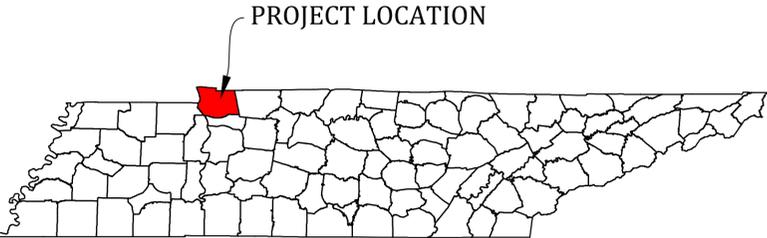


# 2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS

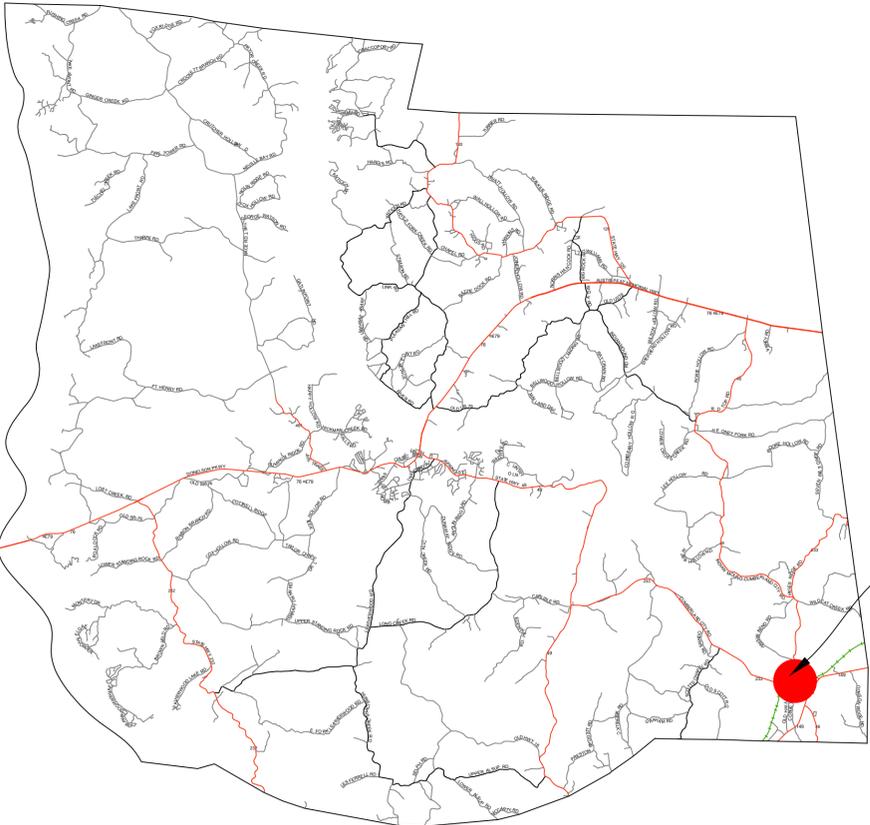
## CUMBERLAND CITY, TENNESSEE

PHILLIP TAYLOR, HONORABLE MAYOR  
 LINDA GUNSON, VICE MAYOR  
 ALEX SHORT, ALDERMAN  
 ERIC MILLIKEN, ALDERMAN  
 WANDA GILLIAM, ALDERMAN



<u>SHEET NAME</u>	<u>PAGE INDEX</u>	<u>SHEET NO.</u>
TITLE SHEET.....		G 0.00
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BRIDGE CROSSING ADDITIVE ALTERNATE WATER CONSTRUCTION PLAN.....		C 1.1
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CONSTRUCTION DETAILS.....		D 1.1
CONSTRUCTION DETAILS.....		D 1.2
CONSTRUCTION DETAILS.....		D 1.3

## STEWART COUNTY, TENNESSEE



DW20250303R1  
**APPROVED FOR CONSTRUCTION**  
 THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE  
**TENNESSEE DEPT. OF ENVIRONMENT & CONSERVATION**  
**DIVISION OF WATER RESOURCES**  
 AND IS HEREBY APPROVED FOR CONSTRUCTION BY THE COMMISSIONER  
  
 01/08/2026  
 THIS APPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE COMMISSIONER THAT THE APPROVED FACILITIES WILL REACH THE DESIGNED GOALS.  
 APPROVAL EXPIRES ONE YEAR FROM ABOVE DATE

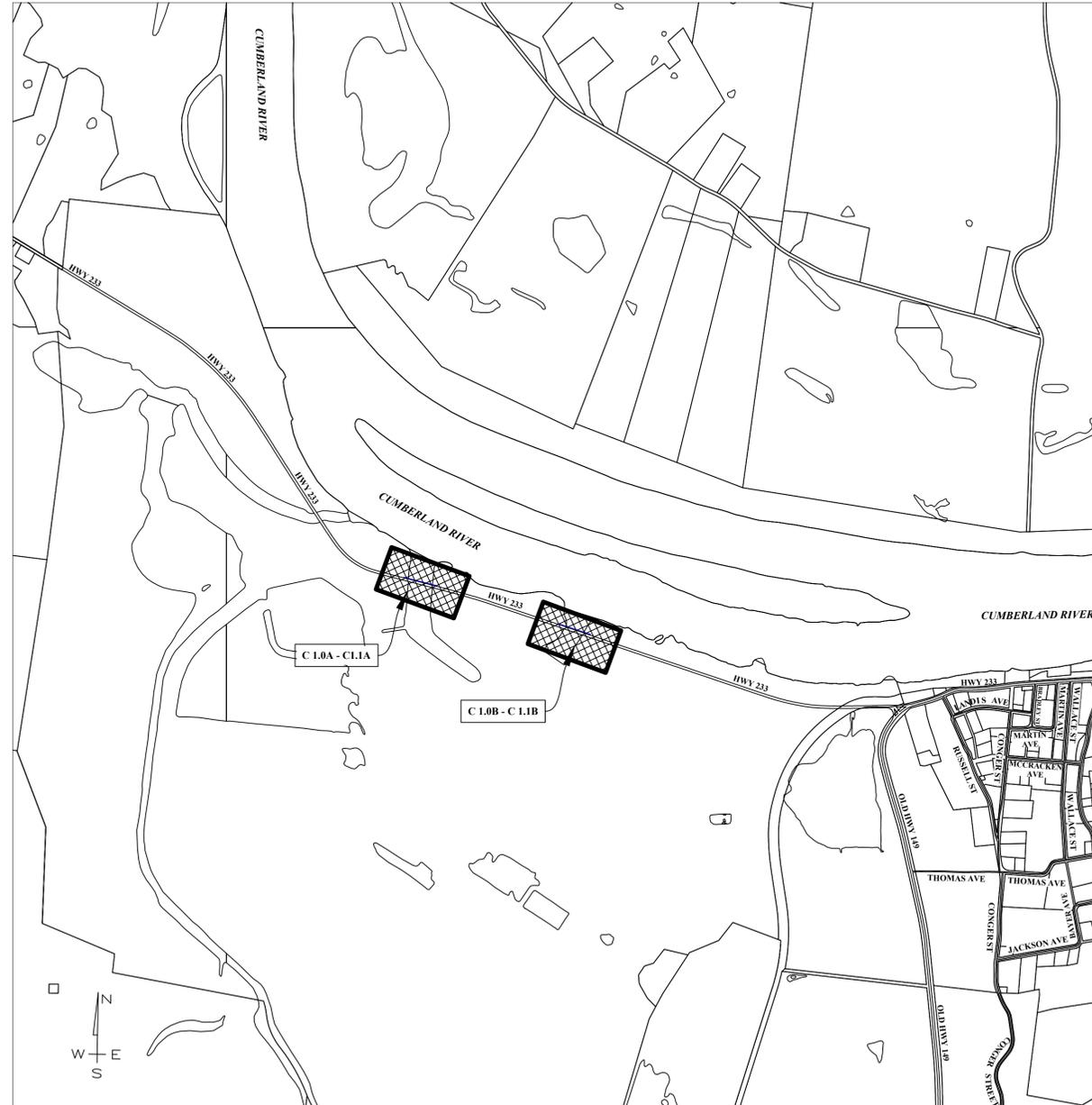
  
**RYE**  
 ENGINEERING PLC  
 CONSULTING ENGINEERS & SYSTEM OPERATORS  
 4210 W MAIN STREET, ERIN TN 37061  
 OFFICE (931) 289-2300 FAX (931) 289-2313



