

ECS MID-ATLANTIC, LLC

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"One Firm. One Mission."

March 15, 2024

Mr. Mike Swank, PE
Cornwall Properties, LLC
201 Iron Vally Drive
Lebanon, PA 17042

ECS Project No. 18:5967-A

Reference: Geotechnical Engineering Report for Stormwater Management
Cornwall Properties Residential Development
Lebanon, Pennsylvania

Dear Mr. Swank:

ECS Mid-Atlantic, LLC (ECS) has completed the subsurface exploration and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our Proposal No. 18:9489-GP, December 28, 2023. This report presents our understanding of the geotechnical aspects of the project, results of the field exploration, laboratory testing, and our design and construction recommendations.

It has been our pleasure to be of service to Cornwall Properties, LLC during this phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase and to provide our services during construction phase operations as well to verify the assumptions of subsurface conditions made for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS Mid-Atlantic, LLC

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION	2
2.0 PROJECT INFORMATION.....	3
2.1 Project Location.....	3
2.2 Proposed Construction.....	3
3.0 FIELD EXPLORATION AND LABORATORY TESTING	4
3.1 Subsurface Characterization.....	4
3.1.1 Stormwater Infiltration Testing.....	4
3.2 Soil Survey Mapping	6
3.3 Site Geology.....	7
3.4 Groundwater Observations	8
3.5 Laboratory Testing.....	8
4.0 DESIGN RECOMMENDATIONS	9
4.1 Stormwater Management Areas.....	9
4.1.1 Stormwater Management Facilities.....	9
4.1.2 Stormwater Management Considerations.....	11
4.1.3 Stormwater Management Facilities - Design Notes.....	11
5.0 SITE CONSTRUCTION RECOMMENDATIONS	14
5.1 Construction Recommendations.....	14
5.1.1 Existing Man-Placed Fill.....	14
5.1.2 Rock Excavation.....	14
6.0 CLOSING	16

APPENDICES

Appendix A – Diagrams & Reports

- Site Location Diagram
- Exploration Location Diagram(s)
- Geologic Survey Map
- Soil Survey Map

Appendix B – Field Operations

- Reference Notes
- Exploration Procedures
- Test Pit and Boring Logs
- Photographs
- Infiltration/Permeability/Hydraulic Test Results

Appendix C – Laboratory Testing

- Laboratory Testing Summary
- Plasticity Chart(s)
- Grain Size Analysis/Analyses
- Textural Triangle USDA Test(s)

EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal recommendations are summarized. Information gleaned from the Executive Summary should not be utilized in lieu of reading the entire geotechnical report.

- At exploration locations IT-01 through IT-06, groundwater depths measured at the time of excavation ranged from 0.8 to 4 feet below the ground surface, corresponding to EL. 667.2 to EL. 711.2 ft. At exploration locations IT-10, IT-11 and IT-12, the water appears to be seeping into the boreholes from under the pavement but did not appear to show signs of seepage at deeper depths. In both instances groundwater appears to be a perched condition which could be associated with recent rainfall. Isolated areas of perched water should be anticipated.
- Infiltration rates ranged between 0.00 in/hr to >10.00 in/hr, including a factor of safety. Due to the variability in our determined rates from the infiltration testing, our rate recommendations will vary based on locations. Please refer to **Section 4.1.1** for specific design rate recommendations.
- Storm water management facilities with embankments should include the construction of a clay core having a minimum thickness of 2 feet. Limited laboratory testing of the on-site materials indicated that soils meeting the criteria listed herein are not present on the site.
- Some rock excavation may be required to achieve bottom of basin elevations with the required 2-foot of buffer below the basin subgrade elevations, specifically within Facility G.

Refer to the text of the report for site specific design and construction recommendations.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for design of the proposed stormwater management facility with the associated development at the project site. The recommendations developed for this report are based on project information supplied Cornwall Properties, LLC.

Our services were provided in accordance with our Proposal No. 18: 9849-GP-REV, dated December 28, 2023, as authorized by Cornwall Properties, LLC on January 4, 2024, which includes the Subconsultant Agreement between ECS Mid-Atlantic, LLC and Cornwall Properties, LLC, dated January 4, 2024.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items:

- A brief review and description of our field procedures.
- A review of surface topographical features and site conditions.
- A review of area and site geologic conditions.
- A review of subsurface soil stratigraphy with pertinent available physical properties.
- Final copies of our test pit logs.
- Infiltration testing results and recommendations for stormwater management.
- Evaluation and recommendations relative to groundwater.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION

The project site is located along Rexmont Road in Cornwall, Lebanon County, Pennsylvania. The site is generally bordered to the north by Rexmont Road and residential properties, to the south by a golf course and residential properties along Boyd Street, to the east by Iron Valley Drive, and to the west by Boyd Street and the large open pit (lake) feature associated with the historic Cornwall Iron Ore Mines. At the time of our exploration, the property contained evidence of various features which appeared to have been associated with the known historic mining operations that occurred in the general vicinity of the site and surrounding areas. Additionally, topography at the site was generally highly erratic with a total topographic relief on the order of approximately ± 220 feet across the proposed improvement areas based on our review of the provided preliminary grading plans.

Refer to Figure 2.1.A and the Site Location Diagram in Appendix A for a detailed depiction of the project site location.



Figure 2.1.A – Site Location

2.2 PROPOSED CONSTRUCTION

The proposed construction is comprised of approximately 117 single family homes and associated drive lanes, and stormwater management (SWM) facilities. The SWM facilities are comprised of ten (10) at-grade basins located around the perimeter of the proposed development. This report addresses only the stormwater management features of this development.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our scope of work included excavating 24 test pits and performing 8 geotechnical borings with corresponding infiltration tests. Our exploration locations were located with a handheld GPS unit and their approximate locations are shown on the Exploration Location Diagram in Appendix A.

3.1 SUBSURFACE CHARACTERIZATION

The following sections provide generalized characterizations of the subsurface conditions. Please refer to the test pit logs in Appendix B for more detailed information.

SUBSURFACE SUMMARY	
Stratum	Description
n/a	Topsoil Thickness: Approximately 2 to 17 inches OR Asphalt Thickness: Approximately 2 to 4 inches Gravel Thickness: Approximately 4 to 6 inches
I	FILL SAND (SP, SM) with varying amounts of Gravel and Silt, brown, black, and gray, moist, very loose to very dense FILL GRAVEL (GP, GM, GP-GM) with varying amounts of Sand, Clay and Silt, light brown to gray, and black, moist, contains construction debris
II	CLAY (CL) with varying amounts of Sand and Gravel, light brown and reddish brown, moist to wet, soft to very stiff SAND (SP, SC) with varying amounts of Gravel and Clay, light brown, brown and gray, moist to wet, loose to very dense Some SILT (ML) varying amounts of Sand and Gravel, light brown, moist, stiff
III	Weathered DIABASE sampled as GRAVEL and SAND, light brown and gray, moist, medium dense to very dense Weathered SANDSTONE sampled as SAND, contains cobble and boulder sized rock fragments

3.1.1 Stormwater Infiltration Testing

The infiltration testing was completed using the double ring infiltration, percolation, and cased borehole methodology in general accordance with Appendix C of the Pennsylvania Stormwater Best Management Practices (PA BMP) Manual. Infiltration test results are provided in the following table.

INFILTRATION TESTING RESULTS						
Test Location	Surface Elevation (Feet) ⁽¹⁾	Depth to Limiting Zone (Feet)	Limiting Layer Elevation (Feet)	Infiltration Test Depth (Feet)	Test Elevation (Feet)	Infiltration Rate (inches / hour) (Includes FS=2)
Facility A						
IT-01	712.0	9.3	702.7	N/A	N/A	N/A ⁴
IT-02	712.0	>11.0	<701.0	N/A	N/A	N/A ⁴
IT-03	714.0	>11.0	<703.0	7.0	707.0	0.50
N/A – Facility Removed with Revised Plan						
IT-04	672.0	>10.5	<661.5	0.80	671.2	0.00
						0.18 ²
IT-05	674.0	>10.5	<663.5	2.0	672.0	1.06
IT-06	668.0	>11.0	<657.0	0.7	667.3	1.50
Facility B						
IT-07	689.0	>10.0	<679.0	3.0	686.0	2.81
IT-08	691.0	>12.5	<678.5	5.0	686.0	3.75
IT-09	693.0	>11.0	<682.0	7.0	686.0	12.00
Facility C						
IT-10	688.5	>12.0	<676.5	9.5	679.0	0.00 ³
IT-11	687.5	>12.0	<675.5	8.5	679.0	>10.00 ³
IT-12	688.0	>12.0	<676.0	9.0	679.0	0.00 ³
IT-13	680.0	>11.0	<669.0	1.0	679.0	2.65 ²
IT-14	686.0	>9.0	<677.0	7.0	679.0	10.80 ²
Facility D						
IT-15	811.0	>10.0	<801.0	5.0	806.0	10.80 ²
IT-16	811.0	>10.0	<801.0	5.0	806.0	10.80 ²
Facility E						
IT-17	812.0	>10.0	<802.0	6.0	806.0	0.00
						0.04 ²
IT-18	812.0	>10.0	<802.0	6.0	806.0	0.03
						0.07 ²
IT-19	813.0	>10.0	<803.0	7.0	806.0	10.80 ²
Facility F						
IT-20	736.0	>11.0	<725.0	4.0	732.0	10.80 ²
IT-21	738.0	>10.5	<727.5	6.0	732.0	10.80 ²
Facility G						
IT-22	776.0	9.0 ⁵	767.0	7.0	769.0	1.69 ³
IT-23	778.0	6.5 ⁵	771.5	4.5	773.5	1.80 ³
IT-24	774.0	12.0 ⁵	774.0	10.0	776.0	2.25 ³
IT-25	774.0	16.5 ⁵	769.5	14.5	771.5	1.35 ³
IT-26	782.0	12.0 ⁵	770.0	9.5	772.5	0.42 ³
Facility H						
IT-27	791.0	>10.0	<781.0	6.0	785.0	1.00
						1.44 ²

INFILTRATION TESTING RESULTS						
Test Location	Surface Elevation (Feet) ⁽¹⁾	Depth to Limiting Zone (Feet)	Limiting Layer Elevation (Feet)	Infiltration Test Depth (Feet)	Test Elevation (Feet)	Infiltration Rate (inches / hour) (Includes FS=2)
IT-28	791.0	>10.0	<781.0	6.0	785.0	1.50
IT-29	796.0	>14.0	<782.0	11.0	785.0	5.76 ³
IT-30	795.0	>14.0	<781.0	10.0	785.0	>10.00 ³
N/A						
IT-31	830.0	>14.0	<816.0	11.0	819.0	>10.00 ³
IT-32	832.0	>11.0	<815.0	7.0	819.0	10.80

Note¹: Please note that the ground surface was not surveyed by a licensed surveyor; these elevations are approximate based on the provided plans; therefore, elevation ranges are approximate +/- half a foot.

Note²: Percolation test.

Note³: Cased Borehole test.

Note⁴: Perched groundwater encountered at these locations inhibited our ability to perform tests.

Note⁵: Limiting zone is bedrock.

3.2 SOIL SURVEY MAPPING

Based on our review of the Soil Survey (USDA - Natural Resources Conservation Service (websoilsurvey.nrcs.usda.gov), the site soils are mapped as Quarries, Neshaminy gravelly silt loam, 8 to 15 percent slopes, Neshaminy extremely stony silt loam, steep, Ungers extremely stony loam, 8 to 25 percent slopes, Ungers and Calvin soils, steep. These soil types are described as having the following properties:

SOIL MAPPING SUMMARY						
Mapped Soil Unit	Soil Unit Symbol	Origin/ Type	Depth to Restrictive Feature	Depth to Water Table	Hydrologic Soil Group	KSat (in/hr)
Quarries	Qu	Pits	N/A	N/A	N/A	N/A
Neshaminy gravelly silt loam, 8 to 15 percent slopes	NeC	Residuum weathered from diabase	48 to 172 inches to lithic bedrock	60-72 inches	N/A	(0.60 – 2.00)
Neshaminy extremely stony silt loam, steep	NHE	Residuum weathered from diabase	60 to 64 inches from diabase	60-72 inches	B	(0.20 – 6.00)
Ungers extremely stony loam, 8 to 25 percent slopes	UoC	Residuum weathered from sandstone and siltstone	40 to 80 inches to lithic bedrock	0 to 60 inches	B	(0.20 – 6.00)

SOIL MAPPING SUMMARY						
Mapped Soil Unit	Soil Unit Symbol	Origin/ Type	Depth to Restrictive Feature	Depth to Water Table	Hydrologic Soil Group	KSat (in/hr)
Ungers and Calvin soils, steep	UPE	Residuum weathered from sandstone and siltstone	40 to 80 inches to lithic bedrock	>80 inches	B	(0.20 – 6.00)

3.3 SITE GEOLOGY

According to the Geologic Map of Pennsylvania (1980)¹, the site is underlain by the Diabase Formation, the Hamburg Sequence, and the Hammer Creek Formation. In many cases, when a site is near the meeting of two or more formations, the bedrock encountered displays characteristics of both formations. Based on *Engineering Characteristics of the Rocks of Pennsylvania*², these formations are described as having the following characteristics.

