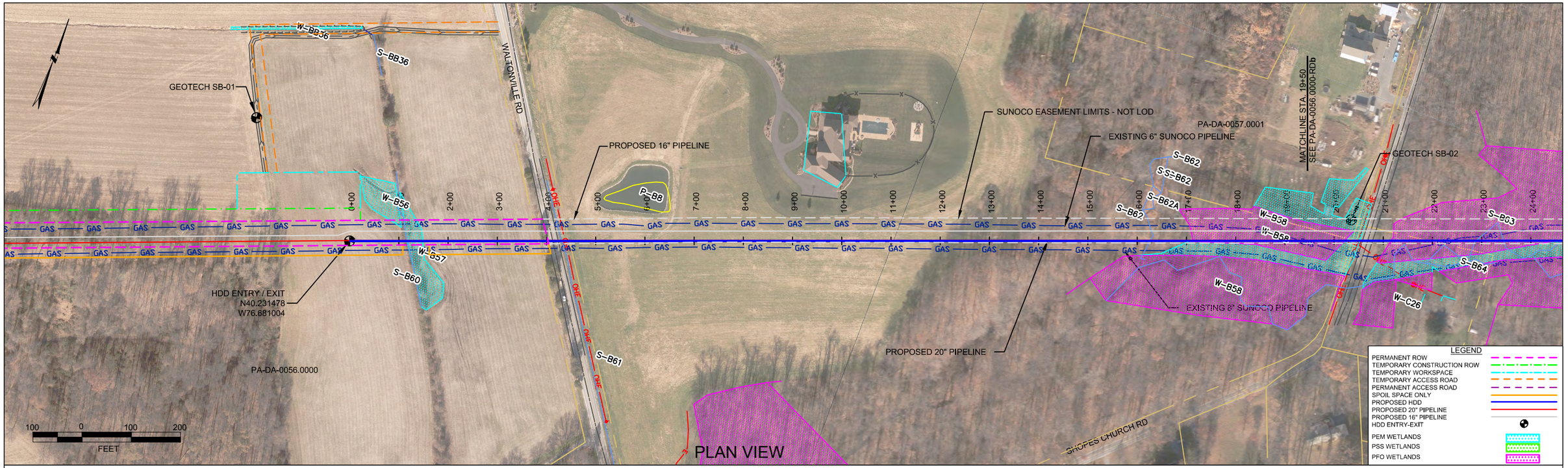
HDD PA-DA-0056.0000-RD (S-B60, PEM-B57, S-B61, S-B62, W-B58, W-C26, S-B63)

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 120 feet from the western edge of Stream B60 (S-B60) and enter exit 3,750 feet from the eastern edge. The drill will enter/exit 120 feet from the edge of Grassy Wetland B57 (PEM-B57) and enter/exit 3,720 feet from the eastern edge. The western entrance/exit of the drill will be 430 feet from the western edge of Stream B61 (S-B61) while the eastern entrance/exit is 3,440 feet from the eastern edge. The western edge of Stream B62 (S-B62) is 1,630 feet from the drill's western entrance/exit and the eastern edge is 2,240 feet from the eastern entrance/exit. The drill will enter/exit 1,710 feet from the western edge of wetland B58 (W-B58) and will enter/exit 1,820 feet from the eastern edge. The drill will enter/exit 2,120 feet from the western edge of Wetland C26 (W-C26) and enter/exit 100 feet from the eastern edge. The Iron Run (S-B63) crosses the drill in multiple locations. The westernmost crossing is 2,290 feet from the drill's western entrance/exit while the easternmost crossing is 1,306 feet from the eastern entrance/exit. The drill will pass under each of these formations at different depths: 15 feet below S-B60 and PEM-B57; 32 feet beneath S-B61; 20 feet beneath S-B62; 25 feet beneath W-B58; 25 feet beneath S-B63; and between 25 feet on the western side and 5 feet on the eastern edge beneath W-C26.

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 primary substrates being drilled through are sandstone beneath layers of sands with some silts. Based on the geotechnical report and the drill profile minimal inadvertent returns are expected. Additional inspection is recommended on the eastern portion of the drill due to the lower depth of the drill and the size of W-C26.