DATE: 12/05/2025

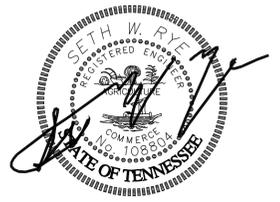
**GENERAL NOTES**

1. THE CONTRACTOR SHALL COMPLY WITH ALL LOCAL CODES, OBTAIN ALL PERMITS, AND PAY ALL PERMIT AND TAP FEES PRIOR TO BEGINNING WORK.
2. ALL CONSTRUCTION SHALL BE MADE IN ACCORDANCE WITH THE CONSTRUCTION PLANS AND SPECIFICATIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE CONSTRUCTION WITH THE TOWN OF CUMBERLAND CITY.
3. THE CONTRACTOR SHALL NOTIFY THE TENNESSEE ONE-CALL SYSTEM, INC., AND ANY NON ONE-CALL UTILITIES INDIVIDUALLY, AT LEAST THREE WORKING DAYS PRIOR TO ANY EXCAVATION AND/OR DEMOLITION.
4. UNDERGROUND STRUCTURES AND UTILITIES SHOWN ARE STRICTLY APPROXIMATE IN LOCATION AND DEPTH, AND MAY NOT BE THE ONLY UTILITIES PRESENT. THE CONTRACTOR SHALL FIELD VERIFY SIZES, LOCATIONS, AND ELEVATIONS OF EXISTING UNDERGROUND UTILITIES, PRIOR TO BEGINNING WORK. NOTIFY ENGINEER OF ANY DISCREPANCIES.
5. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR ANY DAMAGE TO PROPERTY OR ADJOINING PROPERTIES DURING CONSTRUCTION.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING ALL EXISTING DRAINAGE SYSTEMS.
7. THE CONTRACTOR SHALL PROTECT THE PUBLIC FROM WORK AT ALL TIMES. WHEN THE WORK AREA IS IN AN AREA OF DIRECT PUBLIC ACCESS, THE WORK AREA BARRICADED AND ILLUMINATED DARKNESS AND PERIODS OF ACTIVITY.
8. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL FOR ALL WORK IN PUBLIC RIGHT-OF-WAYS. TRAFFIC CONTROL SHALL BE IN ACCORDANCE WITH FEDERAL AND STATE MANUALS OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) CURRENT EDITION. SEE DETAIL FOR TYPICAL TEMPORARY TRAFFIC CONTROL REQUIREMENTS.
9. CONTRACTOR SHALL ALLOW FULL ACCESS TO PROPERTIES AFFECTED BY UTILITY CONSTRUCTION.
10. CONTRACTOR SHALL PROVIDE SHEETING, SHORING, AND BRACING AS NECESSARY, TO PROTECT WORKMEN AND EXISTING UTILITIES DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE A TRENCH SAFETY SYSTEM MEET ALL APPROPRIATE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.
11. THE CONTRACTOR SHALL MAKE A PHYSICAL INSPECTION OF THE SITE BEFORE SUBMITTING A BID FOR THE PROJECT. IT IS ASSUMED THAT THE CONTRACTOR HAS EXAMINED THE PLANS SPECIFICATIONS AND THE SITE BEFORE SUBMITTING A BID. ANY ITEMS THAT WOULD BE REASONABLY REQUIRED FOR CONSTRUCTION, WHETHER OR NOT SPECIFICALLY DENOTED IN THE PLANS SHALL BE PROVIDED BY THE CONTRACTOR.
12. MAINTAIN ONE SET ONE SET OF AS-BUILT DRAWINGS ON THE JOB SITE FOR DISTRIBUTION TO THE ENGINEER UPON COMPLETION. AS-BUILTS SHALL INCLUDE LOCATIONS AND ELEVATIONS OF WATER MAIN, APPURTENANCES, AND ACCUMULATE ON SITE.
13. THE CONTRACTOR SHALL CONTINUOUSLY CLEAN-UP AND REMOVE DEMOLISHED MATERIALS FROM SITE. DO NOT ALLOW MATERIALS TO ACCUMULATE ON SITE.
14. ALL WATER LINES SHALL BE INSTALLED, AND TESTED IN ACCORDANCE WITH THE SPECIFICATIONS.
15. BACKFILL UTILITY TRENCHES UNDER PAVEMENT AREAS AND WITH CRUSHED STONE OR FLOWABLE FILL. BACKFILL UTILITY TRENCHES IN LAWN AREAS WITH SATISFACTORY FILL MATERIAL DEVOID OF LARGE ROCKS AND STONES, COMPACTED TO AT LEAST 90% OF MAXIMUM DRY DENSITY PER ASTM D698.
16. WATER LINE DEPTH SHALL BE GREATER AS NECESSARY TO AVOID SEWER, STORM DRAINS, AND OTHER UTILITIES.
17. ROUTE OF NEW UTILITIES IS SHOWN AS APPROXIMATE. ADJUSTMENTS TO ALIGNMENT SHALL BE MADE IN THE FIELD, IF FIELD CONDITIONS VARY FROM THE PLANS. NO CHANGE ORDERS SHALL BE ISSUED FOR MINOR ALIGNMENT CHANGES FOR EXPLORATORY DIGGING.
18. WHERE NO FITTING IS SHOWN, THE CONTRACTOR SHALL FIELD DIRECT PIPE WITHIN THE PIPE MANUFACTURER'S TOLERANCES TO ESTABLISH PROPER ALIGNMENT. IF TOLERANCES CANT BE MET, DISCLOSE TO THE ENGINEER.
19. CONTRACTOR SHALL RESTORE ALL EFFECTED STRUCTURES AND PROPERTY AFFECTED DURING CONSTRUCTION, TO A CONDITION THAT IS EQUAL OR BETTER THAN THE PRE-CONSTRUCTION CONDITIONS, AND/OR CONDITION THAT IS SATISFACTORY TO THE PROPERTY OWNER AND THE TOWN OF CUMBERLAND CITY.
20. THE CONTRACTOR IS REQUIRED TO PROVIDE AND INSTALL TRACER WIRE AND DETECTOR TAPE.
21. THE CONTRACTOR SHALL LANDSCAPE DISTRIBUTED AREAS IMMEDIATELY AFTER CONSTRUCTION TO WITHIN 0.3 FEET OF EXISTING GRADE.



**2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS**

CUMBERLAND CITY



DATE: 12/05/2025



REVISION BLOCK

NO.	REVISION:	DATE:
A	FINAL PLANS	12/05/2025

GENERAL NOTES

G 0.01

**2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS**

CUMBERLAND CITY



DATE: 12/05/2025

LEGEND

- EXISTING PROPERTY LINE
- ROW --- EXISTING RIGHT-OF-WAY
- TREE LINE
- OHP --- EXISTING OVERHEAD POWER
- 6"W --- EXISTING 6" WATER MAIN
- EXISTING GUARDRAIL
- EXISTING POWER POLE
- EXISTING RIP-RAP
- EXISTING CONCRETE
- EXISTING GRAVEL
- NEW 8" RJ DUCTILE IRON PIPE
- SAW CUT
- OPEN CUT
- NEW 8" X 6" MJ REDUCER
- NEW 8" MJ GATE VALVE
- NEW 2" BLOW OFF HYDRANT



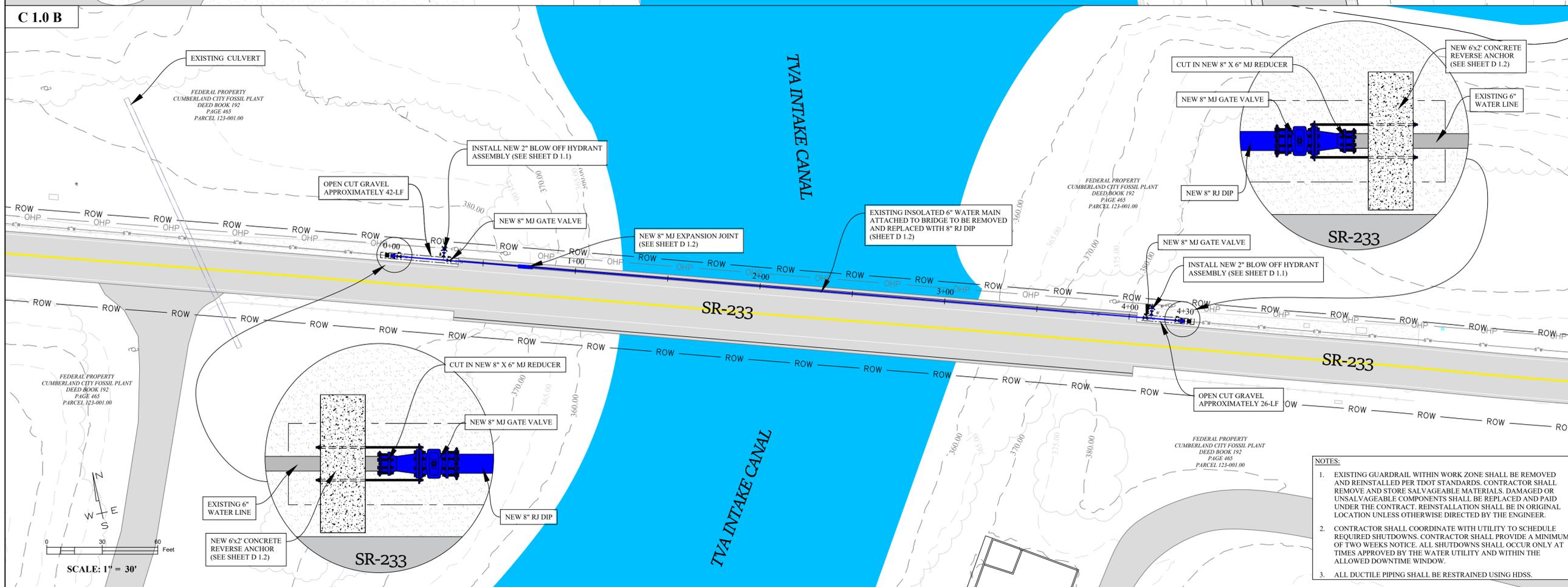
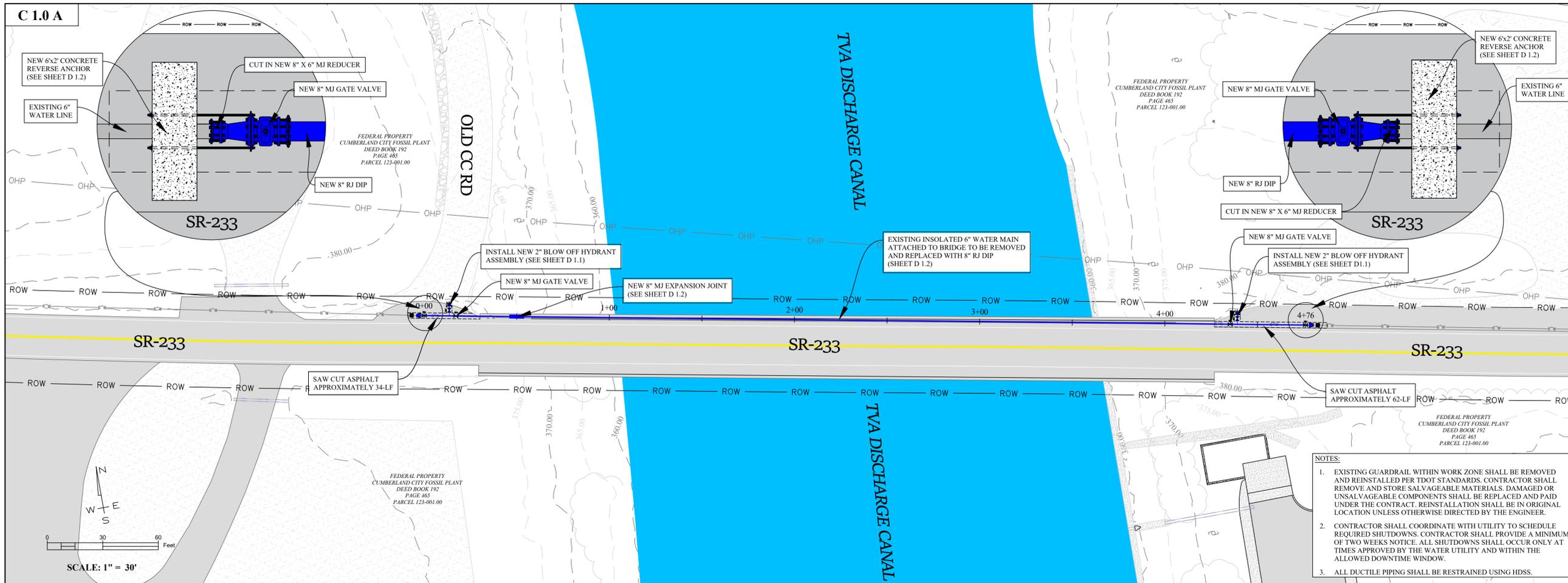
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NO.	REVISION:	DATE:
A	FINAL PLANS	12/05/2025

