LIMITING SOIL CHARACTERISTICS LEGEND

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Map Symbol	Soil Name	Cutbanks Cave	Corrosive to Concrete/ Steel	Droughty	Easily Erodible	Flooding	Depth to Saturated Zone/ Seaonal High Water Table	Hydric / Hydric Inclusions	Low Strength / Landslide Prone	Slow Percolation	Piping	Poor Source of Topsoil	Frost Action	Shrink - Swell	Potential Sinkhole	Ponding	Wetness	Min. Depth to Bedrock	pH
UudB	Urban land-Udorthents, limestone complex, 0 to 8 percent slopes		NO DATA					NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	X	
UudD	Urban land-Udorthents, limestone complex, 8 to 25 percent slopes		NO DATA				NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	X	
UupB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	X	X
UupD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	X	X
UusB	Urban land-Udorthents, shale and sandstone complex, 0 to 8 percent slopes	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	X	
VeF	Very stony land, 25 to 120 percent slopes	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	X	X
VoB	Volusia channery silt loam, 0 to 8 percent slopes	Х	C/S	X	X		X	X	Х	X	X	X	X		-			X	
VsB	Volusia very stony loam, 0 to 8 percent slopes	Х	C/S	Х	Х		X	X	X	X	X	X	X					X	X
VrB	Volusia very stony silt loam, 0 to 8 percent slopes	X	C/S	X	X		X	X	Х	X	X	X	X					X	X
VrC	Volusia very stony silt loam, 8 to 15 percent slopes	X	C/S	X	X		X	X	X	X	X	X	X					X	X
WaA	Washington silt loam, 0 to 3 percent slopes	X	S				X	X	X	X	X		X	X	X			X	
WaD	Washington silt loam, 15 to 25 percent slopes	X	S				X	X	Х	X	X	/i.	X	X	X			X	
WaB	Washington silt loam, 3 to 8 percent slopes	X	S				X	X	X	X	X		X	X	X			Х	
WaC	Washington silt loam, 8 to 15 percent slopes	X	S				X	X	X	X	X		X	X	X			X	
WsB2	Watson silt loam, 3 to 8 percent slopes, moderately eroded	X	C/S	Х			X	X	X	X	X		X	X				X	X
W	Water	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DAT
Wa	Wayland silt loam	X	S		X	X	X	X	X	X	X	X	X			Х	X	X	
WeB	Weikert and Klinesville channery silt loams, 3 to 8 percent slopes	Х	C/S	Х			111111	X	Х	X	X	X	X				(1)	X	X
WkD	Weikert-Berks complex, 15 to 25 percent slopes	X	C/S	Х				X	X	X	X	X	X					X	X
WkB	Weikert-Berks complex, 3 to 8 percent slopes	X	C/S	X			Į)	X	X	X	X	X	X					X	X
WkC	Weikert-Berks complex, 8 to 15 percent slopes	X	C/S	Х				X	X	X	X	X	X					X	X
WKE	Weikert and Klinesville soils, steep	X	C/S	Х				X	X	X	Х	X	X					X	X
WID	Wellsboro channery silt loam, 15 to 25 percent slopes	X	C/S	Х	X		X	X	X	X	X		X				Х	X	X
WIB	Wellsboro channery silt loam, 3 to 8 percent slopes	X	C/S	Х	X		X	X	X	Х	X		X				Х	X	X
WIC	Wellsboro channery silt loam, 8 to 15 percent slopes	Х	C/S	X	X		X	X	X	X	X	2.	X				X	X	X
WmB	Wellsboro very stony silt loam, 3 to 8 percent slopes	X	C/S	Х	X		X	X	X	X	X		X				X	X	X
WmD	Wellsboro very stony silt loam, 8 to 25 percent slopes	X	C/S	X	X		X	X	X	X	X		X				X	X	X
WrD	Wurtsboro channery loam, 15 to 25 percent slopes	X	C/S				X	X		X		X	X					X	X
WrB	Wurtsboro channery loam, 3 to 8 percent slopes	X	C/S				X	Х		X		X	X					X	X
WrC	Wurtsboro channery loam, 8 to 15 percent slopes	X	C/S				X	X	III.	Х		X	X					X	X
WtB	Wurtsboro extremely stony loam, 3 to 8 percent slopes	Х	C/S				X	X		Х		X	X					X	X
WtD	Wurtsboro extremely stony loam, 8 to 25 percent slopes	Х	C/S				X	X		Х		X	X					X	X
WwB	Wurtsboro very stony loam, 0 to 8 percent slopes	X	C/S				X	X		X		X	X					X	X
WyD	Wyoming gravelly loam, 15 to 25 percent slopes	X	С	X				X		X		X						X	X
WvF	Wyoming gravelly loam, 25 to 60 percent slopes	X	С	X				X		X		X						X	X

