN BEND	VERTICAL UP BEND	VERTICAL DN BEND	L (FT)
8	12	6	3	12	42	6	21	3	10	101
TEES SEE NOTE 4										
REDUCERS										
RUN SIZE (IN)	BRANCH SIZE (IN)	L (FT)	SIZE (IN)	L (FT)						
8	8	25	10" x 8"	41						
8	6	F.O.								
6	6	2								

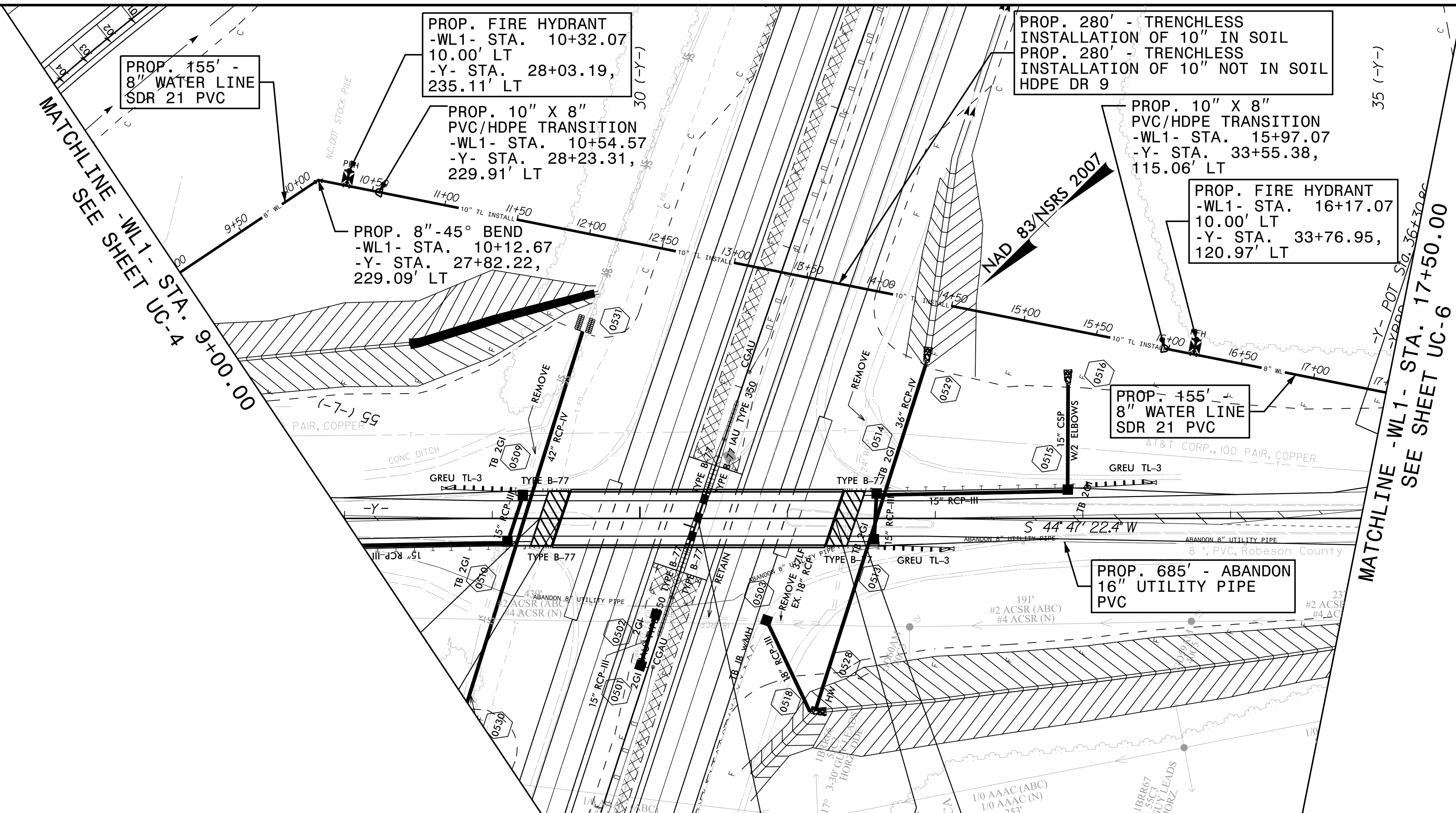
Notes:
***F.O. = Fitting Only

RESTRAINED JOINT DETAIL

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8/17/99

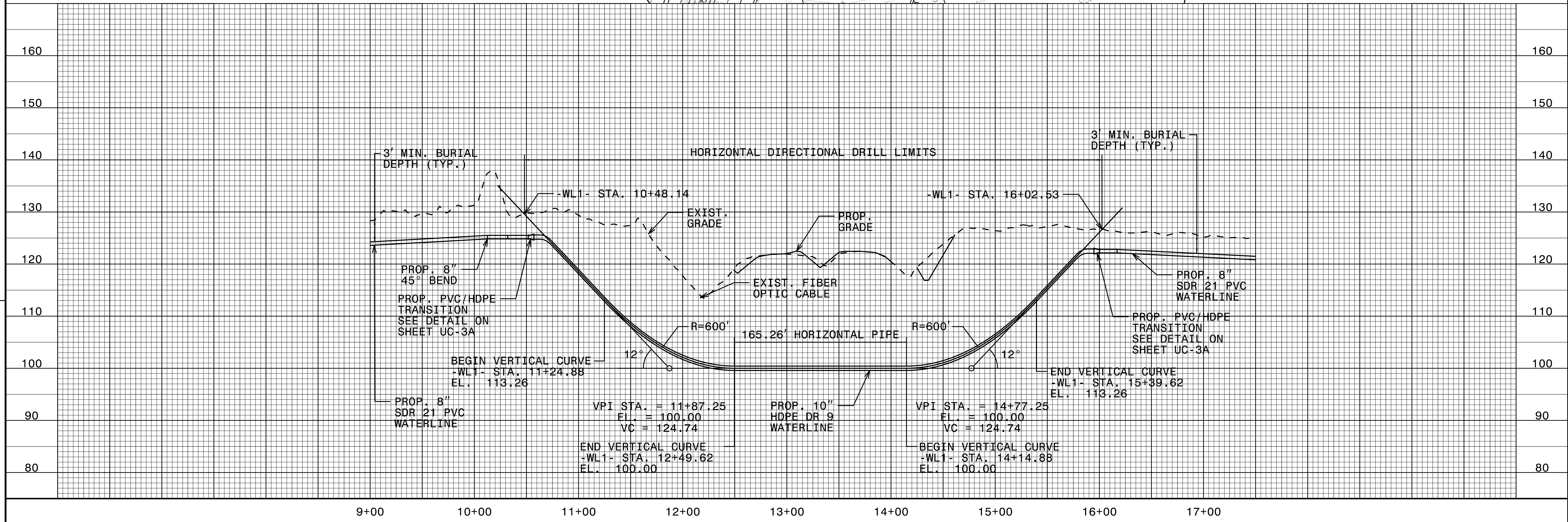
NOTE:
1. REFER TO THE RESTRAINED JOINT DETAIL ON SHEET UC-3B FOR RESTRAINED JOINT LENGTHS.



PROJECT REFERENCE NO.	SHEET NO.
R-5752	UC-5
DESIGNED BY: WPS	
DRAWN BY: KAP	
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REVISER:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SECTION PHONE: (919) 707-6690 FAX: (919) 250-4151	

UTILITY CONSTRUCTION
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REVISIONS