**BRIDGE CROSSING WATER CONSTRUCTION PLAN**

C 1.0



NOTES:  
1. EXISTING GUARDRAIL WITHIN WORK ZONE SHALL BE REMOVED AND REINSTALLED PER TDOT STANDARDS. CONTRACTOR SHALL REMOVE AND STORE SALVAGEABLE MATERIALS. DAMAGED OR UNSALVAGEABLE COMPONENTS SHALL BE REPLACED AND PAID UNDER THE CONTRACT. REINSTALLATION SHALL BE IN ORIGINAL LOCATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.  
2. CONTRACTOR SHALL COORDINATE WITH UTILITY TO SCHEDULE REQUIRED SHUTDOWNS. CONTRACTOR SHALL PROVIDE A MINIMUM OF TWO WEEKS NOTICE. ALL SHUTDOWNS SHALL OCCUR ONLY AT TIMES APPROVED BY THE WATER UTILITY AND WITHIN THE ALLOWED DOWNTIME WINDOW.  
3. ALL DUCTILE PIPING SHALL BE RESTRAINED USING HDSS.

NOTES:  
1. EXISTING GUARDRAIL WITHIN WORK ZONE SHALL BE REMOVED AND REINSTALLED PER TDOT STANDARDS. CONTRACTOR SHALL REMOVE AND STORE SALVAGEABLE MATERIALS. DAMAGED OR UNSALVAGEABLE COMPONENTS SHALL BE REPLACED AND PAID UNDER THE CONTRACT. REINSTALLATION SHALL BE IN ORIGINAL LOCATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.  
2. CONTRACTOR SHALL COORDINATE WITH UTILITY TO SCHEDULE REQUIRED SHUTDOWNS. CONTRACTOR SHALL PROVIDE A MINIMUM OF TWO WEEKS NOTICE. ALL SHUTDOWNS SHALL OCCUR ONLY AT TIMES APPROVED BY THE WATER UTILITY AND WITHIN THE ALLOWED DOWNTIME WINDOW.  
3. ALL DUCTILE PIPING SHALL BE RESTRAINED USING HDSS.

**2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS**

CUMBERLAND CITY



DATE: 12/05/2025

LEGEND

- EXISTING PROPERTY LINE
- ROW — EXISTING RIGHT-OF-WAY
- TREE LINE
- OHP — EXISTING OVERHEAD POWER
- 6"W — EXISTING 6" WATER MAIN
- EXISTING GUARDRAIL
- EXISTING POWER POLE
- EXISTING RIP-RAP
- EXISTING CONCRETE
- EXISTING GRAVEL
- NEW 12" RJ DUCTILE IRON PIPE
- SAW CUT
- OPEN CUT
- NEW 8" X 6" MJ REDUCER
- NEW 8" MJ GATE VALVE
- NEW 2" BLOW OFF HYDRANT



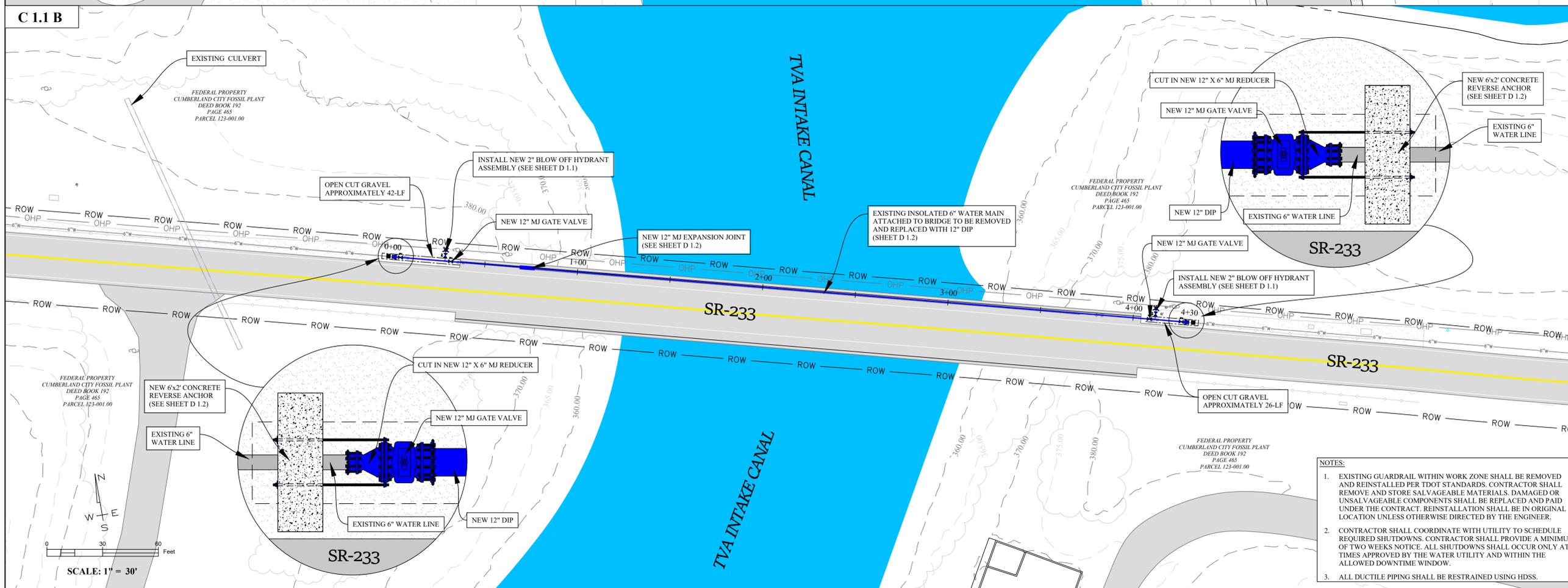
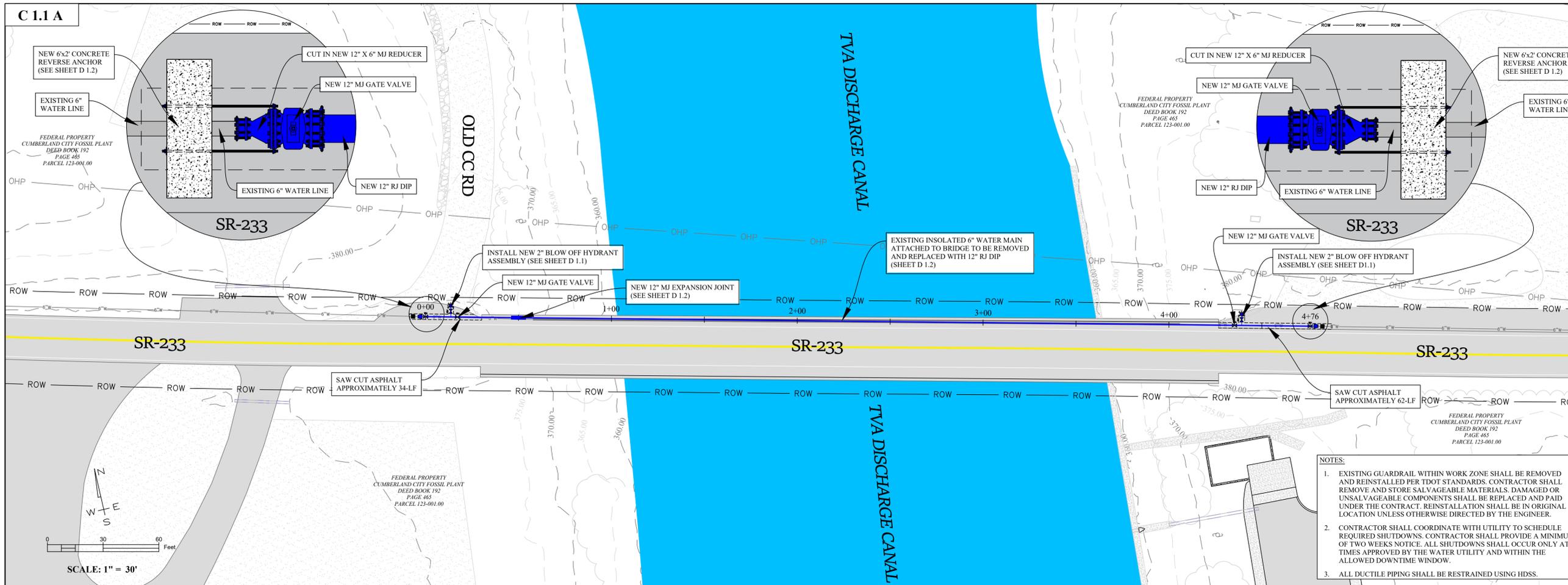
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**ADDITIVE ALTERNATE BRIDGE CROSSING WATER CONSTRUCTION PLAN**

