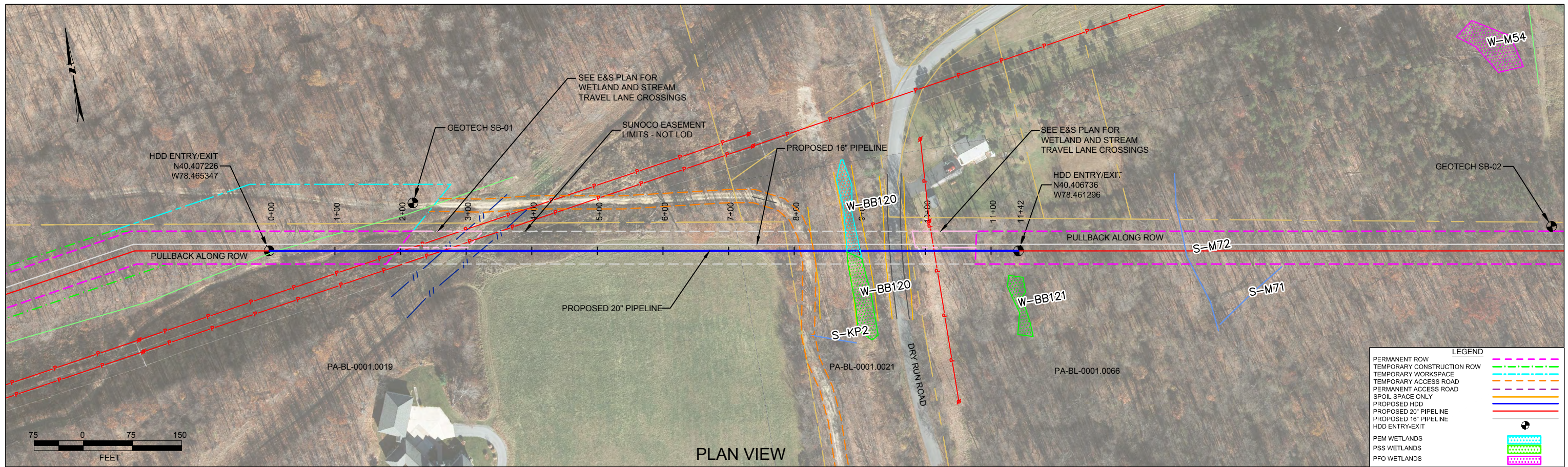


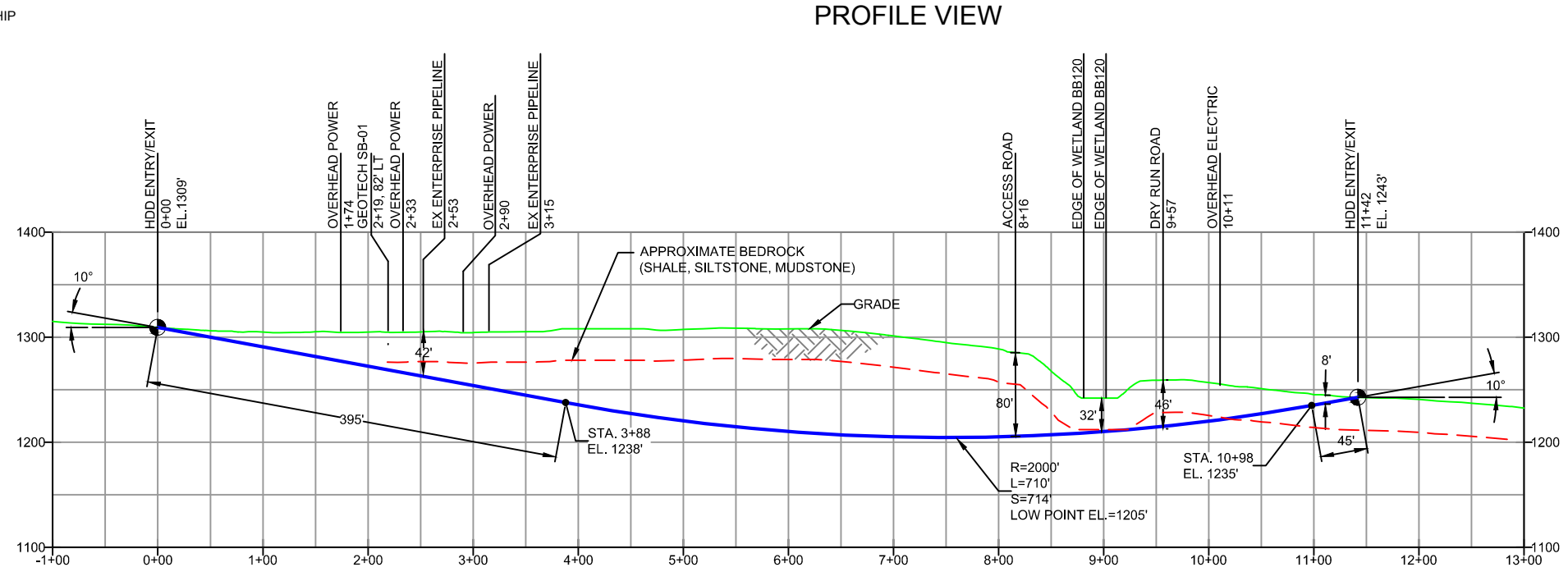
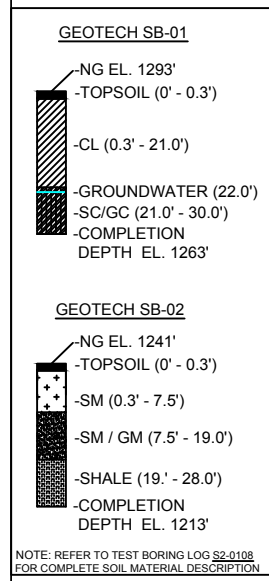
HDD PA-BL-0001.0021-RD (BB-120)