The Diabase formation is a dark gray to black, dense, and very fine grained, and consists of 90 to 95 percent labradorite and augite. The joints have blocky pattern; well developed; moderate distance between fractures. The bedrock formation is highly resistant; slightly weathered to a shallow depth. This formation possesses fair surface drainage. Joint openings provide a very low secondary porosity and low permeability.

The Hamburg sequence consists of gray, greenish-gray, and maroon shale, silty and siliceous in many places with dark-gray impure sandstone and medium-to light-gray, finely crystalline limestone. Bedding within the formation is moderately thin well bedded; the sandstone is well bedded; and the limestone is well bedded as well. Fracturing in the shale has a seamy to platy pattern, close spacing, open and steeply dipping. The sandstone has a blocky pattern, moderately spaced, open and vertically oriented. The bedrock is moderately resistant to a deep depth, resulting in loose rubble of pencil-like to rectangular plates. The formation exhibits good surface drainage with the joints and bedding planes providing secondary porosity of moderate magnitude.

The Hammer Creek Formation consists of reddish-brown to gray and pale-red, fine- to coarse-grained quartzose sandstone, siltstone, and shale that is well bedded in a thick to massive manner. Jointing in the formation exhibits a moderately developed and abundant, blocky, regularly occurring, open, and steeply dipping pattern. The formation is moderately resistant to weathering but is dependent upon the grain size of the section exposed. Shale portions of the formation weather more rapidly than the sandstone and conglomeratic sections. Natural slopes formed in areas underlain by the formation are of high relief and are stable. The formation is characterized by low primary porosity, moderate secondary porosity from joint- and bedding- plane openings, and moderate to low permeability.

¹ Berg, T. M., Edmunds, W. E., Geyer, A. R., and others, compilers, 1980, Geologic map of Pennsylvania (2nd ed.): Pennsylvania Geological Survey, 4th ser., Map 1, 3 sheets, scale 1:250,000

² Geyer, A. R., and Wilshusen, J. P., (1982), *Engineering Characteristics of the Rocks of Pennsylvania*. Bureau of Topographic and Geologic Survey.

3.4 GROUNDWATER OBSERVATIONS

Water levels were measured during the on-site exploration and are included on our test pit logs in Appendix B. At exploration locations IT-01 through IT-06, groundwater depths measured at the time of excavation ranged from 0.8 to 4 feet below the ground surface, corresponding to EL. 667.2 to EL. 711.2 ft. At exploration locations IT-10, IT-11 and IT-12, the water appears to be seeping into the boreholes from under the pavement but did not appear to show signs of seepage at deeper depths. In both instances groundwater appears to be a perched condition which could be associated with the temporary increases in rainfall. Isolated areas of perched water should be anticipated. It should be noted that there appears to be nearby water features which include a pond and stream located on-site as well as two pond/lake features located nearby but off-site. Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

3.5 LABORATORY TESTING

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the test pit logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

The laboratory testing performed by ECS for this project consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples obtained from the test pits in order to aid in classifying soils according to the Unified Soil Classification System (USCS) and to quantify and correlate engineering properties. The laboratory results can be found in Appendix C.

4.0 DESIGN RECOMMENDATIONS

4.1 STORMWATER MANAGEMENT AREAS

4.1.1 Stormwater Management Facilities

General: The plan provided to ECS provided the exploration locations within the proposed stormwater management facilities.

4.1.1.a Infiltration Characteristics

Due to the variability in our determined rates from the infiltration testing, the infiltration rate recommendations vary based on BMP location.

RECOMMENEED DESIGN RATES		
Feature	Test Location	Recommended Design Rate (inches / hour)
A	IT-01	0.50
	IT-02	
	IT-03	
N/A	IT-04	N/A
	IT-05	
	IT-06	
B	IT-07	3.25
	IT-08	
	IT-09	
C	IT-10	1.56
	IT-11	
	IT-12	
	IT-13	
	IT-14	
D ¹	IT-15	Excessive; Amended soils required to slow rate
	IT-16	
E	IT-17	0.00 ²
	IT-18	
	IT-19	
F ¹	IT-20	Excessive; Amended soils required to slow rate
	IT-21	
G ³	IT-22	0.50
	IT-23	

RECOMMENEED DESIGN RATES		
Feature	Test Location	Recommended Design Rate (inches / hour)
	IT-24	
	IT-25	
	IT-26	
H	IT-27	1.88
	IT-28	
	IT-29	
	IT-30	
N/A	IT-31	N/A
	IT-32	

Note¹: Please note that for facilities D and F, the field rates are excessive. These facilities will require amended soils to slow the infiltration rate down to less than 6.0 in/hr.

Note²: Based on the results of the infiltration testing at locations generally located within Facility E, infiltration characteristics are very limited to negligible at the tested elevations. For these reasons, ECS recommends that stormwater management for this facility consist of volume and rate control combined (one such method is the Managed Release Concept (MRC)) with water quality measures using BMP facilities. For design purposes we recommend that stormwater management facilities consist of BMP areas for water quality with underdrains to convey the water offsite.

Note³: It should be noted that tests performed in Facility G were above the proposed facility bottom elevation due to bedrock and will require amended soils to establish the basin bottom elevation with the 2-foot buffer zone. The design rate has been limited to 0.50 in/hr due to the bedrock encountered and the design rate should be confirmed at the time of construction.

If volume reduction cannot be met with this infiltration rate, stormwater management may also need to incorporate water quality and rate control measures. Water quality can be enhanced with the use of amended soils in BMP facilities for filtering of the water, while volume control can be provided with adequate sizing of facilities combined with an appropriate underdrain system.

ECS recommends that specific construction notes appear on the plans requiring full-time observation of the excavation of the basins by the authorized ECS representative to verify suitable conditions are present and field infiltration rates are consistent with the design. ECS can assist in developing these notes once plans become more final.

4.1.1.b Embankment/Outlet Structures/Slopes

Embankment construction or cut slopes to facilitate pond construction should incorporate side slopes of 3(H):1(V) or flatter. If steeper slopes are necessary, ECS should be contacted to review the proposed slope geometry.

Fill materials should be placed to a minimum of 95% of the maximum dry density of the material, as determined by the Standard Proctor method (ASTM D698). The moisture content of the materials should be within $\pm 3\%$ of the optimum.

Storm water management facilities with embankments should include the construction of a clay core having a minimum thickness of 2 feet. Clay suitable for this use should consist of CL or CH materials, having a minimum of 70% fines (passing the No. 200 sieve), a minimum liquid limit (LL) of 40 and minimum plasticity index (PI) of 20. This fill material must be approved by the ECS. Clay materials should be compacted to 95% of the standard Proctor maximum dry density at a moisture content that is at or up to 3% above the optimum. Limited laboratory testing of the on-site materials indicated that soils meeting the criteria listed herein are not present on the site.

4.1.1.c Temporary Sediment Basin Fill Embankments

Soils used in temporary sediment basin fill embankments should satisfy the requirements for fill discussed above and should be placed and compacted to the specification requirements for Structural Fill. Care should be taken not to track heavy equipment over the basin bottom during construction.

4.1.2 Stormwater Management Considerations

In keeping with the guidelines and recommendations of the PA BMP Manual, ECS recommends that the following design principles be incorporated:

- Use existing drainage patterns
- Keep stormwater away from known problematic areas
- Avoid concentrating stormwater
- Reduce runoff volume and velocity
- Use broad shallow basins
- Maintain the facilities post construction
- Provide underdrains or other means for dewatering in stormwater management facilities if needed

4.1.3 Stormwater Management Facilities - Design Notes

It has been our experience that construction of basins may encounter conditions that were not anticipated as a result of the subsurface exploration. As a result, we have developed the following sequence of items for addressing construction related difficulties or discrepancies with the design assumptions. We recommend that these recommendations be included in the stormwater management feature construction notes on the plans.

- A) If redoximorphic features (soil mottling and coloration patterns formed by the reduction of iron and/or manganese from saturated conditions in the soil) are encountered:
- A qualified professional should determine if the features observed are associated with a historic condition (associated with fill, previous site condition, or natural coloration) or are associated with conditions that could presently occur (seasonal variations in the water table).

- Evaluate the elevation of the features relative to the proposed design elevation of the SWM feature and determine if the size and elevation of the SWM feature can be adjusted to alleviate the conflict.
- Retain ECS and Civil Engineer to evaluate alternate design concepts. Alternate designs proposed by the Professional should be sealed and submitted to the Township for approval.

B) If the field verified infiltration rates are excessively high (greater than 6 inches per hour) and Cation Exchange Capacity is known:

- Determine the extent of the materials exhibiting the high infiltration rates through a combination of visual-manual classification, hand probing, density testing, or other suitable methods as determined by ECS.
- Overexcavate the materials to the depth where the material type changes or a maximum depth of 2 feet, whichever is encountered first.
- If excessive rates are associated with weathered or broken rock, the rock surface should be examined by ECS, prior to replacement of suitable material.
- Replace the excavated material with finer grained materials approved by ECS. Suitable soil mixtures can consist of a blend of on-site and/or off-site materials available to the Contractor generally conforming to the table below, with field infiltration rates post placement determined and approved by ECS.

RECOMMENDED SOIL MEDIA BLEND								
Permissible Soil Types for Soil Media, based on USDA Classification	Ranges of USDA Particle Size Percentages						Typical Infiltration Rates for Permissible Soil Types (in/hr)*	
	Sand		Silt		Clay		Min	Max
	Min	Max	Min	Max	Min	Max		
Sand, Loamy Sand, Sandy Loam, Loam	50	100	0	50	0	20	0.5	6.0

- Materials should be lightly tracked into place in non-structural areas.
- If material replacement is required in structural areas (Ex: below-grade SWM facilities in paved areas), material placement specifications, including materials type, mix ratio, compactive effort and required density should be determined by ECS. Technical recommendations should be sealed by ECS and submitted to the Township for approval.

C) If the field verified infiltration rates are excessively low (less than 0.1 in/hr):

- Determine the extent of the materials exhibiting the low infiltration rates through a combination of visual-manual classification, hand probing, density testing, or other suitable methods as determined by the ECS.
- Overexcavate the materials to the depth where the material type changes or a maximum depth of 2 feet, whichever is encountered first.
- If bedrock is encountered, the rock should be removed to a minimum depth of 2 feet below the bottom of basin and should be examined by ECS, prior to replacement of suitable material.
- Replace the excavated material with more coarsely grained materials approved by ECS. Suitable soil mixtures can consist of a blend of on-site and/or off-site materials available to the Contractor, and subject to testing and approval of ECS.
- Suitable soil mixtures may consist of materials blended by volume ratios as determined by ECS.

-
- Materials should be lightly tracked into place in non-structural areas.

If material replacement is required in structural areas (Ex: below-grade SWM facilities in paved areas), material placement specifications, including materials type, mix ratio, compactive effort and required density should be determined by ECS. Suitable soil mixtures can consist of a blend of on-site and/or off-site materials available to the Contractor generally conforming the table above, with field infiltration rates post placement determined and approved by ECS.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 CONSTRUCTION RECOMMENDATIONS

It is recommended that verification of the subgrade conditions at the time of construction be conducted by an authorized ECS representative.

During excavation of the basin, the materials at the bottom of basin should be verified to be consistent with those encountered in the exploration. Proper performance of infiltration facilities will be influenced by the variability in the subsurface. It will be important that construction equipment does not traffic on the materials at the infiltration bed elevation, and that hand probing on an approximately 25 foot grid or isolated test pits be provided to evaluate proper offset distances from bedrock limiting zones.

Some rock excavation may be required to achieve bottom of basin elevations with the required 2-foot of buffer below the basin subgrade elevations, specifically within Facility G.

We recommend SWM facilities be located a minimum of 25 feet from adjacent buildings, taken from edge of SWM facility to outside of footing. The allowable buffer distance is highly dependent on site constraints including but not limited to, foundation type, subgrade soils, geology, structural loading, foundation bearing elevation, invert elevation, and groundwater. If site constraints prohibit this recommendation, the facility may be located closer to a building subject to the review and approval of ECS.

5.1.1 Existing Man-Placed Fill

Significant existing fill deposits were encountered across the site. Generally, the fill appears to consist of granular materials associated with historic mining on and around the site. The fill materials generally had excessive infiltration rates and amended soils will be required to slow the design infiltration rate down to less than 6.0 in/hr. It is our understanding that the fills are predominately gravel, cobble, and boulder sized rock particles from the iron ore mining in the immediate area. Although no reports of instability or leachate associated with the mine spoils are known at this time, ECS did submit several rock samples to an analytical laboratory for forms of sulfur testing for a preliminary evaluation of the potential for either swell or acid mine drainage. Based on the results of the sulfur testing, which are presented in the *Geotechnical Engineering Report* with this same date, the percent total sulfur is below the levels which may generate significant acidity as presented in the PennDOT Geotechnical Engineering Manual. Additional testing of rock samples that are freshly cut from intact bedrock and/or newly crushed materials at the time of construction is recommended as a quality control measure. If the site is redesigned to include below-grade facilities, ECS should be contacted to review the recommendations within this report.