C 1.1



**2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS**

CUMBERLAND CITY



DATE: 12/05/2025



REVISION BLOCK

NO.	REVISION:	DATE:
A	FINAL PLANS	12/05/2025

WATER CONSTRUCTION DETAILS

D 1.0

**REDUCER**

LENGTH (L) TO BE RESTRAINED

NOMINAL PIPE SIZE	HORIZONTAL BENDS				VERTICAL OFFSETS (SEE NOTE 4)		VALVES OR DEAD ENDS
	90° BENDS	45° BENDS	22.5° BENDS	11.25° BENDS	UPPER	LOWER	
4"	21'	9'	5'	3'	17'	3'	47'
6"	30'	13'	6'	3'	23'	4'	66'
8"	38'	16'	8'	4'	30'	6'	86'
10"	45'	19'	9'	5'	36'	7'	103'
12"	53'	22'	11'	6'	43'	8'	121'
14"	61'	26'	13'	6'	50'	9'	140'
16"	66'	28'	14'	7'	55'	10'	154'
18"	73'	30'	15'	8'	60'	11'	170'
20"	79'	33'	16'	8'	66'	12'	186'
24"	93'	39'	19'	10'	77'	15'	204'
30"	111'	47'	23'	12'	92'	17'	222'
36"	131'	56'	28'	15'	107'	20'	257'
42"	153'	66'	34'	18'	125'	24'	289'
48"	177'	78'	41'	22'	145'	28'	321'

**REDUCERS**

SIZE	L
6X4	34'
8X6	36'
8X4	62'
10X8	35'
10X6	63'
12X10	36'
12X8	64'
16X12	66'
16X10	92'
20X18	35'
20X16	66'
20X12	117'
24X20	56'
24X18	80'
24X16	101'
30X24	78'
30X20	121'
36X30	78'
36X24	142'
42X36	75'
42X30	140'
48X42	75'
48X36	139'

**NOTE:**

- THIS SCALE SHALL BE USED ON ALL WATER AND SEWER FORCE MAIN SYSTEMS. ALL FITTINGS SHALL BE RESTRAINED TO THE LENGTHS INDICATED ON THE ABOVE SCHEDULE AT A MINIMUM.
- ASSUMPTIONS: PVC PIPE, SAFETY FACTOR=1.5, TEST PRESSURE=150PSI, SOIL=GM OR SM, TRENCH TYPE 3, DEPTH OF COVER=30 INCHES FOR 20" AND SMALLER PIPE SIZE OR 36 INCHES FOR 24" AND LARGER PIPE SIZE.
- BENDS AND VALVES: SHALL BE RESTRAINED ON EACH SIDE.
- VERTICAL OFFSETS: ARE APPROX. 3 FEET COVER ON TOP AND APPROX. 8 FEET COVER ON BOTTOM. PER THE DETAILS, L<sub>u</sub> IS RESTRAINED LENGTH FOR UPPER (TOP) LEVEL, L<sub>l</sub> IS THE RESTRAINED LENGTH FOR THE LOWER (DEEPER) LEVEL. ASSUME 45 DEGREE BENDS.
- TEES: TOTAL LENGTH BETWEEN FIRST JOINTS OR RESTRAINED LENGTH ON EITHER SIDE OF TEE (RUN) SHALL BE A TOTAL DISTANCE OF 30 FEET (MIN). SEE SCHEDULE FOR RESTRAINED LENGTH ON TEE "BRANCH" LINE.
- HOPE TO PVC TRANSITIONS: THE PVC PIPE SIDE SHALL BE RESTRAINED 35 FT. (MIN).
- THE INSTALLATION OF BELL HARNESS RESTRAINTS AT PVC JOINTS (DR-18 AND DR-25 PIPES) SHALL BE COMPLETED PER THE MANUFACTURER'S RECOMMENDATION, WHICH INCLUDES NOT OVER TIGHTENING THE PARALLEL RODS/NUTS. THESE NUTS SHOULD ONLY BE SNUG TIGHT. THE HONEYMARKS ON THE PIPE SHOULD ALWAYS BE VISIBLE AFTER THE RESTRAINT IS INSTALLED. OVER TIGHTENING THE JOINT MAY CAUSE A FAILURE AT THE BELL RESULTING IN A SERVICE OUTAGE.

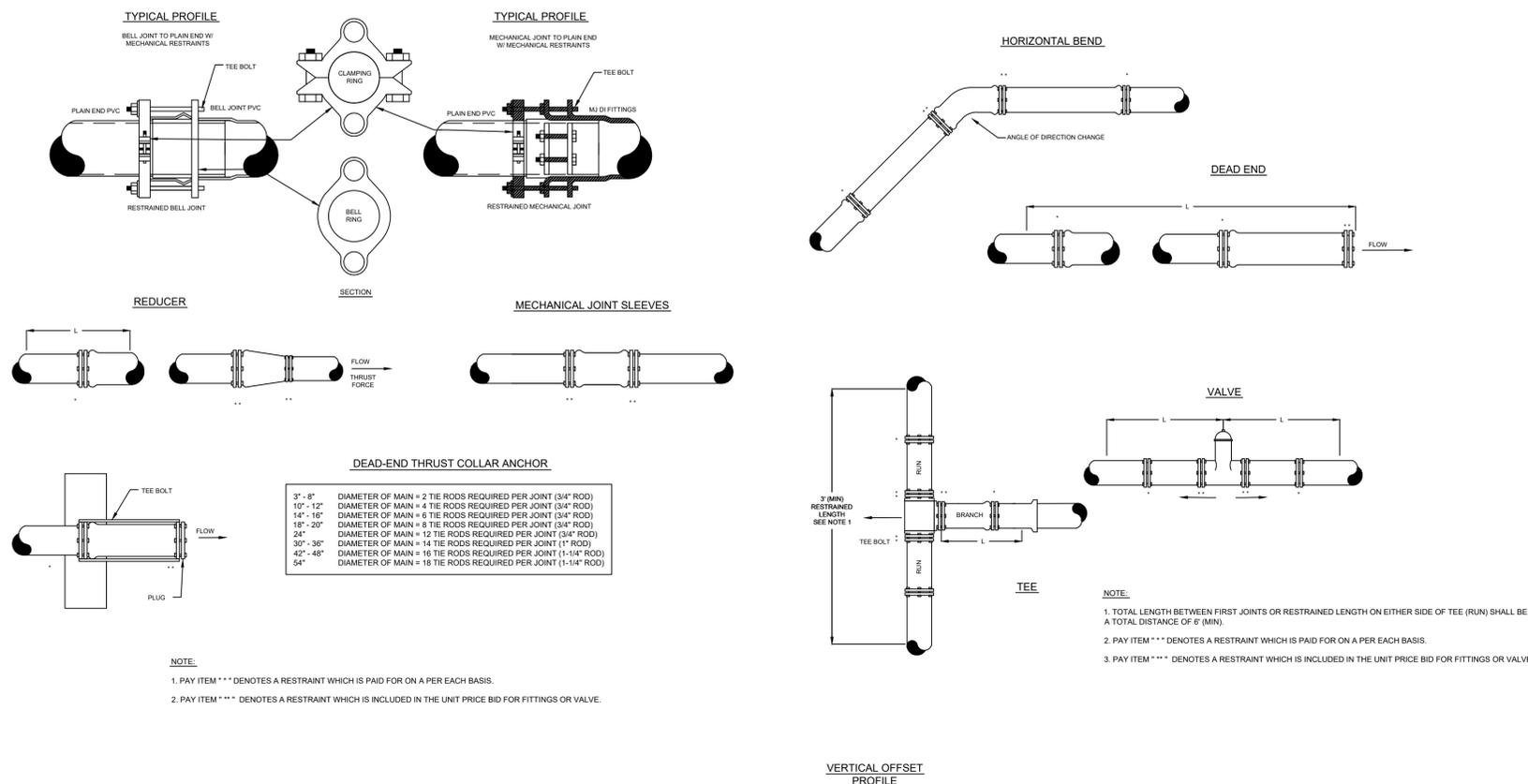
**TEES**

(SEE NOTE 5)

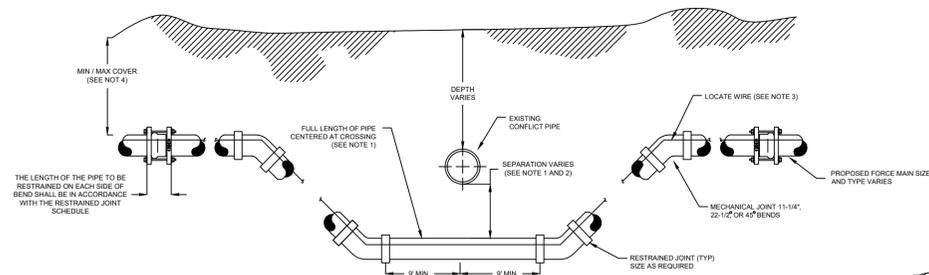
RUN	BRANCH	L
4"	4"	F.O.
4"	6"	10'
4"	8"	6">
8"	8"	29'
8"	8">	F.O.
10"	10"	45'
10"	8"	13'
10"	8">	F.O.
12"	12"	63'
12"	10"	32'
12"	8">	F.O.
16"	16"	94'
16"	12"	39'
16"	10"	5'
16"	10">	F.O.
20"	20"	125'
20"	16"	76'
20"	12"	14'
20"	12">	F.O.
24"	24"	124'
24"	20"	84'
24"	16"	36'
24"	16">	F.O.
30"	30"	159'
30"	24"	104'
30"	20"	80'
30"	16"	5'
30"	16">	F.O.
36"	36"	192'
36"	30"	142'
36"	24"	83'
36"	20"	33'
36"	20">	F.O.
42"	42"	223'
42"	36"	178'
42"	30"	124'
42"	24"	59'
42"	20"	5'
42"	20">	F.O.
48"	48"	253'
48"	42"	209'
48"	36"	162'
48"	30"	104'
48"	24"	34'
48"	24">	F.O.

