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**GEOTECHNICAL ENGINEERING REPORT**

**RUTTER'S STORE #82**


**ANTIS TOWNSHIP, BLAIR COUNTY, PENNSYLVANIA**

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PROJECT NUMBER – 1800941001

NOVEMBER 19, 2018



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## 1.0 INTRODUCTION

This report was prepared by Advantage Engineers, LLC (Advantage), on behalf of Rutter's, of York, Pennsylvania, and contains the results of a geotechnical engineering exploration conducted for Store #82. The purpose of this exploration has been to evaluate the suitability of the subsurface conditions to support the proposed improvements. The scope of work for this project included a subsurface exploration, laboratory testing program and geotechnical engineering analysis. This report summarizes the results of the work performed and provides geotechnical and general construction recommendations.

## 2.0 SITE AND PROJECT DESCRIPTION

The project site currently consists of a grass and tree covered parcel of land which formally included a residential dwelling located northwest of East Pleasant Valley Boulevard (Business Route 220) and Sabbath Rest Road (T-4018) in Antis Township, Blair County, Pennsylvania. The site is bordered to the north a grass and tree covered parcel of land, to the west by a hotel, to the south by Sabbath Rest Road and to the east by East Pleasant Valley Boulevard. Existing topography across the project site slopes down gradient towards the south resulting in approximately 72 feet of grade variation across the proposed improvements. The approximate location of the site in relation to the surrounding area is presented on the *Topographic Map* (Figure 1) found within the Appendix.

Based on plans provided by the Client, the project will consist of constructing a new Rutter's Store (Store #82). The proposed store is anticipated to measure approximately 10,200 square-feet in plan area, be single-story in height and have a finished floor elevation situated at 1087 feet with a slab-on-grade floor system. Based on existing and proposed grades, maximum cuts of approximately 23 feet are anticipated to be required to reach the proposed building pad elevation. Column and wall loads were not known at the time of this report; therefore, maximum column loads of 80 kips and wall loads and 3 kips per lineal foot were assumed. Development of the project will also include constructing parking areas, drive lanes, stormwater management facilities, underground fuel storage tank (UST) field, a gasoline fuel island canopy and a diesel fuel island canopy.

## 3.0 SITE GEOLOGY

According to the *Pennsylvania Geologic Survey Geologic Map of the State of Pennsylvania*, the project site is underlain by the Devonian age Keyser and Tonoloway Formations, undivided (geologic symbol DSkt). The property within its geologic setting is presented on the *Geologic Map* (Figure 2) found within the Appendix.

According to the Pennsylvania Geologic Survey publication, [The Engineering Characteristics of the Rocks of Pennsylvania](#), Second Edition, 1982, these formations are described as follows:

**Keyser Formation:** Comprised of dark-gray, highly fossiliferous and crystalline to nodular limestone with shaly limestone near the top. The formation is well-bedded, flaggy to thick, with some massive beds. Fracturing is along moderately to highly abundant platy or blocky patterned joints which are regularly spaced with a moderate to close distance between open and steeply dipping fractures. This formation is moderately resistant to weathering which occurs to a moderate or shallow depth, with a thin soil mantle which may be characterized by pinnacles.

**Tonoloway Formation:** Consists of medium-gray, laminated limestone; containing interbedded zones of medium-dark-gray to light-olive gray shale and siltstone. Bedding is well-developed, flaggy to thick. Fracturing is along moderately to highly abundant platy, and rarely, blocky patterned joints. Spacing between fractures is moderate to close, open and steeply dipping. This formation is moderately resistant to weathering which occurs to a moderate or shallow depth, with a thin soil mantle which may be characterized by pinnacles.



Additionally, these formations are comprised of carbonate lithology which are subject to dissolution and the development of sinkholes and other karst-related features. The *Sinkhole Map of Pennsylvania*, prepared by William Kochonov of the Pennsylvania Geologic Survey, does not show any mapped karst features across the property or on adjacent lands. It should be noted, no karst features (i.e. bedrock outcrops, sinkholes and/or surface depressions) were observed at the time of our site reconnaissance.

#### 4.0 SUBSURFACE EXPLORATION PROGRAM

To evaluate the subsurface conditions across the project site, 9 test borings, 3 auger probes, 3 test pits and 10 infiltration tests and were conducted between November 4 and 8, 2018, in accordance with the following schedule:

- 5 test borings were conducted within the footprint of the proposed Rutter's Store
- 2 test borings were completed across the footprint of the proposed gasoline fuel island canopy
- 2 test borings were advanced within the envelope of the proposed diesel fuel island canopy
- 3 auger probes were conducted within the proposed UST field
- 3 test pits were excavated across the proposed trailer parking areas and drive lanes
- 10 test borings and auger probes were completed across the proposed stormwater management facilities

Supervision and monitoring of the subsurface exploration were provided by a representative of Advantage, who field located the test locations utilizing a hand-held GPS unit based on plans provided by the Client. Ground surface elevations were estimated from the topographic contours shown on the plans. The approximate test locations are shown on the *Exploration Plan* (Figure 3) presented within the Appendix.

The test borings and auger probes were advanced using a track-mounted CME-45 drill rig equipped with an automatic hammer and hollow-stem augers. Split-spoon samples conducted in accordance with ASTM standard D1586 were taken at suitable intervals throughout the entire depth of the borings and the Standard Penetration Test (SPT) values were recorded for each sample obtained. The SPT values, which are a measure of relative density or consistency, are the number of blows required to drive a 2-inch (outer-diameter) split-barrel sampler 18 inches using a 140-pound weight dropped 30 inches. The number of blows required to advance the sampler over the 12-inch interval from 6 to 18 inches is considered the "N" value. The test pits were excavated utilizing a Caterpillar 318B tracked excavator.

Data pertaining to the subsurface exploration were documented in the field and are presented in detail on the *Test Boring and Auger Probe Profiles*, *Test Boring Logs* and *Test Pit Logs* presented within the Appendix. The *Test Boring and Auger Probe Profiles* (Figures 4 and 5) depict cross-sections of the subsurface conditions encountered within each test boring and auger probe conducted, including: soil and rock types, depths of individual strata and recorded "N" values. The *Test Boring Logs* contain general information about the subsurface program and specific data regarding each test boring, including: sample depths, blow counts per 6 inches of penetration and visual classifications of the subsurface materials encountered. The *Test Pit Logs* contain visual classifications of the subsurface materials encountered including bedrock, groundwater, springs, existing fill and other noteworthy items.



## 5.0 LABORATORY TESTING

Soil samples retrieved from the site were visually reviewed and classified by Advantage. Representative samples were subjected to laboratory analyses to verify visual classifications and aid in establishing engineering parameters in accordance with the following schedule:

- Natural Moisture Content (ASTM D2216)
- Sieve Analysis (ASTM D422)
- Atterberg Limits Determination (ASTM D4318)

Unified Soil Classification System (USCS) Group Symbols and ASTM Group Names have been assigned to the soils analyzed. Graphical depictions of the laboratory testing completed are presented in the Appendix. The results of the testing conducted are presented in the tables below.

STANDARD CLASSIFICATION RESULTS											
Location	Depth (ft)	Soil Type	% Gravel	% Sand	% Fines	LL	PL	PI	Natural Moisture Content	USCS Group Symbol	ASTM Group Name
IT-6	2 – 5	Stratum I	1.2	55.3	43.5	27	18	9	18.7%	SC	Clayey SAND
IT-9	6 – 10		22.8	36.4	40.8	34	15	19	17.4%	SC	Clayey SAND with Gravel

*LL-Liquid Limit; PL-Plastic Limit; PI-Plasticity Index*

## 6.0 DESCRIPTION OF SUBSURFACE CONDITIONS

A general description of the conditions encountered at the site is as follows:

### 6.1 SOIL

#### Surficial Materials

The test locations were covered by approximately 3 to 14 inches of topsoil; however, the topsoil may differ in unexplored areas of the project site.