5.1.2 Rock Excavation

Bedrock refusal was encountered in locations IT-22 through IT-26, all of which are located within Facility G, signified by auger and bucket refusal. Rock excavation should be anticipated in the footprint of this stormwater management facility in order to reach the proposed basin bottom elevation and establish the 2 foot buffer zone. Significant excavation difficulties which may slow down the construction process may occur.

Usually, rock saws employed for trench excavations are capable of exceeding our refusal depths by several feet, but with some difficulty. The use of hydraulic rams on heavy duty excavation equipment, or the use of blasting, should be anticipated. We do not recommend straight line interpolation of bedrock surfaces for the estimation of excavation quantities due to the variable bedrock surface that is common in this geology.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by Cornwall Properties, LLC. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

Appendix A - Drawings and Reports

Site Location Diagram
Exploration Location Diagram(s)
Geologic Survey Map
Soil Survey Map



**SITE LOCATION DIAGRAM
CORNWALL PROPERTIES RESIDENTIAL
DEVELOPMENT**

**REXMONT ROAD, CORNWALL, PENNSYLVANIA
CORNWALL PROPERTIES, LLC**

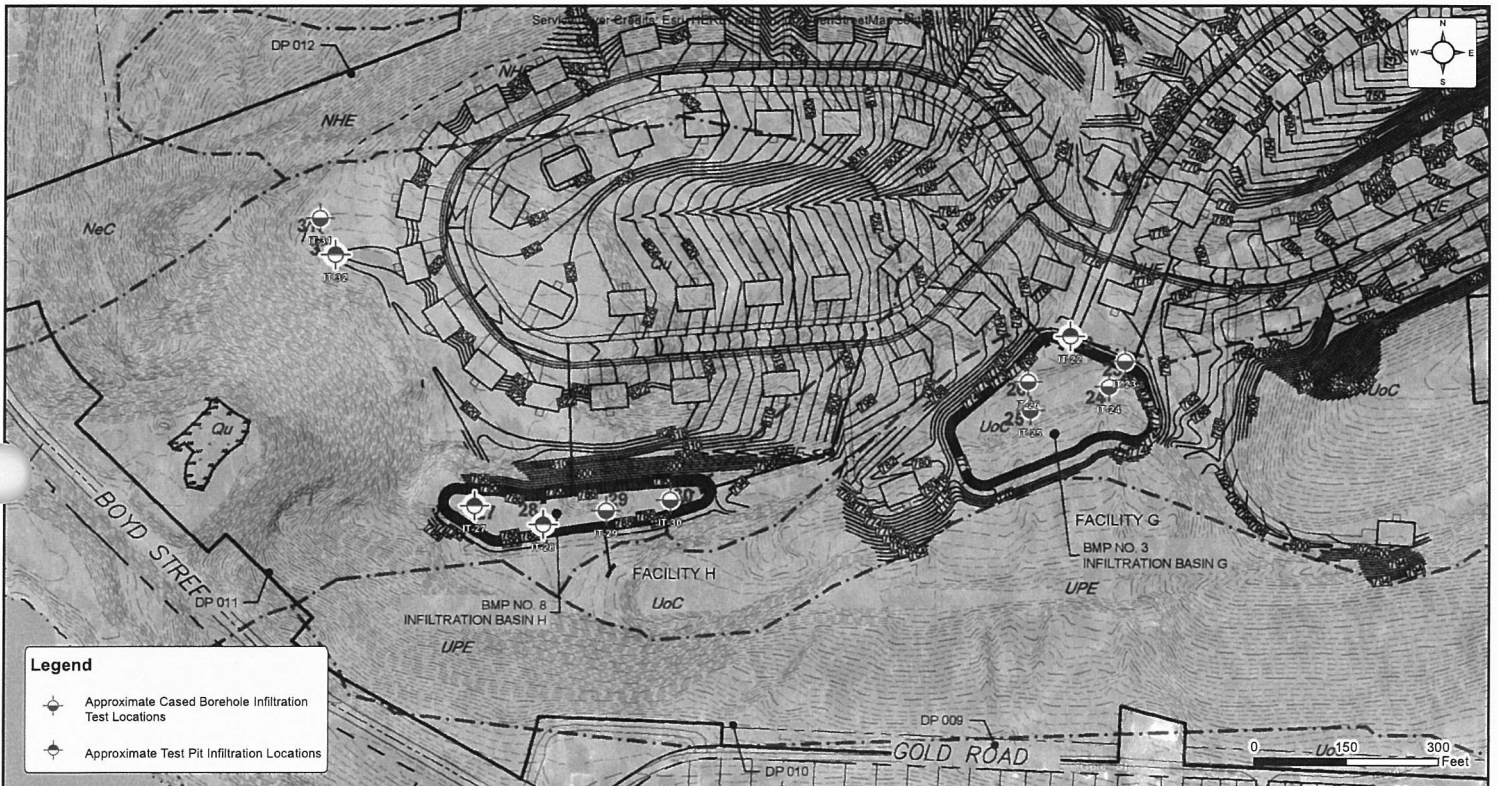
ENGINEER JMC2
SCALE AS NOTED
PROJECT NO. 18:5967-A
FIGURE 1 OF 1
DATE 1/19/2024



EXPLORATION LOCATION DIAGRAM I **CORNWALL PROPERTIES RESIDENTIAL DEVELOPMENT**

REXMONT ROAD, CORNWALL, PENNSYLVANIA
CORNWALL PROPERTIES, LLC

ENGINEER
JMC2
SCALE
AS NOTED
PROJECT NO.
18-5967-A1
FIGURE
1 OF 1
DATE
3/12/2024

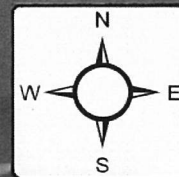


EXPLORATION LOCATION DIAGRAM II CORNWALL PROPERTIES RESIDENTIAL DEVELOPMENT

REXMONT ROAD, CORNWALL, PENNSYLVANIA
CORNWALL PROPERTIES, LLC



ENGINEER
JMC2
SCALE
AS NOTED
PROJECT NO.
18:5967-A1
FIGURE
1 OF 1
DATE
3/12/2024



Hamburg Sequence

Main Rock Type: Shale

Diabase

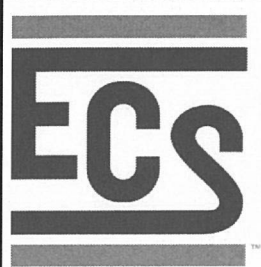
Main Rock Type: Diabase

Hammer Creek Conglomerate

Main Rock Type: Conglomerate

Hammer Creek Formation

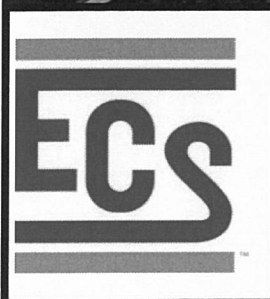
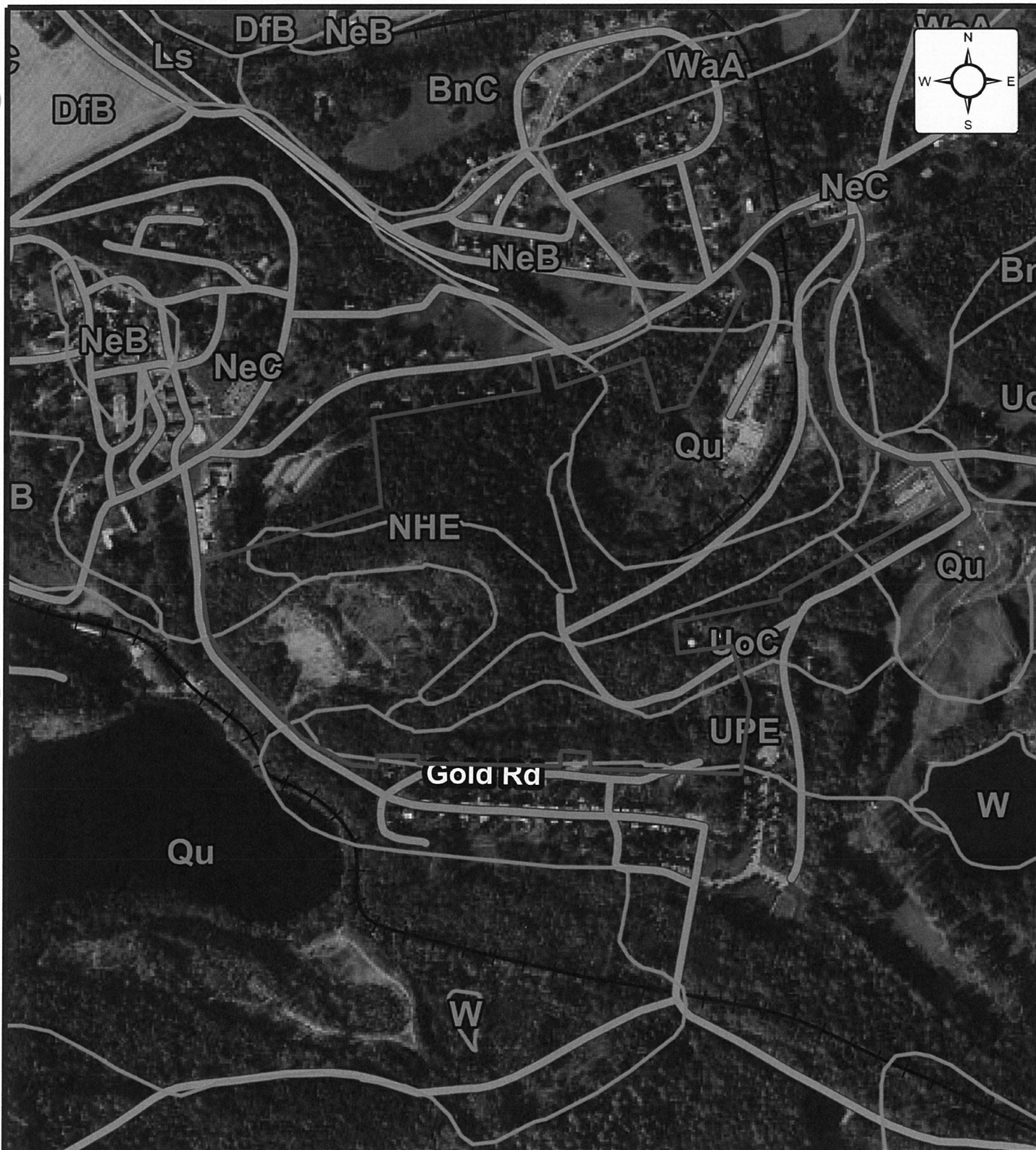
Main Rock Type: Sandstone



GEOLOGIC SURVEY MAP CORNWALL PROPERTIES RESIDENTIAL DEVELOPMENT

REXMONT ROAD, CORNWALL, PENNSYLVANIA
CORNWALL PROPERTIES, LLC

DRAFTER	SCA
SCALE	NTS
PROJECT NO.	18:5967-A
DATE	3/6/2024
SOURCE	PA DCNR Geologic Map http://www.gis.dcnr.state.pa.us



SOIL SURVEY MAP **CORNWALL PROPERTIES** **RESIDENTIAL DEVELOPMENT**

REXMONT ROAD, CORNWALL, PENNSYLVANIA
 CORNWALL PROPERTIES, LLC

DRAFTER	SCA
SCALE	NTS
PROJECT NO.	18:5967-A
DATE	3/6/2024
SOURCE	Web Soil Survey https://websoilsurvey.nrcs.usda.gov

Appendix B – Field Operations

Reference Notes

Exploration Procedures

Test Pit Logs

Photographs

Infiltration/Permeability/Hydraulic Test Results

REFERENCE NOTES FOR BORING LOGS

MATERIAL^{1,2}

	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
	GW WELL-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GP POORLY-GRADED GRAVEL gravel-sand mixtures, little or no fines
	GM SILTY GRAVEL gravel-sand-silt mixtures
	GC CLAYEY GRAVEL gravel-sand-clay mixtures
	SW WELL-GRADED SAND gravely sand, little or no fines
	SP POORLY-GRADED SAND gravely sand, little or no fines
	SM SILTY SAND sand-silt mixtures
	SC CLAYEY SAND sand-clay mixtures
	ML SILT non-plastic to medium plasticity
	MH ELASTIC SILT high plasticity
	CL LEAN CLAY low to medium plasticity
	CH FAT CLAY high plasticity
	OL ORGANIC SILT or CLAY non-plastic to low plasticity
	OH ORGANIC SILT or CLAY high plasticity
	PT PEAT highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION	PARTICLE SIZES
Boulders	12 inches (300 mm) or larger
Cobbles	3 inches to 12 inches (75 mm to 300 mm)
Gravel: Coarse	¾ inch to 3 inches (19 mm to 75 mm)
Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand: Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")	<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, QP ⁴	SPT ⁵ (BPF)	CONSISTENCY ⁷ (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

RELATIVE AMOUNT ⁷	COARSE GRAINED (%) ⁸	FINE GRAINED (%) ⁸
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective (ex: "Silty")	25 - 45	30 - 45

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT ⁵	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS⁶

	WL (First Encountered)
	WL (Completion)
	WL (Seasonal High Water)
	WL (Stabilized)

FILL AND ROCK

FILL	POSSIBLE FILL	PROBABLE FILL	ROCK

¹Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

²To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

³Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

⁴Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

⁵Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

⁷Minor deviation from ASTM D 2488-17 Note 14.