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 900 feet from the edge of the western most boundary of the wetland W-BB120. The drill will pass 20 feet under wetland W-BB120. Using the results of the geotechnical investigation, as well as several other data points, the entry/exit, angles, and depths have been configured to pass through the best substrates while maintaining pipe integrity (e.g., no large bends). The majority of the substrate that will be passed through is estimated to be silty clay to fine coarse sand at the western end of the wetland and shale, siltstone, to mudstone at the central part of the wetland and shale, siltstone, to mudstone at the eastern portion of the wetland. The drill will continue from the eastern most boundary of the wetland W-BB120 and will enter/exit 200 feet from the eastern most edge of wetland W-BB120.



BLAIR COUNTY, PA - JUNIATA TOWNSHIP
S2-0108



- DESIGN AND CONSTRUCTION:
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 - 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)=1142'
HDD PIPE LENGTH (S)=1152'
20" x 0.456" W.T., X-65, API 5L PSL2, ERW, BFW
COATING: 14-16 MILS FBE WITH 30-35 MIL ARO (POWERCURE OR ENGINEER APPROVED EQUAL)
 - 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

- 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 | | REVISIONS | |
|--------------|-------------|-------------------------|--|
| ES-3.17 | TO ES-3.18 | EROSION & SEDIMENT PLAN | EP2 REVISED PER PADEP COMMENTS RECEIVED 09-06-16 |
| SHEET 10 | TO SHEET 11 | AERIAL SITE PLAN | EP1 REVISED PER PADEP COMMENTS |
| | | | EP ADDED GEOTECH INFO |
| | | | B ISSUED FOR BID |
| | | | A ISSUED FOR REVIEW |
| DWG NO | DWG NO | DESCRIPTION | NO. DESCRIPTION |