THE SOIL LIMITATIONS SHALL BE ADDRESSED AS FOLLOWS:

LIMITATIONS AND RESOLUTIONS:

<u>LIMITATION: CUTBANKS CAVE, LOW STRENGTH - CUTBANKS HAVE POTENTIAL TO CAVE AND MANY SOILS ARE LOW STRENGTH.</u>

RESOLUTION: CONTRACTOR SHALL BE AWARE OF POTENTIAL ISSUES AND FOLLOW OSHA GUIDELINES FOR OPEN TRENCHING. LOW SOIL STRENGTH IS NOT A CONCERN DUE TO THE PROPOSED PROJECT. UTILITY TRENCHING WILL NOT BE ADVERSELY EFFECTED BY POOR SOIL STRENGTH.

<u>LIMITATION: CORROSIVE TO STEEL - SOILS CORROSIVE TO STEEL</u> RESOLUTION: IF STEEL PIPE IS USED RUST PROTECTION BY COATINGS AND/OR USE OF CATHODIC PROTECTION IS RECOMMENDED

LIMITATION: DROUGHTY - SOILS EXHIBITING A POOR MOISTURE-HOLDING CAPACITY, WHICH MAY LIMIT THE VEGETATIVE STABILIZATION ABILITY OF THE SOIL. RESOLUTION: FOR DROUGHTY SOILS, CONTRACTOR TO REFER TO "TABLE 11-3: PLANT TOLERANCES OF SOIL LIMITATION FACTORS" TO SELECT APPROPRIATE VEGETATION. EROSION CONTROL BLANKETS SHOULD ALSO BE CONSIDERED IN SOIL CONDITIONS THAT MAKE REVEGETATION DIFFICULT (E.G. DROUGHTY). WHEN INSTALLED PROPERLY, EROSION CONTROL BLANKETS CAN HELP HOLD SOIL PARTICLES IN PLACE AND RETAIN SOIL MOISTURE, PROMOTING SEED GERMINATION.

LIMITATION: EASILY ERODIBLE RESOLUTION: SPECIAL ATTENTION SHALL BE GIVEN TO MAINTAINING EXISTING VEGETATION IN EASILY ERODIBLE SOILS, TO THE EXTENT POSSIBLE. EASILY ERODIBLE SOILS WITHIN 50 FEET OF A SURFACE WATER SHOULD BE BLANKETED. WHEREVER ERODIBLE SOILS ARE PRESENT, OR WHERE THERE IS NOT A SUFFICIENT VEGETATIVE FILTER STRIP BETWEEN THE WATERBAR AND A RECEIVING SURFACE WATER, THE WATERBAR SHOULD BE PROVIDED WITH A TEMPORARY PROTECTIVE LINER.

LIMITATION: FLOODING - ANY SOIL SUBJECT TO INUNDATION DURING A 2-YEAR/24HR STORM EVENT.

<u>LIMITATION: HIGH WATER TABLE, POTENTIALLY HYDRIC - HIGH WATER TABLE IS TO BE EXPECTED AND MANY OF THE SOILS ARE POTENTIALLY HYDRIC.</u> RESOLUTION: FOLLOW E&S PLAN WITH REGARD TO PUMPING AND DEWATERING. DISCHARGE OF SEDIMENT LADEN WATER IS PROHIBITED UNLESS WITHOUT FIRST PASSING THRU A "PUMPED WATER FILTER BAG".