#### Stratum I – Orange-brown to brown to gray SAND with varying amounts of Clay and Gravel

Stratum I was encountered within each test location completed with exception to IT-3, and extended to depths ranging from approximately 5 to 33 feet below existing site grades. The “N” values, recorded within this soil ranged from 4 blows per foot to 50 blows over 5 inches and show Stratum I to range from loose to very dense in relative density.

Laboratory testing conducted on representative samples of Stratum I show this soil to be well graded and plastic with natural moisture contents of 17.4% and 18.7%. Stratum I is described under the USCS as Clayey SAND (SC) and Clayey SAND with Gravel (SC).



**Stratum II – Brown to gray GRAVEL with varying amounts of cobble-to boulder-sized rock fragments (weathered rock)**

Stratum II was encountered within 9 test borings and 2 test pits and extended to depths ranging from approximately 2 to 21 feet below existing site grades. The “N” values, recorded within this soil ranged from 65 blows over 11 inches to 50 blows over 3 inches and show Stratum II to be very dense in relative density.

Upon review, the soils of Stratum II were found to be moderately well graded, non-plastic and predominantly comprised of Gravel with varying amounts of cobble-to boulder-sized rock fragments. The soils of Stratum II are anticipated to represent the highly weathered bedrock surface.

**6.2 BEDROCK**

The bedrock surface was encountered within the majority of the test boring locations and all the test pits completed at depths ranging from approximately 2 to 33 feet below existing site grades. It should be noted the bedrock surface was not encountered within the 3 auger probes advanced within the tank field. The bedrock surface was defined as the depth at which refusal of the given equipment was achieved.

To determine the composition and integrity of the bedrock present beneath the site, bedrock coring was conducted in general accordance with ASTM D 2113. Percent Recovery (REC) was calculated by dividing the length of the rock core retrieved from the core barrel by the total length of the core run and multiplying by 100. Rock Quality Designation (RQD) was calculated by summing the length of the rock fragments in the core run which are greater than or equal to 4 inches in length and dividing by the total length of the core run and multiplying by 100. RQD results are generally correlated to rock quality as follows:

<u>RQD (%)</u>	<u>Description of Rock Quality</u>
0 – 25%	Very Poor
25 – 50%	Poor
50 – 75 %	Fair
75 – 90 %	Good
90 – 100%	Excellent

Visual description of the bedrock encountered is provided in the table below. Based on the RQD value, the rock core obtained was of very poor quality.

<b>ROCK CORING DATA SUMMARY</b>				
<b>Location</b>	<b>Rock Core Depth (feet)</b>	<b>REC (%)</b>	<b>RQD (%)</b>	<b>Visual Description</b>
B-2	12 – 17	43	0	Highly weathered and fractured grey SHALE

**Based on the results of the subsurface exploration and published geologic data, the bedrock surface beneath the project site is pinnacled with significant variation in the elevation of the bedrock surface over short lateral distances. Therefore, the potential exists for the bedrock surface to be encountered at elevations which vary significantly from the elevations encountered during our exploration.**



### **6.3 GROUNDWATER & SOIL MOTTLING**

Neither groundwater nor soil mottling (indicating a seasonal high water table and/or poorly draining soils) were encountered during the subsurface exploration. However, based on the deep cuts required to reach final site grades coupled with the underlying geology, seeps and springs may be encountered during mass grading operations. These observations were made at the time of the exploration and the groundwater table elevations will vary with daily, seasonal and climatological variations as well as anthropogenic activities.

### **7.0 CONSIDERATION OF KARST GEOLOGY**

The following construction considerations are provided in an effort to minimize the potential for development of sinkholes at the site both during and following construction.

- Surface water should not be allowed to collect or pool in low lying areas of the site and should be directed to appropriate stormwater channels. Expeditious backfilling or grading of low-lying areas will also help minimize the potential for the development of sinkholes.
- The bases of all foundation excavations should be reviewed for unusually soft or wet soil conditions. Any unstable areas encountered should be further excavated and reviewed by the geotechnical engineer to determine the extent of any solution activity so that remedial measures can be designed and implemented.
- The extent of excavations should be kept to a minimum and the influx of surface water into excavations should be minimized.
- Positive drainage away from the proposed structures should always be maintained. Roof drains should also be directed away from the structures and into designated, storm sewer connections.
- Storm sewer conveyance lines should be constructed with watertight joints.
- Unpaved areas, swales, and/or surface/subsurface stormwater management facilities should be avoided immediately adjacent to building/foundation areas.
- Exterior backfill around foundations should consist of fine-grained, on-site soils, (i.e. clay) in an effort to limit stormwater infiltration in foundation areas.

The site owner must recognize the risks associated with development in areas underlain by carbonate geologic formations. Contingencies should be made in the construction schedule and budget for the repair of existing and future sinkholes and unstable soil conditions encountered during development of the site.

### **8.0 GEOTECHNICAL RECOMMENDATIONS**

Provided the recommendations within this report are followed, firm and stable existing soils and/or suitable structural fill placed under engineering control should be suitable for the support of the proposed improvements. Our geotechnical recommendations are provided in the following sections.



## 8.1 STRUCTURAL FILL

Our recommendations regarding suitable imported fill and the reuse of on-site soils as structural fill are provided below.

### Imported Fill

- free of organic matter, ash, cinders, trash, or other unsuitable or deleterious materials
- particle size distribution that is well-graded
- Liquid Limit (LL) less than 30 and Plasticity Index (PI) less than 10
- less than 15 percent by weight rock fragments larger than 3" with no particle size exceeding 6", less than 30 percent by weight larger than the 3/4" and less than 30 percent smaller than the no. 200 sieve

Alternate soils proposed for use which differ from those specified above should be evaluated by the Geotechnical Engineer of Record regarding their suitability prior to placement at the site.

### Reuse of On-Site Material

**Stratum I** – This soil was found to be well graded, plastic and predominantly comprised of SAND with varying amounts of Clay and Gravel. Based on this information, this soil is considered suitable for reuse as structural fill. **Due to the high amounts of CLAY, this soil may be moisture sensitive and difficult to place during periods of adverse weather.**

**Stratum I** – This soil was found to be well graded, non-plastic and predominantly comprised of GRAVEL with varying amounts of varying amounts of cobble-to boulder-sized rock fragments. Based on this information, this soil is considered suitable for reuse as structural fill.

**Processed Bedrock/Boulders** – Bedrock/Boulder excavation will be required during development of the site. The excavated bedrock/boulders are considered well-suited for use as structural fill provided the following criteria are adhered to and that care is exercised to minimize void space or "nesting" of larger rock fragments during placement.

- Within upper 4 feet of the building pad subgrade elevations and within the upper 2 feet of the pavement subgrade elevations: *Well graded mixture with a maximum particle size of 8 inches.*
- 4 feet or more below the proposed building pad subgrade elevation and 2 feet or more below of the pavement subgrade: *Well graded mixture with a maximum particle size of 24 inches. Care should be given to compact the soils surrounding the larger particles which are greater than the lift thickness.*

Our analysis of the suitability of the on-site soil for use as structural fill is based on data collected from the test locations completed. Soil suitability should be confirmed in the field by Advantage during construction.