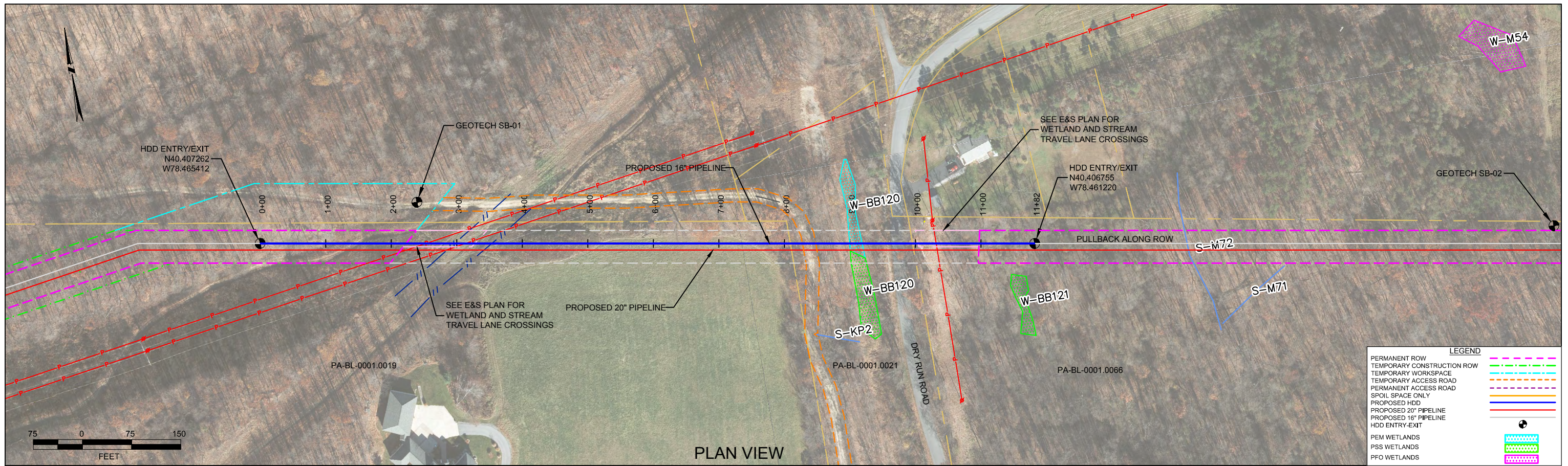
**Sunoco Logistics
Partners L.P.**

TETRA TECH ROONEY
(303) 792-5911

SUNOCO PIPELINE, L.P.

20-INCH HORIZONTAL DIRECTIONAL DRILL
DRY RUN ROAD
PENNSYLVANIA PIPELINE PROJECT

| | |
|----------------|-----------------------------|
| SCALE: 1"=150' | DWG. NO: PA-BL-0001.0021-RD |
|----------------|-----------------------------|



PLAN VIEW

| LEGEND | |
|----------------------------|--|
| PERMANENT ROW | |
| TEMPORARY CONSTRUCTION ROW | |
| TEMPORARY WORKSPACE | |
| TEMPORARY ACCESS ROAD | |
| PERMANENT ACCESS ROAD | |
| SPOIL SPACE ONLY | |
| PROPOSED HDD | |
| PROPOSED 20" PIPELINE | |
| PROPOSED 16" PIPELINE | |
| HDD ENTRY-EXIT | |
| PEM WETLANDS | |
| PSS WETLANDS | |
| PFO WETLANDS | |

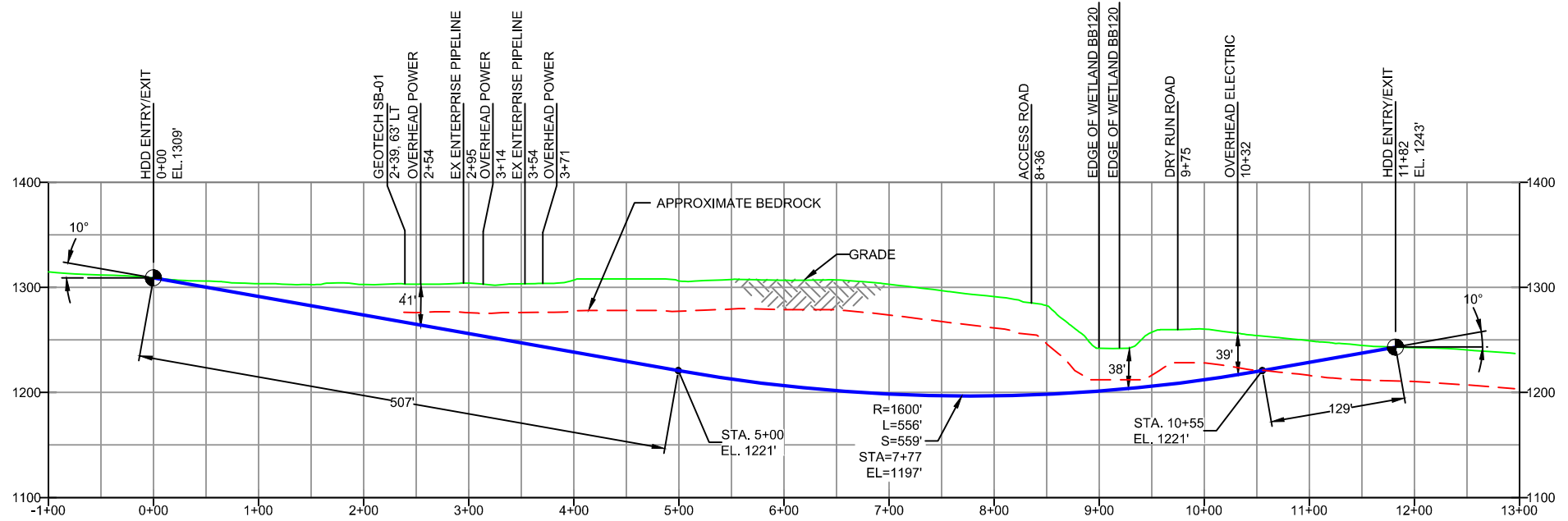
BLAIR COUNTY, PA - JUNIATA TOWNSHIP
S2-0108-16