LIMITATION: HYDRIC / HYDRIC INCLUSIONS - A SOIL THAT IS SATURATED, FLOODED, OR PONDED LONG ENOUGH DURING THE GROWING SEASON TO DEVELOP ANAEROBIC-CONDITIONS. WHEN SUCH A SOIL IS LOCATED IN AN AREA THAT HAS HYDROPHYTIC VEGETATION AND WETLAND HYDROLOGY, A WETLAND IS PRESENT. RESOLUTION: HYDRIC SOILS THAT ARE DELINEATED WETLANDS, SHOULD BE AVOIDED TO THE EXTENT POSSIBLE. STAGING AREAS SHOULD BE LOCATED 50 FEET FROM THE EDGE OF WETLAND. MOVEMENT OF VEHICLES ACROSS WETLAND MUST BE MINIMIZED. WHERE VEHICLES NEED TO CROSS WETLANDS, THE USE OF TEMPORARY TIMBER MATS SHALL BE USED DUE TO THE POTENTIAL FOR RUTTING. TRENCH PLUGS SHALL BE INSTALLED TO PREVENT THE TRENCH FROM DRAINING THE WETLANDS OR CHANGING THE HYDROLOGY.

LIMITATION: LOW STRENGTH / LANDSLIDE PRONE - SOILS WITH LOW STRENGTH HAVE A LESSER ABILITY TO RESIST SLOPE FAILURE, SUCH AS SLUMPING, FLOWING, ETC. MATERIALS WITH LOW SHEAR STRENGTH ARE MORE SUSCEPTIBLE TO LANDSLIDES AND EMBANKMENT FAILURES RESOLUTION: PRECAUTIONS SHOULD BE TAKEN TO PREVENT SLOPE FAILURES DUE TO IMPROPER CONSTRUCTION PRACTICES SUCH AS OVER-STEEPENING AND OVERLOADING SLOPES, REMOVAL OF LATERAL SUPPORT, AND FAILURE TO PREVENT SATURATION OF SLOPES. SETBACKS SHOULD COMPLY WITH THE STANDARDS

CONTAINED IN CHAPTER 16 OF THE, "PADEP - EROSION AND SEDIMENT CONTROL PROGRAM MANUAL," UNLESS IT CAN BE SHOWN THAT PROPOSED CUTS AND FILLS DO NOT POSE A HAZARD TO PUBLIC SAFETY OR SURFACE WATERS. ALSO, ROAD FILL MATERIAL WILL LIKELY NEED TO BE IMPORTED IN AREAS WHERE SOILS HAVE LOW

LIMITATION: SLOW PERCOLATION - PERMEABILITY RATE LESS THAN OR EQUAL TO 0.2 INCHES/HR. RESOLUTION: BMPS TO BE INSPECTED AFTER RUNOFF EVENTS, MAKE SURE THERE IS AN ADEQUATE AREA FOR PUMPED WATER DISCHARGE.

LIMITATION: PIPING RESOLUTION: PIPING POTENTIAL IN THE SOIL WILL BE MINIMIZED BY THE USE OF TRENCH PLUGS. FURTHERMORE, ANY PLANNED EMBANKMENTS OR PERMANENT IMPOUNDMENTS SUSCEPTIBLE TO PIPING SHALL UTILIZE ANTI-SEEP COLLARS OR FILTER DIAPHRAMS ON OUTLET BARRELS.

REVISIONS

REVISIONS

ISSUED FOR PADEP

LIMITATION: LIMITED AVAILABLE TOPSOIL RESOLUTION: ANY EXCAVATED TOPSOIL WILL BE STOCKPILED AND REUSED. IF NECESSARY, ADDITIONAL TOPSOIL WILL BE BROUGHT ON-SITE.

LIMITATION: FROST ACTION - THE LIKELIHOOD OF UPWARD OR LATERAL EXPANSION OF THE SOIL CAUSED BY THE FORMATION OF SEGREGATED ICE LENSES, OR FROST HEAVE, AND THE SUBSEQUENT COLLAPSE OF THE SOIL AND LOSS OF STRENGTH ON THAWING, WHICH CAN DAMAGE ROADS, BUILDINGS, AND OTHER STRUCTURES AS WELL AS PLANT ROOTS.