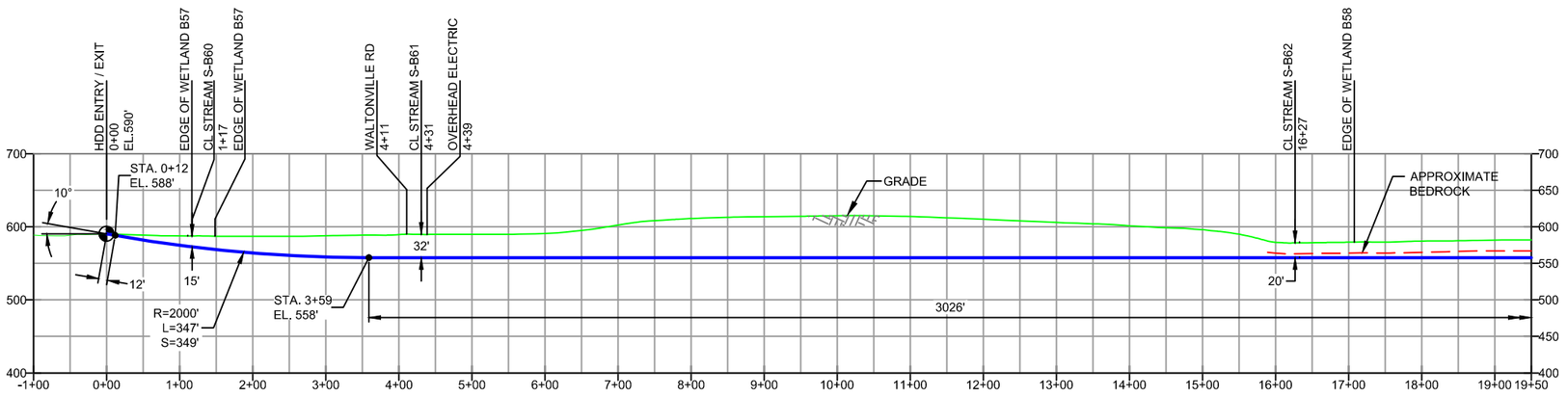


PROFILE VIEW

DAUPHIN COUNTY, PENNSYLVANIA - DERRY TOWNSHIP
S3-0080A

GEOTECH SB-01
-NG EL. 599'
-TOPSOIL (0' - 1.0')
-GROUNDWATER (6.0')
-SM (1.0' - 30.0')
-COMPLETION DEPTH EL. 569'

NOTE: REFER TO TEST BORING LOG S3-0080 FOR COMPLETE SOIL MATERIAL DESCRIPTION



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3. DESIGNED IN ACCORDANCE WITH CFR 49 195 & ASME B31.4
4. CROSSING PIPE SPECIFICATION:
   HDD HORZ. LENGTH (L=):3,850'
   HDD PIPE LENGTH (S=):3,855'
   20" x 0.456" W.T., X-65, API5L, PSL2, ERW, BFW
   COATING: 14-16 MILS FBE WITH 30-35 MIL ARO (POWERCRETE R95)
5. INTERNAL DESIGN PRESSURE 1480 PSIG (SEAM FACTOR 1.0, DESIGH FACTOR 0.50).
6. INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL (HDD).
7. PIPELINE WARNING MARKERS SHALL BE INSTALLED ON BOTH SIDES OF ALL ROAD, RAILWAY, AND STREAM CROSSINGS.
8. CARRIER PIPE NOT ENCASED.
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NOTES
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5. SUNOCO EMERGENCY HOTLINE NUMBER IS #1-800-786-7440.

REF. DRAWING

DWG NO		DWG NO	DESCRIPTION
ES-4.23	TO	ES-4.25	EROSION & SEDIMENT PLAN
SHEET 14	TO	SHEET 15	AERIAL SITE PLAN

REVISIONS

NO.	DESCRIPTION	BY	DATE	CHK	DATE	APP	DATE
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EP		JTW	03/15/16	RMB	03/15/16	AAW	03/15/16
C	ADDED GEOTECH INFO	MRS	09/21/15	RMB	09/21/15	AAW	09/21/15
B	ISSUED FOR BID	MRS	07/31/15	RMB	07/31/15	AAW	07/31/15
A	ISSUED FOR REVIEW	JVA	04/15/15	RMB	04/15/15	AAW	04/15/15

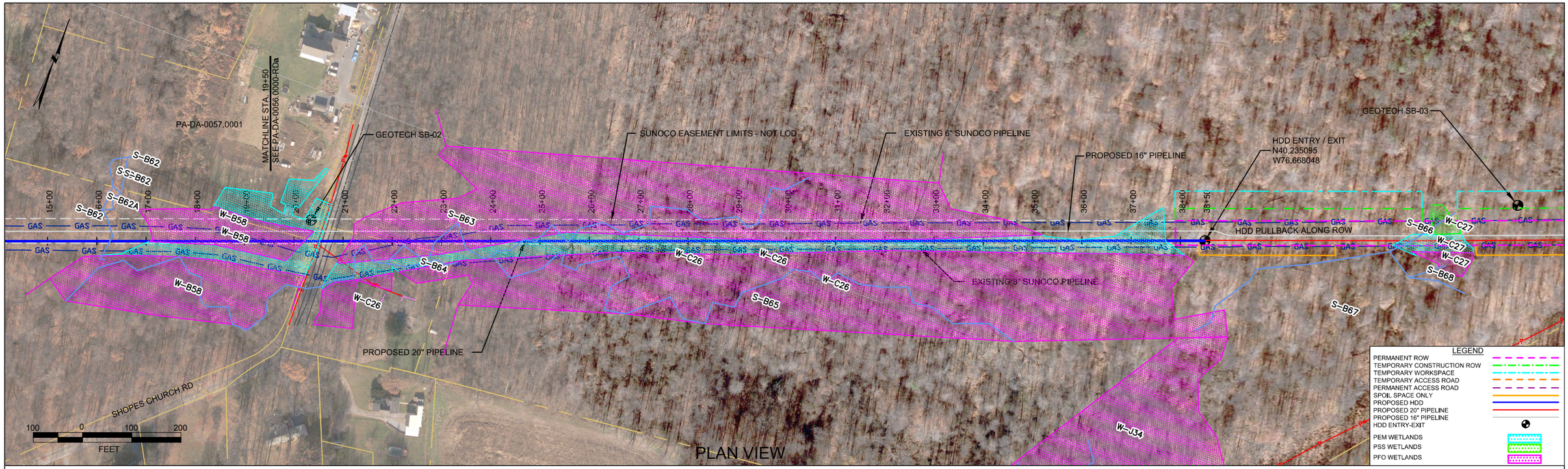
Sunoco Logistics Partners L.P.