⁸Percentages are estimated to the nearest 5% per ASTM D 2488-17.



SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling

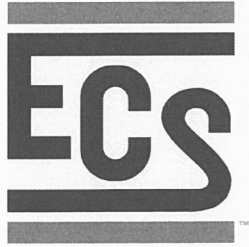
Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth
- Recording the number of hammer blows required to drive split-spoon a distance of 18-24 inches (in 3 or 4 Increments of 6 inches each)
- Auger is advanced* and an additional SPT is performed
- One SPT typically performed for every two to five feet. An approximate 1.5 inch diameter soil sample is recovered.



**Drilling Methods May Vary—* The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.

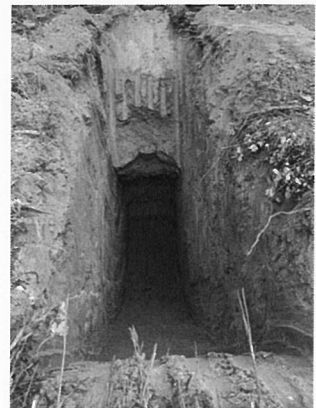


SUBSURFACE EXPLORATION PROCEDURE: TEST PIT EXCAVATION

A test pit is an excavation of subsurface materials to characterize the composition and rippability/excavation efforts. Test pit exploration allows observation of the boundary relationships within a soil and rock profile and is useful to identify existing fill composition, disturbed material or the depth of soft sediments. Both track mounted excavators and backhoes are used in a variety of ground conditions allowing for difficult terrain to be accessed. The excavation process also provides access for in-situ and field testing and acquisition of samples for laboratory testing.

TEST PIT Procedure:

- Involves excavation subsurface material to observe composition and physical characteristics
- Recording the approximate depth of subsurface strata
- Excavation is continued as prescribed or to limits of equipment and subsurface conditions
- The exploration is typically carried out with an excavator or backhoe, with the depth dependent on machine size and ground



CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-01	SURFACE ELEVATION: 712.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[10.00"]					
			(CL) SANDY LEAN CLAY, light brown, moist to wet, firm, 10YR 5/4					
5		707		M		0.75	S-1	
10		702	BUCKET REFUSAL AT 9.2 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

WL (First Encountered) 0.80	WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
WL (Completion) 4.00		Client Provided	Jack	CAT 315C
ECS REP.: CBP	DATE COMPLETED: Jan 29 2024	UNITS: English	CAVE-IN-DEPTH:	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-02	SURFACE ELEVATION: 712.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5	⊗	707	Topsoil Thickness[10.00"] (CL) LEAN CLAY WITH SAND, light brown, moist to wet, stiff, 10YR 5/4 (SC) CLAYEY SAND, light brown, moist to wet, 10YR 5/4	M		1.00	S-1	
10		702	END OF TEST PIT AT 11.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

⊗ WL (First Encountered) 0.80	▼ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
▼ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.: CBP	DATE COMPLETED: Jan 29 2024	UNITS: English	CAVE-IN-DEPTH:
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TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-03	SURFACE ELEVATION: 714.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[17.00"]					
	⊗		(SC) CLAYEY SAND WITH GRAVEL, light brown, moist to wet, 10YR 5/4					
5		709		M			S-1	
10		704						
			END OF TEST PIT AT 11.0 FT					
15								

REMARKS:					
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL					
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT					
☒ WL (First Encountered) 2.00		☒ WL (Seasonal High)		CONTRACTOR:	OPERATOR:
☒ WL (Completion)				Client Provided	Jack
					MAKE/MODEL:
					CAT 315C
ECS REP.:	DATE COMPLETED:		UNITS:	CAVE-IN-DEPTH:	
CBP	Jan 29 2024		English		

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-04	SURFACE ELEVATION: 672.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[10.00"]					
			(CL) SANDY LEAN CLAY, light brown, moist to wet, firm, 10YR 5/4			0.75	S-1	24.9
5		667	(SP) SAND WITH GRAVEL, light brown, moist to wet, pinnacle at 7', 10YR 5/4	E				
10		662		D				
			BUCKET REFUSAL AT 10.5 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered) 2.00	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.: CBP	DATE COMPLETED: Jan 26 2024	UNITS: English	CAVE-IN-DEPTH:
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TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-05	SURFACE ELEVATION: 674.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[10.00"]					
			(CL) SANDY LEAN CLAY WITH GRAVEL, light brown, moist to wet, firm, 10YR 5/4	E		0.50	S-1	
5		669	(SP) SAND WITH GRAVEL, light brown, moist to wet, 10YR 5/4, 10YR 4/4	M				
10		664	END OF TEST PIT AT 10.5 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered) 0.80	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C
ECS REP.: CBP	DATE COMPLETED: Jan 26 2024	UNITS: English	CAVE-IN-DEPTH:	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC			PROJECT NO.: 18:5967-A		SHEET: 1 of 1			
PROJECT NAME: Cornwall Properties Residential Development			TEST PIT NO.: IT-06		SURFACE ELEVATION: 668.0			
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016					STATION:			
LATITUDE:			LONGITUDE:					

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5	N	663	Topsoil Thickness[10.00"]	M		0.50	S-1	
			(CL) SANDY LEAN CLAY, light brown, moist to wet, firm, 10YR 5/4					
			(SC) CLAYEY SAND WITH GRAVEL, light brown and brown, moist to wet, 10YR 5/4, 10YR 4/4					
10		658	END OF TEST PIT AT 11.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered) 0.80	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.: CBP	DATE COMPLETED: Jan 26 2024	UNITS: English	CAVE-IN-DEPTH:
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TEST PIT LOG

CLIENT: Cornwall Properties, LLC		PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development		TEST PIT NO.: IT-07	SURFACE ELEVATION: 689.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016			STATION:
LATITUDE:		LONGITUDE:	



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[14.00"]					
			(SP FILL) FILL, SAND WITH GRAVEL, brown, moist, 10YR 4/4				S-1	
5		684		E				
10		679	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL				
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT				
☒ WL (First Encountered)		☒ WL (Seasonal High)		CONTRACTOR:
☒ WL (Completion)				Client Provided
OPERATOR:		MAKE/MODEL:		
Jack		CAT 315C		
ECS REP.:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:	
CBP	Jan 24 2024	English		

CLIENT: Cornwall Properties, LLC		PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development		TEST PIT NO.: IT-08	SURFACE ELEVATION: 691.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016			STATION:	
LATITUDE:		LONGITUDE:		

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		686	Topsoil Thickness[3.00"] (SP FILL) FILL, SAND WITH GRAVEL, black and gray, moist, 10YR 4/1 (SP) SAND WITH GRAVEL, light brown, moist, 10YR 5/4	E			S-1	
10		681						
15			END OF TEST PIT AT 12.5 FT					

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)		☒ WL (Seasonal High)		CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)				Client Provided	Jack	CAT 315C
ECS REP.:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:			
CBP	Jan 24 2024	English				

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-09	SURFACE ELEVATION: 693.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[11.00"]					
			(SP) SAND WITH GRAVEL, light brown and gray, moist, 10YR 5/4, !0 YR 3/1					
5		688		E			S-1	
10		683						
			END OF TEST PIT AT 11.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
CBP	Jan 24 2024	English	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-10		SHEET: 1 of 1				
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.								
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION 				
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 688.5		BOTTOM OF CASING 				
DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		LIQUID LIMIT X PLASTIC LIMIT	
									ROCK QUALITY DESIGNATION & RECOVERY		CALIBRATED PENETROMETER TSF	
								10 20 30 40 50		1 2 3 4 5		
								20 40 60 80 100		10 20 30 40 50		
								RQD		WATER CONTENT % [FINES CONTENT] %		
								REC		10 20 30 40 50		
5	S-1	SS	24	15	Asphalt Thickness[4.00"] Gravel Thickness[6.00"] (GP FILL) FILL, GRAVEL WITH SAND, brown and gray, moist, medium dense to dense		684	47-18-20-28 (38)				
	S-2	SS	24	10	(SM FILL) FILL, SILTY SAND WITH GRAVEL, brown and gray, moist, loose to very dense			9-12-13-12 (25)				
	S-3	SS	24	5				26-47-17-10 (64)				
	S-4	SS	24	6				10-4-4-5 (8)				
	S-5	SS	24	10				4-3-5-4 (8)				
10	S-6	SS	24	24	(ML) SANDY SILT WITH GRAVEL, light brown, moist, stiff		679	2-3-7-9 (10)				
END OF DRILLING AT 12.0 FT											1.25	
15							674					
20							669					
25							664					
30							659					
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL												
WL (First Encountered) 1.00				BORING STARTED: Feb 14 2024				CAVE IN DEPTH: 3.00				
WL (Completion) Not Encountered				BORING COMPLETED: Feb 14 2024				HAMMER TYPE: Auto				
WL (Seasonal High Water) Not Encountered				EQUIPMENT: Diedrich D50				LOGGED BY: CBP1		DRILLING METHOD: 3.25" HSA		
WL (Stabilized)												
GEOTECHNICAL BOREHOLE LOG												

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	BORING NO.: IT-12	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	DRILLER/CONTRACTOR: Eichelbergers, Inc.			

SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016			LOSS OF CIRCULATION 	
LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION: 688.0	BOTTOM OF CASING 

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT ROCK QUALITY DESIGNATION & RECOVERY	LIQUID LIMIT X PLASTIC LIMIT CALIBRATED PENETROMETER TSF WATER CONTENT % [FINES CONTENT] %
	S-1	SS	24	12	Asphalt Thickness[4.00"] Gravel Thickness[4.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray, moist, dense		14-22-23-19 (45)			
	S-2	SS	24	4			11-18-14-12 (32)			
5	S-3	SS	24	13	(SC POSSIBLE FILL) POSSIBLE FILL, CLAYEY SAND, brown, moist, very loose to medium dense		683	6-7-4-5 (11)		
	S-4	SS	24	16				4-4-5-7 (9)		
	S-5	SS	24	18				2-2-2-3 (4)		
10	S-6	SS	24	24				3-5-5-2 (10)		
					END OF DRILLING AT 12.0 FT					
15							673			
20							668			
25							663			
30							658			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
 WL (First Encountered)	1.00	BORING STARTED: Feb 14 2024	CAVE IN DEPTH: 5.50
 WL (Completion)	Not Encountered	BORING COMPLETED: Feb 14 2024	HAMMER TYPE: Auto
 WL (Seasonal High Water)	Not Encountered	EQUIPMENT: Diedrich D50	LOGGED BY: CBP1
 WL (Stabilized)		DRILLING METHOD: 3.25" HSA	
GEOTECHNICAL BOREHOLE LOG			

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-13	SURFACE ELEVATION: 680.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		675	Topsoil Thickness[4.00"] (GC FILL) FILL, CLAYEY GRAVEL WITH SAND, brown to gray and light brown, moist, 10YR 4/4, 10YR 3/1, 10YR 5/4	D			S-1	
10		670	END OF TEST PIT AT 11.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C
ECS REP.: CBP	DATE COMPLETED: Jan 29 2024	UNITS: English	CAVE-IN-DEPTH:	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-14	SURFACE ELEVATION: 686.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[7.00"]					
			(GC FILL) FILL, CLAYEY GRAVEL WITH SAND, gray to brown and light brown, moist, 10YR 3/1, 10YR 4/4, 10YR 5/4					
5		681		D			S-1	
10		676	END OF TEST PIT AT 9.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
CBP	Dec 29 2023	English	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-15	SURFACE ELEVATION: 811.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		806	Topsoil Thickness[11.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray and brown, moist, 10YR 3/1	E			S-1	
10		801	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
CBP	Jan 30 2024	English	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-16	SURFACE ELEVATION: 811.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[9.00"]					
			(GP FILL) FILL, GRAVEL WITH SAND, gray and brown, moist, 10YR 3/1					
5		806		E			S-1	
10		801	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:					
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL					
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT					
☒ WL (First Encountered)		☒ WL (Seasonal High)		CONTRACTOR:	OPERATOR:
☒ WL (Completion)				Client Provided	Jack
MAKE/MODEL:		CAT 315C			
ECS REP:		DATE COMPLETED:		UNITS:	CAVE-IN-DEPTH:
CBP		Jan 30 2024		English	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-17	SURFACE ELEVATION: 812.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	Qp (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		807	Asphalt Thickness[2.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray and light brown, moist, contains cobbles, contains construction debris, 10YR 3/1	E				
			(CL) SANDY LEAN CLAY, light brown and reddish brown, moist, very stiff, 10YR 5/4, 5YR 4/4	M		2.25	S-1	
10		802	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.: CBP	DATE COMPLETED: Jan 30 2024	UNITS: English	CAVE-IN-DEPTH:
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TEST PIT LOG

CLIENT: Cornwall Properties, LLC		PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development		TEST PIT NO.: IT-18	SURFACE ELEVATION: 812.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016			STATION:
LATITUDE:		LONGITUDE:	



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[5.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray, moist, 10YR 3/1	E				
5		807	(CL) SANDY LEAN CLAY, reddish brown, moist, very stiff, 5YR 4/4	M		2.50	S-1	17.8
10		802	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL					
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT					
☒ WL (First Encountered)		☒ WL (Seasonal High)		CONTRACTOR:	OPERATOR:
☒ WL (Completion)				Client Provided	Jack
MAKE/MODEL:		CAT 315C			
ECS REP.: CBP		DATE COMPLETED: Jan 30 2024		UNITS: English	CAVE-IN-DEPTH:

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-19	SURFACE ELEVATION: 813.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		808	Topsoil Thickness[5.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray, moist, 10YR 3/1	E			S-1	
10		803	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C
ECS REP.: CBP	DATE COMPLETED: Jan 30 2024	UNITS: English	CAVE-IN-DEPTH:	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-20	SURFACE ELEVATION: 736.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		731	Topsoil Thickness[5.00"] (GP FILL) FILL, GRAVEL WITH SAND, black and gray, moist, contains cobbles, contains construction debris, 10YR 4/1, 10YR 3/1	M			S-1	
10		726	(CL) GRAVELLY LEAN CLAY, light brown, moist, 10YR 5/4					
			END OF TEST PIT AT 11.0 FT					
15								

REMARKS:				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL				
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT				
☐ WL (First Encountered) ☒ WL (Seasonal High)		CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C
ECS REP.: CBP	DATE COMPLETED: Jan 26 2024	UNITS: English	CAVE-IN-DEPTH:	
TEST PIT LOG				

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-21	SURFACE ELEVATION: 738.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		733	Topsoil Thickness[7.00"] (GP FILL) FILL, GRAVEL WITH SAND, black and gray, moist, contains cobbles, contains construction debris, 10YR 4/1, 10YR 3/1	M			S-1	
10		728	(CL) SANDY LEAN CLAY, light brown and brown, moist, stiff, 10YR 5/4, 10YR 4/4					
			END OF TEST PIT AT 10.5 FT					
15								

REMARKS:				
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL				
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT				
☒ WL (First Encountered)		☒ WL (Seasonal High)		CONTRACTOR:
☒ WL (Completion)		Client Provided		OPERATOR:
				MAKE/MODEL:
ECS REP:		DATE COMPLETED:		UNITS:
CBP		Jan 26 2024		English
CAVE-IN-DEPTH:				
TEST PIT LOG				

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-22	SURFACE ELEVATION: 776.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[12.00"]					
			(SP) SAND, light brown, moist, 10YR 5/4	M				
5		771	(WR) PARTIALLY WEATHERED SANDSTONE SAMPLED AS SAND WITH GRAVEL, contains boulders, contains cobbles, 10YR 5/4 [Weathered SANDSTONE]	D			S-1	
10		766	BUCKET REFUSAL AT 9.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL					
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT					
☐ WL (First Encountered)		☐ WL (Seasonal High)		CONTRACTOR:	OPERATOR:
☒ WL (Completion)				Client Provided	Jack
MAKE/MODEL:		CAT 315C			
ECS REP.: CBP		DATE COMPLETED: Jan 23 2024		UNITS: English	CAVE-IN-DEPTH:

TEST PIT LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-23		SHEET: 1 of 1		
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.						
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION >100?		
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 778.0		BOTTOM OF CASING ▶		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									10	20	30	40	50	10
	S-1	SS	24	10	Topsoil Thickness[4.00"] (GP) GRAVEL WITH SAND, light brown and gray, moist, very dense			17-24-30-38 (54)						
	S-2	SS	10	9	(WR) WEATHERED DIABASE SAMPLED AS GRAVEL WITH SAND, gray and light brown, moist, very dense [Weathered DIABASE]			49-50/4" (50/4")						
5	S-3	SS	16	8			773	11-49-50/4" (99/10")						
	S-4	SS	2	2				50/2" (50/2")						
	AUGER REFUSAL AT 6.5 FT													
10							768							
15							763							
20							758							
25							753							
30							748							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

☒ WL (First Encountered)	Not Encountered	BORING STARTED: Feb 09 2024	CAVE IN DEPTH:
☒ WL (Completion)	Not Encountered	BORING COMPLETED: Feb 09 2024	HAMMER TYPE: Auto
☒ WL (Seasonal High Water)	Not Encountered	EQUIPMENT: Diedrich D50	LOGGED BY: CBP1
☒ WL (Stabilized)			DRILLING METHOD: 3.25" HSA

GEOTECHNICAL BOREHOLE LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-24		SHEET: 1 of 1		
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.						
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION 		
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 786.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % (FINES CONTENT) %	
									10	20	30	40	50	10
5	S-1	SS	24	4	Topsoil Thickness[4.00"] (SC FILL) FILL, CLAYEY SAND WITH GRAVEL, light brown and gray, moist, loose to medium dense		781	4-7-9-9 (16)	16					
	S-2	SS	24	10				9-5-5-6 (10)	10					
	S-3	SS	24	7				12-5-4-3 (9)	9					
	S-4	SS	24	17	(CL) LEAN CLAY WITH SAND, orangish brown, moist, firm to very stiff			4-3-4-6 (7)	7					
10	S-5	SS	23	11				4-7-16-50/5" (23)	23					
	S-6	SS	4	2	(WR) WEATHERED DIABASE SAMPLED AS SAND WITH GRAVEL, gray and light brown, moist, very dense [Weathered DIABASE] AUGER REFUSAL AT 12.0 FT		776	50/4" (50/4")	50/4"					
15							771							
20							766							
25							761							
30							756							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

☒ WL (First Encountered) ☒ WL (Completion) ☒ WL (Seasonal High Water) ☒ WL (Stabilized) Not Encountered Not Encountered Not Encountered	BORING STARTED: Feb 09 2024 BORING COMPLETED: Feb 09 2024 EQUIPMENT: Diedrich D50 CAVE IN DEPTH: 11.50 HAMMER TYPE: Auto LOGGED BY: CBP1
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GEOTECHNICAL BOREHOLE LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-25		SHEET: 1 of 1		
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.						
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION 100%		
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 786.0		BOTTOM OF CASING 100%		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % (FINES CONTENT) %			
									10	20	30	40	50	10	20	30
5	S-1	SS	24	10	Topsoil Thickness[6.00"] (SC FILL) FILL, CLAYEY SAND, brown and orangish brown, moist, loose to dense, contains slag, contains organics		781	12-18-15-20 (33)	33							
	S-2	SS	24	7			781	12-7-8-12 (15)	15							
	S-3	SS	24	7			781	3-3-4-3 (7)	7							
	S-4	SS	24	6			781	3-3-3-3 (6)	6							
10	S-5	SS	24	12	(SC) CLAYEY SAND, light brown, moist, loose to very dense		776	3-2-4-5 (6)	6							
	S-6	SS	24	20			776	7-7-9-11 (16)	16							
	S-7	SS	24	11			771	8-9-10-13 (19)	19							
15	S-8	SS	24	18			771	19-22-31-23 (53)	53							
20					AUGER REFUSAL AT 16.5 FT		766									
25							761									
30							756									

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

☒ WL (First Encountered)	Not Encountered	BORING STARTED: Feb 08 2024	CAVE IN DEPTH: 15.00
☒ WL (Completion)	Not Encountered	BORING COMPLETED: Feb 08 2024	HAMMER TYPE: Auto
☒ WL (Seasonal High Water)	Not Encountered	EQUIPMENT: Diedrich D50	LOGGED BY: CBP1
☒ WL (Stabilized)		DRILLING METHOD: 3.25" HSA	

GEOTECHNICAL BOREHOLE LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-26		SHEET: 1 of 1		
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.						
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION >100'		
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 782.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %	
									10	20	30	40	50	10
	S-1	SS	24	8	Topsoil Thickness[6.00"] (SC) CLAYEY SAND, light brown, moist, loose to medium dense			2-2-3-4 (5)	⊗					
	S-2	SS	24	15				5-7-11-15 (18)	⊗					
5	S-3	SS	24	16	(WR) WEATHERED DIABASE SAMPLED AS SAND WITH GRAVEL, light brown, moist, medium dense to very dense [Weathered DIABASE]		777	8-14-14-22 (28)	⊗					
	S-4	SS	24	15				19-22-28-34 (50)	⊗					
	S-5	SS	24	10			772	16-11-25-22 (36)	⊗					
10	S-6	SS	23	22				18-26-45-50 /5" (71)	⊗					
					AUGER REFUSAL AT 12.0 FT									
15							767							
20							762							
25							757							
30							752							

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

☒ WL (First Encountered)	Not Encountered	BORING STARTED: Feb 09 2024	CAVE IN DEPTH:
☒ WL (Completion)	Not Encountered	BORING COMPLETED: Feb 09 2024	HAMMER TYPE: Auto
☒ WL (Seasonal High Water)	Not Encountered	EQUIPMENT: Diedrich D50	LOGGED BY: CBP1
☒ WL (Stabilized)		DRILLING METHOD: 3.25" HSA	

GEOTECHNICAL BOREHOLE LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-27	SURFACE ELEVATION: 791.0
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:
LATITUDE:		LONGITUDE:



DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
			Topsoil Thickness[4.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray and black, moist, 10YR 3/1, 10YR 4/1					
5		786	(SP FILL) FILL, SAND WITH GRAVEL, brown and light brown, moist, 10YR 4/4, 10YR 5/4	M			S-1	
10		781	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C

ECS REP.: CBP	DATE COMPLETED: Feb 01 2024	UNITS: English	CAVE-IN-DEPTH:
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TEST PIT LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-28	SURFACE ELEVATION: 791.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		786	Topsoil Thickness[3.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray and black, moist, 10YR 3/1, 10YR 4/1	M			S-1	
			(SP) SAND WITH GRAVEL, yellowish brown, moist, contains cobbles, 7.5YR 6/8					
10		781	END OF TEST PIT AT 10.0 FT					
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

☒ WL (First Encountered)	☒ WL (Seasonal High)	CONTRACTOR:	OPERATOR:	MAKE/MODEL:
☒ WL (Completion)		Client Provided	Jack	CAT 315C
ECS REP.: CBP	DATE COMPLETED: Feb 01 2024	UNITS: English	CAVE-IN-DEPTH:	

TEST PIT LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-29		SHEET: 1 of 1		
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.						
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION 		
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 796.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %					
									10	20	30	40	50	10	20	30	40	50
	S-1	SS	24	7	Topsoil Thickness[9.00"]			2-10-9-11 (19)	19									
	S-2	SS	24	6	(GP FILL) FILL, GRAVEL, gray, moist, medium dense			11-10-9-11 (19)	9									
5	S-3	SS	24	3			791	15-15-9-6 (24)	24									
	S-4	SS	24	0	(GP POSSIBLE FILL) POSSIBLE FILL, GRAVEL WITH SAND, gray and light brown, moist, loose			7-4-5-4 (9)	9									
10	S-5	SS	24	2			786	2-2-5-3 (7)	7									
	S-6	SS	24	0				3-4-5-9 (9)	9									
	S-7	SS	24	16	(CL) LEAN CLAY, orangish brown, moist, soft			3-2-2-4 (4)	4									
15					END OF DRILLING AT 14.0 FT		781											
20							776											
25							771											
30							766											

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
☒ WL (First Encountered)	Not Encountered	BORING STARTED:	Feb 05 2024
☒ WL (Completion)	Not Encountered	BORING COMPLETED:	Feb 05 2024
☒ WL (Seasonal High Water)	Not Encountered	EQUIPMENT:	Diedrich D50
☒ WL (Stabilized)		LOGGED BY:	CBP1
		CAVE IN DEPTH:	5.00
		HAMMER TYPE:	Auto
		DRILLING METHOD:	3.25" HSA

GEOTECHNICAL BOREHOLE LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-30		SHEET: 1 of 1			
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.							
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION			
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 795.0		BOTTOM OF CASING			

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % [FINES CONTENT] %					
									10	20	30	40	50	10	20	30	40	50
									RQD REC									
5	S-1	SS	24	9	Topsoil Thickness[6.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray, moist, medium dense			5-7-8-8 (15)	15									
	S-2	SS	24	4				5-5-10-9 (15)	15									
	S-3	SS	24	11	(CL) SANDY LEAN CLAY, orangish brown, moist, firm		790	5-3-2-3 (5)	5									
	S-4	SS	24	13	(SC) CLAYEY SAND, orangish brown, moist, medium dense			3-5-10-8 (15)	15									
	S-5	SS	24	16				4-6-7-6 (13)	13									
10	S-6	SS	22	4	(WR) WEATHERED DIABASE SAMPLED AS GRAVEL, gray, moist, dense to very dense [Weathered DIABASE]		785	20-30-18-50 /4" (48)	48									
	S-7	SS	5	1				50/5" (50/5")	50/5"									
15	END OF DRILLING AT 14.0 FT						780											
20							775											
25							770											
30							765											