RESOLUTION: PRECAUTIONS ARE NEEDED TO PREVENT DAMAGE TO ROADWAYS. **<u>LIMITATION: WET SOILS -</u>** SOME SOILS MAY EXHIBIT A HIGH WATER TABLE OR PONDING.

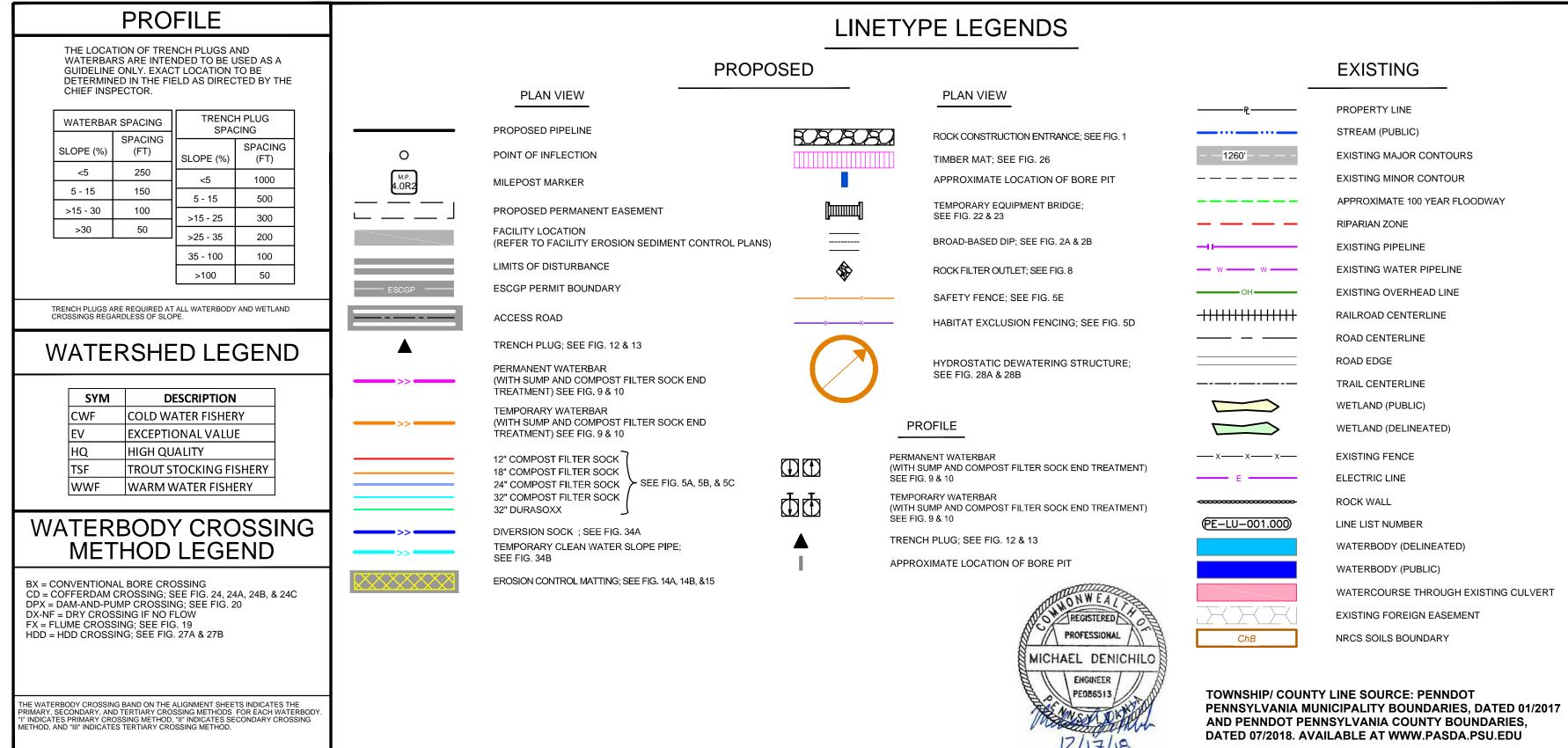
RESOLUTION: IF HIGH WATER TABLE IS ENCOUNTERED, TRENCH DEWATERING WILL BE EMPLOYED. LIMITATION: MIN. DEPTH TO BEDROCK - SOME SOILS HAVE A MIN DEPTH OF BEDROCK LESS THAN THE THE TYPICAL TRENCH DEPTH OF 7 FT (ASSUMES 3 FT OF COVER, PIPE DIAMETER, AND BEDDING DEPTH OF 1 FT).