TETRA TECH ROONEY
(303) 792-5911

SUNOCO PIPELINE, L.P.

20-INCH HORIZONTAL DIRECTIONAL DRILL
WALTONVILLE ROAD
PENNSYLVANIA PIPELINE PROJECT

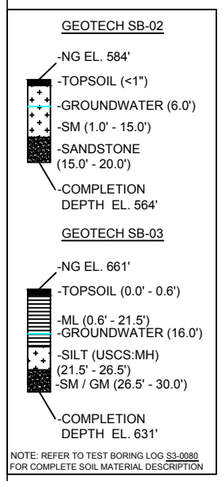
SCALE: 1"=200' | DWG. NO: PA-DA-0056.0000-RDa



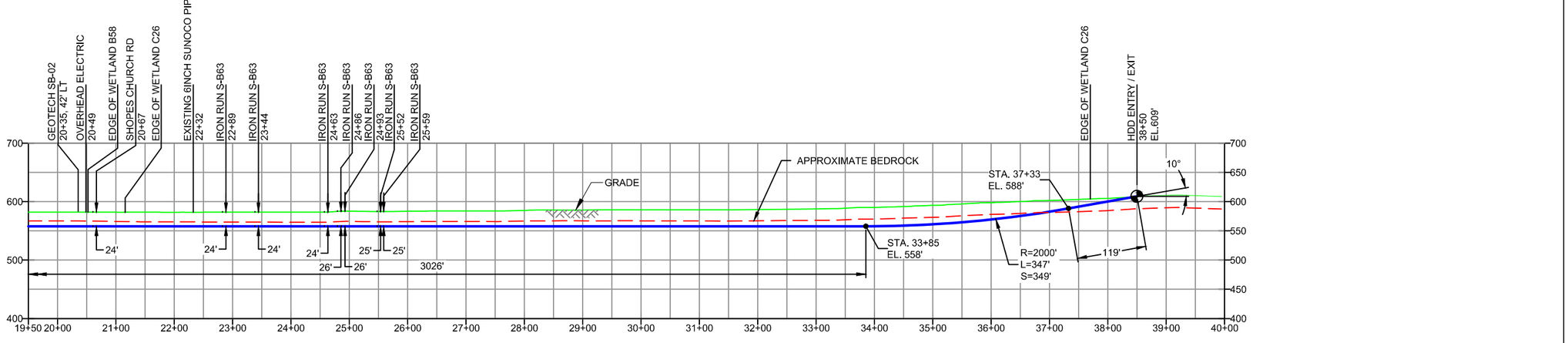
PLAN VIEW

PROFILE VIEW

DAUPHIN COUNTY, PENNSYLVANIA - DERRY TOWNSHIP
S3-0080B



NOTE: REFER TO TEST BORING LOG S3-0080 FOR COMPLETE SOIL MATERIAL DESCRIPTION



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   HDD PIPE LENGTH (S=):3855'
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ES-4.23	TO	ES-4.25	EROSION & SEDIMENT PLAN	
SHEET 14	TO	SHEET 15	AERIAL SITE PLAN	
DWG NO		DWG NO	DESCRIPTION	

REVISIONS

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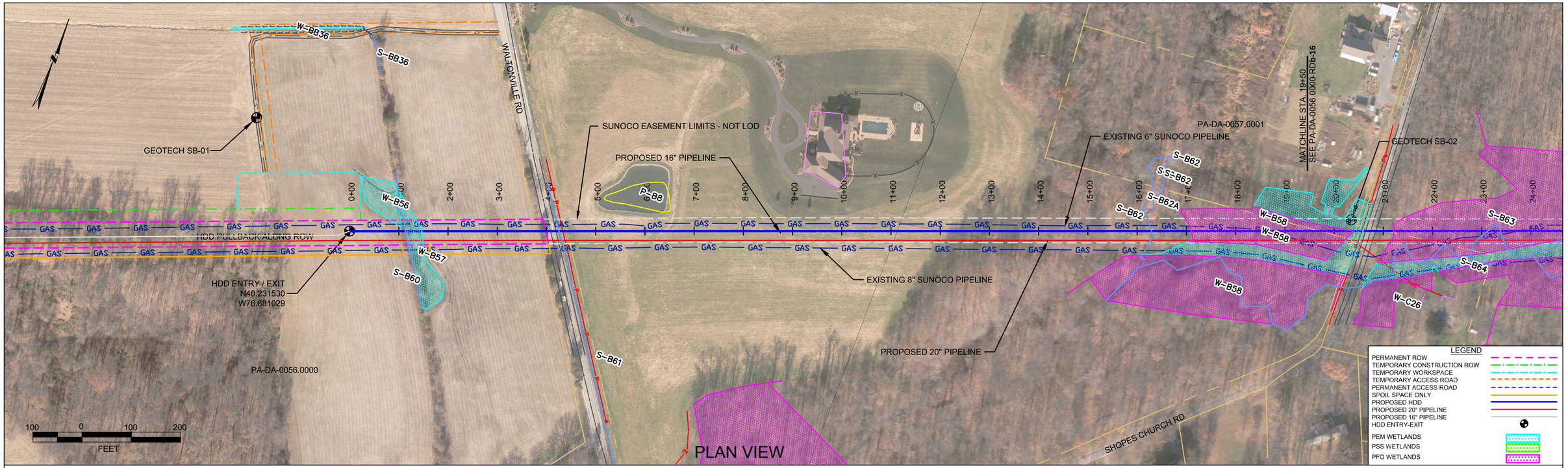
20-INCH HORIZONTAL DIRECTIONAL DRILL
WALTONVILLE ROAD
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=200'

DWG. NO: PA-DA-0056.0000-RDb



PROFILE VIEW

DAUPHIN COUNTY, PENNSYLVANIA - DERRY TOWNSHIP
S3-0080A-16

GEOTECH SB-01

-NG EL. 599'
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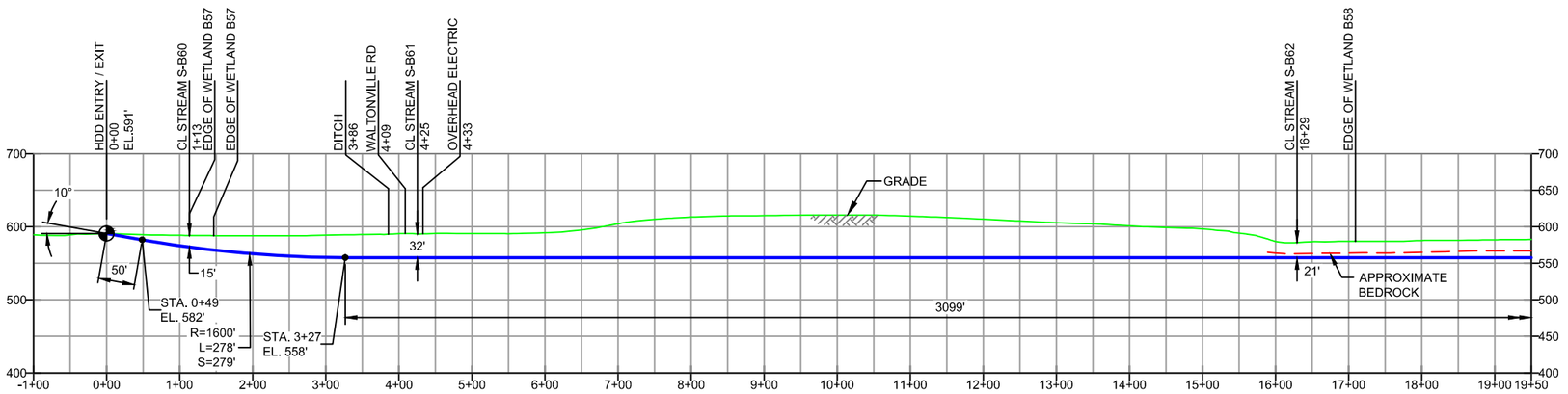
-GROUNDWATER (6.0')
-SM (1.0' - 30.0')
-COMPLETION DEPTH EL. 569'

NOTE: REFER TO TEST BORING LOG S3-0080 FOR COMPLETE SOIL MATERIAL DESCRIPTION



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REF. DRAWING

DWG NO		DWG NO	DESCRIPTION
ES-4.23	TO	ES-4.25	EROSION & SEDIMENT PLAN
SHEET 14	TO	SHEET 15	AERIAL SITE PLAN

REVISIONS

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B	ADDED GEOTECH INFO	MRS	09/22/15	RMB	09/22/15	AAW	09/22/15
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Sunoco Logistics Partners L.P.

TETRA TECH ROONEY
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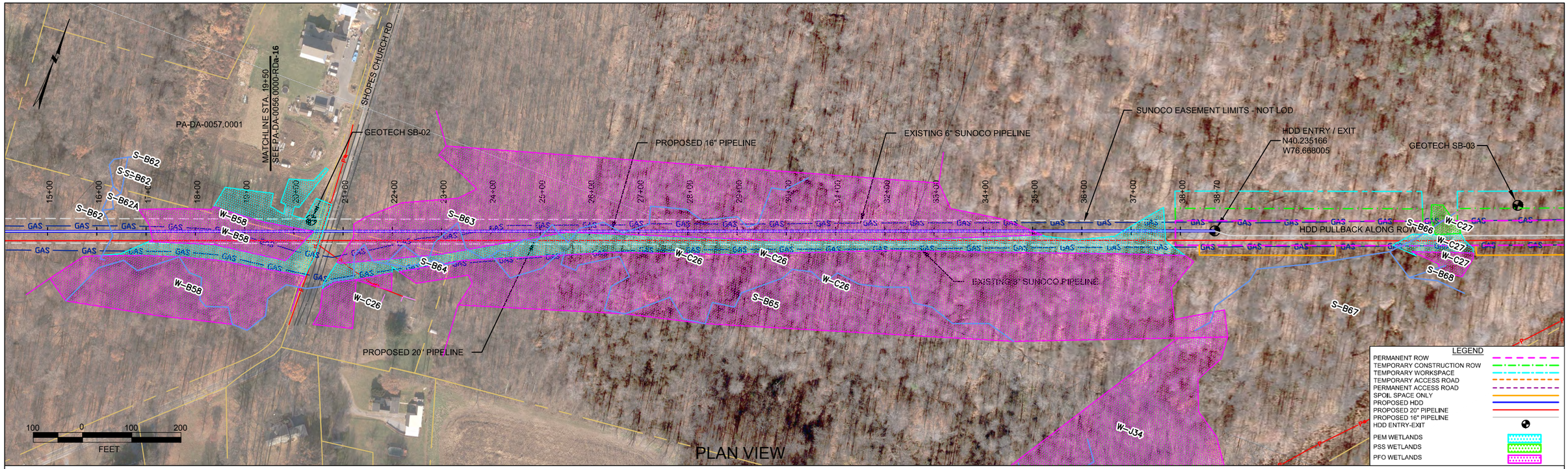
SUNOCO PIPELINE, L.P.

16-INCH HORIZONTAL DIRECTIONAL DRILL
WALTONVILLE ROAD
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=200'

DWG. NO: PA-DA-0056.0000-RDa-16



PLAN VIEW

PROFILE VIEW

DAUPHIN COUNTY, PENNSYLVANIA - DERRY TOWNSHIP
S3-0080B-16

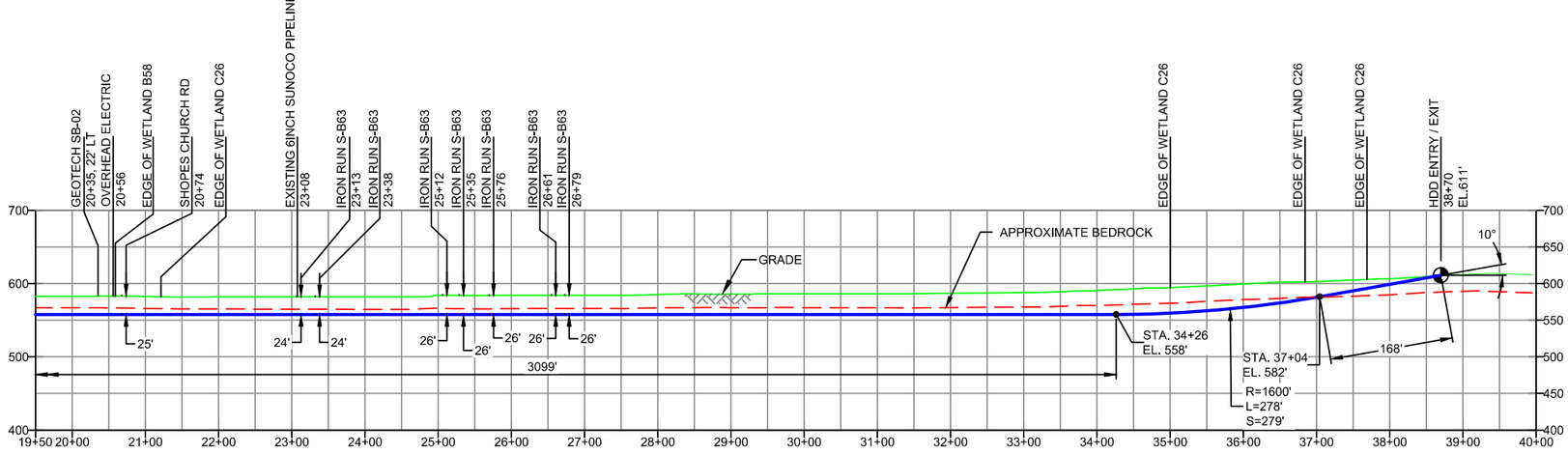
GEOTECH SB-02

-NG EL. 584'
-TOPSOIL (<1")
-GROUNDWATER (6.0')
-SM (1.0' - 15.0')
-SANDSTONE (15.0' - 20.0')
-COMPLETION DEPTH EL. 564'

GEOTECH SB-03

-NG EL. 661'
-TOPSOIL (0.0' - 0.6')
-ML (0.6' - 21.5')
-GROUNDWATER (16.0')
-SILT (USCS:MH) (21.5' - 26.5')
-SM / GM (26.5' - 30.0')
-COMPLETION DEPTH EL. 631'

NOTE: REFER TO TEST BORING LOG S3-0080 FOR COMPLETE SOIL MATERIAL DESCRIPTION



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DWG NO		DWG NO	DESCRIPTION	

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PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=200'

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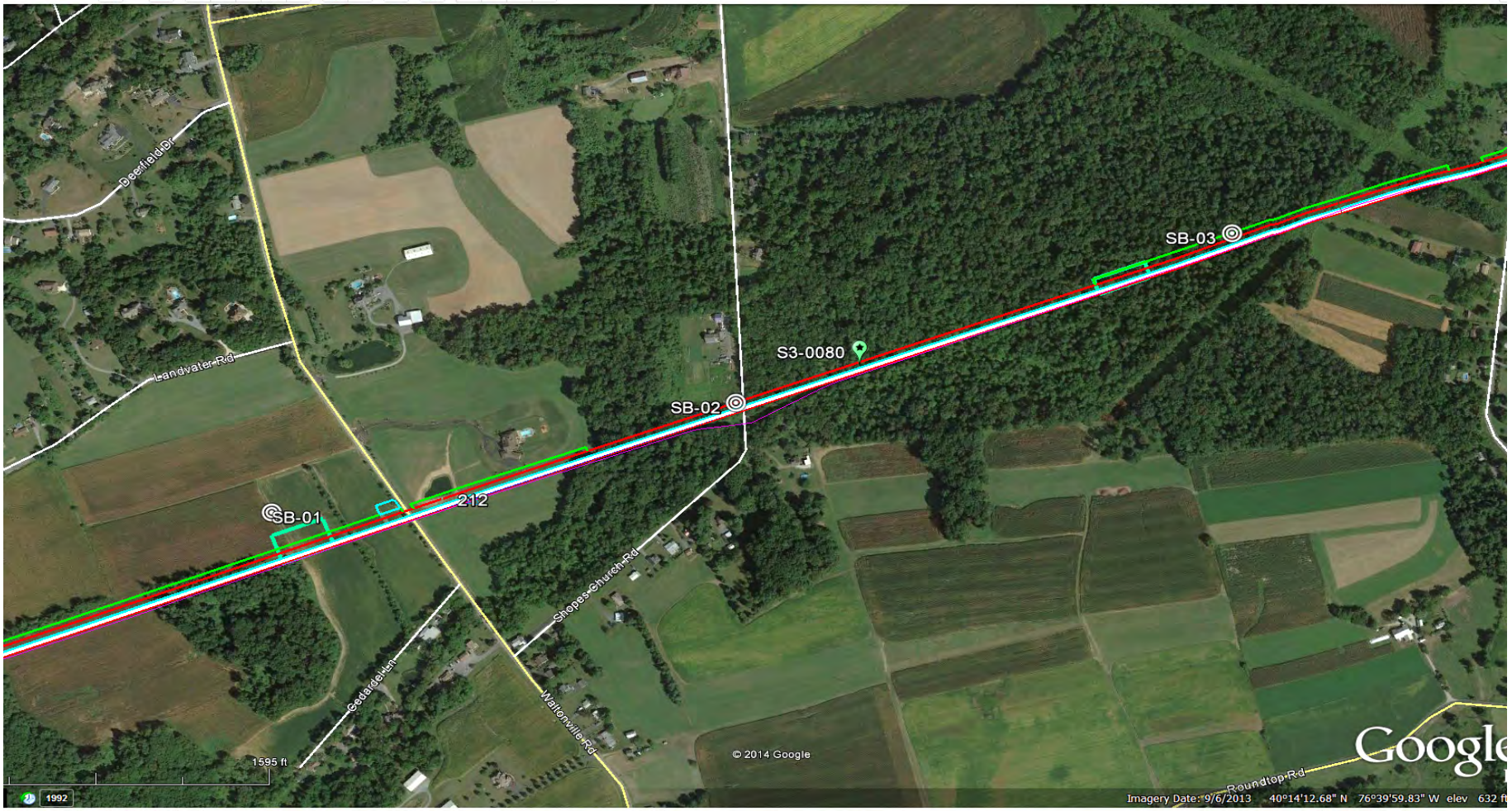

LEGEND:

◎ Geotechnical Soil Boring (SB) Locations

TETRA TECH

GEOTECHNICAL BORING LOCATIONS
HDD S3-0080
DAUPHIN COUNTY, DERRY 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:	WALTONVILLE ROAD, HUMMELSTOWN, PA		Page 1 of 1
HDD No.:	S3-0080	Dates(s) Drilled: 11-11-14	Inspector: E. WATT
Boring No.:	SB-01	Drilling Method: SPT - ASTM D1586	Driller: S. HOFFER
Drilling Contractor:	HAD DRILLING	Groundwater Depth (ft): 6.0	Total Depth (ft): 30.0
Boring Location Coordinates:		40° 13' 55.015" N	76° 40' 54.952" W

Sample No.	Sample Depth (ft) From	Sample Depth (ft) To	Strata Depth (ft) From	Strata Depth (ft) To	Recov. (in)	Strata (USCS)	Description of Materials	6" Increment Blows *				N
			0.0	1.0			TOPSOIL (12")					
1	3.0	5.0	1.0		16	SM	BROWN TO ORANGE BROWN MEDIUM TO COARSE SAND WITH	2	8	10	11	**18**
							SOME SILT AND A LITTLE FINE TO COARSE GRAVEL.					
2	8.0	10.0			20		GRAY FINE TO MEIDUM SAND WITH SOME SILT.	2	6	6	6	**12**
3	13.0	15.0			24		GRAY FINE SAND WITH SOME SILT, TRACE FINE GRAVEL.	1	3	6	12	**9**
4	18.0	20.0			8		GRAY FINE TO MEDIUM SAND WITH SOME SILT, AND WITH SOME	3	14	15	15	**29**
							FINE TO COARSE GRAVEL.					
5	23.0	25.0			22		GRAY AND BROWN FINE TO MEDIUM SAND WITH A LITTLE SILT, AND	6	22	19	50	**41**
							A LITTLE FINE GRAVEL.					
6	28.0	29.2			10		BROWN TO ORANGE BROWN MEDIUM TO COARSE SAND WITH A	2	15	50/2"		**>65**
				30.0			LITTLE SILT.					
							WET ON SPOON AT 6'.					
							WATER LEVEL THROUGH AUGERS AT 8'.					
							CAVED AT 21', WATER LEVEL ON CAVE AT 5'.					

Notes/Comments:
Pocket Pentrometer Testing

DR: DECOMPOSED ROCK

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.

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TEST BORING LOG

Project Name:	SUNOCO PENNSYLVANIA PIPELINE PROJECT		Project No.: 103IP3406
Project Location:	SHOPS CHURCH ROAD, HUMMELSTOWN, PA		Page 1 of 1
HDD No.:	S3-0080	Dates(s) Drilled: 11-11-14	Inspector: E. WATT
Boring No.:	SB-02	Drilling Method: SPT - ASTM D1586	Driller: S. HOFFER
Drilling Contractor:	HAD DRILLING	Groundwater Depth (ft): 6.0	Total Depth (ft): 20.0
Boring Location Coordinates:		40° 14' 0.606" N	76° 40' 27.087" W

Sample No.	Sample Depth (ft) From	Sample Depth (ft) To	Strata Depth (ft) From	Strata Depth (ft) To	Recov. (in)	Strata (USCS)	Description of Materials	6" Increment Blows *				N
			0.0	0.0			TOPSOIL (<1")					
1	3.0	5.0	0.0		18		BROWN, YELLOWISH BROWN TO ORANGE BROWN FINE TO COARSE	1	6	11	11	**17**
							SAND WITH A LITTLE SILT, AND LITTLE F-C GRAVEL.					
2	8.0	9.9			24		SAME, WITH PIECES OF UNWEATHERED SANDSTONE.	2	9	26	50/5"	**35**
							AUGER REFUSAL AT 12', OFF-SET 10' SOUTH, AND CONTINUOULSY					
						SM	AUGERED TO 10'.					
3	10.0	12.0					DR WEATHERED TO A YELLOWISH BROWN TO GRAY FINE TO	8	29	17	50/6"	**46**
							COARSE SAND AND SILT, WITH SOME F-C UNWEATHERED SANDSTONE					
				15.0			GRAVEL.					
							AUGERS STICKING UP TOO HIGH TO ROCK CORE. OFF-SET BORING					
							AND CONTINUOUSLY AUGERED TO REFUSAL AT 15"					
							<u>ROCK CORING</u>					
RUN 1	15.0	20.0	15.0	20.0	24		HIGHLY FRACTURED AND HEAVILY WEATHERED GRAY SAND STONE.	TCR: 40%, SCR: 0%, RQD: 0%				
							COULD NOT PERFORM AN ADDITIONAL ROCK CORE RUN. BORING					
							CAVED DUE TO HEAVILY FRACTURED/WEATHERED ROCK.					
							WET ON SPOON AT 10'					
							WATER LEVEL THROUGH AUGERS AT 6'.					
							CAVED AT 4', WATER AT SURFACE.					

Notes/Comments:
<u>Pocket Pentrometer Testing</u>

DR: DECOMPOSED ROCK

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* 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.

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TEST BORING LOG

Project Name:	SUNOCO PENNSYLVANIA PIPELINE PROJECT		Project No.: 103IP3406
Project Location:	SAND HILL ROAD, NUMMELSTOWN, PA		Page 1 of 1
HDD No.:	S3-0080	Dates(s) Drilled: 11-12-14	Inspector: E. WATT
Boring No.:	SB-03	Drilling Method: SPT - ASTM D1586	Driller: S. HOFFER
Drilling Contractor:	HAD DRILLING	Groundwater Depth (ft): 16.0	Total Depth (ft): 30.0
Boring Location Coordinates:		40° 14' 9.164" N	76° 39' 57.534" W

Sample No.	Sample Depth (ft) From	Sample Depth (ft) To	Strata Depth (ft) From	Strata Depth (ft) To	Recov. (in)	Strata (USCS)	Description of Materials	6" Increment Blows *				N
			0.0	0.6			TOPSOIL (7")					
1	3.0	5.0	0.6		17		BROWN SILT AND FINE SAND WITH A TRACE FINE	2	7	8	9	**15**
				6.5			GRAEL.					
2	8.0	10.0	6.5		24		ORANGE BROWN CLAYEY SILT AND FINE SAND, TRACE FINE	4	9	7	12	**16**
				11.5		ML	GRAVEL (USCS: ML).					
3	13.0	15.0	11.5		24		ORANGE BROWN TO REDDISH BROWN CLAYEY SILT WITH A LITTLE	1	2	4	5	**6**
							FINE SAND, TRACE FINE GRAVEL.					
4	18.0	20.0			24		ORANGE BROWN TO REDDISH BROWN CLAYEY SILT AND FINE	1	1	7	22	**8**
				21.5			SAND, TRACE FINE GRAVEL.					
5	23.0	25.0	21.5		15	MH	MOTTLED (GRAY, YELLOWISH BRWN,BLACK) CLAYEY SILT WITH	8	12	3	11	**15**
				26.5			SOME FINE SAND, TRACE FINE GRAVEL. (USCS: MH)					
6	28.0	30.0	26.5		13	SM/ GM	VARI-COLORED FINE TO COARSE SAND AND FINE TO COARSE	3	21	34	43	**55**
				30.0			SANDSTONE GRAVEL.					
							SOME GRINDING AT 9'.					
							WET ON SPOON AT 16'.					
							WATER LEVEL NOT DETECTED THORUGH AUGERS.					
							CAVED AT 26', WATER LEVEL ON CAVE AT 20'.					

Notes/Comments:

Pocket Pentrometer Testing
S1: > 4 TSF S4: 1.25 TSF
S2: 3 TSF
S3: 1.5 TSF

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N: Number of blows to drive spoon from 6" to 18" interval.

