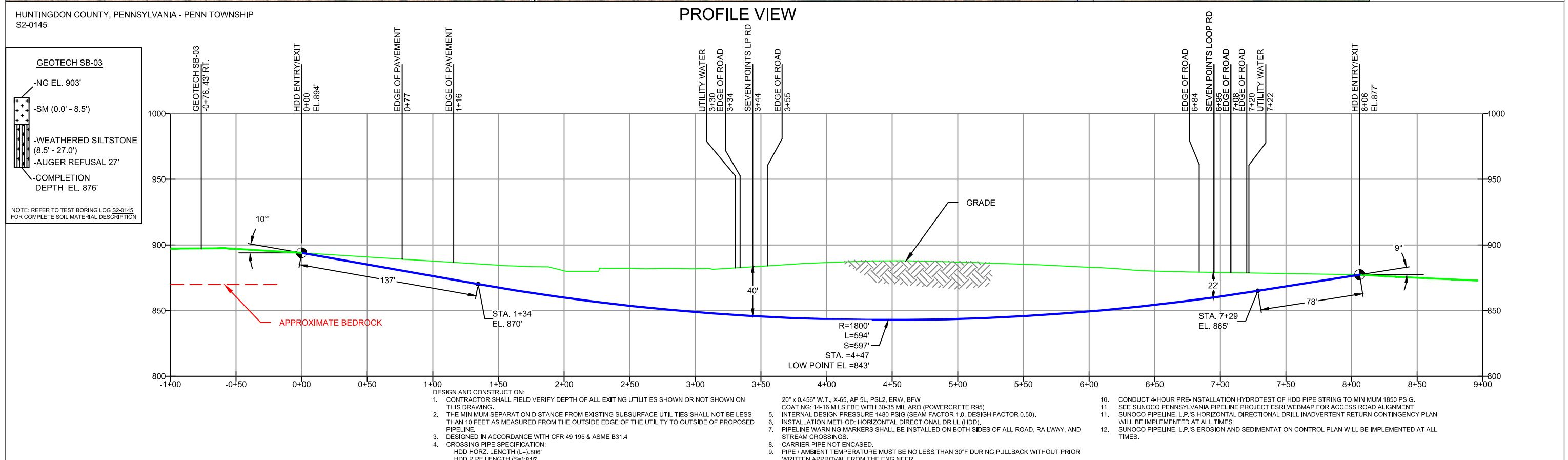
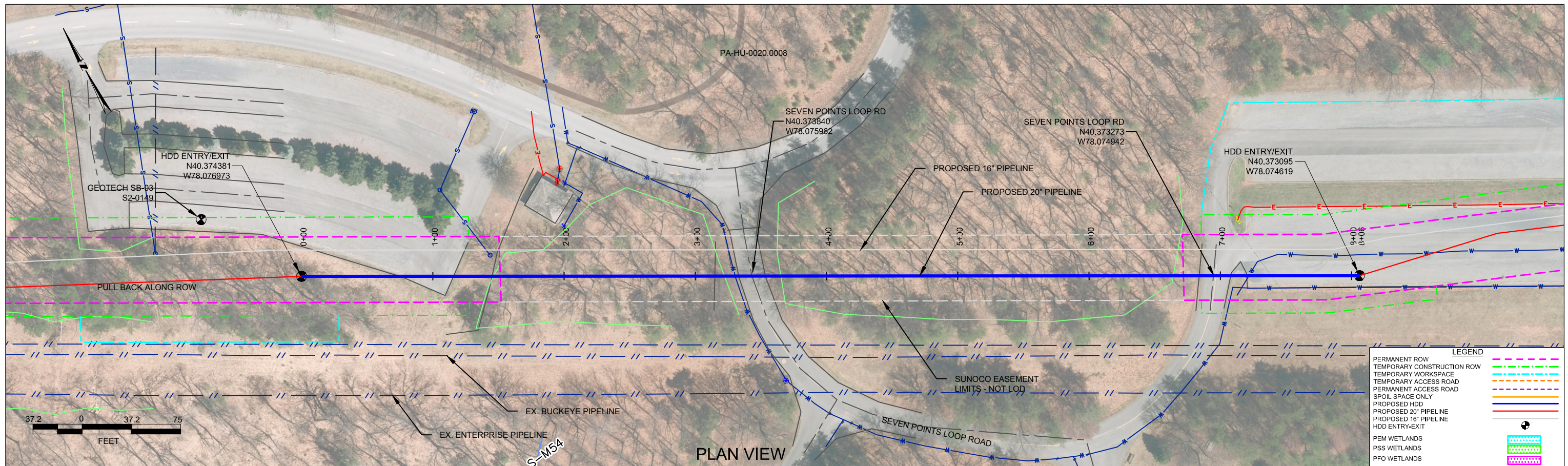