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL											
☒ WL (First Encountered)		Not Encountered		BORING STARTED: Feb 05 2024		CAVE IN DEPTH: 10.00					
☒ WL (Completion)		Not Encountered		BORING COMPLETED: Feb 05 2024		HAMMER TYPE: Auto					
☒ WL (Seasonal High Water)		Not Encountered		EQUIPMENT: Diedrich D50		LOGGED BY: CBP1		DRILLING METHOD: 3.25" HSA			
☒ WL (Stabilized)											

GEOTECHNICAL BOREHOLE LOG

CLIENT: Cornwall Properties, LLC				PROJECT NO.: 18:5967-A		BORING NO.: IT-31		SHEET: 1 of 1		
PROJECT NAME: Cornwall Properties Residential Development				DRILLER/CONTRACTOR: Eichelbergers, Inc.						
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016								LOSS OF CIRCULATION 		
LATITUDE:		LONGITUDE:		STATION:		SURFACE ELEVATION: 830.0		BOTTOM OF CASING 		

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)	STANDARD PENETRATION BLOWS/FT		ROCK QUALITY DESIGNATION & RECOVERY		WATER CONTENT % (FINES CONTENT) %					
									10	20	30	40	50	10	20	30	40	50
									△ LIQUID LIMIT × PLASTIC LIMIT ○ CALIBRATED PENETROMETER TSF ● WATER CONTENT %									
	S-1	SS	24	4	Topsoil Thickness[3.00"] (GP FILL) FILL, GRAVEL, gray, moist, loose to very dense			3-8-7-6 (15)	15									
	S-2	SS	24	3				5-6-1-4 (7)	7									
5	S-3	SS	24	3			825	11-15-5-2 (20)	20									
	S-4	SS	24	1				4-5-6-4 (11)	11									
	S-5	SS	24	5				3-5-21-42 (26)	26									
10	S-6	SS	14	4			820	18-34-50/2" (84/8")	84/8"									
	S-7	SS	5	2				50/5" (50/5")	50/5"									
15	END OF DRILLING AT 14.0 FT						815											
20							810											
25							805											
30							800											

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL			
▽ WL (First Encountered) Not Encountered	BORING STARTED: Feb 06 2024		CAVE IN DEPTH: 3.00
▼ WL (Completion) Not Encountered	BORING COMPLETED: Feb 06 2024		HAMMER TYPE: Auto
▽ WL (Seasonal High Water) Not Encountered	EQUIPMENT: Diedrich D50		DRILLING METHOD: 3.25" HSA
▽ WL (Stabilized)	LOGGED BY: CBP1		

GEOTECHNICAL BOREHOLE LOG

CLIENT: Cornwall Properties, LLC	PROJECT NO.: 18:5967-A	SHEET: 1 of 1	
PROJECT NAME: Cornwall Properties Residential Development	TEST PIT NO.: IT-32	SURFACE ELEVATION: 836.0	
SITE LOCATION: Rexmont Road, Cornwall, Pennsylvania, 17016		STATION:	
LATITUDE:		LONGITUDE:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	QP (TSF)	SAMPLE NUMBER	MOISTURE CONTENT (%)
5		831	Topsoil Thickness[2.00"] (GP FILL) FILL, GRAVEL WITH SAND, gray and black, moist, contains cobbles, 10YR 3/1, 10YR 4/1	M			S-1	
10		826						
			END OF TEST PIT AT 11.0 FT					
15								

REMARKS:					
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL					
EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT					
☒ WL (First Encountered)		☒ WL (Seasonal High)		CONTRACTOR:	OPERATOR:
☒ WL (Completion)				Client Provided	Jack
ECS REP.:		DATE COMPLETED:		UNITS:	CAVE-IN-DEPTH:
CBP		Jan 23 2024		English	
TEST PIT LOG					



IT-01



IT-02



IT-03



IT-04

**CORNWALL PROPERTIES RESIDENTIAL
DEVELOPMENT**

ECS PROJECT NO. 18:5967-A
LEBANON COUNTY, PENNSYLVANIA



TEST PIT PHOTOGRAPHS

JANUARY 2024



IT-05



IT-06



IT-07



IT-08

**CORNWALL PROPERTIES RESIDENTIAL
DEVELOPMENT**

ECS PROJECT NO. 18:5967-A
LEBANON COUNTY, PENNSYLVANIA



TEST PIT PHOTOGRAPHS

JANUARY 2024



IT-09



IT-13



IT-14



IT-15

**CORNWALL PROPERTIES RESIDENTIAL
DEVELOPMENT**

ECS PROJECT NO. 18:5967-A
LEBANON COUNTY, PENNSYLVANIA



TEST PIT PHOTOGRAPHS

JANUARY 2024



IT-16



IT-17



IT-18



IT-19

**CORNWALL PROPERTIES RESIDENTIAL
DEVELOPMENT**

ECS PROJECT NO. 18:5967-A
LEBANON COUNTY, PENNSYLVANIA



TEST PIT PHOTOGRAPHS

JANUARY 2024



IT-20



IT-21



IT-22



IT-27

**CORNWALL PROPERTIES RESIDENTIAL
DEVELOPMENT**
ECS PROJECT NO. 18:5967-A
LEBANON COUNTY, PENNSYLVANIA



TEST PIT PHOTOGRAPHS
JANUARY 2024



IT-28



IT-32

**CORNWALL PROPERTIES RESIDENTIAL
DEVELOPMENT**
ECS PROJECT NO. 18:5967-A
LEBANON COUNTY, PENNSYLVANIA



TEST PIT PHOTOGRAPHS
JANUARY 2024

Double Ring Infiltration Test Results
Cornwall Properties Residential Development
ECS Project No. 18:5967-A

Date Tested:		1/29/2024	1/26/2024	1/26/2024	1/26/2024	1/26/2024	1/24/2024	1/24/2024				
Field Data	IT-03		IT-04		IT-05		IT-06		IT-07		IT-08	
Test Depth (ft)	7.0		0.8		2.0		0.7		3.0		5.0	
	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading
Presoak Start/Water Depth (in)	11:25	6.00	10:22	6.00	10:18	6.00	10:25	6.00	12:57	6.00	12:53	6.00
Presoak 30 Min (in)	11:55	0.75	10:52	0.00	10:48	1.25	10:55	2.50	13:27	2.25	13:23	4.25
Presoak 60 Min (in)	12:25	0.50	11:22	0.00	11:18	1.25	11:25	2.75	13:57	2.00	13:53	3.00
START TEST (in)	12:25	6.00	11:22	6.00	11:18	6.00	11:25	6.00	13:57	6.00	13:53	6.00
Reading Interval	30 min		30 min		30 min		10 min		10 min		10 min	
Reading # 1 (in)	12:55	0.50	11:52	0.00	11:48	1.25	11:35	0.50	14:07	0.75	14:03	1.25
Reading # 2 (in)	13:25	0.50	12:22	0.00	12:18	1.00	11:45	0.50	14:17	1.00	14:13	1.25
Reading # 3 (in)	13:55	0.50	12:52	0.00	12:48	1.00	11:55	0.50	14:27	1.00	14:23	1.25
Reading # 4 (in)	14:25	0.50	13:22	0.00	13:18	1.00	12:05	0.50	14:37	1.00	14:33	1.25
Reading # 5 (in)												
Reading # 6 (in)												
Reading # 7 (in)												
Reading # 8 (in)												
O.D. of Double Ring Infiltrometer (in)	6.00		6.00		6.00		6.00		6.00		6.00	
Initial Water Depth (in)	6.00		6.00		6.00		6.00		6.00		6.00	
Final Water Level Drop (in)	0.50		0.00		1.00		0.50		1.00		1.25	
Average Reading (in)	0.50		0.00		1.06		0.50		0.94		1.25	
Infiltration Rate (in/hr)	1.00		0.00		2.13		3.00		5.63		7.50	
Safety Factor	2.00		2.00		2.00		2.00		2.00		2.00	
Corrected Infiltration Rate (in/hr)	0.50		0.00		1.06		1.50		2.81		3.75	

Notes:

1. Infiltrometer refilled to water depth of 6 inches (inner and outer ring) after each reading.

Double Ring Infiltration Test Results
Cornwall Properties Residential Development
ECS Project No. 18:5967-A

Date Tested:	1/24/2024		1/30/2024		1/30/2024		1/23/2024		1/23/2024		1/23/2024	
Field Data	IT-09		IT-17		IT-18		IT-22		IT-27		IT-28	
Test Depth (ft)	7.0		6.0		6.0		7.0		6.0		6.0	
	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading
Presoak Start/Water Depth (in)	12:48	6.00	12:35	6.00	12:37	6.00	12:02	6.00	11:53	6.00	11:55	6.00
Presoak 30 Min (in)	13:18	6.00	13:05	0.00	13:07	0.25	12:32	2.25	12:23	1.25	12:25	2.00
Presoak 60 Min (in)	13:48	6.00	13:35	0.00	13:37	0.13	13:02	2.00	12:53	1.50	12:55	2.00
START TEST (in)	13:48	6.00	13:35	6.00	13:37	6.00	13:02	6.00	12:53	6.00	12:55	6.00
Reading Interval	10 min		30 min		30 min		10 min		30 min		10 min	
Reading # 1 (in)	13:58	4.00	14:05	0.00	14:07	0.00	13:12	0.75	13:23	1.00	13:05	0.50
Reading # 2 (in)	14:08	4.00	14:35	0.00	14:37	0.13	13:22	0.50	13:53	1.00	13:15	0.50
Reading # 3 (in)	14:18	4.00	15:05	0.00	15:07	0.00	13:32	0.50	14:23	1.00	13:25	0.50
Reading # 4 (in)	14:28	4.00	15:35	0.00	15:37	0.00	13:42	0.50	14:53	1.00	13:35	0.50
Reading # 5 (in)												
Reading # 6 (in)												
Reading # 7 (in)												
Reading # 8 (in)												
O.D. of Double Ring Infiltrometer (in)	6.00		6.00		6.00		6.00		6.00		6.00	
Initial Water Depth (in)	6.00		6.00		6.00		6.00		6.00		6.00	
Final Water Level Drop (in)	4.00		0.00		0.00		0.50		1.00		0.50	
Average Reading (in)	4.00		0.00		0.03		0.56		1.00		0.50	
Infiltration Rate (in/hr)	24.00		0.00		0.06		3.38		2.00		3.00	
Safety Factor	2.00		2.00		2.00		2.00		2.00		2.00	
Corrected Infiltration Rate (in/hr)	12.00		0.00		0.03		1.69		1.00		1.50	

Notes:

1. Infiltrometer refilled to water depth of 6 inches (inner and outer ring) after each reading.

Percolation Testing Results
Cornwall Properties Residential Development
ECS Project No. 18:5967-A

Date Tested: 1/26/2024 1/29/2024 1/29/2024 1/30/2024 1/30/2024 1/30/2024

Field Data	IT-04		IT-13		IT-14		IT-15		IT-16		IT-17	
Test Depth (ft)	0.8		1.0		7.0		5.0		5.0		6.0	
	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading
Presoak Start/Water Depth (in)	10:52	6.00	12:07	6.00	12:04	6.00	12:30	6.00	12:27	6.00	12:35	6.00
Presoak 30 Min (in)	11:22	0.75	12:37	4.00	12:34	6.00	13:00	6.00	12:57	6.00	13:05	0.13
Presoak 60 Min (in)	11:52	1.00	13:07	4.00	13:04	6.00	13:30	6.00	13:27	6.00	13:35	0.13
START TEST	11:52	6.00	13:07	6.00	13:04	6.00	13:30	6.00	13:27	6.00	13:35	6.00
Reading Interval	30 min		10 min		10 min		10 min		10 min		30 min	
Reading # 1 (in)	12:22	0.75	13:17	1.75	13:14	6.00	13:40	6.00	13:37	6.00	14:05	0.13
Reading # 2 (in)	12:52	0.75	13:27	1.75	13:24	6.00	13:50	6.00	13:47	6.00	14:35	0.13
Reading # 3 (in)	13:22	0.50	13:37	2.00	13:34	6.00	14:00	6.00	13:57	6.00	15:05	0.13
Reading # 4 (in)	13:52	0.50	13:47	2.00	13:44	6.00	14:10	6.00	14:07	6.00	15:35	0.13
Reading # 5 (in)												
Reading # 6 (in)												
Reading # 7 (in)												
Reading # 8 (in)												
Average Diameter of Hole (in)	9.00		9.00		9.00		9.00		9.00		9.00	
Initial Water Depth (in)	6.00		6.00		6.00		6.00		6.00		6.00	
Final Water Level Drop (in)	0.50		2.00		6.00		6.00		6.00		0.13	
Average Reading (in)	0.63		1.88		6.00		6.00		6.00		0.13	
Infiltration Rate (in/hr)	1.25		11.25		36.00		36.00		36.00		0.25	
Reduction Factor	2.26		2.13		1.67		1.67		1.67		2.32	
Safety Factor	3.00		2.00		2.00		2.00		2.00		3.00	
Corrected Infiltration Rate (in/hr)	0.18		2.65		10.80		10.80		10.80		0.04	