GEOTECHNICAL LABORATORY TESTING SUMMARY
SUNOCO PENNSYLVANIA PIPELINE PROJECT
HDD S3-0080

HDD No.	Test Boring No.	Sample No.	Depth of Sample (ft.) From	Depth of Sample (ft.) To	Water Content, % (ASTM D2216)	Percent Silts/Clays, % (ASTM D1140)	Atterburg Limits (ASTM D4318) Liquid Limit, %	Atterburg Limits (ASTM D4318) Plastic Limit, %	Atterburg Limits (ASTM D4318) Plasticity Index, %	USCS Classif. (ASTM D2487)
S3-0080	SB-01	2	8.0	10.0	19.1	30.4	-	-	-	-
		3	13.0	15.0	17.5	27.2	-	-	-	-
		5	23.0	25.0	16.3	21.0	-	-	-	-
		6	28.0	29.2	16.7	16.2	-	-	-	-
	SB-02	1	3.0	5.0	13.8	18.9	-	-	-	-
		2	8.0	9.9	9.6	14.5	-	-	-	-
		3	10.0	12.0	29.8	46.2	-	-	-	-
	SB-03	1	3.0	5.0	15.1	55.7	-	-	-	-
		2	8.0	10.0	39.4	54.0	49	34	15	ML
		3	13.0	15.0	50.0	81.0	-	-	-	-
		4	18.0	20.0	49.5	66.3	-	-	-	-
		5	23.0	25.0	45.5	73.7	53	38	15	MH

Notes:

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

REGIONAL GEOLOGY SUMMARY
SUNOCO PENNSYLVANIA PIPELINE PROJECT
HDD S3-0080

HDD No.	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
S3-0080	Wetland C26 - Shopes Church Rd.	SB-01 SB-02 SB-03	**Diabase** - occurs primarily as dikes and sheets and forms a complex igneous network that extensively intrudes sedimentary rocks in the Gettysburg and Newark basins.	Moderately sloping rolling hills	Diabase	Ophitic texture , an important variety of basalt texture where pyroxene (or occasionally olivine) forms larger crystals and typically contains numerous crystals of plagioclase (right).	N/A	10-62	Diabase - Medium- to coarse-grained, quartz-normative tholeiite; composed of labradorite and various pyroxenes; occurs as dikes, sheets, and a few small flows. Includes the dark-gray York Haven Diabase (high titanium oxide) and the slightly younger Rossville Diabase (low titanium oxide). In chilled margins, the Rossville is distinguished from the York Haven by its lighter gray color and distinctive, sparse, centimeter-sized calcic-plagioclase phenocrysts.

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.

ROCK CORE DESCRIPTION SUMMARY
SUNOCO PENNSYLVANIA PIPELINE PROJECT
HDD S3-0080

Location	Boring No.	Core Run	Core Depth (ft)		TCR (%)	SCR (%)	RQD (%)	Depth (ft)		Weathering	Classification	Bedding Thickness (ft)	Color	Discontinuity Data
			From	To				From	To					
S3-0080	SB-2	1	15	20	40	0	0	15	20	Heavily	Sandstone	Massive	Gray	Heavily fractured, ranging from 0° to 90°

FIELD DESCRIPTION AND LOGGING SYSTEM FOR SOIL EXPLORATION

GRANULAR SOILS

(Sand, Gravel & Combinations)

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

Relative Proportions

Description Term	*Percent*
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

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 (M)	No. 10 to No. 40 sieve (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)	

COHESIVE SOILS

(Silt, Clay & Combinations)

Consistency	***N (blows)****
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

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

ROCK

(Rock Cores)

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

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).

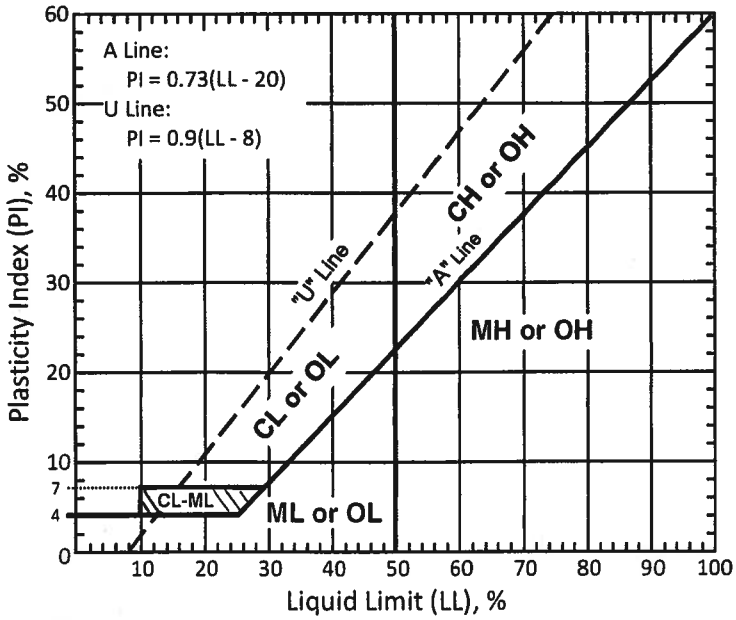
Groundwater observations were made at the times indicated. Groundwater elevations fluctuate throughout a given year, depending on actual field porosity and variations in seasonal and annual precipitation.

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	Clean gravel (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	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]	$C_u=\frac{D_{60}}{D_{10}}$ greater than 4: $C_c=\frac{(D_{30})2}{D_{10} \times D_{60}}$ between 1 and 3	
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting C_u or C_c requirements for GW	
		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	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		Atterberg limits above A line with I_p greater than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 Sieve)	Clean sands (Little or no fines)	SW	Well graded sands, gravely 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	
			SP	Poorly graded sands, gravelly sands, little or no fines		Not meeting C_u or C_c requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures		Atterberg limits below A Line or I_p less than 4	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		Atterberg limits above A line with I_p greater than 7	

Major Divisions		Group Symbols	Typical Descriptions
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts 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
	Silts 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

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.



(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.