## 8.2 SHALLOW FOUNDATIONS

Our foundation recommendations are provided as follows:

1. Foundation systems consisting of strip and/or spread footings are recommended for support of the proposed structures (store and fuel island canopies).
2. The foundations should be supported on firm and stable existing soils and/or properly placed structural fill.





3. A maximum allowable bearing pressure of **3,000** pounds per square foot (psf) should be considered in foundation design of the structures.
4. To protect against frost heave, spread footing foundations, including those in unheated areas, should extend to depths specified by the building code or local code amendments.
5. Foundation bottoms should be free of loose material or debris immediately prior to the placement of concrete.
6. Concrete should be placed in excavated foundation areas as quickly as possible to minimize degradation to the foundation subgrade due to exposure.
7. The suitability of the materials encountered at the proposed foundation subgrade elevations should be confirmed during construction under the supervision of a Professional Engineer licensed in the Commonwealth of Pennsylvania specializing in Geotechnical Engineering.
8. Column and wall foundations should be a minimum of 3.0 and 1.5 feet in width, respectively.
9. If encountered, the bedrock surface should be over-excavated a minimum of 6 inches below the foundation subgrade elevation and be backfilled with crushed stone. Proceeding in this manner will minimize the potential for point loading and allows for a uniform distribution of loads.

### **8.3 SETTLEMENT**

At the time of this report, column and wall loads were not known. Therefore, for analysis purposes, maximum interior column and exterior wall loads of 80 kips and 3 kips per linear foot were assumed. Based on these loads, the maximum bearing pressure recommended, and our settlement analyses, maximum post-construction settlement of the proposed foundations is expected to be 1-inch or less. Differential settlement may equal total settlement in areas where adjacent foundations are situated on soil and bedrock, respectively.

Should the structural loads exceed those presented above, please contact Advantage so that settlement estimates may be re-evaluated.

### **8.4 FLOOR SLAB**

The floor of the proposed Rutter's Store may be constructed as a conventional slab-on-grade and may be supported on properly placed structural fill or firm and stable naturally-occurring soils. These soils are expected to exhibit a modulus of subgrade reaction of approximately 150 pounds per cubic inch (pci), provided they are compacted to a minimum of 95 percent Modified Proctor maximum dry density (ASTM D1557) or 98 percent Standard Proctor maximum dry density (ASTM D698).

Additional design recommendations for the project grade slab is provided below:

- The grade slab should be supported on a minimum 4-inch thick compacted layer of free-draining, granular subbase to distribute the concentrated loads, enhance drainage, and reduce degradation of the prepared subgrade during construction. The granular subbase should be compacted to a state of non-movement when traversed with a 10-ton roller.



- The grade slab should be jointed around columns and along footing-supported walls so that the grade slab and foundations can settle differentially without damage.
- Joints containing smooth dowels or keys may be used in the slab to permit rotational movement between parts of the slab without sharp vertical displacements or cracking.

## 8.5 LATERAL EARTH PRESSURES

The following data is provided for the design of below grade structures which may be constructed at the site. The data presented is based on the use of the on-site soils placed under engineering control for backfill of all retaining walls. Should different soil be used, design data should be re-evaluated and changed based on the specific material. The table below provides the Earth Pressure Design Data for the use of the above referenced soils.

EARTH PRESSURE DESIGN DATA		
Parameter	Stratum I	Stratum I
Angle of Internal Friction (degrees)	28	30
Unit Weight of Soil (pounds per cubic foot, pcf)	125	130
Coefficient of Active Earth Pressure	0.36	0.33
Coefficient of Passive Earth Pressure	2.77	3.00
Coefficient of At-Rest Earth Pressure	0.53	0.50
Cohesion (psf)	0	0

Adequate drainage must be maintained adjacent to all earth retaining walls to minimize the buildup of hydrostatic pressure on the structures. At a minimum, a drainage blanket consisting of clean, crushed aggregate should be placed behind the retaining wall. The drainage blanket should be connected to a drain at the base of the retaining wall with all water directed to dedicated stormwater channels. Consideration may also be given to placing a non-woven geotextile filter fabric between the drainage blanket and on-site soil backfill to minimize potential clogging and sedimentation of the drainage blanket.

## 8.6 SEISMIC SITE CLASS

Based on our review of the test boring data and the soil descriptions provided in the International Building Code, latest Edition, it is our opinion the subsurface conditions encountered at the site can be classified as Site Class D.

## 8.7 STORMWATER INFILTRATION ANALYSIS

To evaluate the feasibility of stormwater infiltration across the proposed stormwater management areas, 10 infiltration tests were proposed to be completed at the invert elevations of the proposed stormwater management facilities. However, due to the limiting zones (i.e. bedrock and groundwater) encountered prior to reaching invert elevation only 2 infiltration tests were completed at the proposed test elevation. The infiltration testing was conducted utilizing the percolation test method in accordance with the Pennsylvania Stormwater Best Management Practices Manual. Prior to conducting the infiltration test within an auger probe, a test boring was advanced a minimum of 2 feet below the test elevation to identify limiting zones (i.e. bedrock, groundwater and/or soil mottling). The results of the infiltration testing are presented in the table below.



INFILTRATION TEST RESULTS					
Test Location	Approximate Surface Elevation (feet)	Proposed Test Elevation (feet)	Approximate Test Elevation (feet)	Limiting Zone Elevation (feet)	Infiltration Rate (inches/hour)
IT-1	1112	1082	1106	Bedrock at 1104	0.38
IT-2	1112	1084	1104	Bedrock at 1102	0.52
IT-3	1110	1080	No Test	Bedrock at 1108	No Test
IT-4	1110	1080	1101	Bedrock at 1099	0.20
IT-5	1080	1078	1078	Not Encountered at 1075	0.14
IT-6	1080	1078	1078	Not Encountered at 1075	0.41
IT-7	1112	1086	1191	Bedrock at 1089	1.36
IT-8	1124	1090	1093	Bedrock at 1091	0.13
IT-9	1088	1081	No Test	Groundwater at 1081.8	No Test
IT-10	1104	1084	1096	Bedrock at 1094	2.85

Shaded cells denote where the infiltration testing was completed above the invert elevation.

After the reduction factor was applied to the stabilized percolation rate recorded per the BMP, the infiltration rates were found to range from 0.20 to 2.85 inches per hour. The recommended rate for infiltration stormwater per the BMP is 0.1 to 10 inches per hour.

The Owner must recognize the risk for sinkhole development increases in karst geology when the influx of stormwater is designated to a concentrated area.

## 9.0 CONSTRUCTION CONSIDERATIONS

Based on the results of our geotechnical exploration and our experience with similar project sites, we have developed the following site specific recommendations for construction of the proposed site improvements.

### 9.1 SITE PREPARATION

At the outset of the project, surficial grubbing and topsoil should be stripped from all structural areas. Structural areas are defined as those areas to be covered by the proposed structures, extending to a minimum of 5 feet beyond all foundation lines and any portion of the site to be covered by asphalt or concrete pavements. Unstable or deleterious materials, if encountered, should also be removed in their entirety.

The topsoil will not be suitable for use as structural fill during construction. The topsoil may be stockpiled on site for future use in landscaped areas or as general fill material in non-structural portions of the site (i.e. landscaping berms, curbed islands, etc.).



## 9.2 PROOF-ROLLING

Following removal of the surficial materials, required excavation to reach proposed subgrade elevations and prior to the placement of structural fill or construction of foundation elements, structural areas should be compacted using a steel-drum, vibratory roller, having a minimum static weight of 10 tons. A minimum of 5 overlapping passes of the roller should be completed across the entirety of the building pad and other structural areas.