8/17/99

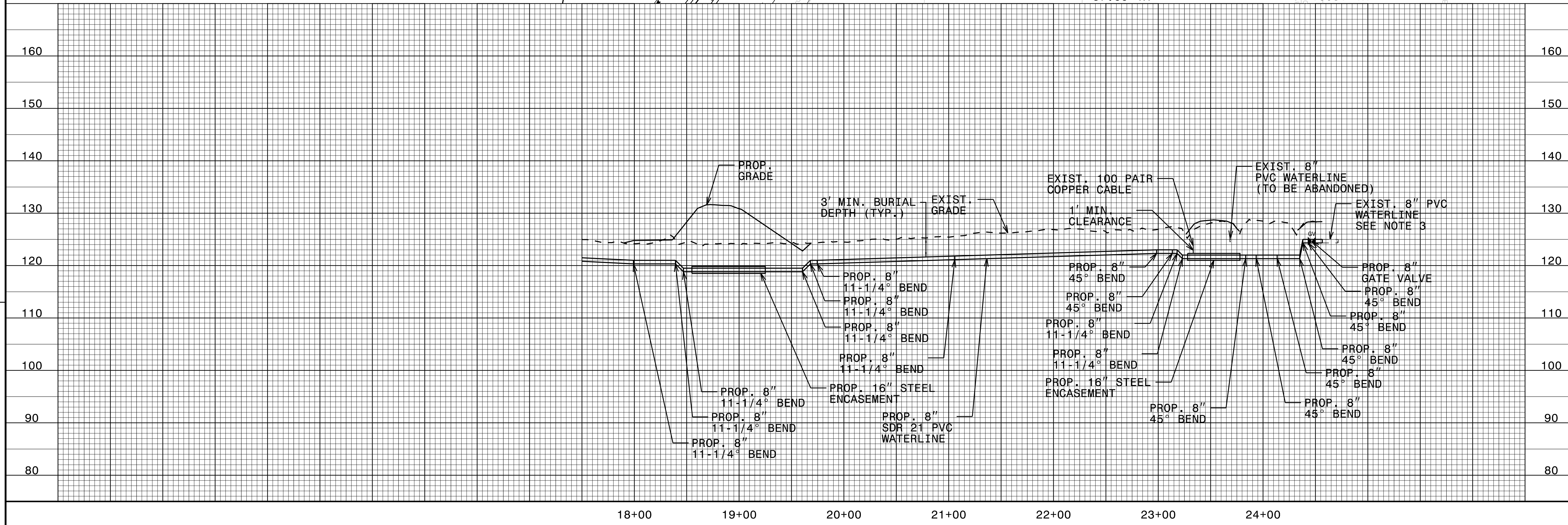
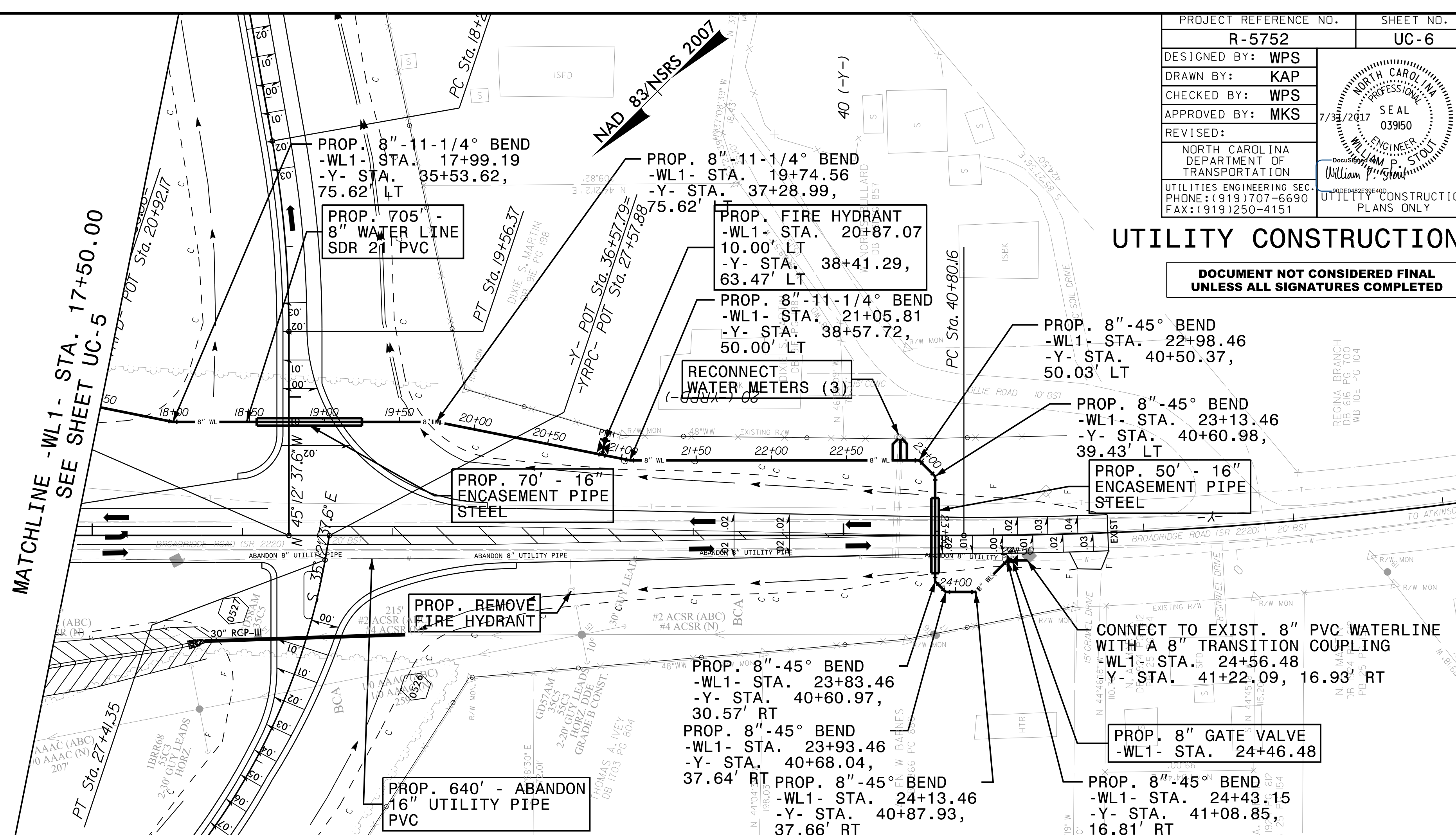
NOTE:

- ELEVATION OF EXISTING 8" WATERLINE AT WATERLINE TIE-IN LOCATIONS IS ASSUMED TO BE 3 FEET BELOW EXISTING GRADE. CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF THE EXISTING WATERLINE PRIOR TO MAKING CONNECTION AND ADJUST PIPE AS NEEDED LEADING UP TO CONNECTION.
- REFER TO THE RESTRAINED JOINT DETAIL ON SHEET UC-3B FOR RESTRAINED JOINT LENGTHS.
- CONTRACTOR SHALL RESTRAIN THE EXISTING WATERLINE BY EXCAVATING AND INSTALLING A BELL AND HARNESS RESTRAINT AROUND EACH PIPE JOINT FOR A MINIMUM LENGTH AS SPECIFIED IN THE RESTRAINED JOINT DETAIL ON SHEET UC-3B. IF THE REQUIRED RESTRAINED LENGTH DOESN'T END AT A PIPE JOINT, CONTRACTOR SHALL INSTALL BELL AND HARNESS RESTRAINT ON THE NEXT PIPE JOINT PAST THE REQUIRED RESTRAINED LENGTH.
- EACH END OF THE PROPOSED ENCASEMENT PIPES SHALL BE PLUGGED IN ACCORDANCE WITH NCDOT STANDARD DRAWING 840.71, CONCRETE AND BRICK PIPE PLUG.
- THE CARRIER PIPE WITHIN THE ENCASEMENT PIPES SHALL BE SUPPORTED WITH THE APPROPRIATE TYPE AND QUANTITY OF STEEL SPACERS APPROVED OR DIRECTED BY THE ENGINEER.

PROJECT REFERENCE NO.	SHEET NO.
R-5752	UC-6
DESIGNED BY: WPS	
DRAWN BY: KAP	
CHECKED BY: WPS	
APPROVED BY: MKS	
REVISED:	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION UTILITIES ENGINEERING SECTION PHONE: (919) 707-6690 FAX: (919) 250-4151	

UTILITY CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS