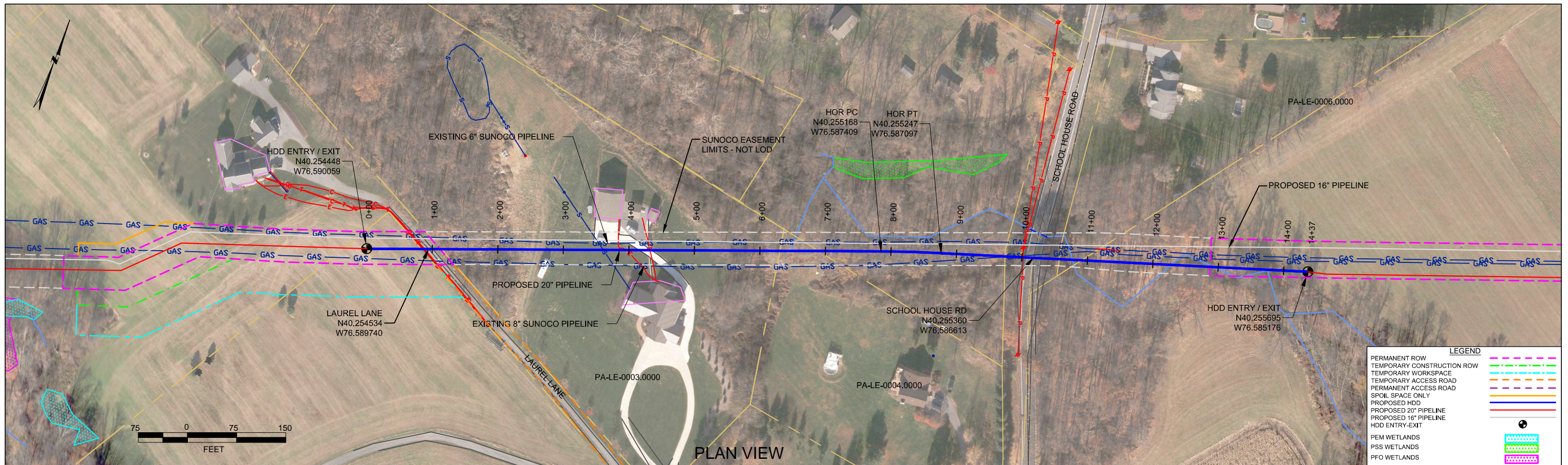


***HDD PA-LE-0005.0000-RD (S-A49)***

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 crosses under Stream A49 (S-A49) three times between the entry and exit locations. Only the western and eastern edges of the stream crossing are considered here. The drill will enter/exit 1,100 feet from the western edge of S-A49 and enter/exit 50 feet from the eastern edge. The drill will pass 50 feet below the western edge and 20 feet below the eastern edge of S-A49. Due to a design change geotechnical bores were not completed for this horizontal directional drill. However, it is adjacent to PA-LE-0001.0000 and it can be assumed the soil layers are the same, clays and silty sands. Based on the drill profile and the adjacent geotechnical report minimal inadvertent returns are expected.

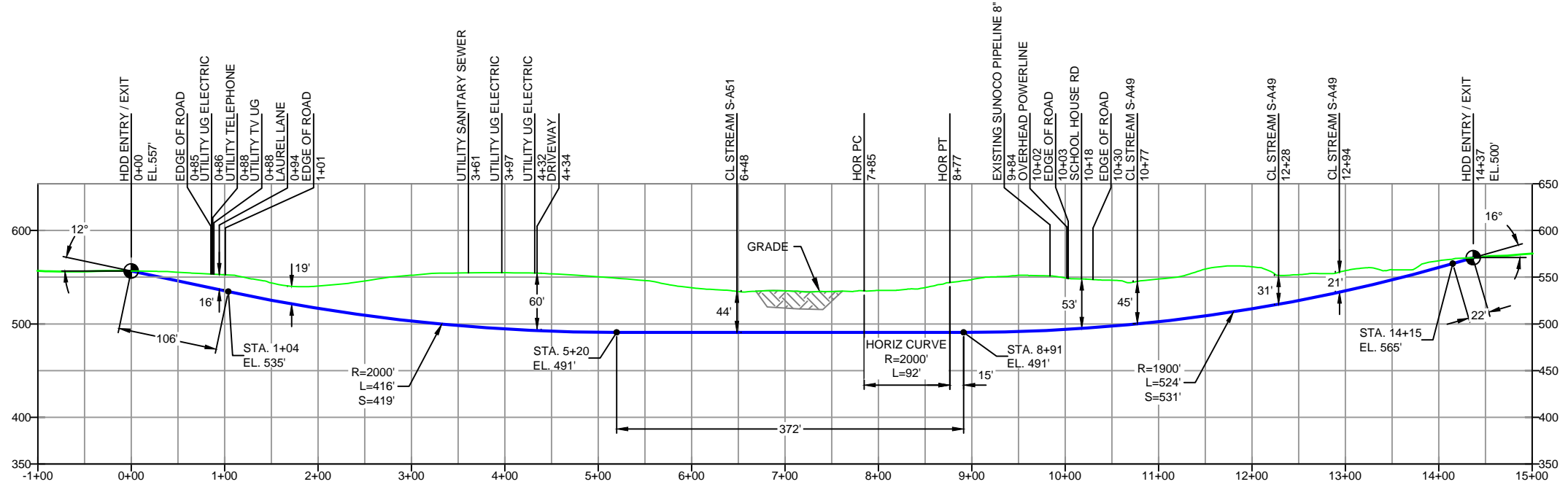




PLAN VIEW

LEBANON COUNTY, PENNSYLVANIA - SOUTH LONDONDERRY TOWNSHIP  
S3-0091

PROFILE VIEW



- DESIGN AND CONSTRUCTION:
- CONTRACTOR SHALL FIELD VERIFY DEPTH OF ALL EXISTING UTILITIES SHOWN OR NOT SHOWN ON THIS DRAWING.
  - THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FEET AS MEASURED FROM THE OUTSIDE EDGE OF THE UTILITY TO OUTSIDE OF PROPOSED PIPELINE.
  - DESIGNED IN ACCORDANCE WITH CFR 49 195 & ASME B31.4
  - CROSSING PIPE SPECIFICATION:  
HDD HORZ. LENGTH (L-): 1437'  
HDD PIPE LENGTH (S-): 1449'  
20" x 0.456" W.T., X-65, API5L, PSL2, ERW, BFW  
COATING: 14-16 MILS FBE WITH 30-35 MIL ARO (POWERCRETE R95)
  - INTERNAL DESIGN PRESSURE 1480 PSIG (SEAM FACTOR 1.0, DESIGN FACTOR 0.50).
  - INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL (HDD).
  - PIPELINE WARNING MARKERS SHALL BE INSTALLED ON BOTH SIDES OF ALL ROAD, RAILWAY, AND STREAM CROSSINGS.
  - CARRIER PIPE NOT ENCASED.
  - PIPE / AMBIENT TEMPERATURE MUST BE NO LESS THAN 30°F DURING PULLBACK WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER.
  - CONDUCT 4-HOUR PRE-INSTALLATION HYDROTEST OF HDD PIPE STRING TO MINIMUM 1850 PSIG.
  - SEE SUNOCO PENNSYLVANIA PIPELINE PROJECT ESRI WEBMAP FOR ACCESS ROAD ALIGNMENT.
  - SUNOCO PIPELINE, L.P.'S HORIZONTAL DIRECTIONAL DRILL INADVERTENT RETURN CONTINGENCY PLAN WILL BE IMPLEMENTED AT ALL TIMES.
  - SUNOCO PIPELINE, L.P.'S EROSION AND SEDIMENTATION CONTROL PLAN WILL BE IMPLEMENTED AT ALL TIMES.

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		REVISIONS	
ES-5.04	TO ES-5.05	EROSION & SEDIMENT PLAN	
SHEET 24	TO SHEET 24	AERIAL SITE PLAN	EP2 REVISED PER PADEP COMMENTS RECEIVED 09-06-16
			EP1 REVISED PER PADEP COMMENTS
			1 DESIGN CHANGE
			0 ISSUED FOR CONSTRUCTION
DWG NO	DWG NO	DESCRIPTION	NO.

**Sunoco Logistics Partners L.P.**

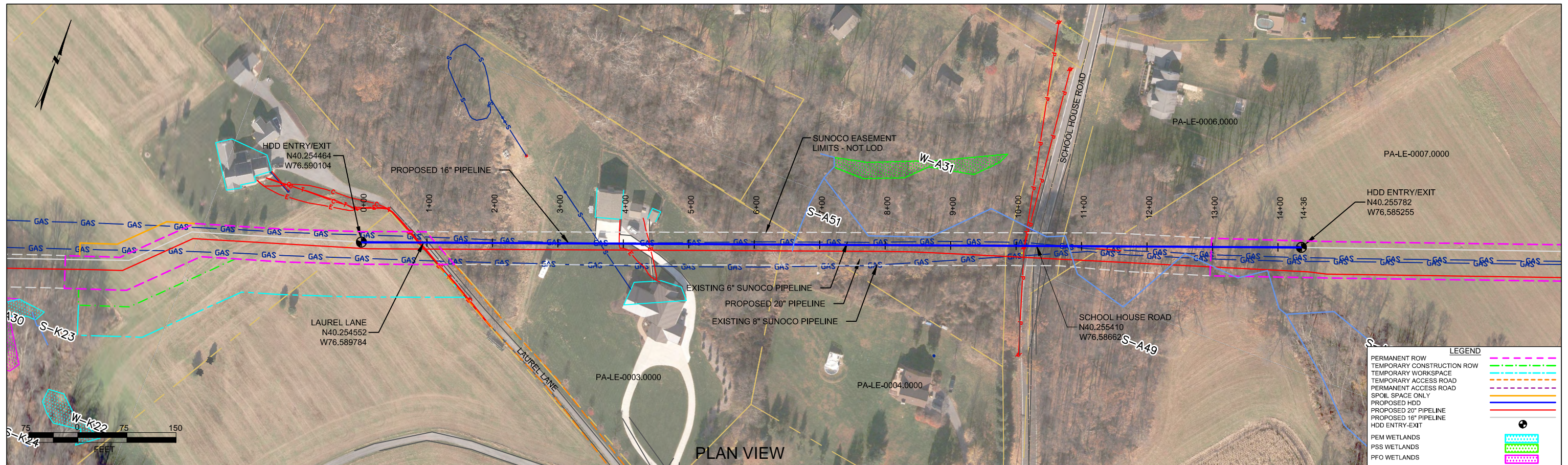
**TETRA TECH ROONEY**  
(303) 792-5911

**SUNOCO PIPELINE, L.P.**

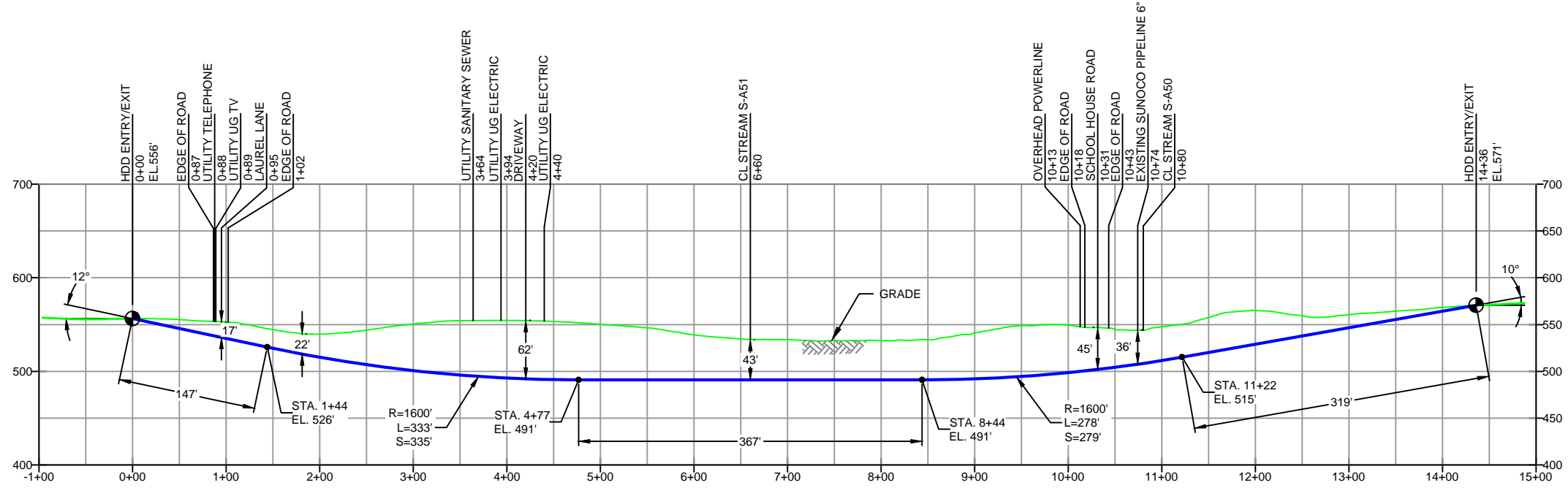
DIANCH HORIZONTAL DIRECTIONAL DRILL  
SCHOOL HOUSE RD  
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=150'  
DWG. NO. PA-LE-0005.0000-RD





PROFILE VIEW



- DESIGN AND CONSTRUCTION:
- CONTRACTOR SHALL FIELD VERIFY DEPTH OF ALL EXISTING UTILITIES SHOWN OR NOT SHOWN ON THIS DRAWING.
  - THE MINIMUM SEPARATION DISTANCE FROM EXISTING SUBSURFACE UTILITIES SHALL NOT BE LESS THAN 10 FEET AS MEASURED FROM THE OUTSIDE EDGE OF THE UTILITY TO OUTSIDE OF PROPOSED PIPELINE.
  - DESIGNED IN ACCORDANCE WITH CFR 49 195 & ASME B31.4
  - CROSSING PIPE SPECIFICATION:  
 HDD HORZ. LENGTH (L-): 1436'  
 HDD PIPE LENGTH (S-): 1447'  
 16" x 0.438" W.T., X-70, API5L, PSL2, ERW, BFW  
 COATING: 14-16 MILS FBE WITH 30-35 MIL ARO (POWERCRETE R95)
  - INTERNAL DESIGN PRESSURE 1480 PSIG (SEAM FACTOR 1.0, DESIGN FACTOR 0.50).
  - INSTALLATION METHOD: HORIZONTAL DIRECTIONAL DRILL (HDD).
  - PIPELINE WARNING MARKERS SHALL BE INSTALLED ON BOTH SIDES OF ALL ROAD, RAILWAY, AND STREAM CROSSINGS.
  - CARRIER PIPE NOT ENCASED.
  - PIPE / AMBIENT TEMPERATURE MUST BE NO LESS THAN 30°F DURING PULLBACK WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER.
  - CONDUCT 4-HOUR PRE-INSTALLATION HYDROTEST OF HDD PIPE STRING TO MINIMUM 1850 PSIG.
  - SEE SUNOCO PENNSYLVANIA PIPELINE PROJECT ESRI WEBMAP FOR ACCESS ROAD ALIGNMENT.
  - SUNOCO PIPELINE, L.P.'S HORIZONTAL DIRECTIONAL DRILL INADVERTENT RETURN CONTINGENCY PLAN WILL BE IMPLEMENTED AT ALL TIMES.
  - SUNOCO PIPELINE, L.P.'S EROSION AND SEDIMENTATION CONTROL PLAN WILL BE IMPLEMENTED AT ALL TIMES.

**PRELIMINARY DESIGN ONLY**

NOTES

- ALL COORDINATES SHOWN ARE IN LATITUDE AND LONGITUDE. ALL MSL ELEVATIONS ARE NAD83
- STATIONING IS BASED ON HORIZONTAL DISTANCES
- 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.
- CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES. CONTACT ONE CALL AT 811 PRIOR TO DIGGING.
- SUNOCO EMERGENCY HOTLINE NUMBER IS #1-800-786-7440.

REF. DRAWING	TO	DESCRIPTION	NO.	DESCRIPTION
ES-5.04	TO	EROSION & SEDIMENT PLAN		
SHEET 24	TO	AERIAL SITE PLAN	EP2	REVISED PER PADEP COMMENTS RECEIVED 09-06-16
			EP1	REVISED PER PADEP COMMENTS
			EP	
			1	DESIGN CHANGE
			0	ISSUED FOR CONSTRUCTION

REVISIONS

BY	DATE	CHK	DATE	APP	DATE
MRS	10/07/16	RMB	10/07/16	AAW	10/07/16
JTW	05/10/16	RMB	05/10/16	AAW	05/10/16
MRS	03/15/16	RMB	03/15/16	AAW	03/15/16
MRS	02/18/16	RMB	02/18/16	AAW	02/18/16
MRS	01/21/16	RMB	01/21/16	AAW	01/21/16



SUNOCO PIPELINE, L.P.

16-INCH HORIZONTAL DIRECTIONAL DRILL  
SCHOOL HOUSE RD  
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=150'    DWG. NO. PA-LE-0005.0000-RD-16