Following the compaction procedures, proof-rolling should be performed using a loaded, tandem-axle dump truck under the direction of Advantage. Proof-rolling and compaction procedures are necessary to compact and verify the integrity of the upper zones of the soils and allow for a uniform distribution of loads. Loose or unstable areas encountered during proof-rolling and compaction should be compacted in place or removed and replaced with structural fill placed in accordance with the recommendations provided in this report.

In areas of the site where a cut or removal of soil is necessary to achieve the required soil subgrade elevation, proof-rolling of the surface may be waived until the proposed subgrade elevation is achieved.

**The project site is underlain by carbonate lithology. Proof-rolling of the project site and specifically the proposed structural areas is considered to be an integral part of the design criteria for the project. Proof-rolling will allow for a final evaluation of subgrade conditions for indications of loose/soft soil conditions and incipient sinkhole activity. Proof-rolling should be carried out as specified above under direction of Advantage.**

## 9.3 EXCAVATION CONSIDERATIONS

The test locations completed for the proposed improvements indicate construction of the project will take place within the naturally-occurring soils of Stratum I and Stratum II which may be removed using conventional earth moving equipment and techniques. However, based on the slow advancement of the drilling augers and excavation equipment observed, coupled with high SPT values recorded, portions of Stratum II may be difficult to excavate and require larger equipment for removal. Furthermore, a toothed ripper may be required to remove denser soils and highly weathered bedrock. In confined excavations such as foundations, utility trenches, etc., removal of decomposed rock material may necessitate the use of pneumatic or hydraulic hammers.

Based on existing and proposed grades coupled with the data obtained during the subsurface exploration, bedrock removal will be required to reach proposed finished subgrade elevations. Bedrock excavation will require the use of hydraulic or pneumatic hammering equipment and/or blasting for removal. It must be understood, the test boing and test pit logs may be used to estimate rock excavation based on the refusal depths; however, refusal should not be considered to be a definite indicator of rock excavation required. The ease of excavation will also be governed by the subsurface conditions encountered, type of excavation equipment used along with the contractor's willingness to utilize the equipment to its full potential.

Should blasting be utilized during site development, it is imperative to minimize charges to avoid "over-blasting" of the bedrock beyond required excavation depths. Increased/manmade fractures within the existing bedrock will increase sinkhole potential. Upon completion of blasting procedures, all loose rock and "over-blast" must be completely excavated from all structural areas. Excavated bedrock may be utilized as structural fill provided it is sufficiently processed to meet the requirements presented in this report.



#### 9.4 COMPACTION & PLACEMENT REQUIREMENTS

Structural fill should be placed in lifts not exceeding 10 inches in loose thickness where heavy compaction equipment can be utilized and 6 inches in loose thickness where hand-operated equipment is necessary. Only hand-operated tampers and rollers should be used immediately behind below-grade and retaining walls during backfilling unless permission is granted by the Structural Engineer to utilize heavy compaction equipment.

The optimum lift thickness and number of repetitive passes with compaction equipment necessary to achieve the required percentage compaction values should be determined in the field with test passes of the chosen compaction equipment. New structural fill should be placed at or deviate nominally from ( $\pm 2\%$ ) the optimum moisture content as determined in accordance with ASTM D698 or ASTM D1557 and compacted to the minimum percentages of maximum dry density as indicated below.

COMPACTION CRITERIA		
Fill Area	Percent of Maximum Dry Density per Standard Proctor (ASTM D698)	Percent of Maximum Dry Density per Modified Proctor (ASTM D1557)
Foundation Support Fill	98	95
Foundation Backfill	98	95
Slab-On-Grade, Parking Areas	98	95
Non-Structural Areas, Green Areas	92	90

#### 9.5 FOUNDATION CONSTRUCTION

Prior to the placement of concrete, the foundation subgrade should be densified and compacted using a walk-behind vibratory roller, gas-powered automatic tamper, or similar equipment. Densification should be performed to provide uniform density of the foundation subgrade and allow for proper distribution of loads. Proper compaction and densification of the foundation subgrade should be verified by Advantage prior to placement of concrete.

It is emphasized that caution should be exercised to not disturb foundation subgrade soils. Should the subgrade be disturbed, the soil should be compacted in place or removed until firm soil is encountered and the resulting excavation backfilled with concrete or controlled structural fill as described above. Every effort should be made to prevent water from entering open foundation excavations. Water that may accumulate in foundation excavations should be removed immediately. It is recommended that footing excavation and placement of concrete be performed on the same day whenever practical.

#### 9.6 PAVEMENT CONSTRUCTION

Areas to be paved should be thoroughly proof-rolled and compacted to a minimum of 98% of the soil's maximum dry density, as determined by ASTM D698 or a minimum of 95% of the soil's maximum dry density, as determined by ASTM D1557 prior to the placement of subbase materials. The extent and magnitude of undercutting, if required, should be determined in the field by Advantage during proof-rolling of the site.

Proper drainage will be an important consideration for the overall performance of the pavement. We have assumed that proper grading to provide suitable runoff from the pavement surface and beyond the limits of the paved areas will be provided.



We recommend that the subbase be placed as soon as possible after the subgrade has been approved. The pavement sections should also be placed as soon as possible after the subbase has been tested and approved. These recommendations are provided to help prevent the subgrade and the subbase from being disturbed by weather and construction traffic. It will also help reduce the potential for the subbase from becoming contaminated with soil.

Minor cracking in pavement sections occurs with age. If water is allowed to pond on the pavement surface, seepage of water into the subbase material and subsequent freeze-thaw action may weaken the subgrade, which can enhance degradation of the pavement section. Proper will be critical to maintain its serviceability over the design life of the pavement.

The pavement construction recommendations do not consider "staged" construction, where construction traffic "runs" on the base/binder course and the final wearing surface is placed near project completion. Construction traffic running on the base course will over time result in premature base course failure. Depending upon the magnitude of traffic and time of year, substantial remedial work may be necessary prior to wearing course placement.

## **9.7 SLAB CONSTRUCTION**

Prior to the placement of granular subbase materials, Advantage should review slab subgrade conditions prior to grade slab construction and provide recommendations for any unsuitable or unstable conditions identified. The subgrade should be proof-rolled with a loaded dump truck or by other approved methods to detect any excessively yielding subgrade conditions.

Depending upon grading requirements and seasonal conditions, it is likely that slab subgrades in some areas will be wet, soft or yielding at the time of construction. If at the time of construction the slab subgrade is found to be excessively wet, soft or yielding, it may be possible to stabilize the subgrade soils by discing, aerating and re-compacting. However, if it is not possible to improve the subgrade soils in this manner because of weather conditions, scheduling or other conditions other means of stabilization may be required. The preferred method for stabilizing the slab subgrade should be determined in the field at the time of construction based upon the actual field conditions in conjunction with the specific soil type encountered at the locations requiring stabilization, the size of the areas requiring stabilization and the construction schedule.

## **10.0 CONSTRUCTION OBSERVATION AND TESTING**

At the time of this report, Advantage Engineers is the Geotechnical Engineer of Record for this project. Regardless of the thoroughness of a geotechnical engineering exploration, there is always a possibility that conditions between the test locations and below the depths explored may be different from those encountered, that conditions are not as anticipated by the designers, or that the construction process has altered the subsurface conditions. We should be retained to provide foundation inspection and materials testing and observation services during construction to ensure continuation of geotechnical interpretation and to verify that the recommendations prepared for geotechnical aspects of site development are adhered to during construction.

If an outside firm is selected to provide foundation inspection and/or construction materials testing and observation services for this project, the engaged firm should prepare a letter indicating their intent to assume the responsibility as Geotechnical Engineer of Record. The selected firm should also provide a written acknowledgement of their concurrence with the recommendations presented in our report or revised recommendations concerning the geotechnical aspects of the proposed development.