F.O. = FITTING ONLY

**MECHANICAL RESTRAINTS**



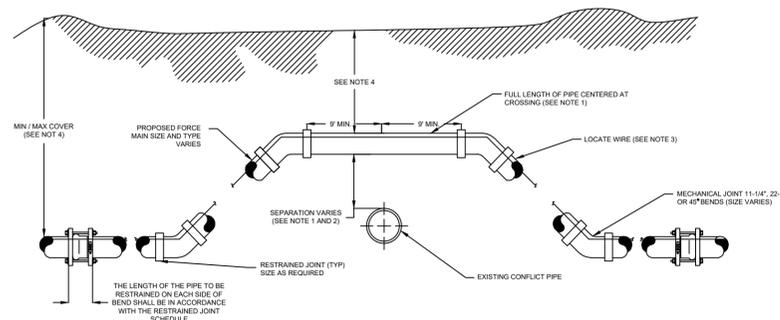
**ADJUSTMENT UNDER EXISTING UTILITIES MECHANICAL RESTRAINTS**



**NOTE:**

- IF EXISTING CONFLICT PIPE IS A WATER MAIN, 18-INCHES OF SEPARATION IS REQUIRED. A FULL LENGTH OF PIPE SHALL BE CENTERED OVER EXISTING UTILITY MAIN TO PROVIDE MAXIMUM JOINT SPACING FOR ALL CROSSINGS.
- IF EXISTING CONFLICT IS SEWER MAIN A WATERTIGHT CASING SHALL BE REQUIRED.
- LOCATOR WIRE REQUIRED
- THE COVER FOR PIPING LESS THAN 24" SIZE SHALL BE 30" (MIN) IN UNPAVED AREAS, 36" (MIN) IN PAVED AREAS, AND A MAXIMUM OF 60", UNLESS APPROVED BY OWNER. THE COVER FOR PIPING 24" SIZE AND LARGER SHALL BE 36" (MIN) IN PAVED AND UNPAVED AREAS AND A MAXIMUM COVER OF 84", UNLESS APPROVED BY OWNER.
- THE SOLIDS BETWEEN THE MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST ASTM D 1557.

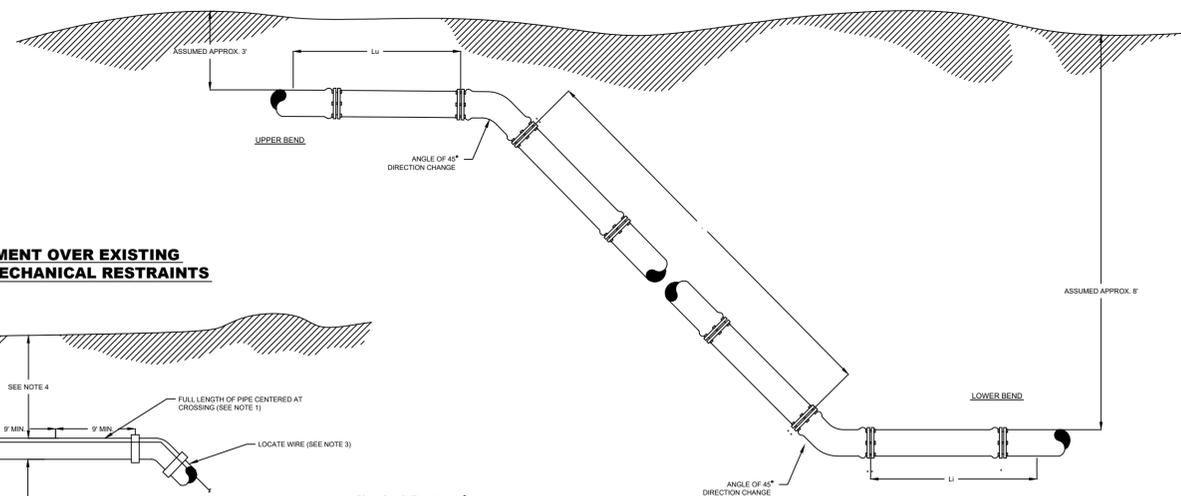
**ADJUSTMENT OVER EXISTING UTILITIES MECHANICAL RESTRAINTS**



**NOTE:**

- IF EXISTING CONFLICT PIPE IS A WATER MAIN, 18-INCHES OF SEPARATION. A FULL LENGTH OF PIPE SHALL BE CENTERED OVER EXISTING UTILITY MAIN TO PROVIDE MAXIMUM JOINT SPACING FOR ALL CROSSINGS.
- IF EXISTING CONFLICT PIPE IS WATER MAIN AND PROPOSED PIPING IS SEWER MAIN A WATERTIGHT CASING SHALL BE REQUIRED.
- LOCATOR WIRE REQUIRED.
- THE COVER OF LESS THAN 24" SIZE SHALL BE 30" (MIN) IN PAVED AREAS, 36" (MIN) IN PAVED AREAS AND A MAXIMUM COVER OF 60", UNLESS APPROVED BY OWNER. THE COVER FOR PIPING 24" SIZE AND LARGER SHALL BE 36" (MIN) IN PAVED AND UNPAVED AREAS AND A MAXIMUM COVER OF 84", UNLESS APPROVED BY OWNER.
- THE SOLIDS BETWEEN THE MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFY PROCTOR TEST ASTM D 1557.

**VERTICAL OFFSET PROFILE**



**2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS**

CUMBERLAND CITY



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WATER CONSTRUCTION DETAILS

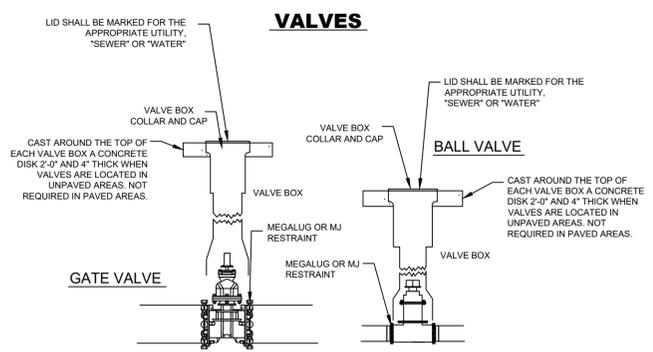
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**THRUST BLOCKING DETAILS**

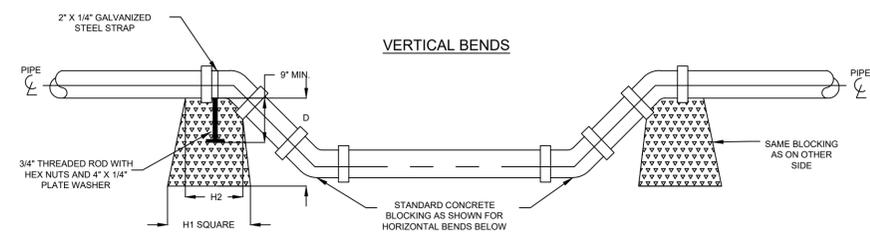
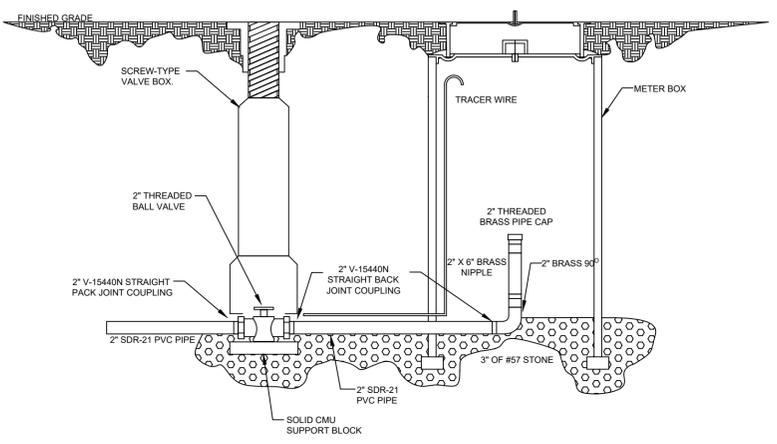
TABLE OF DIMENSIONS FOR CONCRETE THRUST BLOCKS

PIPE SIZE	TEES, CROSSES, PLUGS				90° BENDS				45° BENDS				22-1/2° BENDS				11-1/4° BENDS				PIPE SIZE							
	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.								
2"	2-1/4"	18"	10"	12"	18"	1.90	18"	10"	12"	18"	1.90	18"	6"	12"	18"	1.50	18"	6"	12"	18"	1.50	18"	6"	12"	18"	1.50	2"	2-1/4"
3"	4"	24"	12"	12"	18"	2.25	24"	12"	12"	18"	2.25	18"	8"	12"	18"	1.60	18"	8"	12"	18"	1.60	18"	8"	12"	18"	1.60	3"	4"
6"	6"	24"	16"	18"	18"	3.50	30"	16"	18"	18"	4.05	24"	10"	16"	18"	3.20	24"	10"	16"	18"	3.20	24"	10"	16"	18"	3.20	6"	6"
8"	8"	36"	18"	18"	18"	5.05	39"	18"	24"	18"	7.30	30"	11"	18"	18"	3.95	30"	11"	18"	18"	3.95	24"	11"	16"	18"	3.40	8"	8"
10"	10"	48"	24"	18"	24"	7.15	54"	32"	24"	24"	10.25	24"	18"	21"	18"	4.60	24"	18"	21"	18"	4.60	24"	18"	21"	18"	4.60	10"	10"
12"	12"	54"	30"	24"	24"	13.40	54"	32"	36"	24"	18.15	42"	18"	24"	24"	9.60	24"	18"	24"	24"	9.60	24"	18"	21"	24"	6.10	12"	12"
14"	14"	60"	32"	30"	24"	17.90	60"	40"	42"	24"	25.00	44"	24"	30"	24"	13.20	30"	24"	24"	24"	9.20	27"	21"	24"	24"	7.90	14"	14"
16"	16"	66"	34"	36"	24"	22.50	69"	48"	48"	24"	29.00	48"	30"	36"	24"	17.00	36"	30"	27"	24"	11.80	27"	24"	27"	24"	9.10	16"	16"
18"	18"	66"	36"	40"	24"	27.50	69"	48"	48"	24"	33.00	48"	30"	36"	24"	17.00	36"	30"	29"	24"	13.00	27"	30"	29"	24"	11.00	18"	18"