RESOLUTION: CONTRACTOR TO PLAN FOR ROCK REMOVAL DURING TRENCHING OPERATIONS. FOR SEDIMENT BARRIERS REQUIRING STAKING (E.G. SILT FENCES, ETC.), DEPTH TO BEDROCK LESS THAN 2 FT CAN IMPACT ABILITY TO DRIVE STAKE AND/OR POLE (FOR SUPER SILT FENCE). IN THESE AREAS, COMPOST FILTER SOCK OR OTHER APPLICABLE BMP NOT REQUIRING STAKING MAY BE CONSIDERED.

LIMITATION: pH - SOME SOILS HAVE pH VALUES LESS THAN 5.5, WHICH MAY LIMIT THE VEGETATIVE STABILIZATION ABILITY OF THE SOIL.

RESOLUTION: AS IS TYPICAL FOR THESE TYPE OF SOILS, LIME WILL BE ADDED AS NEEDED TO PRODUCE VEGETATIVE STABILITY.

RESOLUTION: IF NECESSARY TO PRODUCE VEGETATIVE STABILITY OF THE SOIL, FERTILIZER OR NUTRIENT SUPPLEMENTS WILL BE ADDED TO THE SOIL TO PRODUCE VEGETATIVE STABILITY. FOR LOW FERTILITY SOILS, CONTRACTOR TO REFER TO "TABLE 11-3: PLANT TOLERANCES OF SOIL LIMITATION FACTORS" TO SELECT APPROPRIATE VEGETATION. EROSION CONTROL BLANKETS SHOULD ALSO BE CONSIDERED IN SOIL CONDITIONS THAT MAKE REVEGETATION DIFFICULT (E.G. LOW FERTILITY). WHEN INSTALLED PROPERLY, EROSION CONTROL BLANKETS CAN HELP HOLD SOIL PARTICLES IN PLACE AND RETAIN SOIL MOISTURE, PROMOTING SEED GERMINATION

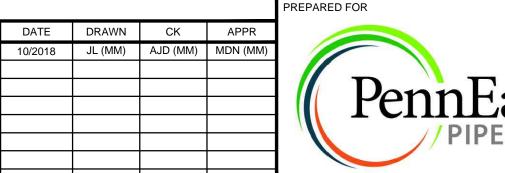


SOIL LIMITATIONS NARRATIVE

THE SOILS IMPACTED BY THE PROJECT CAN BE SEEN IN THE LIMITING SOIL CHARACTERISTICS TABLE. AS A RESULT OF THE LIMITING CHARACTERISTICS OF THE SOILS, MANY EROSION AND SEDIMENT CONTROLS WERE IMPLEMENTED.

- THE GRADING OF THE CUT AND FILL SLOPES WERE LIMITED TO NOT EXCEED 2H:1V SLOPES. EROSION CONTROL MATTING IS PROPOSED FOR ALL SLOPES GREATER THAN 3H:1V.
- ANY TRENCHING WILL FOLLOW OSHA APPROVED GUIDELINES FOR TRENCHING.
- OVERALL SITE HAS BEEN DESIGNED AND GRADED TO SAFELY CONVEY STORM WATER RUNOFF FROM THE CONSTRUCTION PROJECT AREA.





PENNEAST PIPELINE PROJECT SOIL EROSION & SEDIMENT CONTROL PLAN LEGENDS

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AS SHOWN