Additional soil and foundation engineering, testing, and consulting services recommended for this project are summarized below:



- **Review of Final Project Plans and Specifications:** As finalized project documents were not available at the time of this report, we recommend that Advantage be engaged to review the final project plans and specifications to ensure that our recommendations are appropriately incorporated into the project documents.
- **Special Inspections/Fill Placement and Compaction:** An experienced and appropriately-certified soils engineering technician should witness any required filling and wall backfilling operations and should perform sufficient in place density tests to verify that the specified degree of compaction is achieved. The technician should also evaluate borrow materials used and determine if their existing moisture contents are suitable.
- **Foundation Excavation Examination and Testing:** The Geotechnical Engineer or an experienced and appropriately-qualified soils engineering technician should examine all foundation excavations. Significant differences between field observations and our test boring records should be brought to the attention of the Owner's representative along with appropriate recommendations.

## 11.0 LIMITATIONS

This report has been prepared in accordance with generally accepted geotechnical design practices for specific application to this project. This report has been based on assumed conditions and characteristics of the proposed development where specific information was not available.

The conclusions and recommendations contained in this report are based upon the subsurface data obtained during this exploration and on details stated in this report. The validity of the projections, conclusions and recommendations contained in this report is necessarily limited by the scope of field exploration and by the number of test locations that were made. It is understood that the number of test locations made are consistent with good engineering practice but, given the nature of subsurface conditions, there is a possibility that actual conditions encountered may differ significantly from those projected in this report. Should conditions arise which differ from those described in this report, Advantage should be notified immediately and provided with all available information regarding subsurface conditions. Further, Advantage assumes no liability for interpolation of data between the specific test boring locations discussed herein. For bidding purposes, the contractors should be responsible for making their own interpretation of the data found within this report.

Our recommendations are based upon the assumption that the services of Advantage will be retained for the observation of the proof-rolling procedures, structural fill placement, foundation subgrade review, and all critical earthwork operations. Advantage has the capability of providing these services and would be pleased to present a proposal to do the on-site quality control observation.

The subject property is underlain by a carbonate lithology which carries with it the potential for sinkhole development. The Owner must evaluate this risk and come to their own conclusion regarding their tolerance for risk with regard to the impact of sinkholes on the planned construction. Advantage makes no warranty or guarantee with regard to the development of sinkholes on the project site.

The scope of this exploration was limited to the evaluation of the load-carrying capabilities and load stability of the subsoils. Oil, hazardous waste, radioactivity, irritants, pollutants, radon or other dangerous substances and conditions were not the subject of this study. Their presence and/or absence are not implied, inferred or suggested by this report or results of this study.



