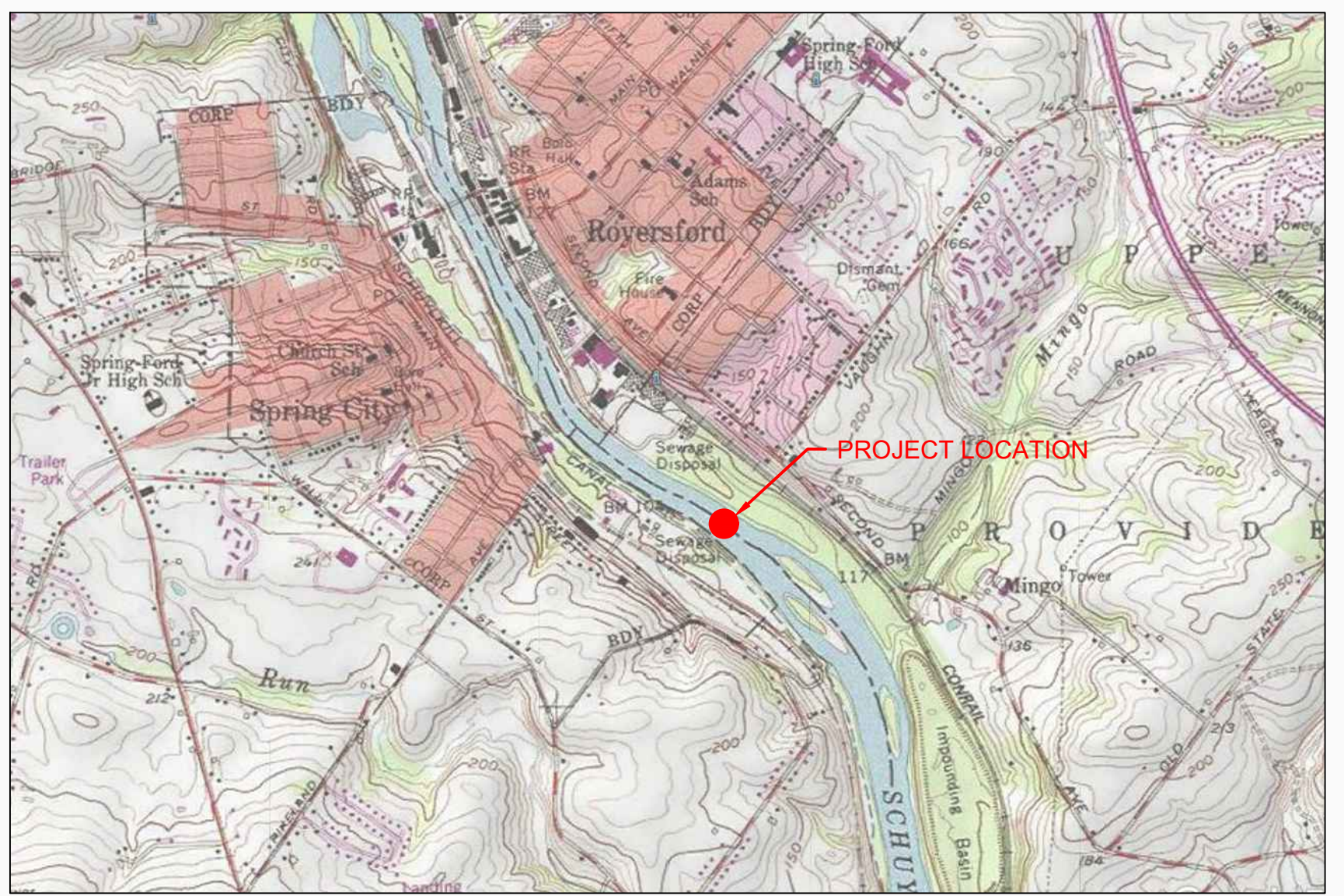


DWG. NO.	DWG. TITLE
TEXAS EASTERN TRANSMISSION SYSTEM EAGL-LAMT, 20-INCH LN 1, MP 9.65 SCHUYLKILL RIVER REPLACEMENT	
MAPPING DRAWINGS	
EAGL-C-8201	COVER SHEET & VICINITY MAP
EAGL-L-1200	ACCESS AND OVERVIEW MAP
EAGL-X-318A	PLD-318A (REFERENCE)
EAGL-LAMT LN 1 SHT. 011	EXISTING ALIGNMENT (REFERENCE)
EAGL-A-1000	CONSTRUCTION ALIGNMENT
EAGL-A-1010	RETIREMENT ALIGNMENT
REFERENCE DRAWINGS	
SR1-HDD-040623-01	HDD PLAN AND PROFILE
SR2-HDD-040623-01	REFERENCE DRAWING
STANDARD SHEET 1 OF 1	
ES-0032	TYPICAL STANDARD WETLAND CROSSING
ES-0033	TYPICAL WET WATERBODY CROSSING
SF-9002	CALIBRATED SPAN TEST SITE
SP-1000	PIPELINE CROSSING MAT
SP-4210	ISOLATION CAP

DWG. NO.	DWG. TITLE

TEXAS EASTERN TRANSMISSION SYSTEM EAGL-LAMT, 20-INCH LN 1, MP 9.65 SCHUYLKILL RIVER REPLACEMENT CHESTER & MONTGOMERY COUNTIES, PENNSYLVANIA 2023

DATE	ISSUE	LEAD DFRS.	SECT. SUPV.	APPROVALS		
				PROJ. DESIGN ENGR.	PROJ. MGR./DESIGN MGR.	PROJECT DIRECTOR
02/06/2023	<input checked="" type="checkbox"/> ISSUED FOR REVIEW-30%(A)	LGF		JC	RG	
03/14/2023	<input checked="" type="checkbox"/> ISSUED FOR REVIEW-60%(B)	LGF		JC	RG	
03/14/2023	<input checked="" type="checkbox"/> ISSUED FOR REVIEW-60%(C)	LGF		JC	RG	
04/07/2023	<input checked="" type="checkbox"/> ISSUED FOR BID(D)	LGF		RG	AC	
05/19/2023	<input checked="" type="checkbox"/> ISSUED FOR BID-REV 1	SAR		RG	AC	
05/30/2023	<input checked="" type="checkbox"/> ISSUED FOR PERMIT(F)	SAR		RG	AC	

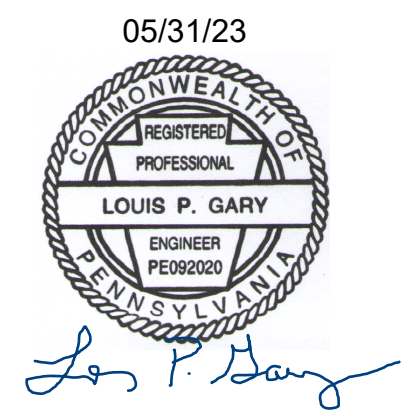


VICINITY MAP
SCALE: N.T.S.

EXHIBIT A	
PO NO.	-
PLANT W.O. NO.	-
PIPELINE W.B.S. NO.	30001031
YEAR	2023

IC# 024896-001 Schuylkill River_Cover Sheet

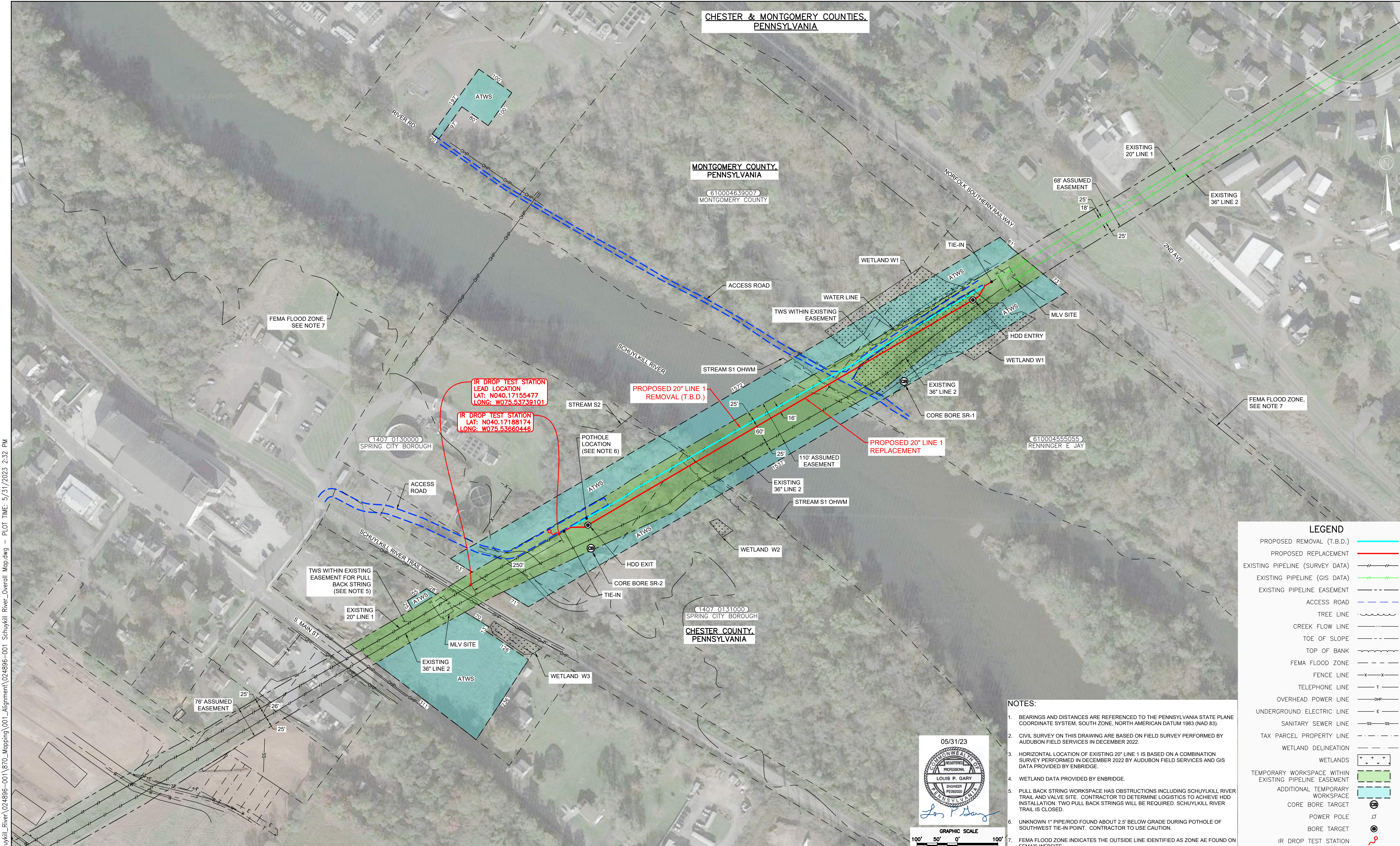
ISSUED FOR
05/30/23
PERMIT



PREPARED BY:
audubon
Field Solutions
10205 WESTHEIMER ROAD
SUITE 100
HOUSTON, TEXAS 77042
PHONE: (281) 669-0590



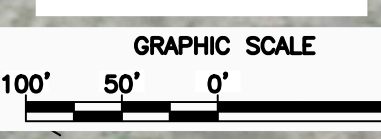
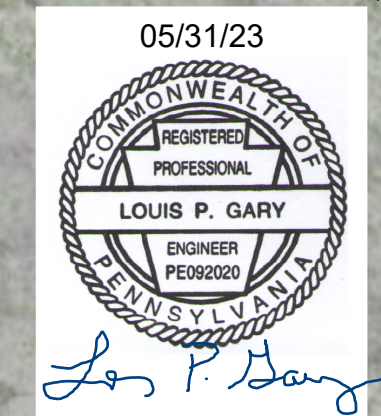
Texas Eastern Transmission, LP
915 North Eldridge Parkway, Suite 1100, Houston, TX 77079 713-627-5400



LEGEND

- PROPOSED REMOVAL (T.B.D.)
- PROPOSED REPLACEMENT
- EXISTING PIPELINE (SURVEY DATA)
- EXISTING PIPELINE (GIS DATA)
- EXISTING PIPELINE EASEMENT
- ACCESS ROAD
- TREE LINE
- CREEK FLOW LINE
- TOE OF SLOPE
- TOP OF BANK
- FEMA FLOOD ZONE
- FENCE LINE
- TELEPHONE LINE
- OVERHEAD POWER LINE
- UNDERGROUND ELECTRIC LINE
- SANITARY SEWER LINE
- TAX PARCEL PROPERTY LINE
- WETLAND DELINEATION
- WETLANDS
- TEMPORARY WORKSPACE WITHIN EXISTING PIPELINE EASEMENT
- ADDITIONAL TEMPORARY WORKSPACE
- CORE BORE TARGET
- POWER POLE
- BORE TARGET
- IR DROP TEST STATION

- NOTES:**
- BEARINGS AND DISTANCES ARE REFERENCED TO THE PENNSYLVANIA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NORTH AMERICAN DATUM 1983 (NAD 83).
 - CIVIL SURVEY ON THIS DRAWING ARE BASED ON FIELD SURVEY PERFORMED BY AUDUBON FIELD SERVICES IN DECEMBER 2022.
 - HORIZONTAL LOCATION OF EXISTING 20" LINE 1 IS BASED ON A COMBINATION SURVEY PERFORMED IN DECEMBER 2022 BY AUDUBON FIELD SERVICES AND GIS DATA PROVIDED BY ENBRIDGE.
 - WETLAND DATA PROVIDED BY ENBRIDGE.
 - PULL BACK STRING WORKSPACE HAS OBSTRUCTIONS INCLUDING SCHUYLKILL RIVER TRAIL AND VALVE SITE. CONTRACTOR TO DETERMINE LOGISTICS TO ACHIEVE HDD INSTALLATION. TWO PULL BACK STRINGS WILL BE REQUIRED. SCHUYLKILL RIVER TRAIL IS CLOSED.
 - UNKNOWN 1" PIPE/ROD FOUND ABOUT 2.5' BELOW GRADE DURING POT HOLE OF SOUTHWEST TIE-IN POINT. CONTRACTOR TO USE CAUTION.
 - FEMA FLOOD ZONE INDICATES THE OUTSIDE LINE IDENTIFIED AS ZONE AE FOUND ON FEMA'S WEBSITE.



**ISSUED FOR
05/30/23
PERMIT**

REV	DSN	CK	DESCRIPTION	DATE	ITEM NO.	DESCRIPTION	QTY
			ISSUED FOR PERMIT	05/30/2023			
			ISSUED FOR BID-REV 1	05/19/2023			
			ISSUED FOR BID	04/07/2023			
			ISSUED FOR REVIEW-60%	03/14/2023			
			ISSUED FOR REVIEW-60%	03/14/2023			
			ISSUED FOR REVIEW-30%	02/06/2023			

audubon
Engineering
10205 WESTHEIMER ROAD
SUITE 100
HOUSTON, TX 77042
PHONE: (281) 669-0590

DRAWN BY:		ENGINEERING APPROVALS	
TITLE	SIGNATURE	DATE	SIGNATURE
LGF			

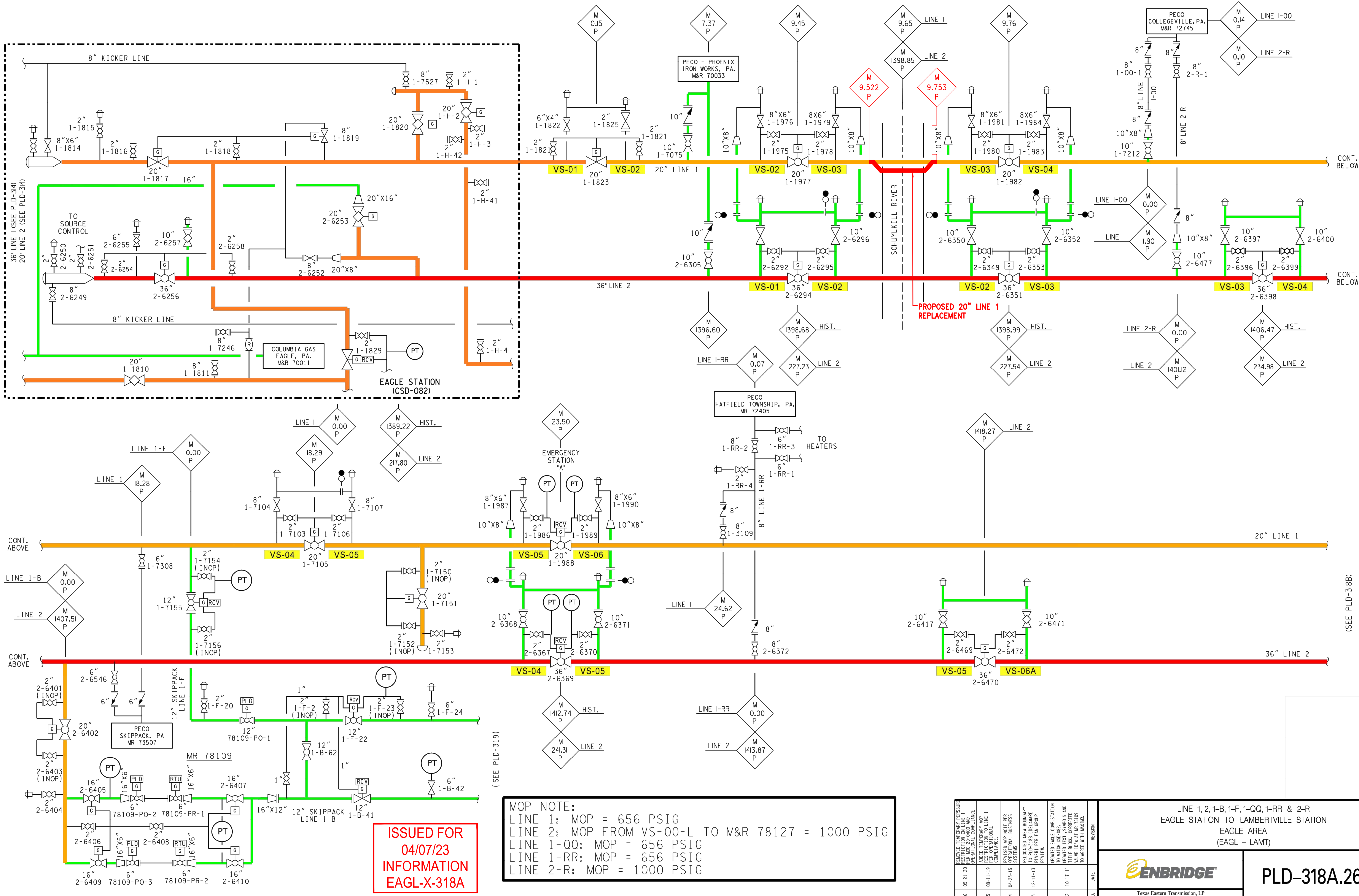
**TEXAS EASTERN TRANSMISSION SYSTEM
EAGL-LAMT, 20-INCH LN 1, MP 9.65
SCHUYLKILL RIVER HDD REPLACEMENT
ACCESS & OVERVIEW MAP**

ENBRIDGE
Texas Eastern Transmission, LP
915 North Ekbridge Parkway, Suite 1100, Houston, TX 77079 713-627-5400

S:\AE\Projects\Enbridge\Schuylkill_River\024896-001\870_Mapping\001_Alignment\024896-001_Schuylkill_River_Overall_Map.dwg - PLOT TIME: 5/31/2023 2:32 PM

DWG. NO.	DESCRIPTION	REV	DSN	CK	DESCRIPTION	ITEM NO.	DESCRIPTION	QTY
	REFERENCE DRAWINGS				REVISIONS		MATERIALS	

LOC.	YEAR:	W.B.S.	SCALE:	DWG.	REV.
CHESTER & MONTGOMERY COUNTIES, PENNSYLVANIA	2023	30001031	1"=100'	EAGL-L-1200	F



MOP NOTE:
 LINE 1: MOP = 656 PSIG
 LINE 2: MOP FROM VS-00-L TO M&R 78127 = 1000 PSIG
 LINE 1-QQ: MOP = 656 PSIG
 LINE 1-RR: MOP = 656 PSIG
 LINE 2-R: MOP = 1000 PSIG

**ISSUED FOR
 04/07/23
 INFORMATION
 EAGL-X-318A**

NO.	DATE	REVISION
26	09-21-20	REVISED TEMPORARY PRESSURE PER M&R 78109-PO-1 PER M&R 78109-PO-1 OPERATIONAL COMPLIANCE
25	09-11-19	ADDED TEMPORARY MOP PER M&R 78109-PO-1 PER M&R 78109-PO-1 OPERATIONAL COMPLIANCE
24	04-23-15	REVISED MOP NOTE PER M&R 78109-PO-1 PER M&R 78109-PO-1 OPERATIONAL COMPLIANCE
23	12-31-13	RELOCATED AREA BOUNDARY TO PLD-3188 (DELAWARE RIVER) PER EAM GROUP REVIEW
22	10-17-11	UPDATED CABLE COMP. STATION (M&R 78109-PO-1) WITH CORRECTED TITLE BLOCK, CORRECTED VALVE ID'S AT M&R 78109-PO-1 TO AGREE WITH MATING.

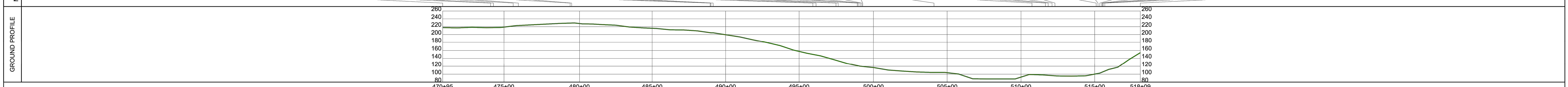
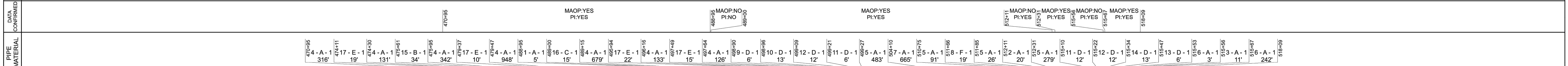
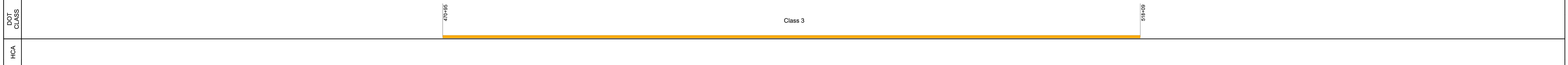
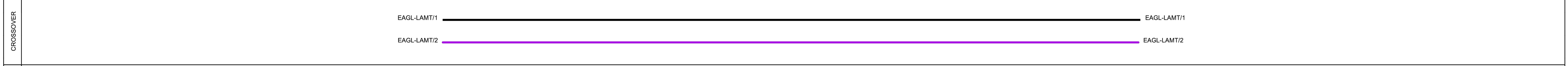
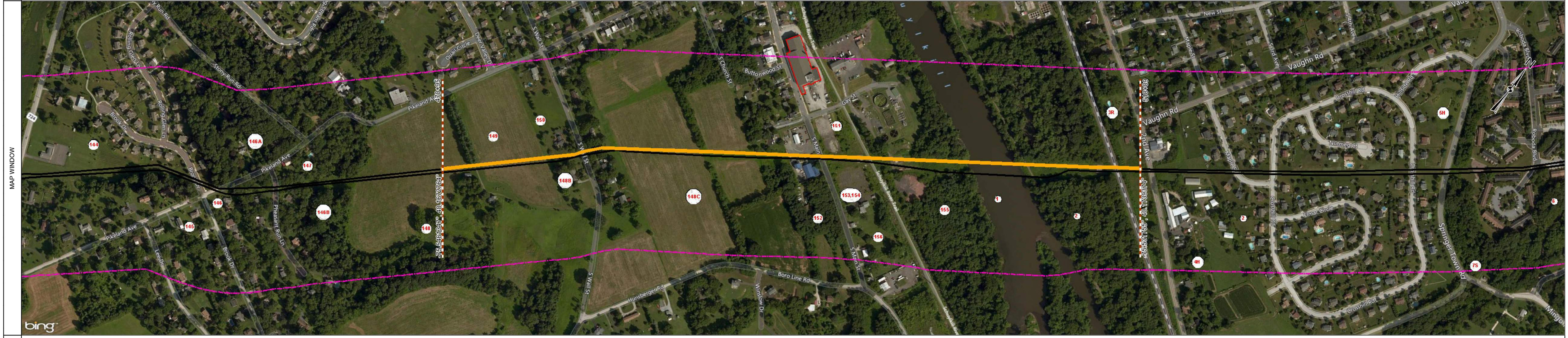
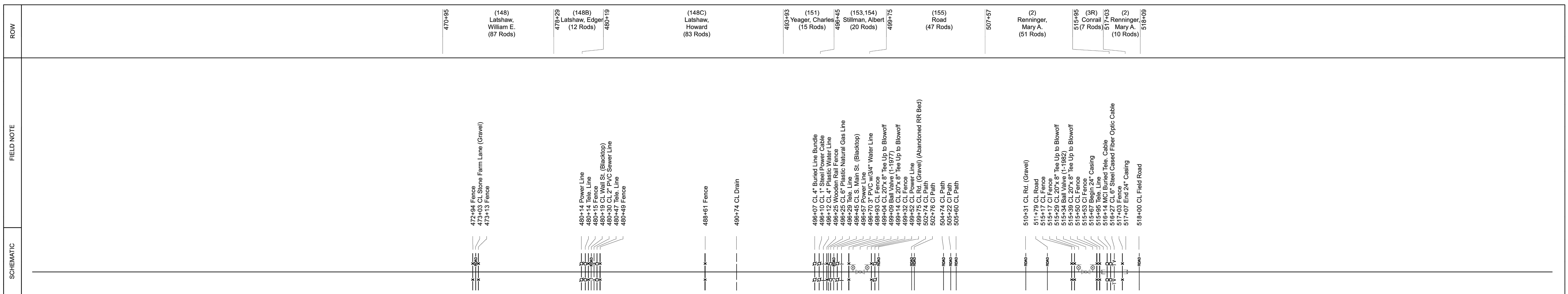
LINE 1, 2, 1-B, 1-F, 1-QQ, 1-RR & 2-R
 EAGLE STATION TO LAMBERTVILLE STATION
 EAGLE AREA
 (EAGL - LAMT)

ENBRIDGE

PLD-318A.26

Texas Eastern Transmission, LP
 5400 Westheimer Ct. Houston, TX 77056-3110 713 / 627-5400

Model: Default
 Username: ERivera



VALVE						PIPE MATERIAL INDEX										PIPE COATING MATERIAL									
ID	TYPE	CONNECT	RATING	CWO	IN-SERVICE	INDEX	OD	WT	GRADE	IN SERVICE	LW SEAM	MFR	INDEX	TYPE	MOP	INDEX	TYPE	MOP							
1-1977	Ball	Welded X Welded	1440	4766	1/1/1978	1	20	0.313	API-5L Gr-B	01/01/1950	SMLS	U.S. Steel	1	Coel Tar Enamel System	656	1	Ball	656							
1-1982	Ball	Welded X Welded	1440	4766	1/1/1978	2	20	0.3125	API-5L Gr-B	09/30/1953	SMLS	National Tube	2	Fusion Bonded Epoxy	656	2	Check	656							
						3	20	0.3125	API-5L Gr-B	09/30/1953	SMLS	National Tube	3	Nap-Gard 7-2501	656	3	Gate	656							
						4	20	0.375	API-5L-X-35	01/01/1943	ERW	Youngstown Sheet and Tube	4	Roskote A-51	656	4	Casing	656							
						5	20	0.375	API-5L-X-35	01/01/1943	ERW	Youngstown Sheet and Tube	5	Scotchkote 206N	656	5	Ground Bed	656							
						6	20	0.375	API-5L-X-35	01/01/1943	ERW	Youngstown Sheet and Tube	6	Schematic	656	6	River Weight	656							
						7	20	0.5	API-5L-X-35	01/01/1943	SMLS	National Tube	7	MOP	656	7	Clock Spring	656							
						8	20	0.312	API-5L-X-52	08/31/1971	SMLS	U.S. Steel	8	CURRENT MOP	656	8	Identified Site	656							
						9	20	0.406	API-5L-X-52	10/14/1978	SMLS	U.S. Steel	9			9									
						10	20	0.594	API-5L-X-52	10/14/1978	SMLS	U.S. Steel	10			10									
						11	20	0.406	API-5L-X-52	10/14/1978	SMLS	U.S. Steel	11			11									
						12	20	0.594	API-5L-X-52	10/14/1978	SMLS	U.S. Steel	12			12									
						13	20	0.406	API-5L-X-52	10/14/1978	SMLS	U.S. Steel	13			13									
						14	20	0.594	API-5L-X-52	10/14/1978	SMLS	U.S. Steel	14			14									
						15	20	0.375	API-5L-X-52	11/19/1986	DSAW	Kaiser Steel	15			15									
						16	20	0.375	API-5L-X-55	08/24/1999	DSAW	Napa Pipe	16			16									
						17	20	0.375	API-5L-X-55	08/28/1998	DSAW	Bethlehem Steel	17			17									

FOR INFORMATION ONLY

LEGEND

- Ball: Tee, Tap
- Check: PI
- Gate: EQUATION
- Casing: Plug
- Ground Bed: MAR
- River Weight: 660' Corridor
- Clock Spring: Identified Site

CLASS

- Class 1
- Class 2
- Class 3
- Class 4

HCA RANGE

- HCA Range
- 660' Corridor
- Identified Site

EGAL-LAMT 1

SEGMENT/LINE ID

011

SHEET ID: MP 6.02-0.01

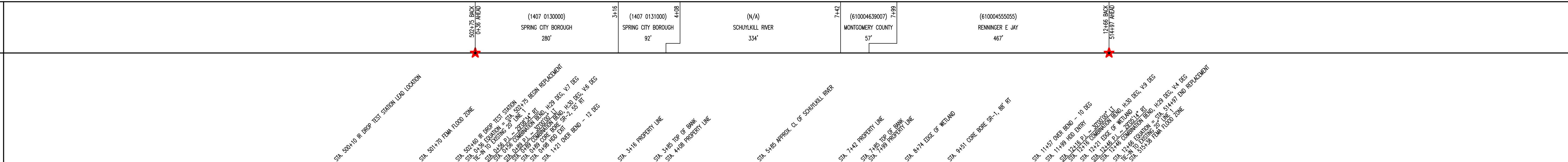
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GRAPHIC SCALE - FEET

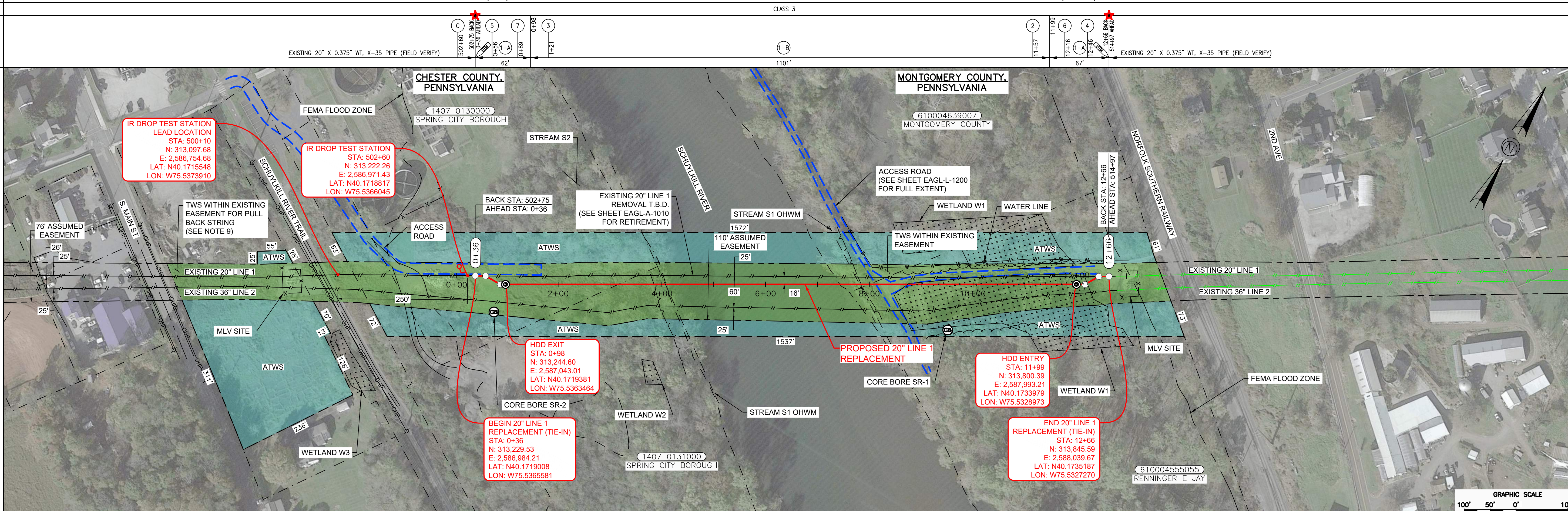
OPERATIONS ALIGNMENT SHEET GENERATION DATE: 1/10/2019

MAP DISCLAIMER: This map has been compiled from the best existing sources available at the time of preparation. However, Enbridge Inc., Enbridge Energy and/or its affiliates and/or subsidiaries do not guarantee the accuracy of the map or assume responsibility of liability for any reliance thereon.

RIGHT-OF-WAY
TRACT NUMBERS OWNERSHIP/AGENCY
SURVEY DATA
SURVEY COMPANY: FIELD BOOK: PAGES:
CLASS LOCATION
PIPE MATERIAL



ALIGNMENT LEGEND
PROPOSED REPLACEMENT
EXISTING PIPELINE (SURVEY DATA)
EXISTING PIPELINE (GIS DATA)
EXISTING PIPELINE EASEMENT
ACCESS ROAD
TREE LINE
CREEK FLOW LINE
TOE OF SLOPE
TOP OF BANK
FEMA FLOOD ZONE
FENCE LINE
TELEPHONE LINE
OVERHEAD POWER LINE
UNDERGROUND ELECTRIC LINE
SANITARY SEWER LINE
TAX PARCEL PROPERTY LINE
WETLAND DELINEATION
WETLANDS
TEMPORARY WORKSPACE WITHIN EXISTING PIPELINE EASEMENT
ADDITIONAL TEMPORARY WORKSPACE
CORE BORE TARGET
POWER POLE
BORE TARGET
IR DROP TEST STATION

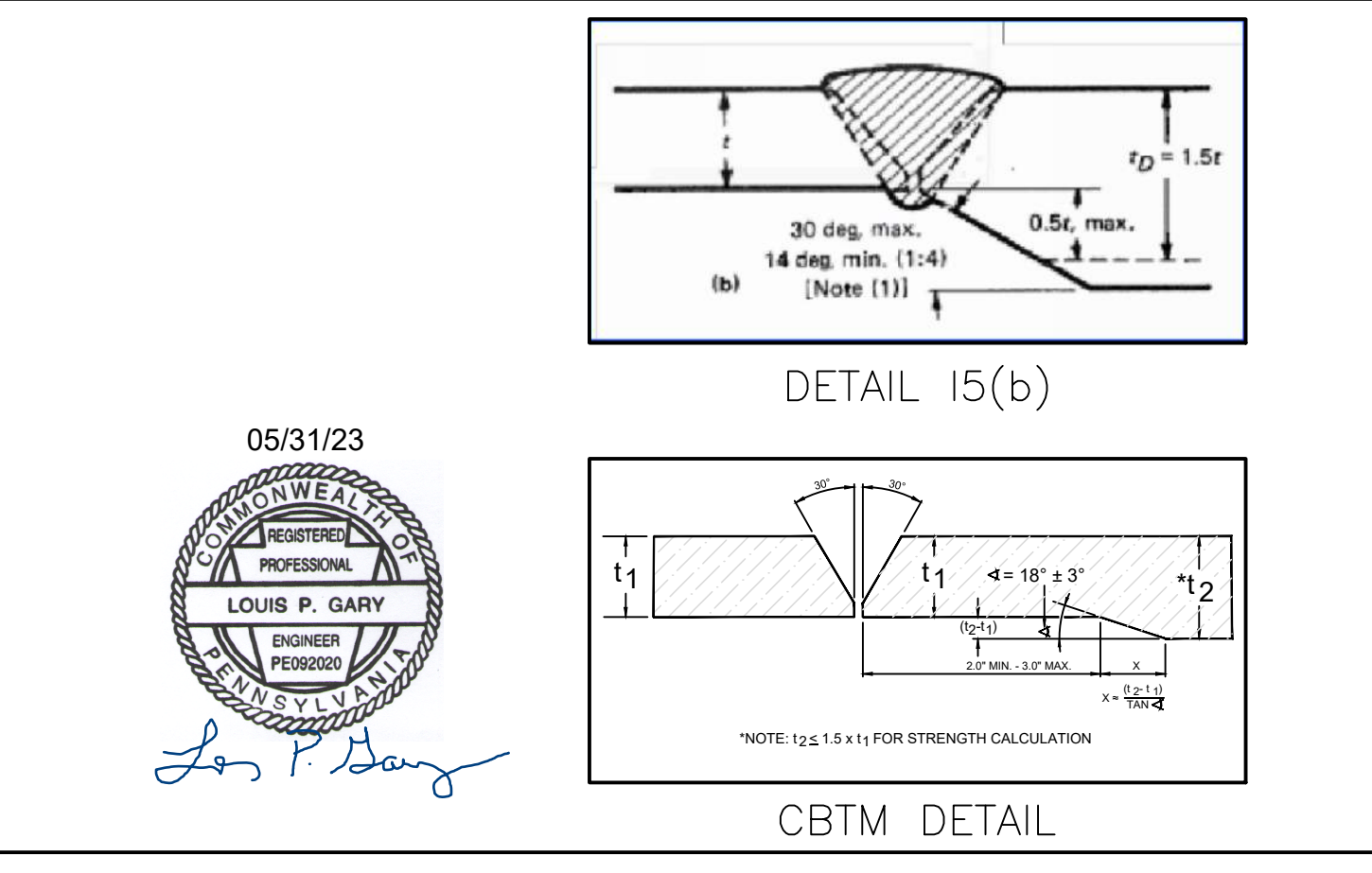
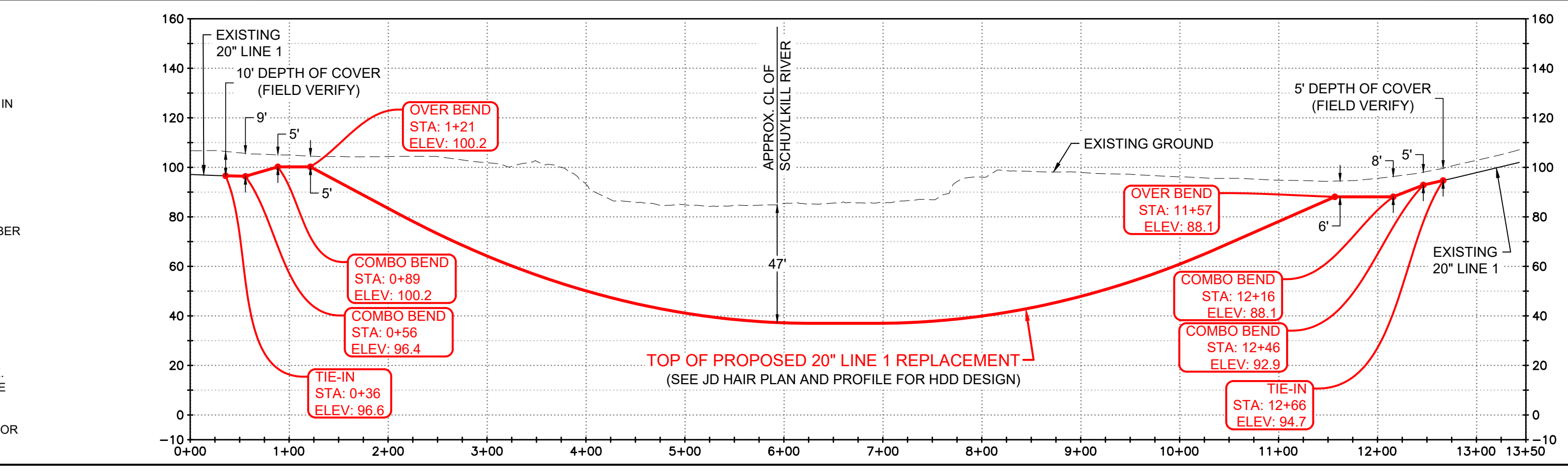


ENVIRONMENTAL DATA
FOR ENVIRONMENTALLY SENSITIVE AREAS (ESA), CONSULT WITH ENVIRONMENTAL INSPECTOR PRIOR TO CONSTRUCTION ACTIVITIES. FOR REFERENCE ENVIRONMENTAL SENSITIVE AREA DEFINITION.

E & S TYPICALS
EAS TYPICALS WILL BE USED AS A PLAN AND WILL FURTHER INPUT FROM ENVIRONMENTAL INSPECTORS, FOR REFERENCED EAS TYPICALS.

PROFILE
THE LOCATION OF TRENCH BREAKERS AND SLOPE BREAKERS ARE INTENDED TO BE USED AS A GUIDELINE ONLY. EXACT LOCATION TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
SLOPE BREAKER
TRENCH BREAKER
PROJECT DATA
NOM. DIA. 20"
MAOP 856 PSIG
DESIGN SPEC. DOT 192
PIPE SPEC. API-SL
MIN. TEST PRESSURE 1.5 X MOP
LAND USE CLASSIFICATION
AG AGRICULTURE PA PASTURE ROW EXISTING RIGHT-OF-WAY
F/W FOREST/WOODLAND R RESIDENTIAL OW OPEN WATER
PERMANENT SLOPE BREAKER & TRENCH BREAKER SPACING
% SLOPE SLOPE BREAKER SPACING (FT) % SLOPE TRENCH BREAKER SPACING (FT)
5-15% 300 FT 5-15% 300 FT
15-30% 200 FT 15-30% 200 FT
>30% 100 FT >30% 100 FT

- NOTES:**
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 - ELEVATION DATA SHOWN FOR THE BOTTOM OF SCHUYLKILL RIVER IS BASED ON HYDROGRAPHIC SURVEY PERFORMED BY AUDUBON FIELD SERVICES IN JANUARY 2023.
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 - VERTICAL LOCATION OF EXISTING 20" LINE 1 IS BASED ON A COMBINATION SURVEY PERFORMED IN DECEMBER 2022 BY AUDUBON FIELD SERVICES AND HYDROGRAPHIC DATA PROVIDED BY ENBRIDGE.
 - WETLAND DATA PROVIDED BY ENBRIDGE.
 - ALL DISTURBED GROUND TO BE REPLACED AND FINISHED GRADE RETURNED TO PRE-CONSTRUCTION CONDITIONS OR BETTER.
 - NEW PIPE SHALL BE INSTALLED TO MEET A MINIMUM OF 3 FEET.
 - PULL BACK STRING WORKSPACE HAS OBSTRUCTIONS INCLUDING SCHUYLKILL RIVER TRAIL AND VALVE SITE. CONTRACTOR TO DETERMINE LOGISTICS TO ACHIEVE HDD INSTALLATION. TWO PULL BACK STRINGS WILL BE REQUIRED. SCHUYLKILL RIVER TRAIL IS CLOSED.
 - PIPE TRANSITIONS FROM HEAVY WALL TO THIN WALL SHALL BE IN ACCORDANCE WITH ASME B31.8 FIG. 15(b) OR CBTM DETAIL (SEE DETAILS THIS SHEET). ENBRIDGE TO DETERMINE FINAL TRANSITION TO BE USED.



ISSUED FOR PERMIT
05/30/23
PERMIT
DWG. NO.
DESCRIPTION
REFERENCE DRAWINGS

LAND USE:
% SLOPE:
ISSUED FOR PERMIT (05/30/2023)
ISSUED FOR BID-REV 1 (05/19/2023)
ISSUED FOR BID (04/07/2023)
ISSUED FOR REVIEW-60% (03/14/2023)
ISSUED FOR REVIEW-60% (03/14/2023)
ISSUED FOR REVIEW-30% (02/06/2023)
REV DSN CK DESCRIPTION
ITEM NO. MATERIALS QTY

audubon
Field Solutions
10205 WESTHEIMER ROAD
SUITE 100
HOUSTON, TEXAS 77042
PHONE: (281) 669-0590
ENGINEERING APPROVALS
DRAWN BY
BID
CONSTRUCTION
TITLE
SIGNATURE
DATE
SIGNATURE
DATE

TEXAS EASTERN TRANSMISSION SYSTEM
EAGL-LAMT, 20-INCH LN 1, MP 9.65
SCHUYLKILL RIVER HDD REPLACEMENT
CONSTRUCTION ALIGNMENT
LOC. CHESTER & MONTGOMERY COUNTIES, PENNSYLVANIA
YEAR: 2023
W.B.S. 30001031
SCALE: 1"=100'H, 1"=40'V
DWG. EAGL-A-1000
REV. F

S:\AE\Projects\Enbridge\Schuykill_River\024896-001\B70_Mapping\001_Alignment\024896-001_Schuykill River_Construction Alignment.dwg - PLOT TIME: 5/31/2023 2:33 PM

RIGHT-OF-WAY	TRACT NUMBERS OWNERSHIP/AGENCY	(1407 0130000) SPRING CITY BOROUGH 315'	(1407 0131000) SPRING CITY BOROUGH 48'	(N/A) SCHUYLKILL RIVER 330'	(610004639007) MONTGOMERY COUNTY 100'	(610004555055) RENNINGER E JAY 429'	514197'
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SURVEY DATA

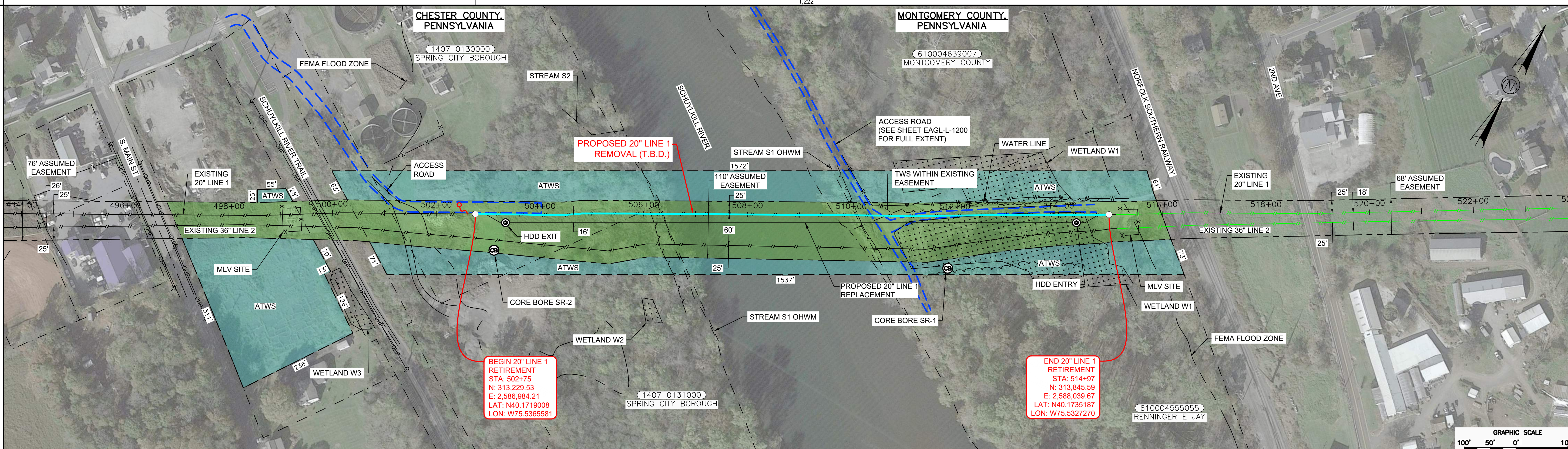
SURVEY COMPANY:
FIELD BOOK:
PAGES:

CLASS LOCATION

PIPE MATERIAL

ALIGNMENT LEGEND

- PROPOSED REMOVAL (T.B.D.)
- PROPOSED REPLACEMENT
- EXISTING PIPELINE (SURVEY DATA)
- EXISTING PIPELINE (GIS DATA)
- EXISTING PIPELINE EASEMENT
- ACCESS ROAD
- TREE LINE
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- TOP OF BANK
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- WETLAND DELINEATION
- WETLANDS
- TEMPORARY WORKSPACE WITHIN EXISTING PIPELINE EASEMENT
- ADDITIONAL TEMPORARY WORKSPACE
- CORE BORE TARGET
- POWER POLE
- BORE TARGET



ENVIRONMENTAL DATA

FOR ENVIRONMENTALLY SENSITIVE AREAS (ESA), CONSULT WITH ENVIRONMENTAL INSPECTOR PRIOR TO CONSTRUCTION ACTIVITIES. FOR REFERENCE ENVIRONMENTAL SENSITIVE AREA DEFINITION.

E & S TYPICALS

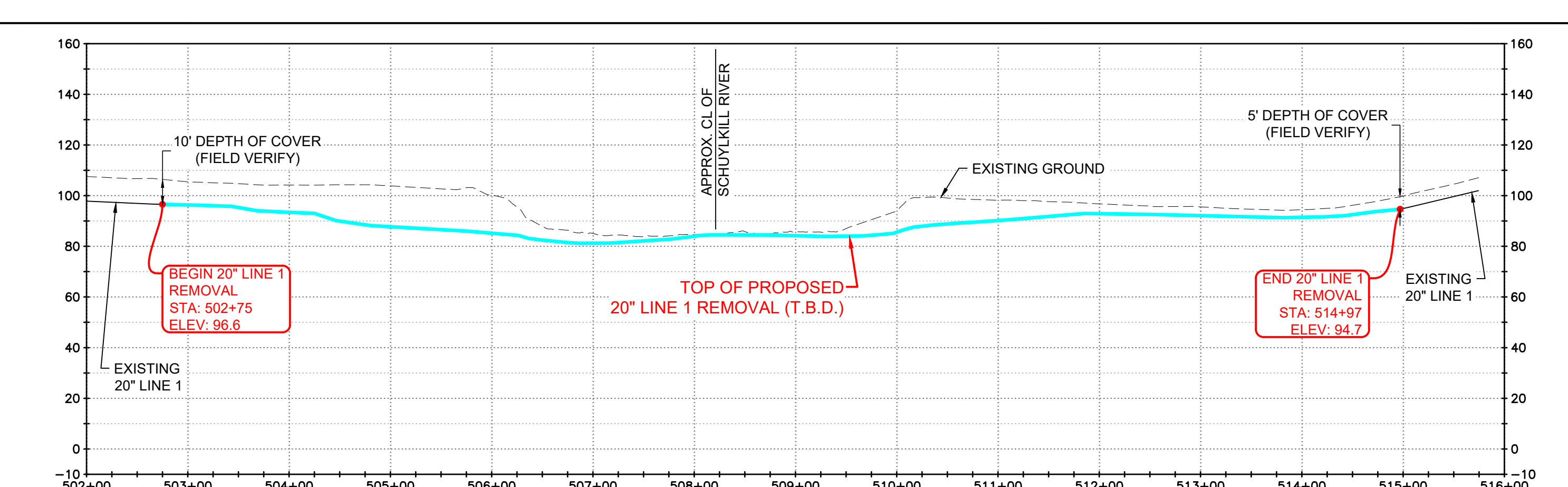
EAS TYPICALS WILL BE USED AS A PLAN AND WILL FURTHER INPUT FROM ENVIRONMENTAL INSPECTORS, FOR REFERENCED EAS TYPICAL.

PROFILE

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- WETLAND DATA PROVIDED BY ENBRIDGE.
- ALL DISTURBED GROUND TO BE REPLACED AND FINISHED GRADE RETURNED TO PRE-CONSTRUCTION CONDITIONS OR BETTER.



05/31/23

LOUIS P. GARY
REGISTERED PROFESSIONAL ENGINEER
PENNSYLVANIA

PROJECT DATA

NOM. DIA.	20"
MAOP	656 PSIG
DESIGN SPEC.	DOT 192
PIPE SPEC.	API-SL
MIN. TEST PRESSURE	1.5 X MOP

LAND USE CLASSIFICATION

AG AGRICULTURE	PA PASTURE	ROW EXISTING RIGHT-OF-WAY
F/W FOREST/WOODLAND	R RESIDENTIAL	OW OPEN WATER

PERMANENT SLOPE BREAKER & TRENCH BREAKER SPACING

% SLOPE	SLOPE BREAKER SPACING (FT)	% SLOPE	TRENCH BREAKER SPACING (FT)
5-15%	300 FT	5-15%	300 FT
15-30%	200 FT	15-30%	200 FT
>30%	100 FT	>30%	100 FT

LAND USE:

REV	DSN	CK	DESCRIPTION	DATE	ITEM NO.	MATERIALS	QTY
1	SAR	RG	ISSUED FOR PERMIT	(05/30/2023)	8	PIPE REMOVAL, 20" X 0.375, X-35 (T.B.D.)	1222'
2	SAR	JC	ISSUED FOR BID-REV 1	(05/19/2023)			
3	LGf	JC	ISSUED FOR BID	(04/07/2023)			
4	LGf	JC	ISSUED FOR REVIEW-60%	(03/14/2023)			
5	LGf	JC	ISSUED FOR REVIEW-60%	(03/14/2023)			
6	LGf	JC	ISSUED FOR REVIEW-30%	(02/06/2023)			

ENGINEERING APPROVALS

DRAWN BY	BID	CONSTRUCTION
LGf		
TITLE	SIGNATURE	DATE

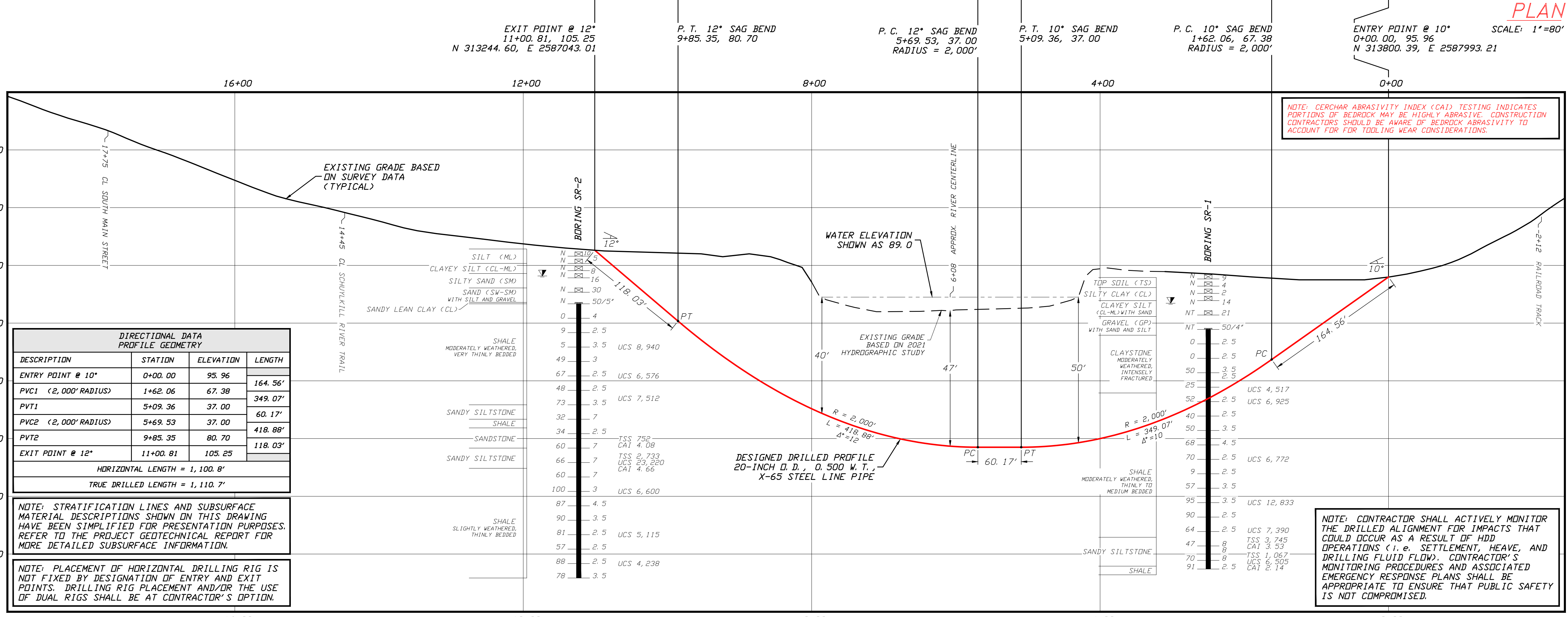
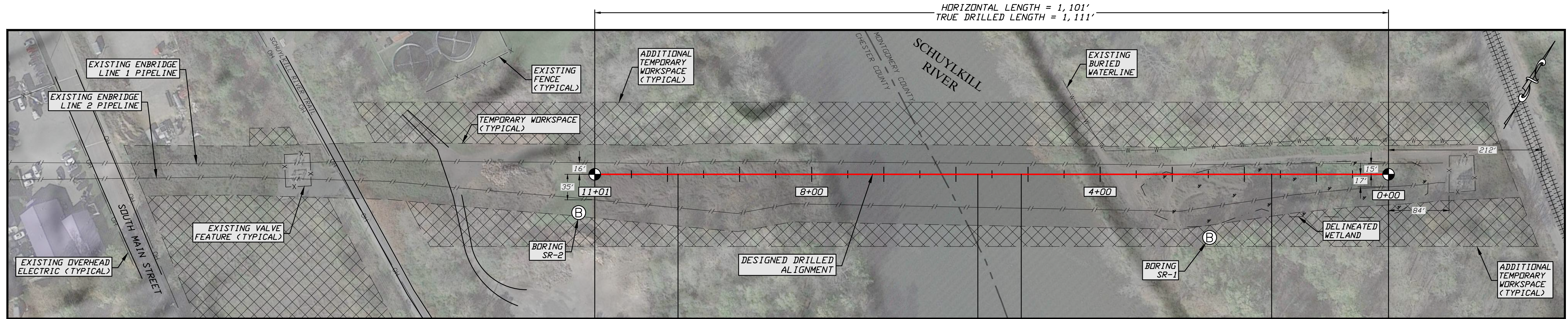
TEXAS EASTERN TRANSMISSION SYSTEM
EAGL-LAMT, 20-INCH LN 1, MP 9.65
SCHUYLKILL RIVER HDD REPLACEMENT
RETIREMENT ALIGNMENT (T.B.D.)

LOC. CHESTER & MONTGOMERY COUNTIES, PENNSYLVANIA

YEAR: 2023 | W.B.S. 30001031 | SCALE: 1"=100'H, 1"=40'V | DWG.EAGL-A-1010 | REV. F

ISSUED FOR 05/30/23 PERMIT





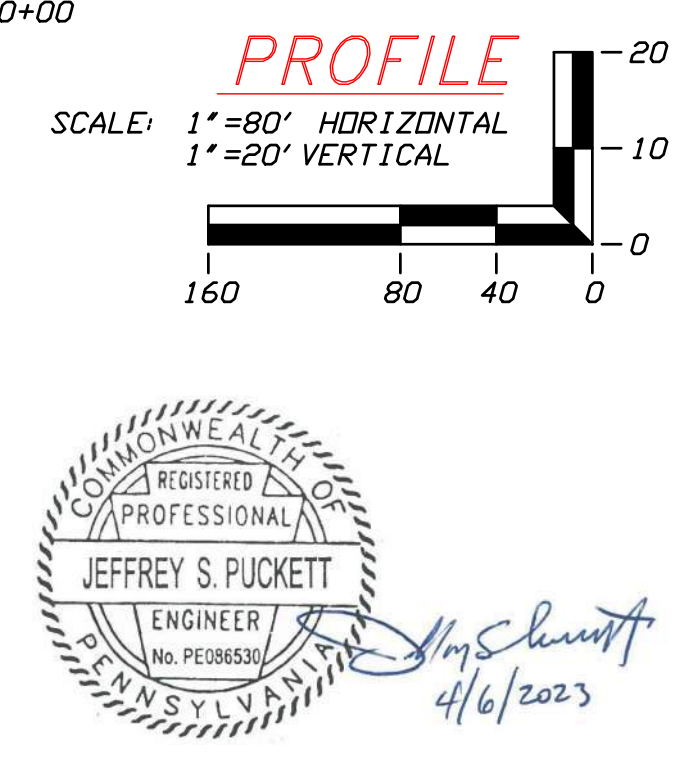
- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
 - ⊙ BORING LOCATION
 - ▽ GROUNDWATER LEVEL
- GEOTECHNICAL LEGEND**
- 1.5 — COMPRESSIVE STRENGTH (TS)
 - 23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
 - 29 — PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - 29 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 29 — TENSILE SPLITTING STRENGTH (PSI)
 - 6 — MOHS HARDNESS OR CERCHAR ABRASIVITY INDEX (CAI)
 - — ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY GEDENGINEERS, INC., SPRINGFIELD, MO. REFER TO THE PROJECT GEOTECHNICAL REPORT DATED FEBRUARY 8, 2023 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 - THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
- TOPOGRAPHIC SURVEY DATA PROVIDED BY AUDUBON ENGINEERING COMPANY, L.P., HOUSTON, TEXAS. ADDITIONAL DATA OBTAINED FROM THE PENNSYLVANIA SPATIAL DATA ACCESS (PASDA), PENNSYLVANIA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES, PAMAP PROGRAM.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO PENNSYLVANIA STATE PLANE COORDINATES, SOUTH ZONE, NAD83.
 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD83, UNLESS OTHERWISE NOTED.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
- ENTRY POINT: UP TO 5 FEET FORWARD OR BACK FROM THE DESIGNED ENTRY POINT; UP TO 3 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - EXIT POINT: UP TO 5 FEET SHORT OR 15 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 3 FEET RIGHT OR 7 FEET LEFT OF THE DESIGNED ALIGNMENT
 - ELEVATION: UP TO 5 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 - ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT UNLESS OTHERWISE DEFINED
 - CURVE RADIUS: NO LESS THAN 1,333 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS:
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.



ISSUED FOR BID - 04/06/23

LINE 1 REPLACEMENT PROJECT

PLAN AND PROFILE
20-INCH PIPELINE CROSSING OF THE SCHUYLKILL RIVER
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: CHESTER & MONTGOMERY COUNTY, PENNSYLVANIA

DRAWN	DATE	CHECKED	APPROVED	SCALE	DRAWING NUMBER	REVISION
ACM	10/24/22	LKB	JMS	AS SHOWN FOR D-SIZED PLOT	SRI-HDD-040623-01	1

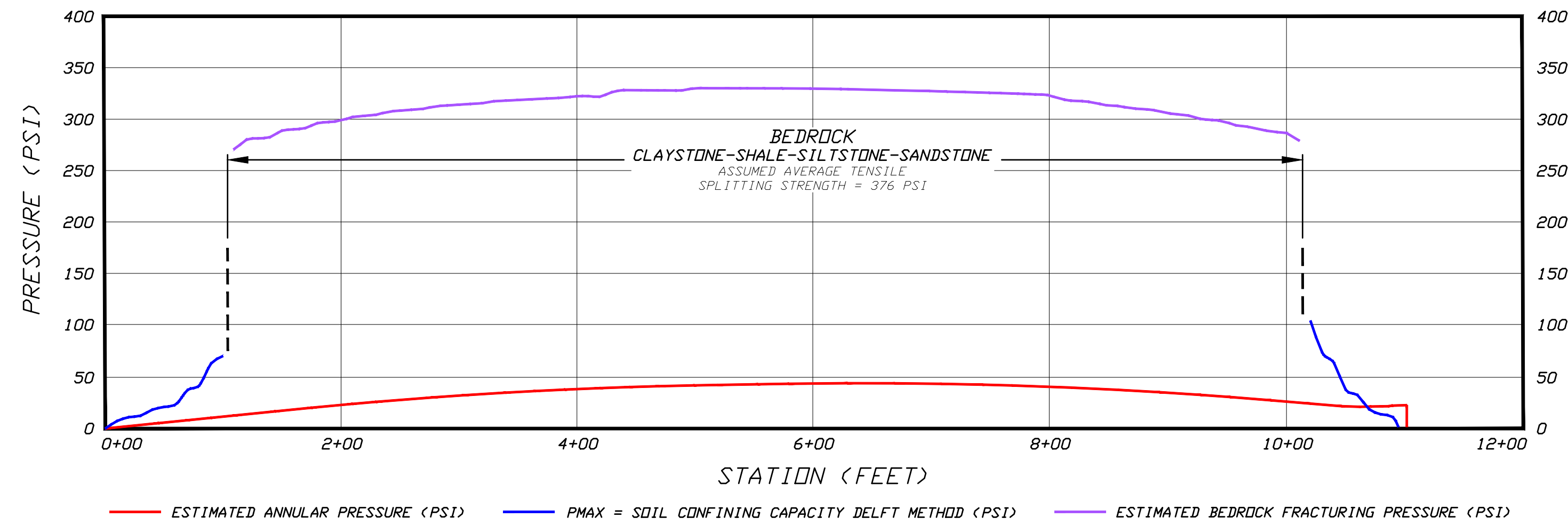
NO.	DATE	REVISION DESCRIPTION	BY	CHKD	APP.
1	04/06/23	ISSUED FOR BID	IDS	LKB	JSP
0	03/30/23	ISSUED FOR REVIEW	IDS	LKB	JSP

J.D. Hair & Associates, Inc.
Consulting Engineers

600 S. Yale Ave
Tulsa, Oklahoma 74136

PROJECT NO.
Audubon2233

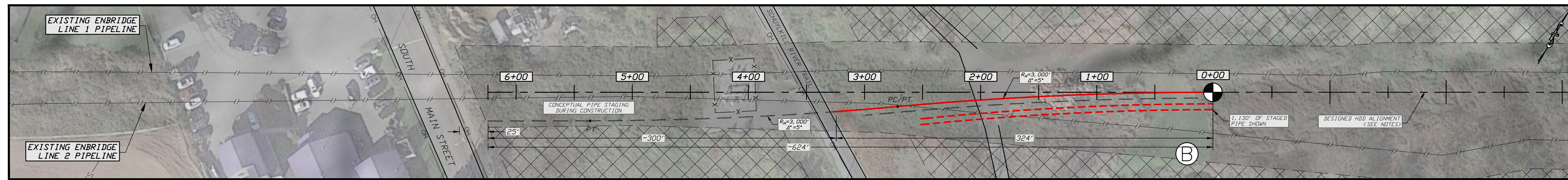
SHEET NO.
1



HYDROFRACTURE PRESSURE CURVES

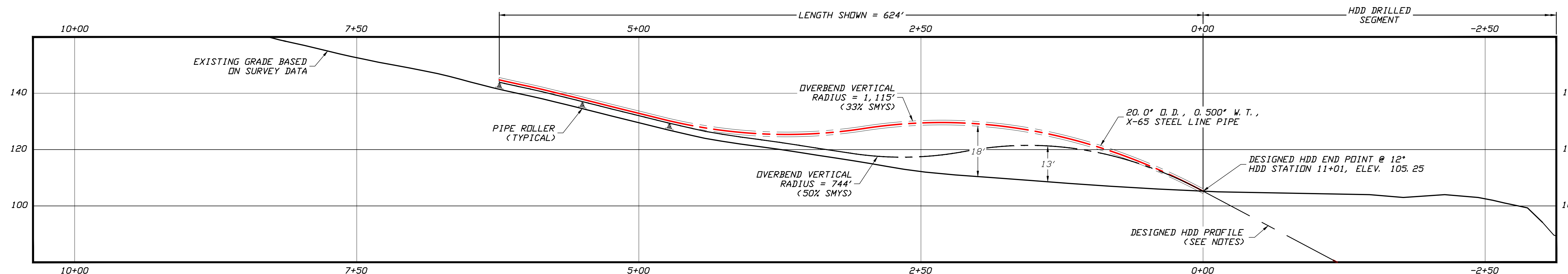
LINE PIPE SPECIFICATION	20.00" O. D., 0.500" W. T., X-65
PIPE COATING	TBD
MAXIMUM OPERATING PRESSURE	656 PSIG
ASSUMED INSTALLATION TEMPERATURE	42°F
ASSUMED MAXIMUM OPERATING TEMPERATURE	80°F
HYDROSTATIC TEST PRESSURE	1,312 PSIG
DESIGNED HDD HORIZONTAL LENGTH	1,101 FEET
DESIGNED HDD TRUE DRILLED LENGTH	1,111 FEET
EMPTY PIPE UPLIFT FORCE (9 / 12 PPG MUD)	+ 42.7 LB/FT / + 91.7 LB/FT
BALLASTED PIPE WEIGHT (9 / 12 PPG MUD)	-80.1 LB/FT / -31.2 LB/FT
CALCULATED PULLING LOAD (PRCI)	138,762 POUNDS (BASED ON WORST-CASE MODEL WITH NO BUDYANCY CONTROL AND FOS = 2)

CRITICAL INFORMATION



OVERBEND PLAN

SCALE: 1"=50'



OVERBEND ELEVATION

SCALE: 1"=50' HORIZONTAL
1"=20' VERTICAL

STEEL LINE PIPE PROPERTIES

- OUTSIDE DIAMETER = 20.00 INCHES
- NOMINAL WALL THICKNESS = 0.500 INCHES
- UNIT WEIGHT = 104.13 POUNDS/FOOT
- SPECIFIED MINIMUM YIELD STRENGTH (SMYS) = 65,000 PSI

OVERBEND STRESS CRITERIA

- MAXIMUM ALLOWABLE BENDING STRESS = 32,500 PSI (50% OF SMYS)
- MINIMUM ALLOWABLE OVERBEND RADIUS = 744 FEET (50% OF SMYS)
- OVERBEND RADIUS AS-SHOWN = 1,115 FEET (33% OF SMYS)
- MAXIMUM OVERBEND SUPPORT SPACING (SIMPLE SPAN) = 116 FEET
- MAXIMUM OVERBEND SUPPORT SPACING (CANTILEVERED SPAN) = 58 FEET
- MAXIMUM DRAG SEGMENT ROLLER SPACING (BASED ON L/360 DEFLECTION LIMIT) = 87 FEET

OVERBEND NOTES

1. THE OVERBEND GEOMETRY INDICATED ON THIS DRAWING DEMONSTRATES ONE OF MANY POSSIBLE CONFIGURATIONS THAT WOULD BE CONSIDERED ACCEPTABLE WITH REGARD TO ALLOWABLE STRESSES. CALCULATED BENDING STRESSES IN THIS CONFIGURATION FALL BELOW 50% OF THE SPECIFIED MINIMUM YIELD STRENGTH OF THE 20-INCH STEEL PIPE BASED ON MOMENT-CURVATURE AND PURE BENDING. DYNAMIC LOADS INVOLVED WITH POSITIONING, LIFTING, AND/OR HANDLING OF THE STEEL PIPE DURING PULLBACK HAVE NOT BEEN CONSIDERED IN THIS ANALYSIS. CONTRACTOR RETAINS ALL RESPONSIBILITY FOR HANDLING THE PULL SECTION SO THAT THE PIPE AND THE CORROSION COATING ARE NOT DAMAGED.
2. CONTRACTOR IS RESPONSIBLE FOR DETERMINING ACTUAL LIFT POINT LOCATIONS, LIFT HEIGHTS, AND LIFTING EQUIPMENT NECESSARY TO ENSURE THAT OPERATIONS ARE CONDUCTED SAFELY AND THE PIPE IS NOT DAMAGED OR OVERSTRESSED.
3. THE OVERBEND GEOMETRY SHOWN IS BASED ON THE PULL SECTION ENTERING THE REAMED HOLE AT THE EXIT POINT LOCATION AND EXIT ANGLE INDICATED ON THE HDD DESIGN DRAWING. NOTE THAT MODIFICATIONS MAY BE REQUIRED BASED ON THE ACTUAL LOCATION AND ANGLES AT THE COMPLETION OF REAMING OPERATIONS.
4. THE OVERBEND GEOMETRY TABLES INCLUDED ON THIS DRAWING ARE INTENDED TO PROVIDE HIGH-LEVEL GUIDANCE WITH REGARD TO POTENTIAL LIFTING HEIGHTS ALONG THE LENGTH OF THE OVERBEND. TWO OVERBEND SCENARIOS HAVE BEEN INCLUDED, ALTHOUGH IT SHOULD BE NOTED THAT THE CONTRACTOR IS NOT LIMITED TO THESE SCENARIOS. THE HEIGHTS THAT HAVE BEEN PROVIDED REPRESENT VERTICAL DISTANCES FROM THE EXISTING GRADE TO THE BOTTOM OF THE PIPE. NOTE THAT LIFT HEIGHTS MAY NEED TO BE MODIFIED BASED ON ACTUAL GRADE ELEVATIONS AT THE TIME OF CONSTRUCTION.

OVERBEND GEOMETRY TABLE
(1,115' RADIUS AS SHOWN)

OFFSET (X)	HEIGHT* (Y)	OFFSET (X)	HEIGHT* (Y)	OFFSET (X)	HEIGHT* (Y)
0+10	1.04	2+10	17.84	4+10	3.31
0+20	2.84	2+20	17.70	4+20	3.11
0+30	4.54	2+30	17.38	4+30	2.98
0+40	6.15	2+40	16.98	4+40	2.89
0+50	7.61	2+50	16.42	4+50	2.71
0+60	8.98	2+60	15.68	4+60	2.57
0+70	10.26	2+70	14.78	4+70	2.50
0+80	11.45	2+80	13.72	4+80	2.50
0+90	12.51	2+90	12.54	4+90	2.50
1+00	13.48	3+00	11.30	-	-
1+10	14.35	3+10	10.07	-	-
1+20	15.13	3+20	8.96	-	-
1+30	15.78	3+30	7.95	-	-
1+40	16.35	3+40	7.04	-	-
1+50	16.82	3+50	6.19	-	-
1+60	17.21	3+60	5.43	-	-
1+70	17.51	3+70	4.79	-	-
1+80	17.73	3+80	4.26	-	-
1+90	17.85	3+90	3.85	-	-
2+00	17.89	4+00	3.53	-	-

* HEIGHTS NOTED ARE FROM GRADE TO BOTTOM OF PIPE

OVERBEND GEOMETRY TABLE
(744' MINIMUM RADIUS)

OFFSET (X)	HEIGHT* (Y)	OFFSET (X)	HEIGHT* (Y)	OFFSET (X)	HEIGHT* (Y)
0+10	1.87	2+10	8.72	-	-
0+20	3.59	2+20	7.74	-	-
0+30	5.17	2+30	6.80	-	-
0+40	6.62	2+40	6.00	-	-
0+50	7.87	2+50	5.28	-	-
0+60	8.99	2+60	4.59	-	-
0+70	9.97	2+70	3.97	-	-
0+80	10.81	2+80	3.41	-	-
0+90	11.49	2+90	2.96	-	-
1+00	12.02	3+00	2.67	-	-
1+10	12.41	3+10	2.53	-	-
1+20	12.67	3+20	2.51	-	-
1+30	12.76	3+30	2.50	-	-
1+40	12.72	3+40	2.50	-	-
1+50	12.54	3+50	2.51	-	-
1+60	12.24	3+60	2.50	-	-
1+70	11.80	-	-	-	-
1+80	11.23	-	-	-	-
1+90	10.53	-	-	-	-
2+00	9.69	-	-	-	-

* HEIGHTS NOTED ARE FROM GRADE TO BOTTOM OF PIPE

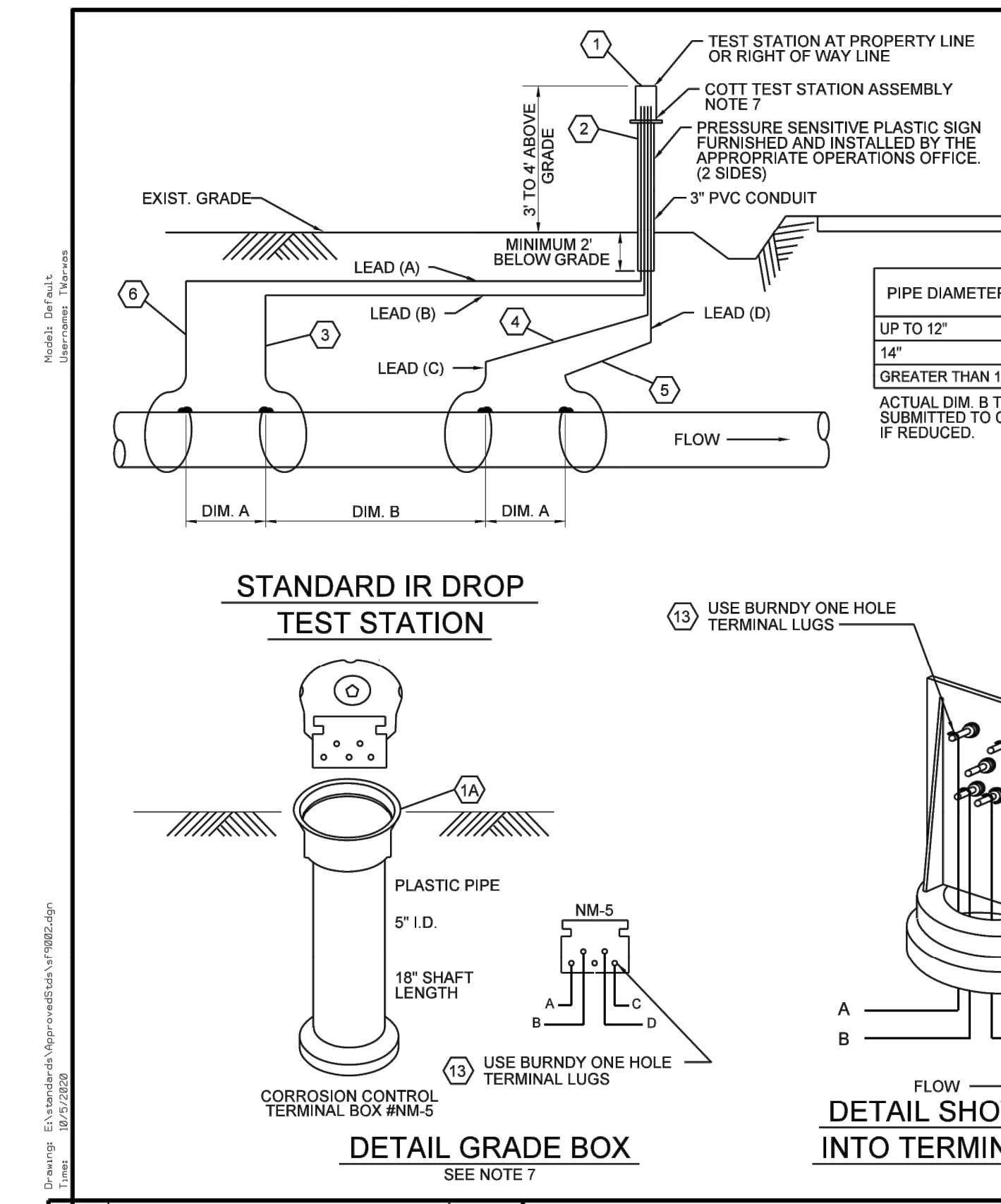
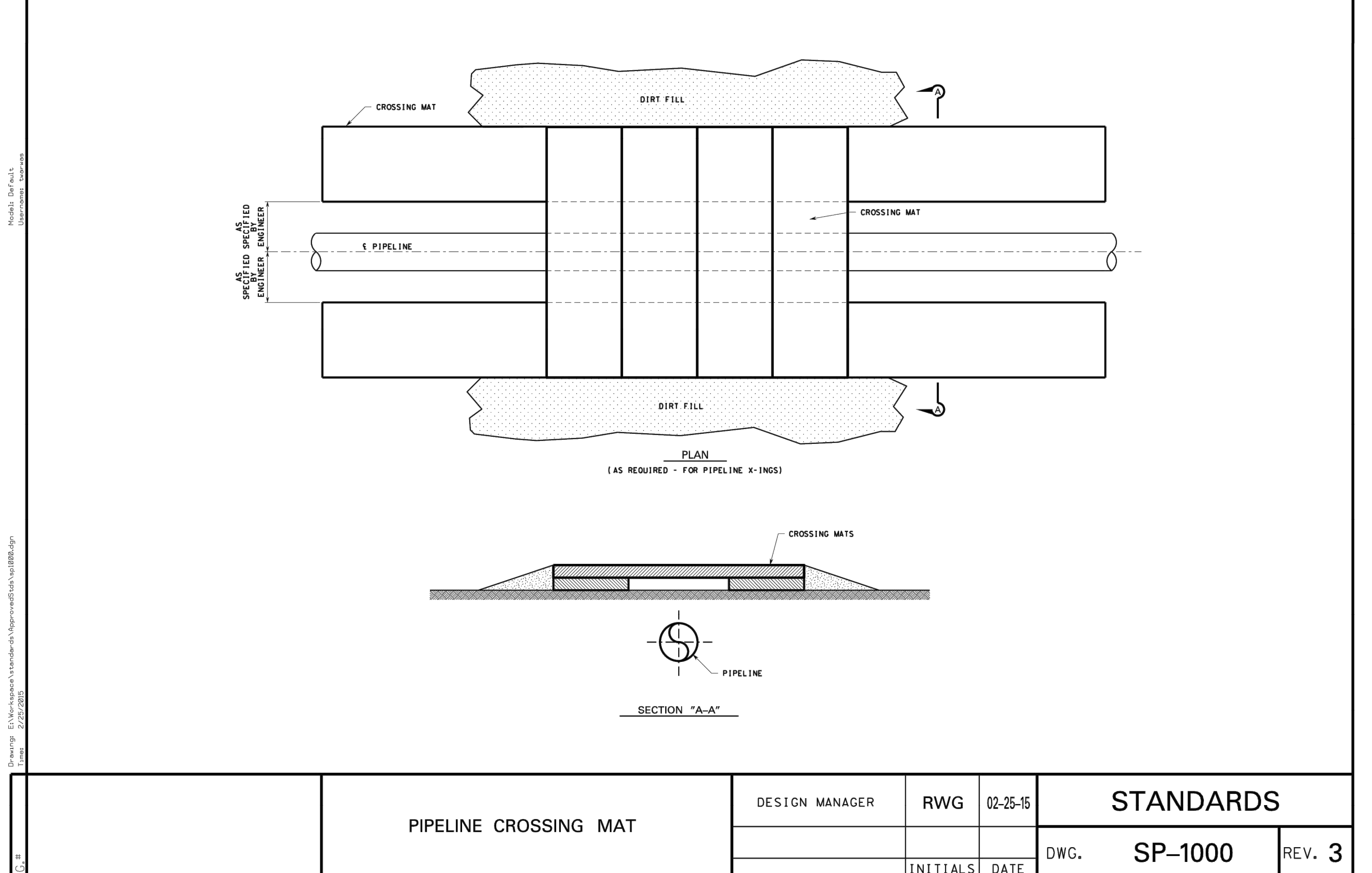
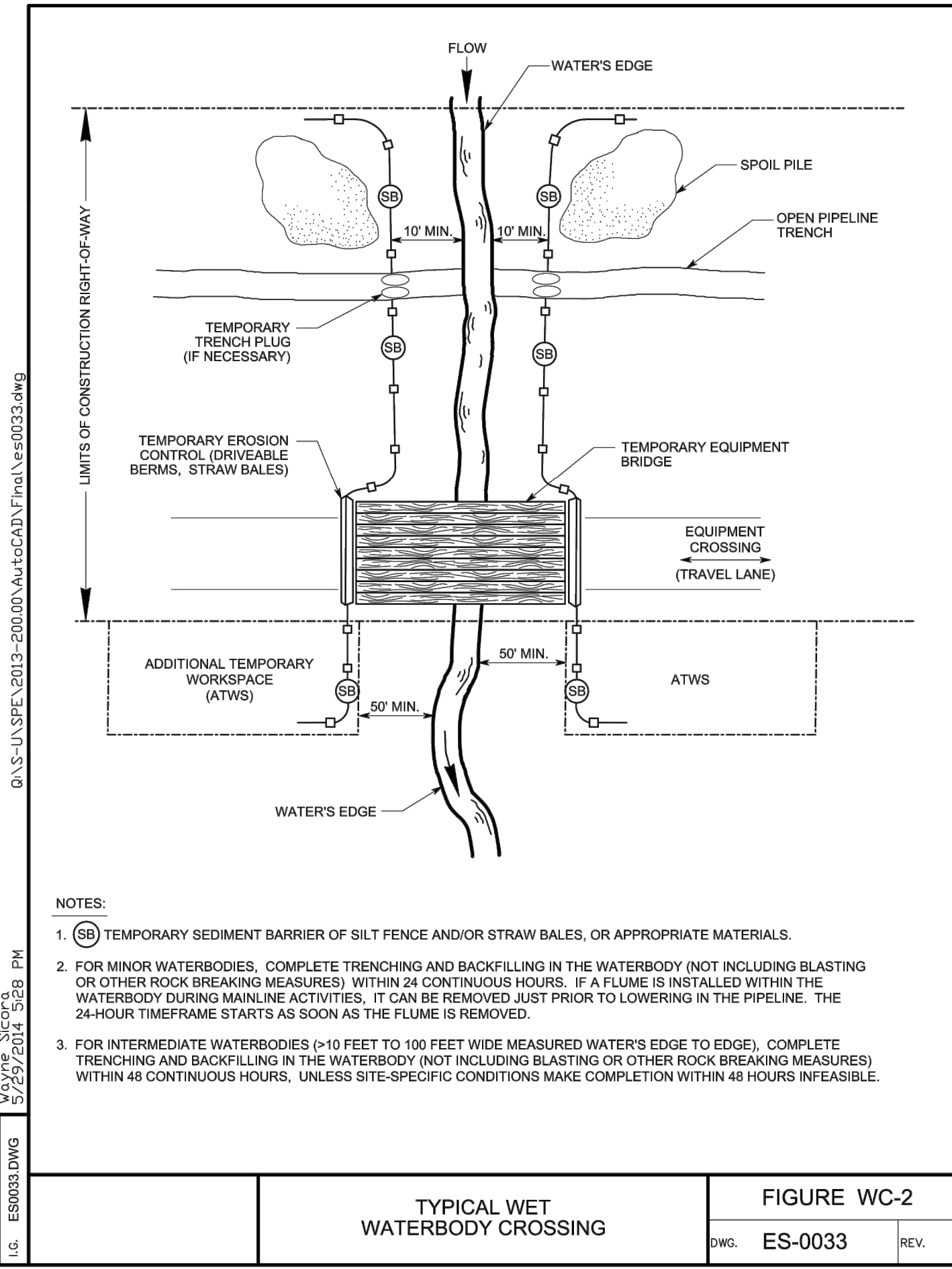
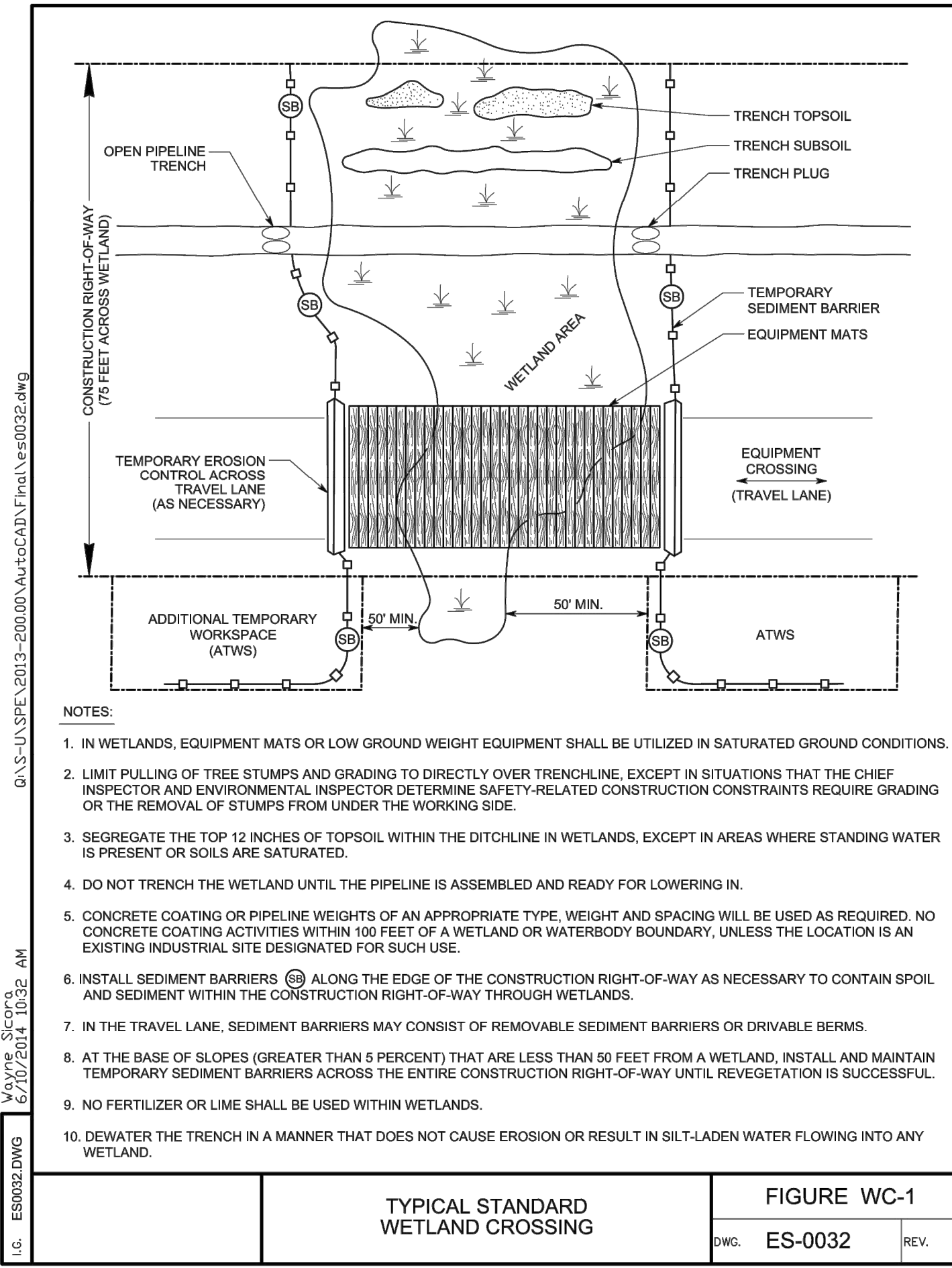
ISSUED FOR BID - 04/06/23

LINE 1 REPLACEMENT PROJECT			
REFERENCE DRAWING			
20-INCH PIPELINE CROSSING OF THE SCHUYLKILL RIVER			
BY HORIZONTAL DIRECTIONAL DRILLING			
LOCATION:	CHESTER & MONTGOMERY COUNTY, PENNSYLVANIA	DRAWING NUMBER	SR2-HDD-040623-01
DRAWN	LKB	SCALE	AS SHOWN FOR D-SIZED PLOT
CHECKED	JSP	APPROVED	JSP
DATE	2/14/23	REVISION	1

NO.	DATE	REVISION DESCRIPTION	BY	CHKD	APP.
1	04/06/23	ISSUED FOR BID	JSP	LKB	JSP
0	03/30/23	ISSUED FOR REVIEW	LKB	LKB	JSP

J.D. Hair & Associates, Inc.
Consulting Engineers
600 S. Yale Ave
Suite 1010
Tulsa, Oklahoma 74136

PROJECT NO.
Audubon/2233
SHEET NO.
2

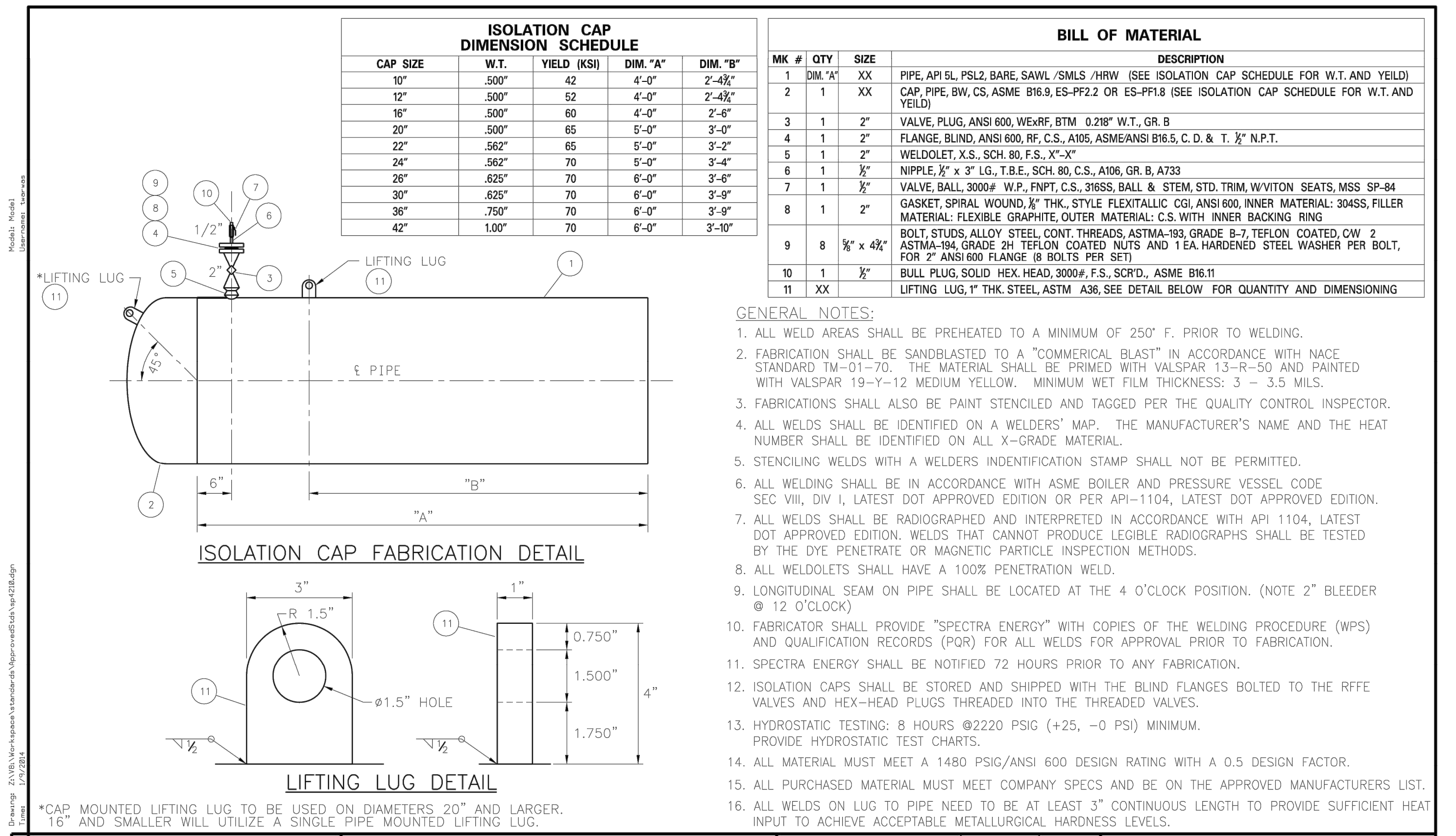


ITEM NO.	NO. REQD.	DESCRIPTION
1	1	YELLOW COTT TEST STATION TYPE "BIG FINK" S LEAD CONFIGURATION
1A	1	ALTERNATE 'C.P.' TEST CORROSION CONTROL TERMINAL BOX #NMS
2	1	3" DIA., 6'-0" LONG WHITE OR YELLOW COLOR P.V.C. CONDUIT
3	170'	#10 THHN STRANDED COPPER (B)
4	40'	#10 THHN STRANDED COPPER (C)
5	30'	#10 THHN STRANDED COPPER (D)
6	175'	#10 THHN STRANDED COPPER (A)
7		NOT USED
8		NOT USED
12		NOT USED
13	4	BURNDY ONE HOLE TERMINAL #YAV10-H3

WIRE	DESCRIPTION	AGT	ETNG	M&N-US	M&N-CANADA	MARKET HUB PARTNERS	NEXUS	OZARK	SESH	STT	TETCO	VCP
A	FAR UPSTREAM TEST LEAD	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE	BLUE
B	UPSTREAM TEST LEAD	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
C	DOWNSTREAM TEST LEAD	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK	BLACK
D	FAR DOWNSTREAM TEST LEAD	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED
	TEST STATION CAP	YELLOW/ORANGE	YELLOW	YELLOW	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE	ORANGE

GENERAL NOTES:

- RUN WIRES INSIDE COTT TEST STATION AND PROVIDE A 12" SLACK LOOP IN EACH END.
- ALL WIRES TO BE PIN BRAZED OR CADWELDED.
- TIE WIRES AROUND PIPELINE.
- TEST STATION LOCATIONS SHOWN ON ALIGNMENT SHEETS ARE APPROXIMATE. ACTUAL LOCATIONS TO BE FIELD DETERMINED BY COMPANY INSPECTOR AT TIME OF INSTALLATION.
- DECOUPLED GROUNDING MAT REQUIRED ON ALL TEST STATIONS IN POWER LINE RIGHT-OF-WAY. CONSULT REGIONAL TECHNICAL STAFF IF NECESSARY.
- REPAIR COATING AT TEST WIRE CONNECTIONS IN ACCORDANCE WITH SPECTRA ENERGY COATING MANUAL-AP-PC1.
- IN CONGESTED AREAS A GRADE BOX MAY BE USED TO TERMINATE TEST LEADS IN PLACE OF THE COTT TEST STATION.
- PIPE IN CALIBRATED SPAN SHALL BE WITHOUT CHANGE IN WALL THICKNESS, LINE CROSSINGS, WIRE CONNECTIONS, OR SIDE TAPS.



NO.	REVISION	DATE

DESIGN MANAGER	TLK	10-5-20	STANDARDS

DESIGN MANAGER	RWG	14-4	STANDARDS

**ISSUED FOR
04/07/23
INFORMATION**

REV	DSN	CK	DESCRIPTION

ITEM NO.	DESCRIPTION	QTY



ENGINEERING APPROVALS	BID	CONSTRUCTION

TEXAS EASTERN TRANSMISSION SYSTEM
EAGL-LAMT, 20-INCH LN 1, MP 9.65
SCHUYLKILL RIVER HDD REPLACEMENT
STANDARDS



DWG. NO.	DESCRIPTION	REV	DSN	CK	DESCRIPTION	ITEM NO.	DESCRIPTION	QTY