PROFILE VIEW

| GEOTECH SB-01 | |
|-----------------------------|------------------------|
| -NG EL. 1293' | -TOPSOIL (0' - 0.3') |
| -CL (0.3' - 21.0') | |
| -GROUNDWATER (22.0') | -SC/GC (21.0' - 30.0') |
| -COMPLETION DEPTH EL. 1263' | |

| GEOTECH SB-02 | |
|-----------------------------|----------------------|
| -NG EL. 1241' | -TOPSOIL (0' - 0.3') |
| -SM (0.3' - 7.5') | |
| -SM / GM (7.5' - 19.0') | |
| -SHALE (19.0' - 28.0') | |
| -COMPLETION DEPTH EL. 1213' | |

NOTE: REFER TO TEST BORING LOG S2-0108 FOR COMPLETE SOIL MATERIAL DESCRIPTION



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 - 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-): 1182'
HDD PIPE LENGTH (S-): 1195'
16" x 0.438" W.T., X-70, APISL, 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-3.17 | TO ES-3.18 | EROSION & SEDIMENT PLAN | |
| SHEET 10 | TO SHEET 11 | AERIAL SITE PLAN | EP2 REVISED PER PADEP COMMENTS RECEIVED 09-06-16 |
| | | | EP1 REVISED PER PADEP COMMENTS |
| | | | EP |
| | | | B ADDED GEOTECH INFO |
| | | | A ISSUED FOR BID |
| DWG NO | DWG NO | DESCRIPTION | NO. |