# APPENDIX

FIGURE 1 – TOPOGRAPHIC MAP

FIGURE 2 – GEOLOGIC MAP

FIGURE 3 – EXPLORATION PLAN

FIGURE 4 – TEST BORING & AUGER PROBE PROFILES

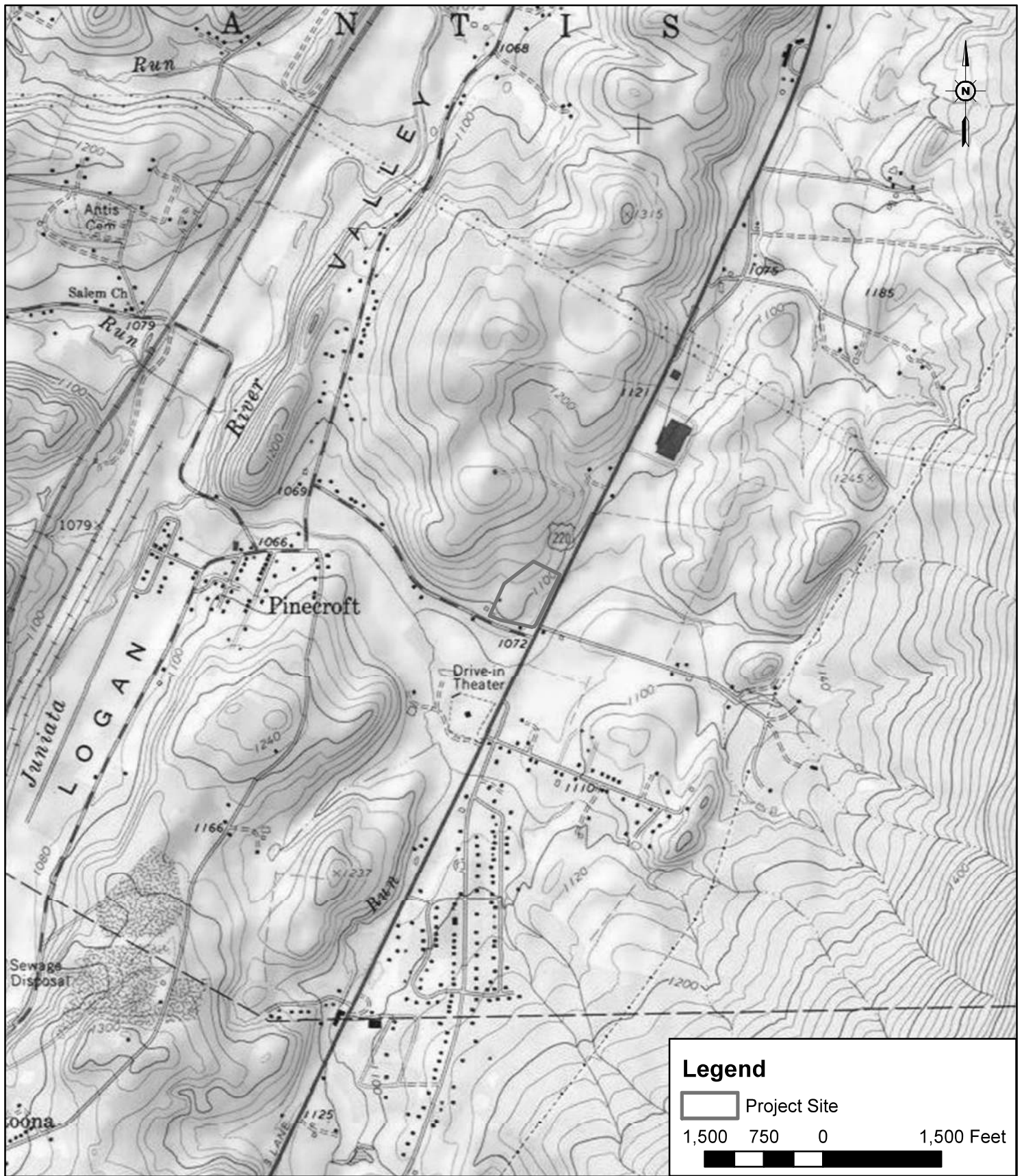
FIGURES 5 – TEST BORING PROFILES

LABORATORY TEST RESULTS

TEST BORING LOGS

TEST PIT LOGS



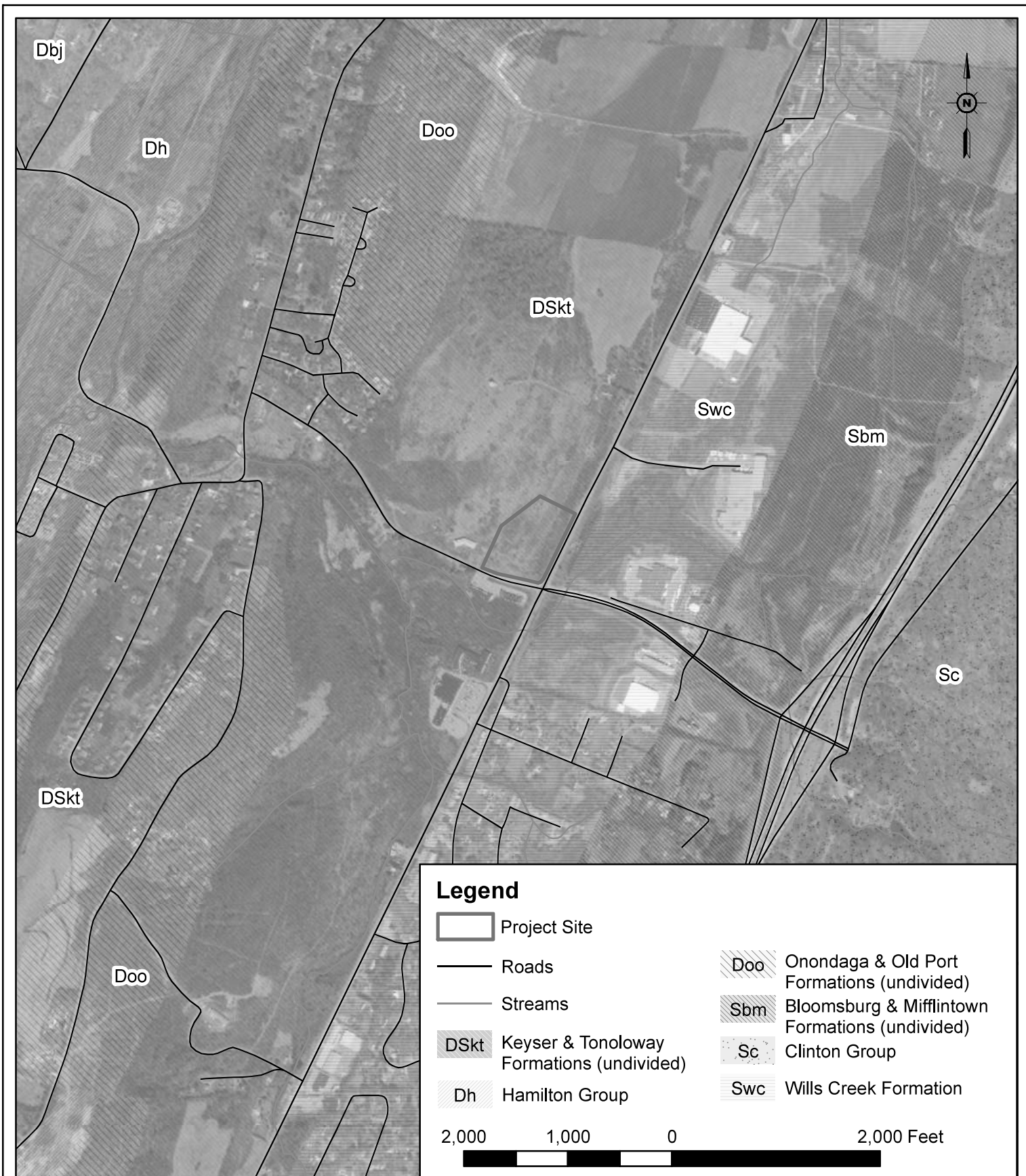


Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed

SCALE: AS SHOWN	DRAWING NUMBER: FIGURE 1
DRAWN BY: B. WILDASIN	CHECKED BY: K. BARNHART
APPROVED BY: M. GIUNTA	DATE: 10-11-2018

**TOPOGRAPHIC MAP**  
 PREPARED FOR  
**RUTTER'S STORE #82**  
 ANTIS TOWNSHIP      BLAIR COUNTY      PENNSYLVANIA

**advantage engineers**  
 435 INDEPENDENCE AVE., SUITE C  
 MECHANICSBURG, PA 17055  
 PH (717) 458-0800  
 FAX (717) 458-0801



\*Source - Map 61 - Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania, 1981, Pa Geological Survey

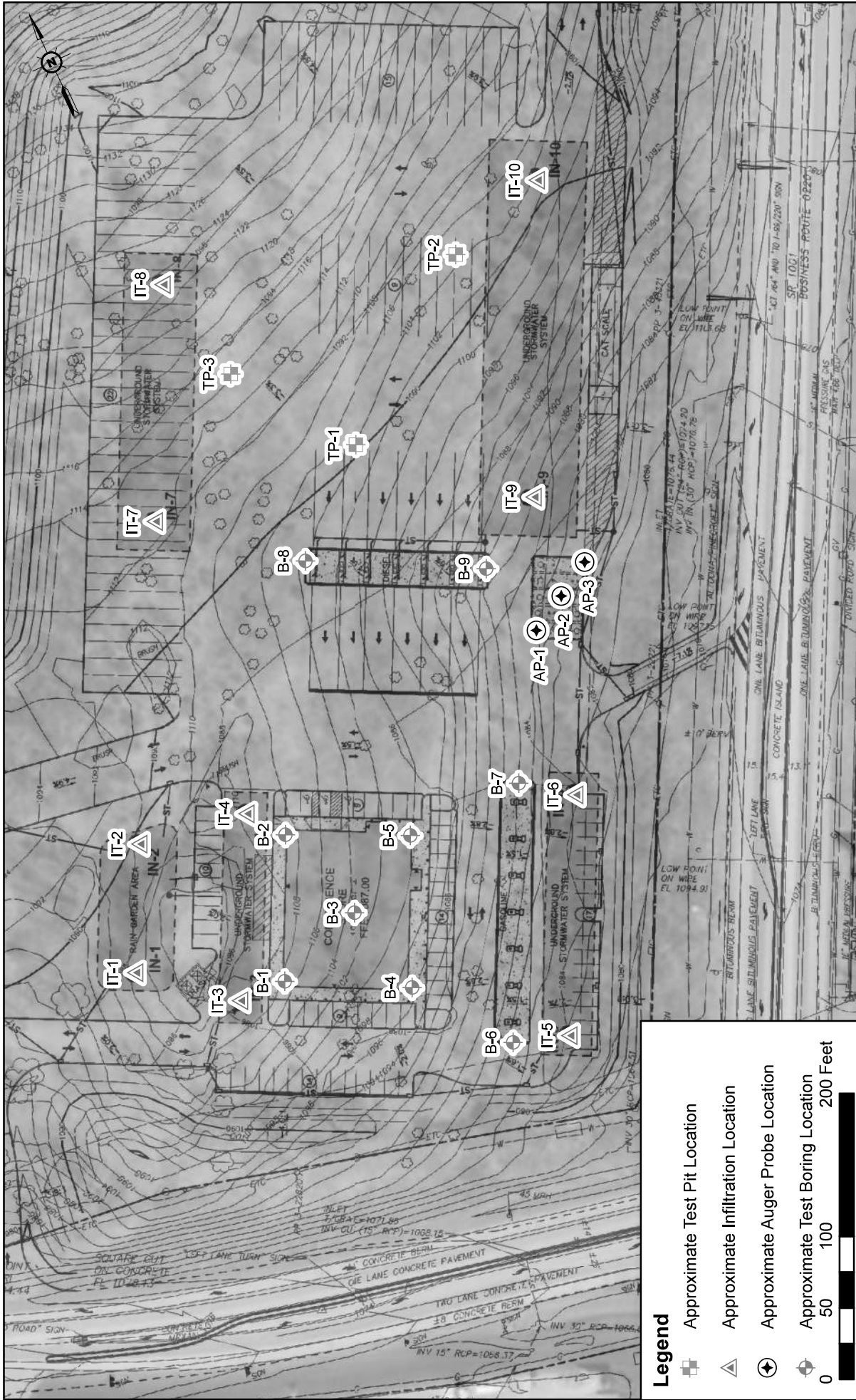
SCALE: AS SHOWN	DRAWING NUMBER: FIGURE 2
DRAWN BY: B. WILDASIN	CHECKED BY: K. BARNHART
APPROVED BY: M. GIUNTA	DATE: 10-11-2018