HDD PA-HU-0025.0000-RD3

Given the design, the threat of inadvertent return has been reduced to the maximum extent practicable and in this case that threat is considered to be low. Implementing this design, along with adherence to the Pennsylvania Pipeline Project Inadvertent Return Contingency Plan will ensure inadvertent impacts, if they were to occur, are also minimized to the maximum extent.

The drill will enter/exit 360 feet from the western edge of the first Seven Point Loop Road crossing and enter/exit 450 feet from the eastern edge. The drill will enter/exit 710 feet from the western edge of the second Seven Point Loop Road crossing and enter/exit 100 feet from the eastern edge. The drill will pass below each road crossing at depths greater than 20 feet with a maximum depth of about 45 feet. The geotechnical results, as well as other data points, were used to determine the entry/exit angles, and depths to pass through the best substrates while maintaining the pipe integrity (e.g., no large bends). According to the geotechnical report substrates being drilled through are silts with fine sands, and siltstone. Based on the geotechnical report and drill profile minimal inadvertent returns are expected.



NOTES

1. ALL COORDINATES SHOWN ARE IN LATITUDE AND LONGITUDE, ALL MSL ELEVATIONS ARE NAD83
2. STATIONING IS BASED ON HORIZONTAL DISTANCES.
3. ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES SHOWN IN PLOT PLAN OR PROFILE, THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP. FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES. CONTACT ONE CALL AT 811 PRIOR TO DIGGING.
5. SUNOCO EMERGENCY HOTLINE NUMBER IS 1-800-786-7440.

REF. DRAWING		EROSION & SEDIMENT PLAN	
DWG NO	DWG NO	DESCRIPTION	NO.
ES-3.21	TO ES-3.21	EROSION & SEDIMENT PLAN	
SHEET 14	TO SHEET 14	AERIAL SITE PLAN	
		EP	
		2	REVISED PER ENGINEERING COMMENTS
		1	ADDED GEOTECH INFO
		0	ISSUED FOR CONSTRUCTION

REVISIONS					
BY	DATE	CHK	DATE	APP	DATE
MRS	11/08/16	RMB	11/08/16	AAW	11/08/16
DLM	08/26/16	RMB	08/26/16	AAW	08/26/16
MRS	07/19/16	RMB	07/19/16	AAW	07/19/16
DLM	04/18/16	RMB	04/18/16	AAW	04/18/16