Notes:

1. Refilled to water depth of 6 inches after each reading.

Percolation Testing Results
Cornwall Properties Residential Development
ECS Project No. 18:5967-A

Date Tested: 1/30/2024 1/30/2024 1/26/2024 1/26/2024 1/23/2024 1/23/2024

Field Data	IT-18		IT-19		IT-20		IT-21		IT-27		IT-32	
Test Depth (ft)	6.0		7.0		4.0		6.0		6.0		7.0	
	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading
Presoak Start/Water Depth (in)	12:37	6.00	12:38	6.00	12:29	6.00	12:34	6.00	12:23	6.00	11:47	6.00
Presoak 30 Min (in)	13:07	0.50	13:08	6.00	12:59	6.00	13:04	6.00	12:53	4.25	12:17	6.00
Presoak 60 Min (in)	13:37	0.25	13:38	6.00	13:29	6.00	13:34	6.00	13:23	3.50	12:47	6.00
START TEST	13:37	6.00	13:38	6.00	13:29	6.00	13:34	6.00	13:23	6.00	12:47	6.00
Reading Interval	30 min		10 min		10 min		10 min		10 min		10 min	
Reading # 1 (in)	14:07	0.25	13:48	6.00	13:39	6.00	13:44	6.00	13:33	1.25	12:57	6.00
Reading # 2 (in)	14:37	0.25	13:58	6.00	13:49	6.00	13:54	6.00	13:43	1.00	13:07	6.00
Reading # 3 (in)	15:07	0.25	14:08	6.00	13:59	6.00	14:04	6.00	13:53	1.00	13:17	6.00
Reading # 4 (in)	15:37	0.25	14:18	6.00	14:09	6.00	14:14	6.00	14:03	1.00	13:27	6.00
Reading # 5 (in)												
Reading # 6 (in)												
Reading # 7 (in)												
Reading # 8 (in)												
Average Diameter of Hole (in)	9.00		9.00		9.00		9.00		9.00		9.00	
Initial Water Depth (in)	6.00		6.00		6.00		6.00		6.00		6.00	
Final Water Level Drop (in)	0.25		6.00		6.00		6.00		1.00		6.00	
Average Reading (in)	0.25		6.00		6.00		6.00		1.06		6.00	
Infiltration Rate (in/hr)	0.50		36.00		36.00		36.00		6.38		36.00	
Reduction Factor	2.31		1.67		1.67		1.67		2.22		1.67	
Safety Factor	3.00		2.00		2.00		2.00		2.00		2.00	
Corrected Infiltration Rate (in/hr)	0.07		10.80		10.80		10.80		1.44		10.80	

Notes:

1. Refilled to water depth of 6 inches after each reading.

Cased Borehole Infiltration Testing Results
Cornwall Properties Residential Development
ECS Project No. 18:5967-A

Date Tested: 2/14/2024 2/14/2024 2/14/2024 2/12/2024 2/12/2024

Field Data	IT-10		IT-11		IT-12		IT-23		IT-24	
Test Depth (ft)	9.5		8.5		9.0		4.5		10.0	
	Time	Drop	Time	Drop	Time	Drop	Time	Drop	Time	Drop
Initial Water Depth (ft)	12:35	-	1:20	-	12:28	-	8:23	-	8:25	-
Presoak 30 Min (ft)	13:05	0.00	1:50	6.00	12:58	0.00	8:53	0.15	8:55	0.21
Presoak 60 Min (ft)	13:35	0.00	2:20	6.00	13:28	0.00	9:23	0.13	9:25	0.22
Reading Interval	30 min		10 min		30 min		30 min		10 min	
Reading # 1 (ft)	14:05	0.00	2:30	6.00	13:58	0.00	9:53	0.15	9:35	0.07
Reading # 2 (ft)	14:35	0.00	2:40	6.00	14:28	0.00	10:23	0.13	9:45	0.07
Reading # 3 (ft)	15:05	0.00	2:50	6.00	14:58	0.00	10:53	0.17	9:55	0.05
Reading # 4 (ft)	15:35	0.00	3:00	6.00	15:28	0.00	11:23	0.16	10:05	0.06
Reading # 5 (ft)							11:33	0.14		
Reading # 6 (ft)										
Reading # 7 (ft)										
Reading # 8 (ft)										
Final Water Level Drop (ft)	0.00		6.00		0.00		0.14		0.06	
Average Reading (ft)	0.00		6.00		0.00		0.15		0.06	
Average Reading (in)	0.00		72.00		0.00		1.80		0.75	
Average Reading (in/hr)	0.00		432.00		0.00		3.60		4.50	
Safety Factor	2.00		2.00		2.00		2.00		2.00	
Infiltration Rate (in/hr)	0.00		>10.00		0.00		1.80		2.25	

Notes:

Cased Borehole Infiltration Testing Results
Cornwall Properties Residential Development
ECS Project No. 18:5967-A

Date Tested: 2/12/2024 2/12/2024 2/7/2024 2/7/2024 2/7/2024

Field Data	IT-25		IT-26		IT-29		IT-30		IT-31	
Test Depth (ft)	14.5		9.5		11.0		10.0		11.0	
	Time	Drop	Time	Drop	Time	Drop	Time	Drop	Time	Drop
Initial Water Depth (ft)	8:09	-	8:10	-	8:18	-	8:20	-	8:13	-
Presoak 30 Min (ft)	8:39	0.22	8:40	0.05	8:48	0.60	8:50	6.00	8:43	6.00
Presoak 60 Min (ft)	9:09	0.14	9:10	0.02	9:18	0.34	9:20	6.00	9:13	6.00
Reading Interval	30 min		30 min		10 min		10 min		10 min	
Reading # 1 (ft)	9:39	0.12	9:20	0.03	9:48	0.42	9:30	6.00	9:23	6.00
Reading # 2 (ft)	10:09	0.10	9:30	0.04	10:18	0.19	9:40	6.00	9:33	6.00
Reading # 3 (ft)	10:39	0.12	9:40	0.03	10:48	0.14	9:50	6.00	9:43	6.00
Reading # 4 (ft)	11:09	0.11	9:50	0.04	11:18	0.17	10:00	6.00	9:53	6.00
Reading # 5 (ft)						0.14				
Reading # 6 (ft)										
Reading # 7 (ft)										
Reading # 8 (ft)										
Final Water Level Drop (ft)	0.11		0.04		0.14		6.00		6.00	
Average Reading (ft)	0.11		0.04		0.16		6.00		6.00	
Average Reading (in)	1.35		0.42		1.92		72.00		72.00	
Average Reading (in/hr)	2.70		0.84		11.52		432.00		432.00	
Safety Factor	2.00		2.00		2.00		2.00		2.00	
Infiltration Rate (in/hr)	1.35		0.42		5.76		>10.00		>10.00	

Notes:

Appendix C – Laboratory Testing

Laboratory Testing Summary
Plasticity Chart(s)
Grain Size Analysis/Analyses
Textural Triangle USDA Test(s)

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
IT-04	S-1	0.8	24.9	CL	38	23	15	65.1					
IT-18	S-1	6	17.8	CL	27	16	11	53.2					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

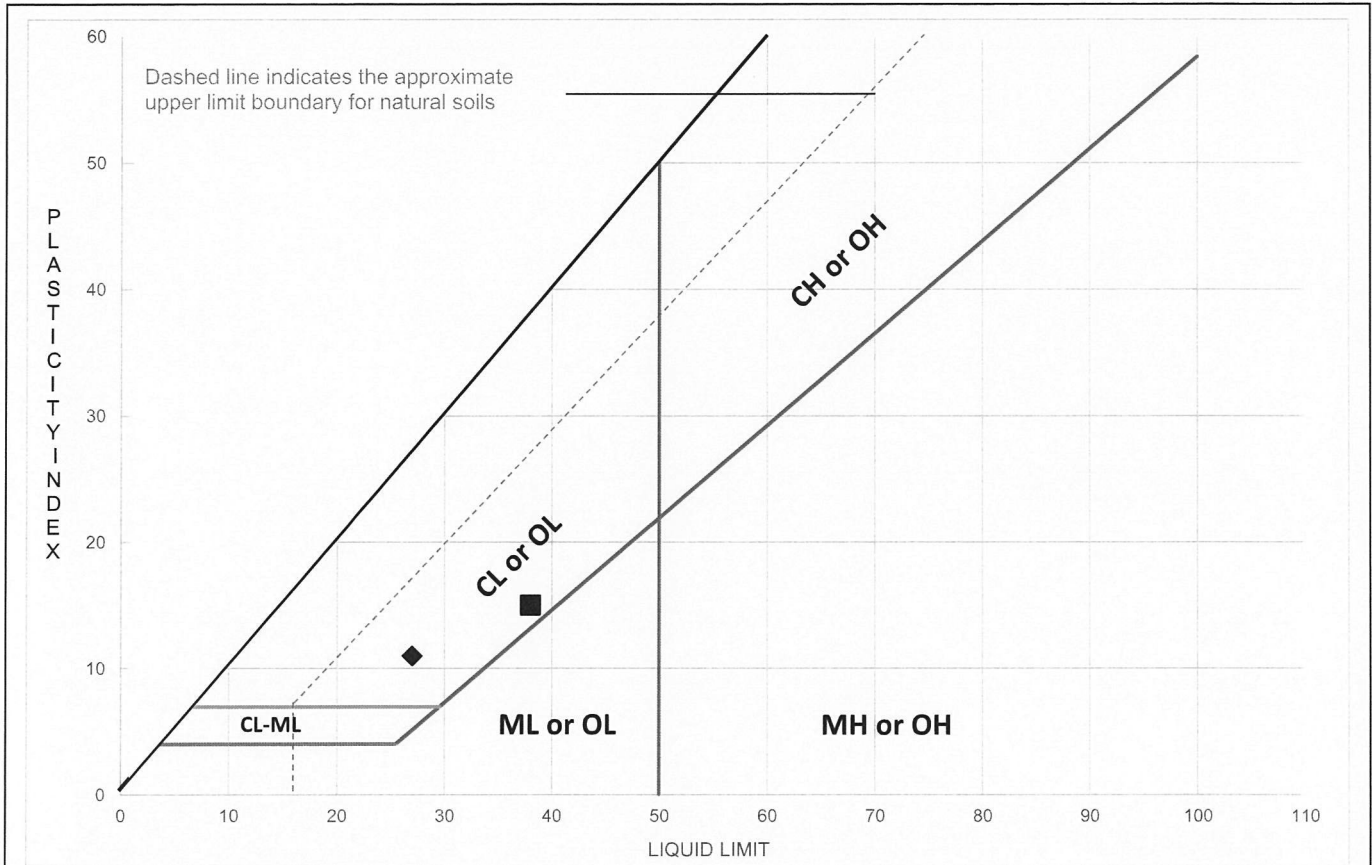
Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Cornwall Properties Residential Development Client: Cornwall Properties, LLC		Project No.: 18:5967-A Date Reported: 3/6/2024	
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	Office / Lab	Address	Office Number / Fax
	ECS Mid-Atlantic LLC - York	52-6 Grumbacher Road York, PA 17406	(717)767-4788 (717)767-5658

Tested by	Checked by	Approved by	Date Received
JGates			

LIQUID AND PLASTIC LIMITS TEST REPORT



TEST RESULTS ()

	Sample Location	Sample Number	Sample Depth ()	LL	PL	PI	%<#40	%<#200	AASHTO	USCS	Material Description
■	IT-04	S-1	0.8	38	23	15	73.7	65.1	A-6	CL	Sandy Lean Clay
◆	IT-18	S-1	6	27	16	11	83.4	53.2	A-6	CL	Sandy Lean Clay

Project: Cornwall Properties Residential Development
Client: Cornwall Properties, LLC