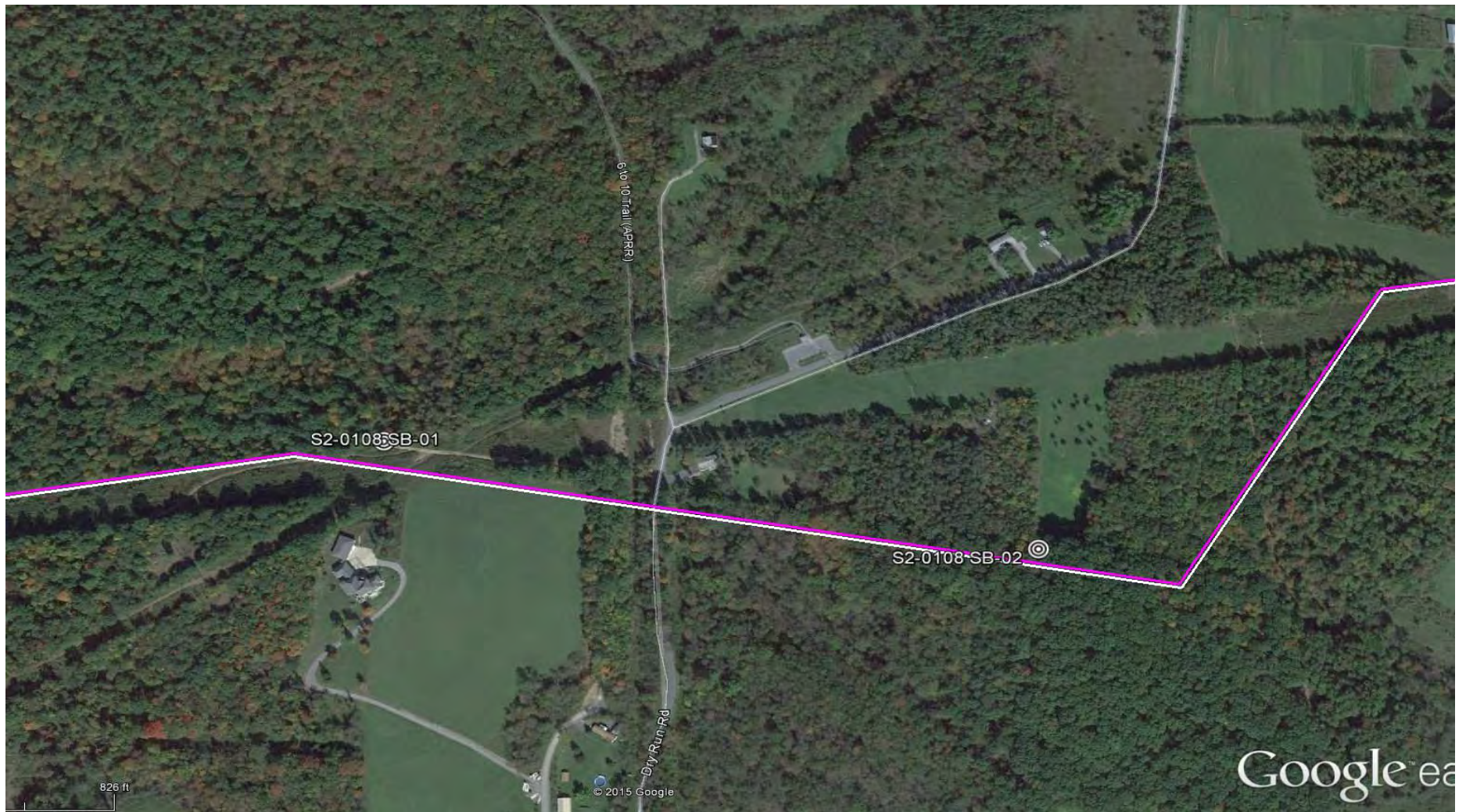
Sunoco Logistics Partners L.P.

TETRA TECH ROONEY
(303) 792-5911

SUNOCO PIPELINE, L.P.

16-INCH HORIZONTAL DIRECTIONAL DRILL
DRY RUN ROAD
PENNSYLVANIA PIPELINE PROJECT

SCALE: 1"=150' DWG. NO: PA-BL-0001.0021-RD-16



LEGEND:

⊙ Geotechnical Soil Boring (SB) Locations



GEOTECHNICAL BORING LOCATIONS
HDD S2-0108
BLAIR COUNTY, JUNIATA 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: DRY RUN ROAD, DUNCANSVILLE, PA | | | Page 1 of 1 | | |
| HDD No.: S2-0108 | | Dates(s) Drilled: 04-21-15 | | Inspector: E. WATT | |
| Boring No.: SB-01 | | Drilling Method: SPT - ASTM D1586 | | Driller: S. HOFFER | |
| Drilling Contractor: HAD DRILLING | | Groundwater Depth (ft): 22.0 | | Total Depth (ft): 30.0 | |
| Boring Location Coordinates: | | | 40° 24' 26.389" N | | 78° 27' 52.301" W |

| Sample No. | Sample Depth (ft) | | Strata Depth (ft) | | Recov. (ft) | Strata (USCS) | Description of Materials | 6" Increment Blows * | | | | N | |
|------------|-------------------|------|-------------------|------|-------------|---------------|---|----------------------|-------|----|-------|-----|--|
| | From | To | From | To | | | | | | | | | |
| | | | 0.0 | 0.3 | | | TOPSOIL (4") | | | | | | |
| 1 | 3.0 | 5.0 | 0.3 | | 17 | CL | MOTTLED BROWN AND GRAY SILTY CLAY, TRACE FINE SAND, TRACE FINE GRAVEL. (USCS: CL). | 3 | 6 | 12 | 12 | 18 | |
| 2 | 8.0 | 9.8 | | | 24 | | GRAY AND BROWN SILTY CLAY AND FINE TO COARSE SAND, WITH SOME FINE SHALE GRAVEL. | 1 | 22 | 43 | 50/4" | 65 | |
| 3 | 13.0 | 13.9 | 9.5 | | 9 | CL | DECOMPOSED SHALE WEATHERED TO A SILTY CLAY AND FINE TO COARSE SAND AND GRAVEL. | 3 | 50/5" | | | >50 | |
| 4 | 18.0 | 18.9 | | | 10 | | DECOMPOSED SHALE WEATHERED TO A SILTY CLAY AND FINE TO COARSE SAND AND GRAVEL. (USCS: CL) | 15 | 50/5" | | | >50 | |
| 5 | 23.0 | 23.8 | 21.0 | | 7 | SC/GC | DECOMPOSED GRAY SHALE WEATHERED TO A CLAYEY FINE TO COARSE SAND AND GRAVEL. | 8 | 50/4" | | | >50 | |
| 6 | 28.0 | 28.9 | | | 10 | | DECOMPOSED GRAY SHALE WEATHERED TO A CLAYEY FINE TO COARSE SAND AND GRAVEL. | 6 | 50/5" | | | >50 | |
| | | | | 30.0 | | | | | | | | | |
| | | | | | | | AUGURED TO 30'. | | | | | | |
| | | | | | | | WET ON SPOON AT 8'. NO WATER WITHIN AUGERS. | | | | | | |
| | | | | | | | WATER LEVEL THROUGH AUGERS AT 22' | | | | | | |
| | | | | | | | CAVED AT 29', WATER LEVEL ON CAVE AT 21'. | | | | | | |

Notes/Comments:
Pocket Pentrometer Testing
 S1: > 4 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
HDD S2-0108**

| HDD No. | 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, % | |
| S2-0108 | SB-01 | 1 | 3.0 | 5.0 | 15.5 | 93.0 | 39 | 22 | 17 | CL |
| | | 2 | 8.0 | 9.8 | 15.6 | 51.5 | - | - | - | - |
| | | 3 | 13.0 | 13.9 | 7.5 | 55.4 | - | - | - | - |
| | | 4 | 18.0 | 18.9 | 10.3 | 79.9 | 33 | 22 | 11 | CL |
| | | 5 | 23.0 | 23.8 | 5.5 | 37.5 | - | - | - | - |
| | SB-02 | 1 | 3.0 | 5.0 | 5.3 | 34.2 | 29 | 23 | 6 | SM |
| | | 2 | 8.0 | 9.8 | 3.2 | 18.3 | - | - | - | - |
| | | 3 | 13.0 | 13.9 | 5.2 | 16.2 | - | - | - | - |
| | | 4 | 18.0 | 18.9 | 1.5 | 10.4 | - | - | - | - |

Notes:

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

**REGIONAL GEOLOGY SUMMARY
SUNOCO PENNSYLVANIA PIPELINE PROJECT
HDD S2-0108**

| 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 |
|---------|-------|------------|---|-----------------------------|-------------------|--|------------------------------|---|---|
| S2-108 | Glass | SB-01 | Brallier and Harrell Formations (undivided) - composed of interbedded light-gray, graded, siliceous siltstone beds and light-gray, hard, silty shales, <u>sparsely fossiliferous</u> . | Ridge & Valley | Brallier-Harrell | Interbedded subfissile shales, f-c. thinly bedded siltstone and sandstones | up to 3,400 | 4-30 | Turbidite (Bouma) sequence Facie Type II, sharp planar bases, undulatory cracks |
| | | SB-02 | Scherr Formation - composed of siltstone, shale, and some sandstone and mudstone. Similar to Brallier Fm but more coarse-grained | | Scherr | Siltstone-sandstone, shale, and mudstone; light olive gray; marine fossils | 1,000 | | Similar to Brallier Fm but more coarse-grained. Yields 2 to 10 gpm |

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 S2-0108**

| 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 | | | | | |
| S2-0108 | SB-02 | 1 | 19 | 23 | 79 | 31 | 0 | 19 | 28 | Moderate | Shale | Very thin beds, Massive formation | Light gray | Fractures along bedding throughout cores; approximate Avg. 15° |
| | | 2 | 23 | 28 | 95 | 58 | 0 | | | | | | | |

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 (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) |

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 |

***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 | 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, 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 | 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 | | |
| | | 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.