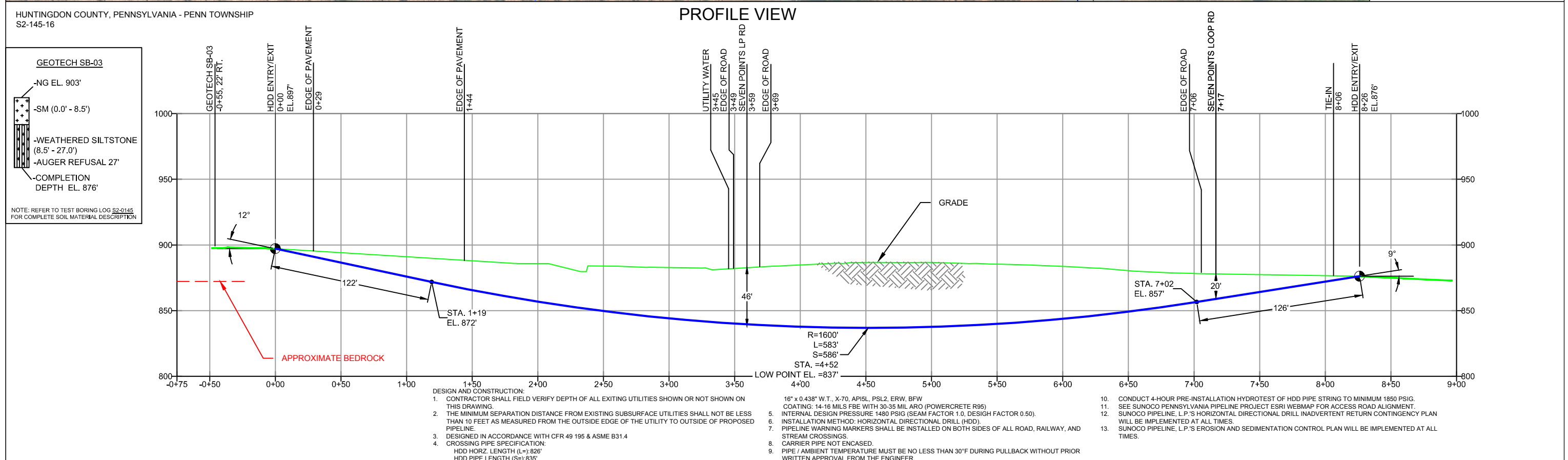
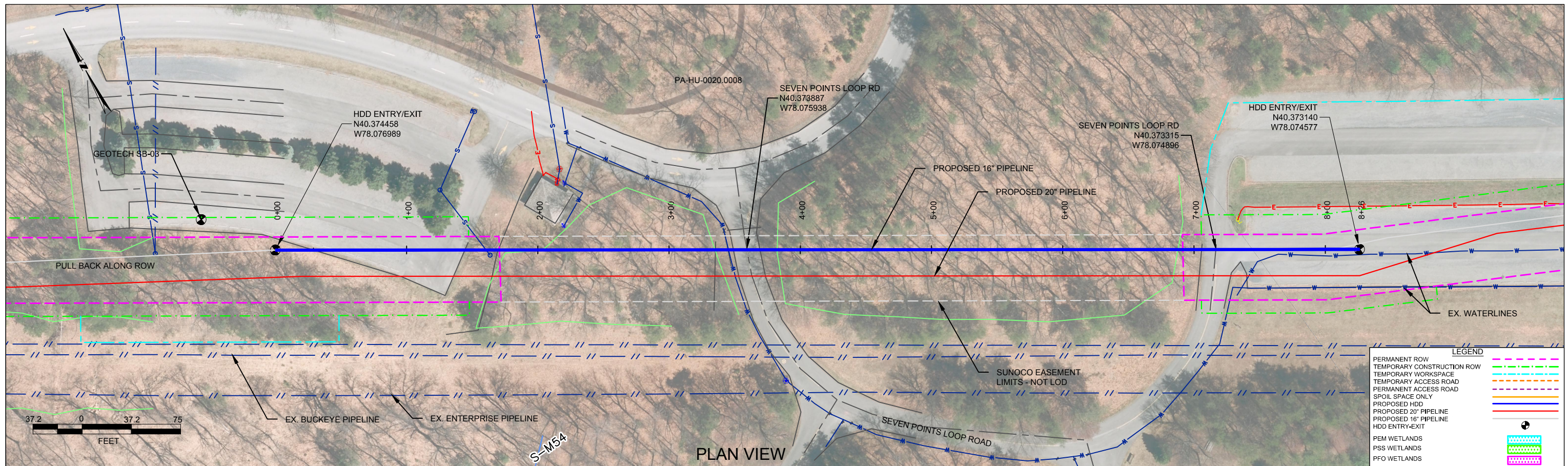
Sunoco Logistics Partners L.P.