**GEOLOGIC MAP**  
PREPARED FOR  
**RUTTER'S STORE #82**

ANTIS TOWNSHIP      BLAIR COUNTY      PENNSYLVANIA

advantage engineers

435 INDEPENDENCE AVE., SUITE C  
MECHANICSBURG, PA 17055  
PH (717) 458-0800  
FAX (717) 458-0801



**Legend**

- Approximate Test Pit Location
  - Approximate Infiltration Location
  - Approximate Auger Probe Location
  - Approximate Test Boring Location
- 0 50 100 200 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community  
 Source: Infiltration Test Located Plan provided by H.F. Lenz Company, dated 09-18-2018

SCALE:	DRAWING NUMBER:
AS SHOWN	FIGURE 3
DRAWN BY:	CHECKED BY:
B. WILDASIN	K. BARNHART
APPROVED BY:	DATE:
M. GIUNTA	10-11-2018

**EXPLORATION PLAN**

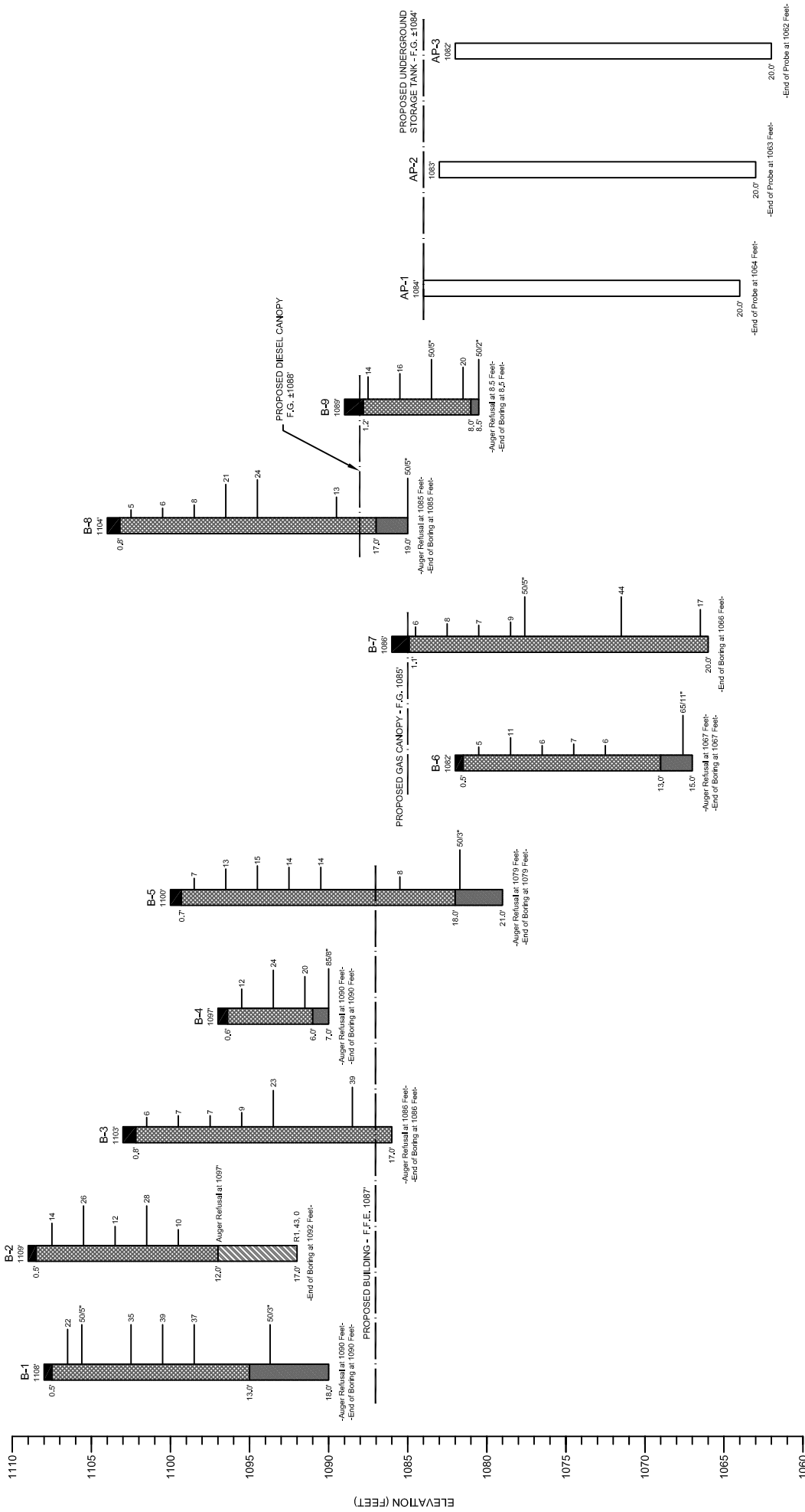
PREPARED FOR  
**RUTTER'S STORE #82**

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 MECHANICSBURG, PA 17055  
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 FAX (717) 458-0801

PENNSYLVANIA

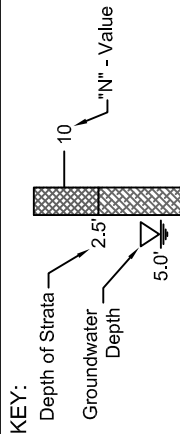
BLAIR COUNTY

ANTIS TOWNSHIP



**LEGEND**

- TOPSOIL
- STRATUM I ORANGE-BROWN TO BROWN TO GRAY SAND WITH VARYING AMOUNTS OF CLAY AND GRAVEL
- STRATUM II BROWN TO GRAY GRAVEL (WEATHERED ROCK)
- BEDROCK HIGHLY WEATHERED AND FRACTURED SHALE