Project No.: 18:5967-A
Date Reported: 3/6/2024



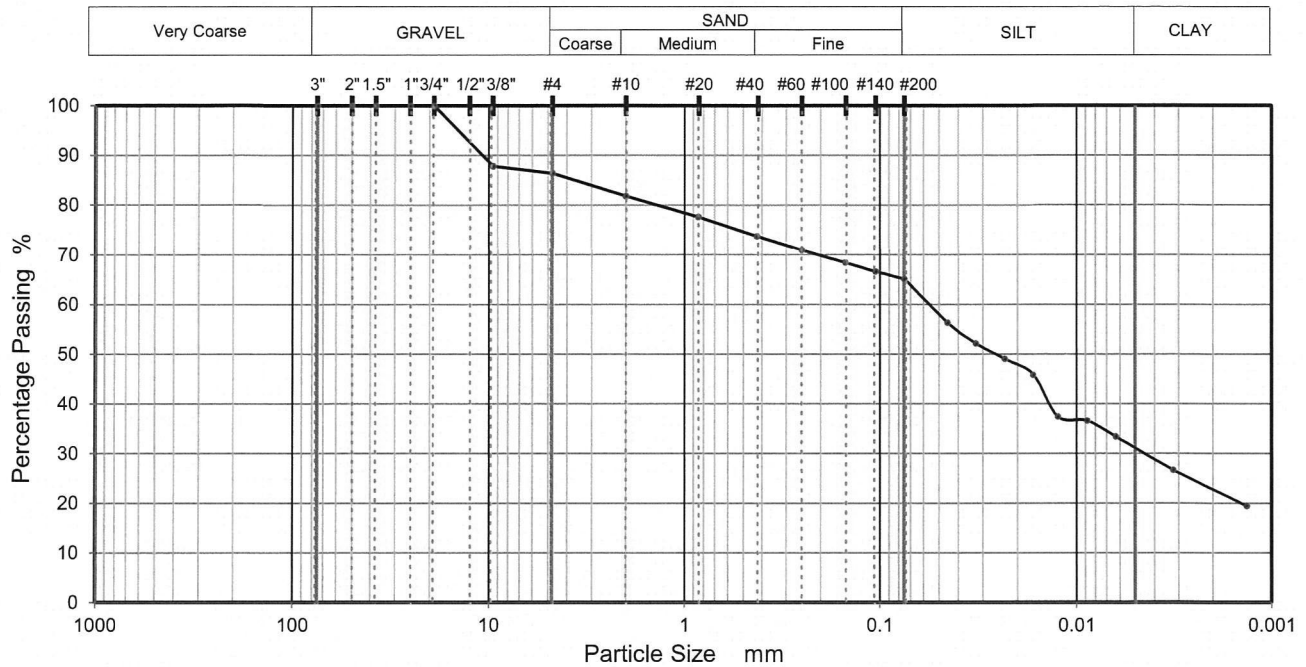
Office / Lab
ECS Mid-Atlantic LLC - York

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York, PA 17406

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(717)767-4788
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100	0.0453	56
2"	100	0.0325	52
1 1/2"	100	0.0232	49
1"	100	0.0166	46
3/4"	100	0.0124	37
3/8"	88	0.0088	37
#4	86	0.0063	33
#10	82	0.0032	27
#20	78	0.0013	19
#40	74	Specific Gravity (Historical) 2.65	
#60	71		
#100	68		
#140	67		
#200	65		

Dry Mass of sample, g

56.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	14
Coarse Sand, #4 to #10 sieve	5
Medium Sand, #10 to #40	8
Fine Sand, #40 to #200	9
Silt, 75µm to 5 µm	34
Clay < 5µm	31

USCS	CL	Liquid Limit	38	D90	10.760	D50	0.026	D10	
AASHTO	A-6	Plastic Limit	23	D85	3.651	D30	0.004	Cu	
USCS Group Name	Sandy lean clay	Plasticity Index	15	D60	0.056	D15		Cc	

Project: Cornwall Properties Residential Development
 Client: Cornwall Properties, LLC
 Sample Description: Sandy Lean Clay
 Sample Source: IT-04

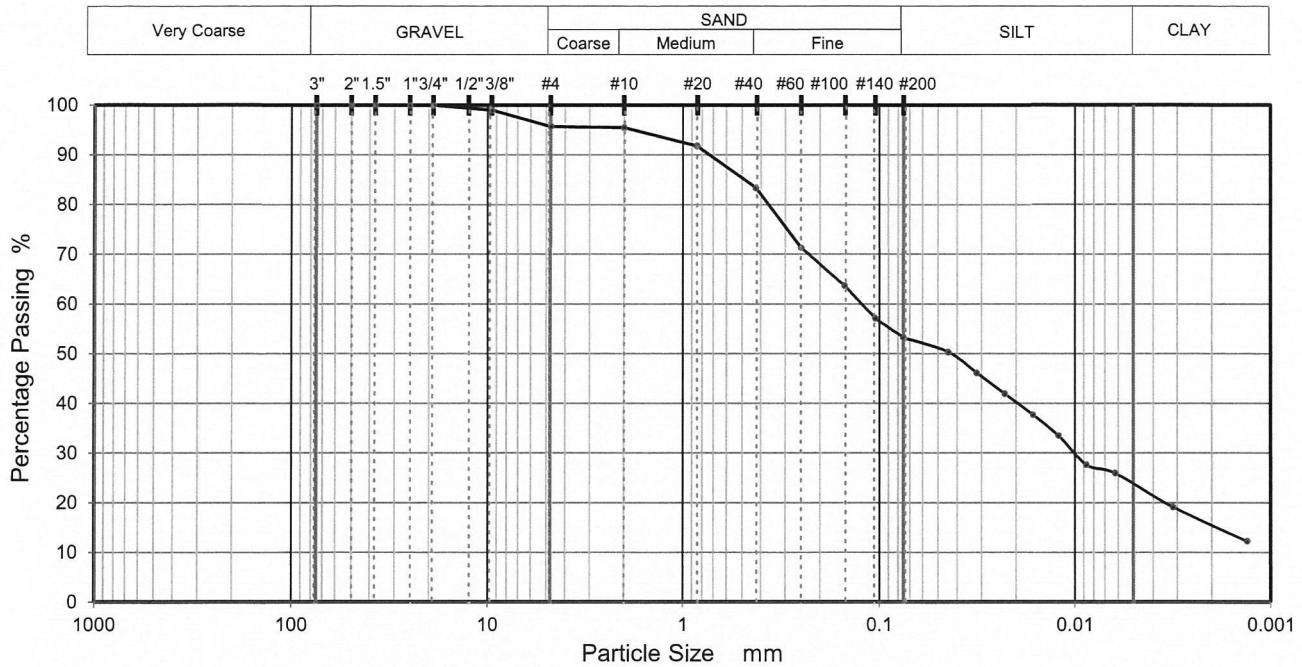
Project No.: 18:5967-A
 Depth (ft): 0.8
 Sample No.: S-1
 Date Reported: 3/6/2024



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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100	0.0442	50
2"	100	0.0318	46
1 1/2"	100	0.0228	42
1"	100	0.0164	38
3/4"	100	0.0121	34
3/8"	99	0.0087	28
#4	96	0.0062	26
#10	96	0.0032	19
#20	92	0.0013	12
#40	83	Specific Gravity (Historical) 2.65	
#60	71		
#100	64		
#140	57		
#200	53		

Dry Mass of sample, g

61.4

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to #4 sieve	4
Coarse Sand, #4 to #10 sieve	0
Medium Sand, #10 to #40	12
Fine Sand, #40 to #200	30
Silt, 75µm to 5 µm	30
Clay < 5µm	24

USCS	CL	Liquid Limit	27	D90	0.733	D50	0.043	D10	
AASHTO	A-6	Plastic Limit	16	D85	0.485	D30	0.010	Cu	
USCS Group Name	Sandy lean clay	Plasticity Index	11	D60	0.123	D15	0.002	Cc	

Project: Cornwall Properties Residential Development
 Client: Cornwall Properties, LLC
 Sample Description: Sandy Lean Clay
 Sample Source: IT-18

Project No.: 18:5967-A
 Depth (ft): 6
 Sample No.: S-1
 Date Reported: 3/6/2024



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USDA Classification

TEST RESULTS (ASTM D6913M-17-METHOD A)

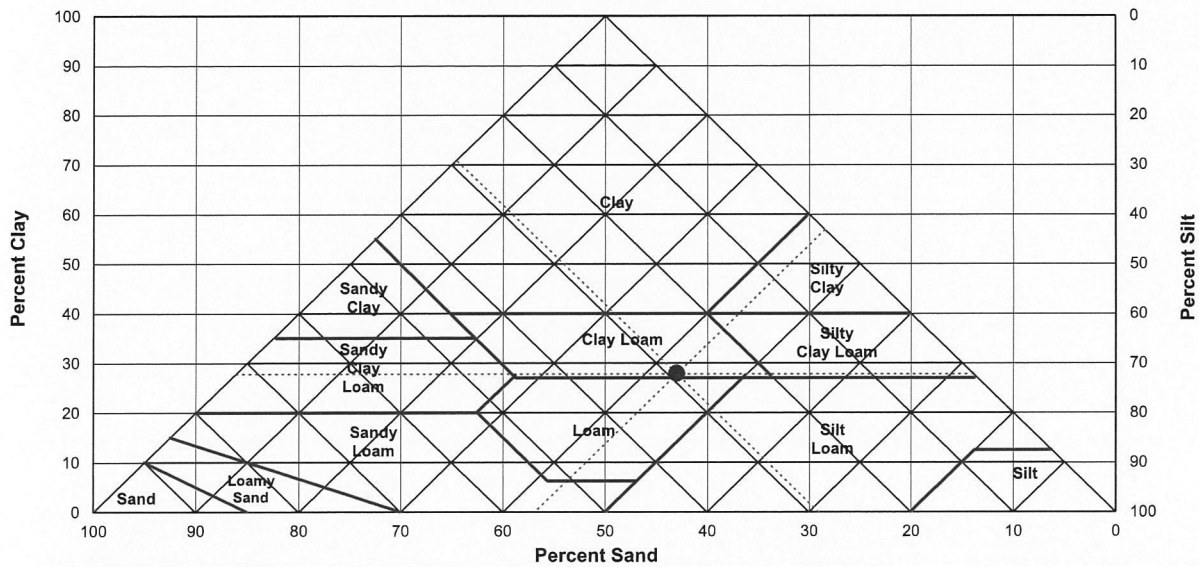
USDA Classification:

Clay Loam

USDA Soil Percentages
(Corrected for Gravel):

%Sand	%Silt	%Clay
29.1	43.1	27.8

Textural Triangle USDA



Project: Cornwall Properties Residential Development
Client: Cornwall Properties, LLC
Sample Description: Sandy Lean Clay
Sample Source: IT-04

Project No.: 18:5967-A
Depth (ft): 0.8
Sample No.: S-1
Date Reported: 3/1/2024



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USDA Classification

TEST RESULTS (ASTM D6913M-17-METHOD A)

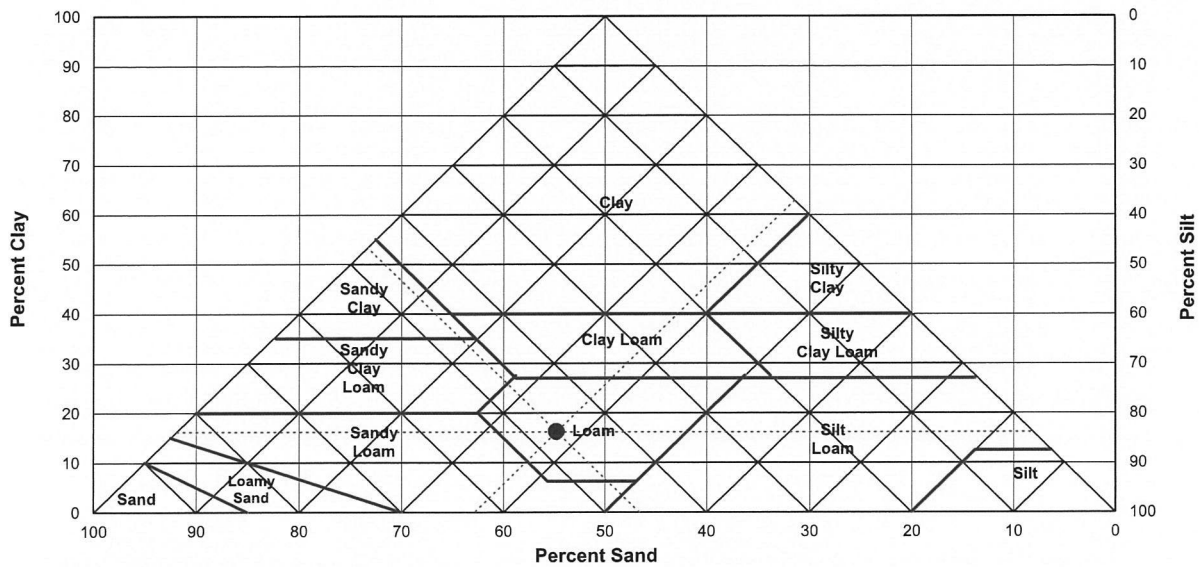
USDA Classification:

Loam

USDA Soil Percentages
(Corrected for Gravel):

%Sand	%Silt	%Clay
46.6	37.2	16.2

Textural Triangle USDA



Project: Cornwall Properties Residential Development
Client: Cornwall Properties, LLC
Sample Description: Sandy Lean Clay
Sample Source: IT-18

Project No.: 18-5967-A
Depth (ft): 6
Sample No.: S-1
Date Reported: 3/1/2024



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Tested by	Checked by	Approved by	Date Received
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