Tetra Tech Rooney
(303) 792-5911

SUNOCO PIPELINE, L.P.

DIANCH HORIZONTAL DIRECTIONAL DRILL
SEVEN POINT LOOP ROAD
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=200' DWG. NO: PA-HU-0025.0000-RD3



NOTES				REF. DRAWING				REVISIONS						SUNOCO PIPELINE, L.P.			
1. ALL COORDINATES SHOWN ARE IN LATITUDE AND LONGITUDE. ALL MSL ELEVATIONS ARE NAD83 2. STATIONING IS BASED ON HORIZONTAL DISTANCES. 3. ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP ARE NOT RESPONSIBLE FOR LOCATION OF FOREIGN UTILITIES SHOWN IN PLOT PLAN OR PROFILE. THE INFORMATION SHOWN HEREON IS FURNISHED WITHOUT LIABILITY ON THE PART OF ROONEY ENGINEERING, INC. AND SUNOCO PIPELINE, LP. FOR ANY DAMAGES RESULTING FROM ERRORS OR OMISSIONS THEREIN. 4. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES. CONTACT ONE CALL AT 811 PRIOR TO DIGGING. 5. SUNOCO EMERGENCY HOTLINE NUMBER IS 811-800-786-7440.				ES-3.21	TO	ES-3.21	EROSION & SEDIMENT PLAN									Sunoco Logistics Partners L.P. TETRA TECH ROONEY (303) 792-5911	DIANCH HORIZONTAL DIRECTIONAL DRILL SEVEN POINT LOOP ROAD PENNSYLVANIA PIPELINE PROJECT
				SHEET 14	TO	SHEET 14	AERIAL SITE PLAN								SCALE: 1"=200'		
							EP										
							2	REVISED PER ENGINEERING COMMENTS		MRS	11/08/16	RMB	11/08/16	AAW	11/08/16		
							1	ADDED GEOTECH INFO		DLM	08/26/16	RMB	08/26/16	AAW	08/26/16		
							0	ISSUED FOR CONSTRUCTION		MRS	07/19/16	RMB	07/19/16	AAW	07/19/16		
				DWG NO		DWG NO	DESCRIPTION	NO.		DLM	04/18/16	RMB	04/18/16	AAW	04/18/16		
							DESCRIPTION			BY	DATE	CHK	DATE	APP	DATE		



LEGEND:

⊙ Geotechnical Soil Boring (SB) Locations



GEOTECHNICAL BORING LOCATIONS
S2-0145 RAYSTOWN LAKE MUSHROOM PARKING AREA
HUNTINGDON COUNTY, PENN TOWNSHIP, PA
SUNOCO PENNSYLVANIA PIPELINE PROJECT



TETRA TECH

240 Continental Drive, Suite 200
 Newark, Delaware 19713
 302.738.7551
 fax: 302.454.5988

TEST BORING LOG

Project Name:	SUNOCO PENNSYLVANIA PIPELINE PROJECT	Project No.:	103IP3406
Project Location:	RAYSTOWN LAKE, SEVEN POINTS LOOP, MUSHROOM PARKING AREA, PA	Page 1 of 1	
HDD No.:	S2-0145	Dates(s) Drilled:	04-21-16
Boring No.:	SB-03	Inspector:	E. WATT
Drilling Contractor:	HAD DRILLING	Drilling Method:	SPT - ASTM D1586
Boring Location Coordinates:	40°22'28.56"N	Driller:	S. HOFFER
		Groundwater Depth (ft):	NOT ENCOUNTERED
		Total Depth (ft):	27.0
			78° 4'37.58"W