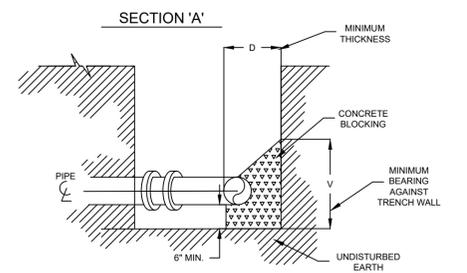
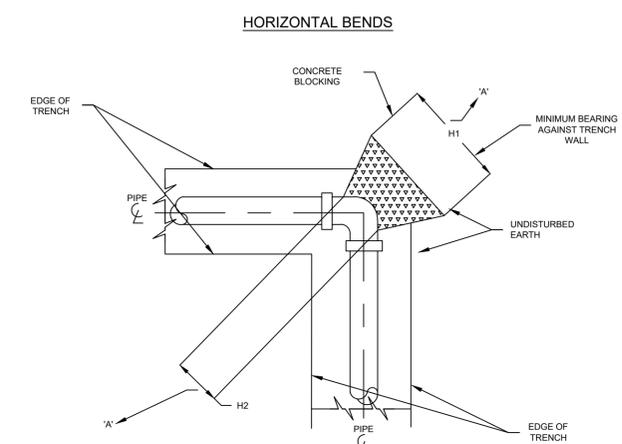
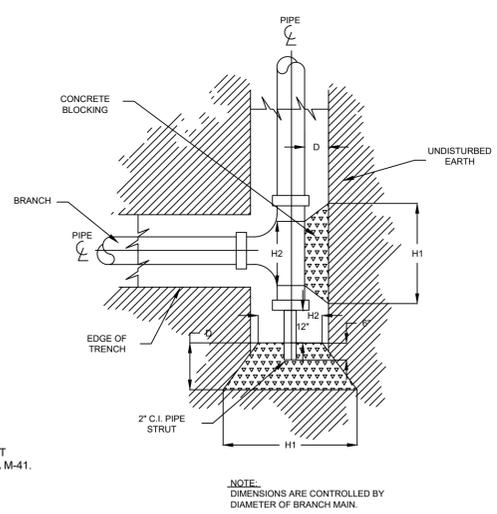
- NOTES:
- DO NOT COVER BELLS OR FLANGES WITH CONCRETE.
  - WRAP ALL FITTINGS WITH POLYETHYLENE PLASTIC SHEETING.
  - BACK ALL TEES ACCORDING TO SIZE OF BRANCH.
  - BACKING FUTURE LINE EXTENSIONS SHALL BE THAT LATER REMOVAL IS POSSIBLE
  - ALL BENDS WHERE FITTINGS ARE USED, BOTH HORIZONTAL AND VERTICAL SHALL BE BACKED.
  - REACTION BACKING TABLE IS BASED ON UTILITY MAIN PRESSURE OF 2,500 LB. / SQ. FT. ADDITIONAL BACKING MAY BE REQUIRED IN SOME AREAS AS DIRECTED BY ENGINEERS.
  - ALL CONCRETE SHALL BE 2500 P.S.I. MINIMUM.
  - 18" AND LARGER REQUIRES ANTI-THRUST DESIGN.
  - ALL 90 DEGREE BENDS ON PVC SERVICE LINES (INCLUDING 1"-2" LINES) SHALL BE BACKED WITH CONCRETE.



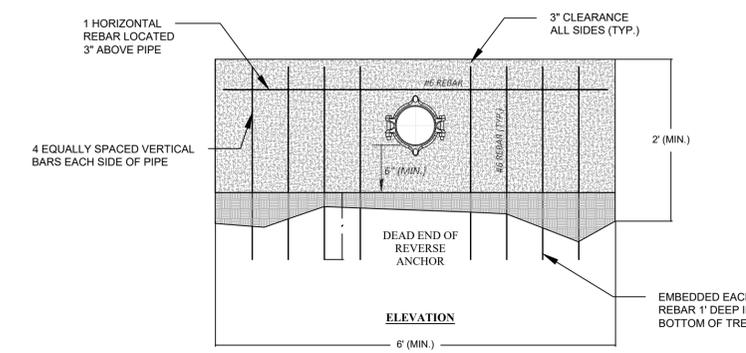
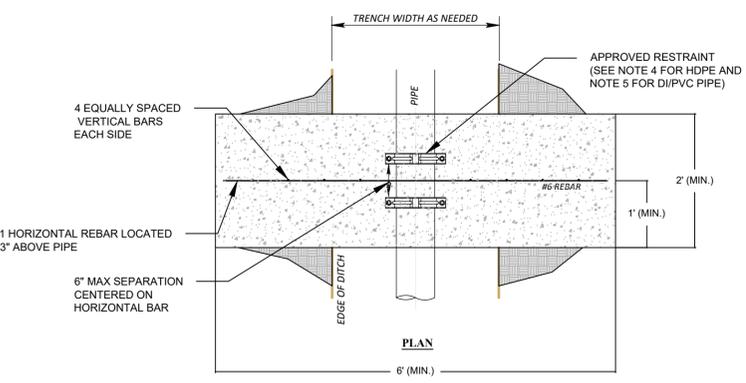
**BLOWOFF ASSEMBLY**



**TEES, CROSSES, PLUGS**



**REVERSE CONCRETE ANCHOR**



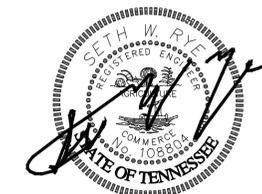
- NOTES
- REFER TO AWWA M-41 AND AWWA M-55 FOR PIPE DESIGN.
  - THE DESIGN ENGINEER IS RESPONSIBLE FOR VERIFYING ASSUMPTIONS BASED ON ACTUAL SITE CONDITIONS. IF SITE CONDITIONS DIFFER FROM ASSUMPTIONS, THE ENGINEER MUST PROVIDE A SITE-SPECIFIC DESIGN THAT COMPLIES WITH AWWA M-41.
  - A SITE-SPECIFIC DESIGN IS REQUIRED FOR:
  - PIPES LARGER THAN 12 INCHES. MAXIMUM STATIC PRESSURES GREATER THAN 250 PSI. APPROVED RESTRAINT FOR HDPE PIPES INCLUDES:
  - FUSED HDPE WALL ANCHOR. ELECTROFUSION FLEX RESTRAINT. 600 SERIES PIPE JOINT RESTRAINT BY ROMAC (2 REQUIRED). OWNER-APPROVED EQUAL RESTRAINT METHODS. APPROVED RESTRAINT FOR DI AND PVC PIPES INCLUDES:
  - 600 SERIES PIPE JOINT RESTRAINT BY ROMAC (2 REQUIRED). OWNER-APPROVED EQUAL RESTRAINT METHODS.

**ALLOWABLE LONGITUDINAL PIPE BENDING IN PVC PIPE**

PIPE SIZE	MAXIMUM PIPE END OFFSET FROM TANGENT CIRCLE ('A')	
	SDR 21 PVC	C900 DR14 PVC
2"	56"	---
6"	22"	16"
8"	17"	12"
10"	13"	9"

**2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS**

CUMBERLAND CITY



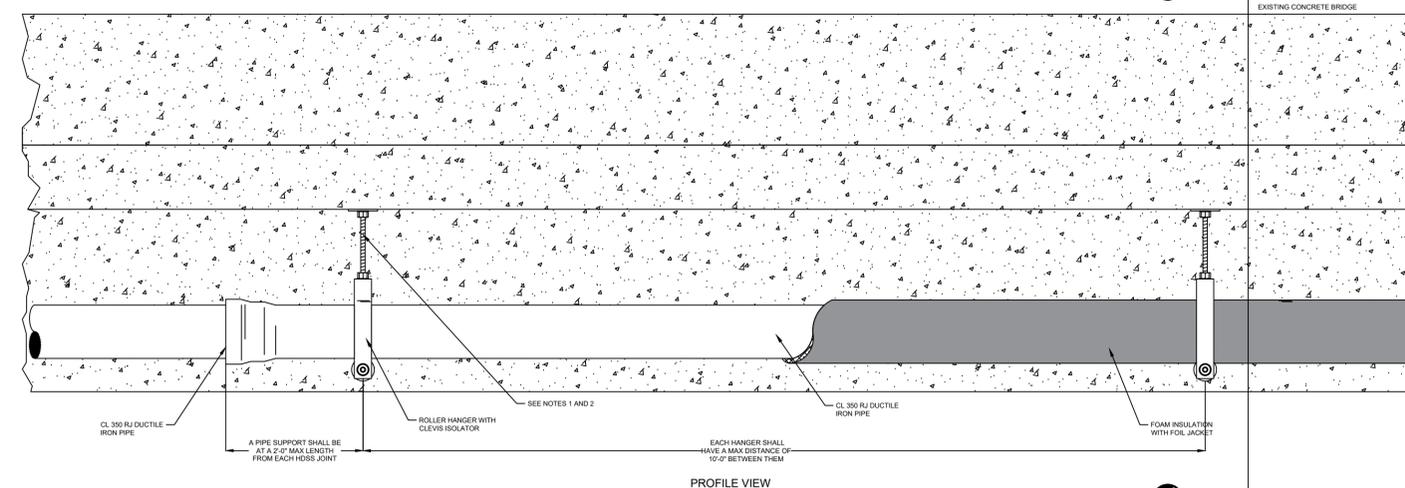
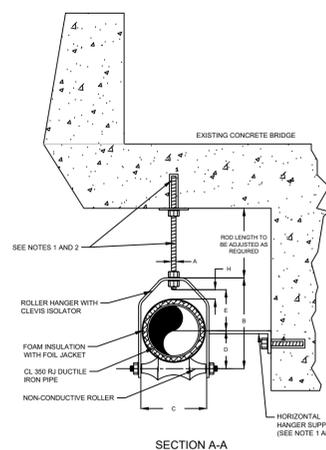
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**TYPICAL PIPE HANGER AND SUPPORT DETAIL**

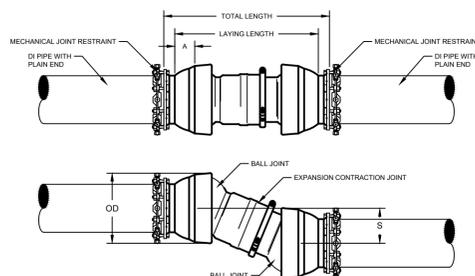
PIPE HANGER AND SUPPORTS										
PIPE SIZE	MAX O.D. OF COVERING	MAX LOAD	WEIGHT	ROD SIZE	A	B	C	D	ROD TAKE OUT E	H
2 1/2"	3"	225LBS	1.7LBS	1/2"	5 3/4"	3 1/4"	1 15/16"	2 7/8"	1 11/16"	
3"	3 5/8"	310LBS	2.2LBS		6 3/4"	3 7/8"	2 1/4"	3 1/8"	1 5/8"	
3 1/2"	4 1/8"	390LBS	2.5LBS	5/8"	7"	4 3/8"	2 9/16"	3 1/2"	1 11/16"	
4"	4 11/16"	475LBS	3.2LBS		7 9/16"	4 5/16"	2 13/16"	3 5/8"	1 5/8"	
5"	5 3/4"	685LBS	6.3LBS	3/4"	9 1/8"	6"	3 7/16"	4 1/2"	1 15/16"	
6"	6 7/8"	780LBS	9.3LBS		10 5/16"	7 1/8"	4"	5"	1 7/8"	
8"	9"	145LBS	14.5LBS	7/8"	12 11/16"	9 1/4"	5 1/8"	6 1/8"	2"	
10"	11"	965LBS	18.8LBS		15 1/8"	11 1/4"	6 3/8"	7 1/4"	2 1/16"	
12"	13"	27.7LBS	39.1LBS	1"	17 7/16"	13 1/4"	7 7/16"	8 3/8"	2 1/4"	
14"	14 1/4"	1,200LBS	49.1LBS		18 7/8"	14 1/2"	8 3/8"	8 3/4"	2"	
16"	16 1/4"	1,400LBS	57.8LBS	1 1/4"	20 13/16"	16 1/2"	9 3/8"	9 11/16"	1 15/16"	
18"	18 1/4"	1,600LBS	75.9LBS		23 3/4"	18 1/2"	10 7/16"	11 7/16"	2 1/2"	
20"	20 1/4"	1,800LBS	119.3LBS	1 1/2"	32 5/16"	24 5/8"	13 15/16"	15 3/4"	4 3/8"	

**NOTES:**

- CORE DRILL THROUGH BRIDGE CONCRETE AS REQUIRED FOR THREADED ROD INSTALLATION AND UTILIZE OR ENLARGE EXISTING CORE HOLES WHERE POSSIBLE TO ACCOMMODATE NEW HANGERS.
- INSTALL THREADED ROD WITH A MINIMUM 5-1/2" EMBEDMENT INTO EXISTING BRIDGE CONCRETE AND SECURE IN PLACE USING HILTI-HY ADHESIVE ANCHOR SYSTEM OR EQUAL.



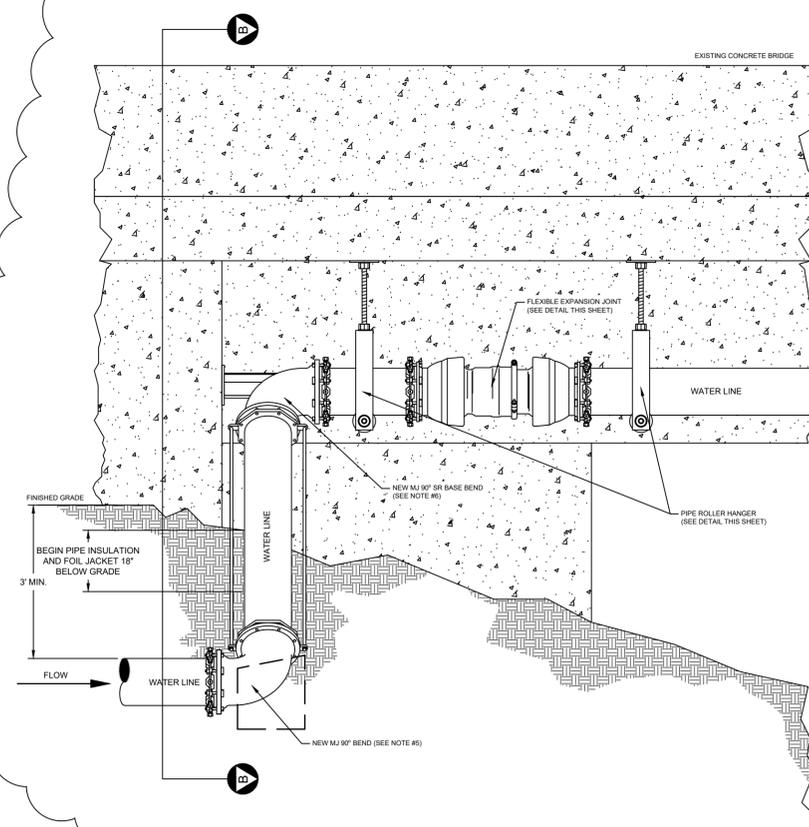
**FLEXIBLE EXPANSION JOINT DETAIL**



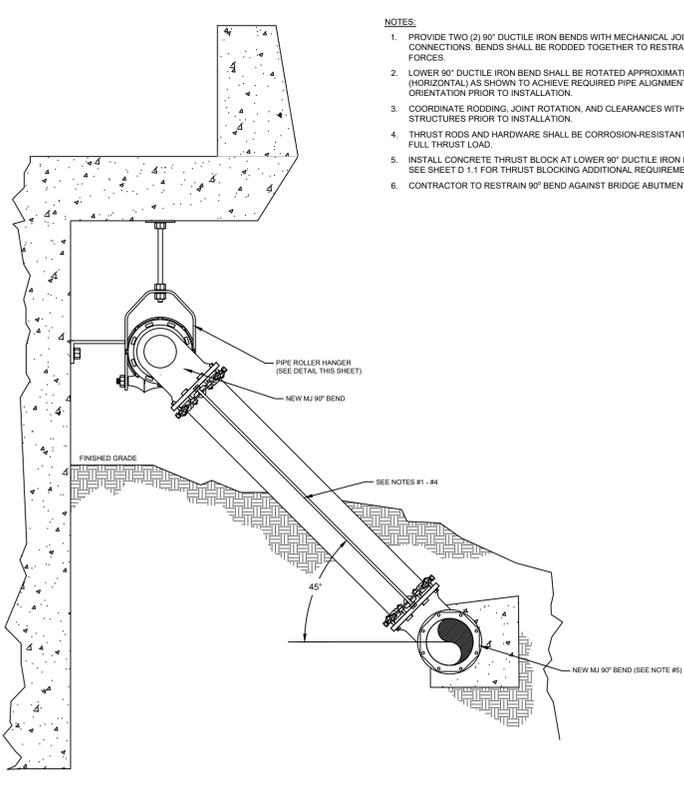
PIPE SIZE	OD	DEFLECTION (DEGREES)	A	EXPANSION	TOTAL LENGTH	LAYING LENGTH	S (OFFSET)	WEIGHT (LBS.)
3"	9.20"	20°	3.88"	4"	35.89"	30.80"	7.75"	176
				8"	51.00"	45.00"	13.20"	221
				12"	56.30"	51.30"	18.84"	265
4"	10.85"	20°	3.55"	4"	34.99"	29.99"	8.49"	152
				8"	50.24"	45.24"	14.39"	203
				12"	54.49"	50.49"	20.29"	248
6"	12.28"	20°	4.20"	4"	37.11"	32.11"	8.79"	213
				8"	51.39"	46.39"	14.36"	274
				12"	55.61"	52.26"	19.93"	335
8"	14.82"	20°	4.91"	4"	41.41"	36.41"	9.79"	311
				8"	58.51"	53.51"	16.31"	404
				12"	75.61"	70.61"	22.84"	497
10"	18.03"	20°	6.18"	4"	45.74"	40.74"	10.39"	475
				8"	61.54"	56.54"	16.49"	612
				12"	77.34"	72.34"	22.57"	750
12"	20.69"	20°	6.84"	4"	49.91"	43.91"	11.03"	587
				8"	64.88"	59.88"	17.17"	735
				12"	80.81"	75.81"	23.31"	882
14"	25.00"	20°	7.00"	4"	65.10"	58.10"	11.79"	1222
				8"	81.50"	74.50"	18.89"	1510
				12"	117.00"	110.00"	29.66"	1798
16"	25.00"	15°	10.30"	4"	74.00"	67.00"	12.41"	1133
				8"	101.50"	94.50"	19.88"	1465
				12"	128.00"	122.00"	27.36"	1797
18"	30.50"	15°	12.60"	4"	71.50"	65.50"	12.82"	1760
				8"	99.20"	92.10"	19.86"	2153
				12"	126.20"	119.20"	27.09"	2546
20"	30.50"	15°	10.40"	4"	73.50"	68.50"	12.30"	1874
				8"	101.00"	94.00"	19.61"	2298
				12"	128.00"	121.00"	26.90"	2721
24"	37.30"	15°	13.80"	4"	87.00"	80.00"	13.99"	3183
				8"	114.00"	107.00"	21.30"	3802
				12"	141.50"	134.00"	28.62"	4555
30"	44.00"	15°	12.30"	4"	88.20"	80.20"	17.50"	4985
				8"	132.50"	124.50"	26.53"	5976
				12"	166.80"	158.80"	35.37"	6856

**NOTES:**

- FOR PVC PIPING THE SERIES 2000PV MEGALUG MECHANICAL JOINT RESTRAINT SHALL BE USED FOR PIPING CONNECTION.
- FOR DUCTILE IRON PIPING THE SERIES 1100 MEGALUG MECHANICAL JOINT RESTRAINT SHALL BE USED FOR PIPING CONNECTION.
- EXPANSION JOINT TO BE INSTALLED IN AN ACCESSIBLE LOCATION FOR FUTURE MAINTENANCE AND PACKING ADJUSTMENT.
- FITTING IS DESIGNED FOR ANGULAR DEFLECTION AND AXIAL PIPE MOVEMENT.



**BRIDGE PIPING CONNECTION DETAIL**



**NOTES:**

- PROVIDE TWO (2) 90° DUCTILE IRON BENDS WITH MECHANICAL JOINT (MJ) CONNECTIONS. BENDS SHALL BE RODDED TOGETHER TO RESTRAIN AGAINST THRUST FORCES.
- LOWER 90° DUCTILE IRON BEND SHALL BE ROTATED APPROXIMATELY 45° IN PLAN (HORIZONTAL) AS SHOWN TO ACHIEVE REQUIRED PIPE ALIGNMENT. FIELD VERIFY ORIENTATION PRIOR TO INSTALLATION.
- COORDINATE RODDING, JOINT ROTATION, AND CLEARANCES WITH ADJACENT STRUCTURES PRIOR TO INSTALLATION.
- THRUST RODS AND HARDWARE SHALL BE CORROSION-RESISTANT AND DESIGNED FOR FULL THRUST LOAD.
- INSTALL CONCRETE THRUST BLOCK AT LOWER 90° DUCTILE IRON BEND AS SHOWN. SEE SHEET D.1.1 FOR THRUST BLOCKING ADDITIONAL REQUIREMENTS.
- CONTRACTOR TO RESTRAIN 90° BEND AGAINST BRIDGE ABUTMENT.



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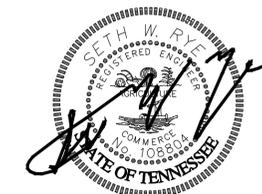
**REVISION BLOCK**

NO.	REVISION:	DATE:
A	FINAL PLANS	12/05/2025
B	ADDENDUM #1	02/10/2025

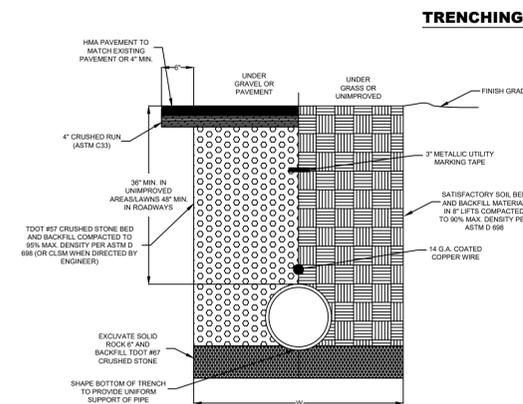
**WATER CONSTRUCTION DETAILS**

**2024 ARPA CUMBERLAND CITY WATER SYSTEM IMPROVEMENTS**

CUMBERLAND CITY



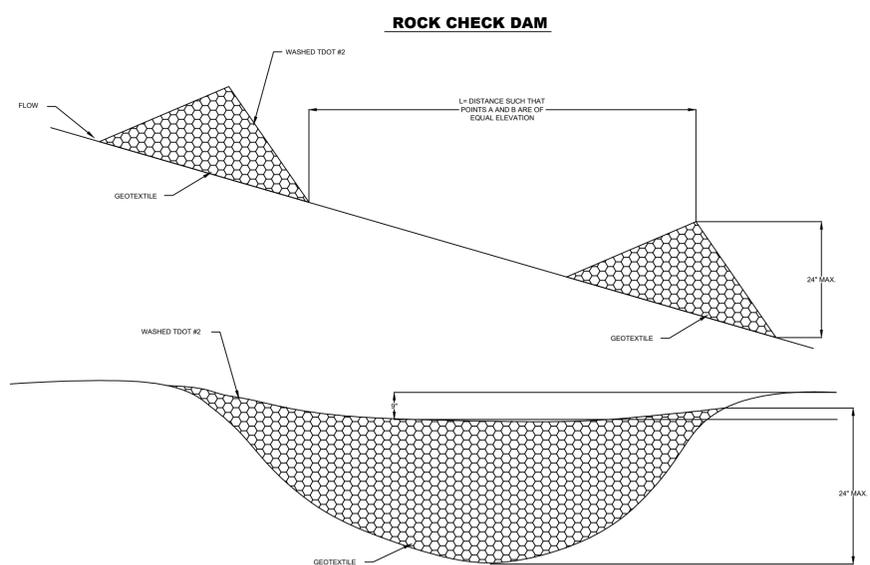
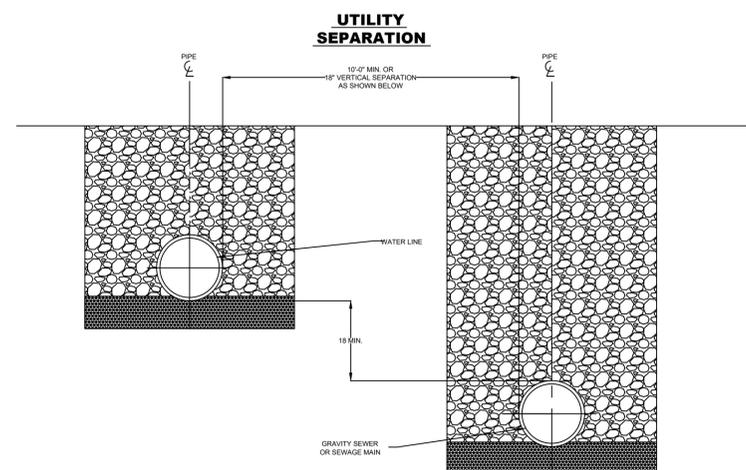
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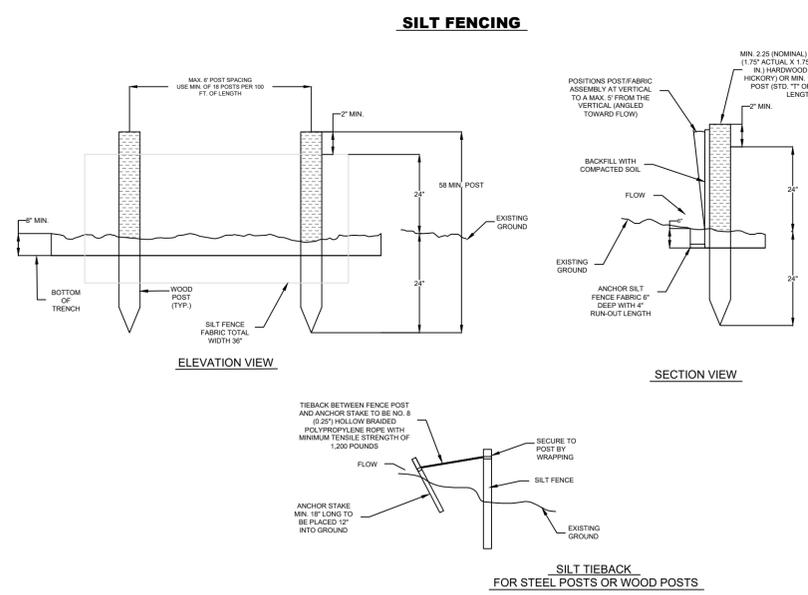
PIPE DIAMETER	TRENCH WIDTH (W)	
	MIN.	MAX.
4"	4"	48"
6"	6"	48"
8"	8"	48"
10"	10"	48"
12"	12"	48"
16"	16"	48"
18"	18"	54"
24"	24"	60"
30"	30"	74"
36"	36"	80"
42"	42"	86"
48"	48"	92"
54"	54"	98"
60"	60"	104"
72"	72"	116"

**TRENCH NOTES:**  
COMPACTED BACKFILL SHALL BE LACED TO ONE FOOT MIN. DEPTH OF COVER. THE INITIAL BACKFILL SHALL BE A MATERIAL FREE FROM ROCKS GREATER THAN 10" DIA. SOIL CLOSURE OR FROZEN MATERIAL. WHEN AUTOMATIC TAMPERS ARE USED, CARE SHALL BE EXERCISED TO AVOID DAMAGE TO THE PIPE.  
ALL WATER LINE TRENCHES AND BORE PIT AREAS SHALL BE MECHANICALLY COMPACTED.

W: TRENCH WIDTH AT BOTTOM OF PIPE. TRENCH SIDE SLOPES SHALL BE IN ACCORDANCE WITH OSHA REQUIREMENTS.



**NOTE:**  
SEDIMENT SHALL BE REMOVED BEFORE IT REACHES THE HEIGHT OF ONE HALF OF THE ORIGINAL DAM. CHECKS DAMS SHALL BE REMOVED ONCE FINAL STABILIZATION OCCURS. AREAS DISTURBED BY THE REMOVAL OF THE DAMS SHALL BE SEEDED AND MULCHED IMMEDIATELY.



REVISION BLOCK		
NO.	REVISION:	DATE:
A	FINAL PLANS	12/05/2025

**WATER CONSTRUCTION DETAILS**

D 1.3