Sample No.	Sample Depth (ft)		Strata Depth (ft)		Recov. (in)	Strata (USCS)	Description of Materials	6" Increment Blows *				N	
	From	To	From	To									
			0.0	0.0			NO TOPSOIL						
1	3.0	5.0	0.0		16	SM	REDDISH BROWN FINE SAND WITH SOME SILT, WITH A LITTLE UNWEATHERED FINE ROCK FRAGMENTS.	3	5	6	8	11	
2	8.0	9.5			17		SAME	7	35	50/4"		>50	
				8.5		PARTIALLY WEATHERED SILTSTONE							
3	13.0	13.3	8.5		1		REDDISH BROWN PARTIALLY WEATHERED SILTSTONE.	50/2"				>50	
4	18.0	18.4			5		GRAY PARTIALLY WEATHERED SILTSTONE.	50/5"				>50	
5	23.0	23.8			3		REDDISH BROWN PARTIALLY WEATHERED SILTSTONE.	50/5"				>50	
6	27.0	27.0		27.0	0		NO RECOVERY	50/0"					
							AUGER REFUSAL AT 27'.						
							A LITTLE AUGER GRINDING COMMENCED AT 11'.						
							HARD GRINDING COMMENCED AT 23'.						
							CAVED AND DRY AT 22'.						

Notes/Comments:
Pocket Pentrometer Testing
 S1: 3.5 TSF

Strata (USCS) Designations are approximated based on visual review, except where indicated in Description of Materials.

* Number of blows of 140 lb. Hammer dropped 30 in. required to drive 2 in. split-spoon sampler in 6 in. increments.
 N: Number of blows to drive spoon from 6" to 18" interval.

**GEOTECHNICAL LABORATORY TESTING SUMMARY
 SUNOCO PENNSYLVANIA PIPELINE PROJECT
 S2-0145 RAYSTOWN LAKE MUSHROOM PARKING AREA**

Location	Test Boring No.	Sample No.	Depth of Sample (ft.)		Water Content, % (ASTM D2216)	Percent Silts/Clays, % (ASTM D1140)	Atterburg Limits (ASTM D4318)			USCS Classif. (ASTM D2487)
			From	To			Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	
S2-0145	SB-03	1	3.0	5.0	11.9	32.7	-	-	-	-
		2	8.0	9.5	6.5	29.2	NV	NP	NP	SM
		4	18.0	18.4	4.7	23.4	-	-	-	-

Notes:

- 1) Sample depths based on feet below grade at time of exploration.

**REGIONAL GEOLOGY SUMMARY
SUNOCO PENNSYLVANIA PIPELINE PROJECT
S2-0145 RAYSTOWN LAKE MUSHROOM PARKING AREA**

NAME	BORING NO.	REGIONAL GEOLOGY DESCRIPTION	GENERAL TOPOGRAPHIC SETTING	BEDROCK FORMATION	GENERAL ROCK TYPE	APPROX MAX FM THICKNESS (FT)	DEPTH TO ROCK (Ft bgs) based on nearby well drilling logs	NOTES / COMMENTS
S2-0145	SB-01	Catskill Fm - succession of greenish-gray-red sandstone, siltstone, shale, and mudstone, generally in fining-upward cycles.	Hilly small peninsula	Catskill Fm	Greenish-gray-red sandstone, siltstone, shale, and mudstone	900-3,900	Data not available for Raystown Lake area; however, based on other borings performed in Raystown Lake area, depth to bedrock is shallow.	

Note : Source of well log data - <http://www.dcnr.state.pa.us/topogeo/groundwater/pagwis/records/index.htm>. All other sources as referenced in comments section.

FIELD DESCRIPTION AND LOGGING SYSTEM FOR SOIL EXPLORATION

GRANULAR SOILS

(Sand, Gravel & Combinations)

<u>Density</u>	<u>N (blows)*</u>
Very Loose	5 or less
Loose	6 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	51 or more

Particle Size Identification

Boulders	8 in. diameter or more
Cobbles	3 to 8 in. diameter
Gravel	Coarse (C) 3 in. to ¾ in. sieve
	Fine (F) ¾ in. to No. 4 sieve
Sand	Coarse (C) No. 4 to No. 10 sieve (4.75mm-2.00mm)
	Medium No. 10 to No. 40 sieve (M) (2.00mm – 0.425mm)
	Fine (F) No. 40 to No. 200 sieve (0.425 – 0.074mm)
Silt/Clay	Less Than a No. 200 sieve (<0.074mm)

Relative Proportions

<u>Description Term</u>	<u>Percent</u>
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

COHESIVE SOILS

(Silt, Clay & Combinations)

<u>Consistency</u>	<u>N (blows)*</u>
Very Soft	3 or less
Soft	4 to 5
Medium Stiff	6 to 10
Stiff	11 to 15
Very Stiff	16 to 30
Hard	31 or more

Plasticity

<u>Degree of Plasticity</u>	<u>Plasticity Index</u>
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	> 22

ROCK

(Rock Cores)

<u>Rock Quality Designation (RQD), %</u>	<u>Rock Quality Description</u>
0-25	Very Poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

RQD: Rock Quality Designation

TCR: Total Core Recovery

SCR: Solid Core Recovery

***N - Standard Penetration Resistance.** Driving a 2.0" O.D., 1-3/8" I.D. sampler a distance of 18 inches into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. The number of hammer blows to drive the sampler through each 6 inch interval is recorded; the number of blows required to drive the sampler through the final 12 inch interval is termed the Standard Penetration Resistance (SPR) N-value. For example, blow counts of 6/8/9 (through three 6-inch intervals) results in an SPR N-value of 17 (8+9).

Groundwater observations were made at the times indicated. Groundwater elevations fluctuate throughout a given year, depending on actual field porosity and variations in seasonal and annual precipitation.

UNIFIED SOIL CLASSIFICATION SYSTEM [Casagrande (1948)]

Major Divisions		Group Symbols	Typical Descriptions	Laboratory Classifications			
Coarse Grained Soils (More than half of material is larger than No. 200 sieve)	Gravels More than half of coarse fraction is larger than No. 4 sieve size	Clean gravel (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 Not meeting C_u or C_c requirements for GW		
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines			
		Gravel with fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below A Line or I_p less than 4 Atterberg limits above A line with I_p greater than 7 Limits plotting in hatched zone with I_p between 4 and 7 are borderline cases requiring use of dual symbols		
			GC	Clayey gravels, gravel-sand-clay mixtures			
	Sands (More than half of coarse fraction is smaller than No. 4 Sieve)	Clean sands (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 Not meeting C_u or C_c requirements for SW		
			SP	Poorly graded sands, gravelly sands, little or no fines			
		Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures	Atterberg limits below A Line or I_p less than 4 Atterberg limits above A line with I_p greater than 7 Limits Plotting in hatched zone with I_p between 4 and 7 are borderline cases requiring use of dual symbols		
			SC	Clayey sands, sand-clay mixtures			
		Determine Percentage of sand and gravel from grain size curve. Depending on Percentage of fines (fraction smaller than No. 200 sieve), coarse-grained soils are classified as follows: Less than 5 percent GW, GP, SW, SP More than 12 percent GM, GC, SM, SC 5 to 12 percent Borderline cases requiring dual symbols ⁽¹⁾					
		Major Divisions		Group Symbols	Typical Descriptions	For soils plotting nearly on A line use dual symbols i.e., $I_p = 29.5$, $w_L = 60$ gives CH-MH. When w_L is near 50 use CL-CH or ML-MH. Take near as ± 2 percent.	
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silt and clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity				
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
		OL	Organic silts and organic silty clays of low plasticity				
	Silt and Clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts				
		CH	Inorganic clays of high plasticity, fat clays				
		OH	Organic clays of medium to high plasticity, organic silts				
	Highly organic soils	Pt	Peat and other highly organic soils				

(1) Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC. well-graded gravel-sand mixture with clay binder.