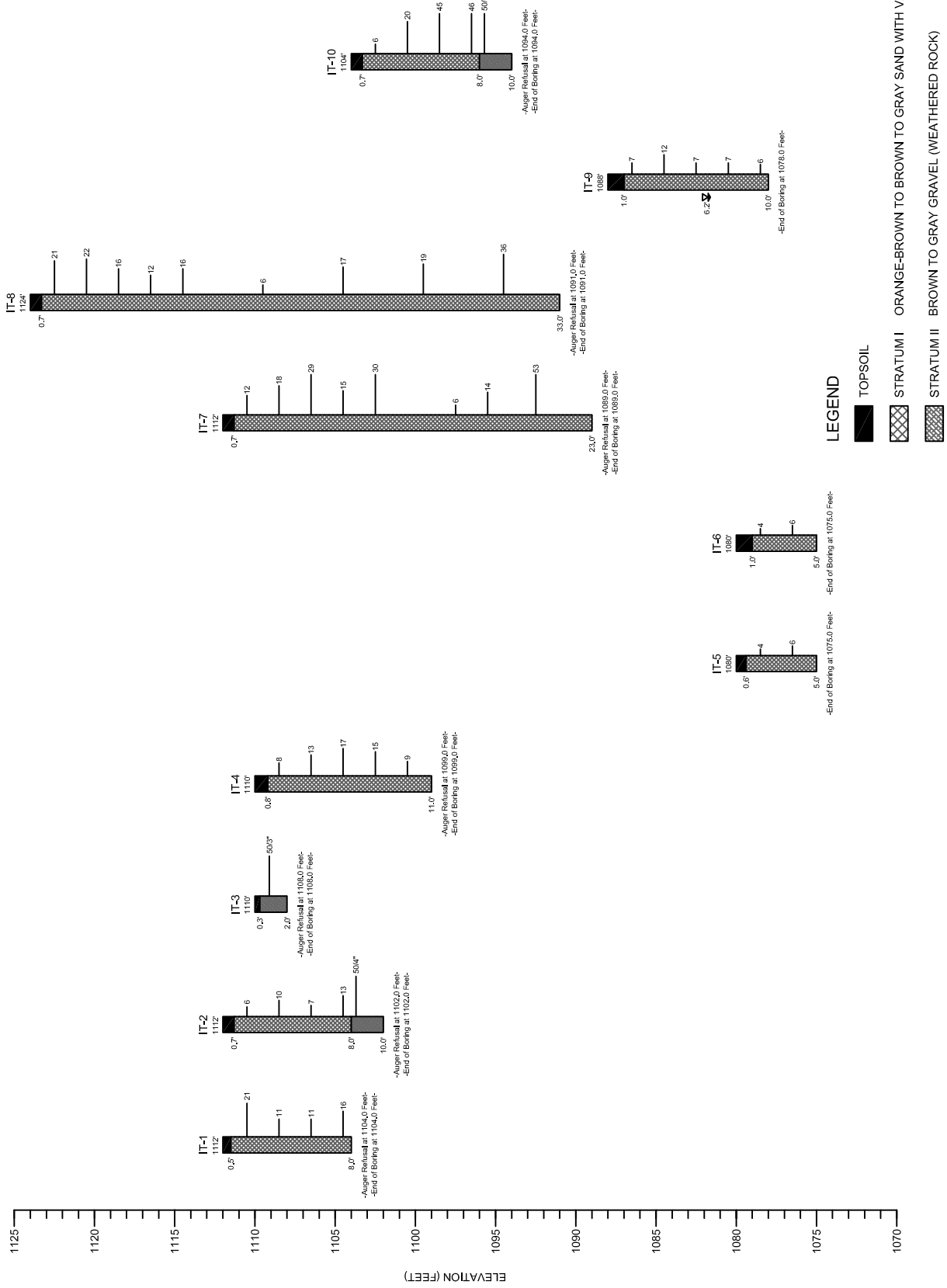
<b>SCALE:</b>	<b>DRAWING NUMBER:</b>
<b>AS SHOWN</b>	<b>FIGURE 4</b>
<b>DRAWN BY:</b>	<b>CHECKED BY:</b>
<b>B. MOSSER</b>	<b>J. TRIMBLE</b>
<b>APPROVED BY:</b>	<b>DATE:</b>
<b>M. GUINTA</b>	<b>11-9-2018</b>

**TEST BORING AND AUGER PROBE PROFILES**

PREPARED FOR  
**RUTTER'S STORE #82**



PROPOSED STORMWATER MANAGEMENT FACILITIES

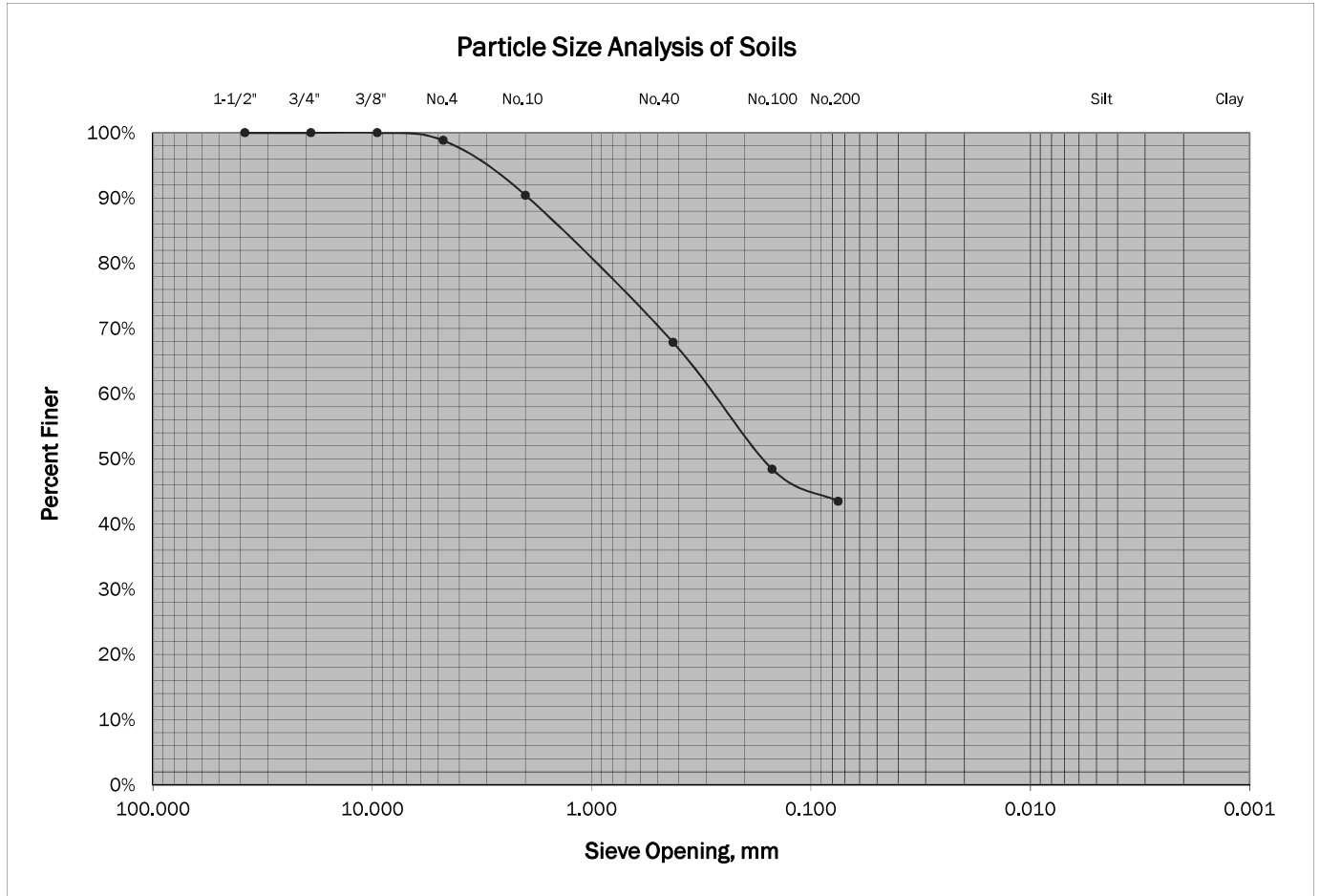


<b>advantage engineers</b> 435 INDEPENDENCE AVENUE, SUITE C, MECHANICSBURG, PENNSYLVANIA, 17055 PHONE (717) 458-0800 FAX (717) 458-0801	
<h2>TEST BORING PROFILES</h2> <p>PREPARED FOR</p> <h3>RUTTER'S STORE #82</h3>	
SCALE: AS SHOWN DRAWING NUMBER: <b>FIGURE 5</b>	ANTIS TOWNSHIP BLAIR COUNTY PENNSYLVANIA
DRAWN BY: <b>B. MOSSER</b>	CHECKED BY: <b>J. TRIMBLE</b>
APPROVED BY: <b>M. GIUNTA</b>	DATE: <b>11-9-2018</b>

**KEY:**

# Soil Classification Report

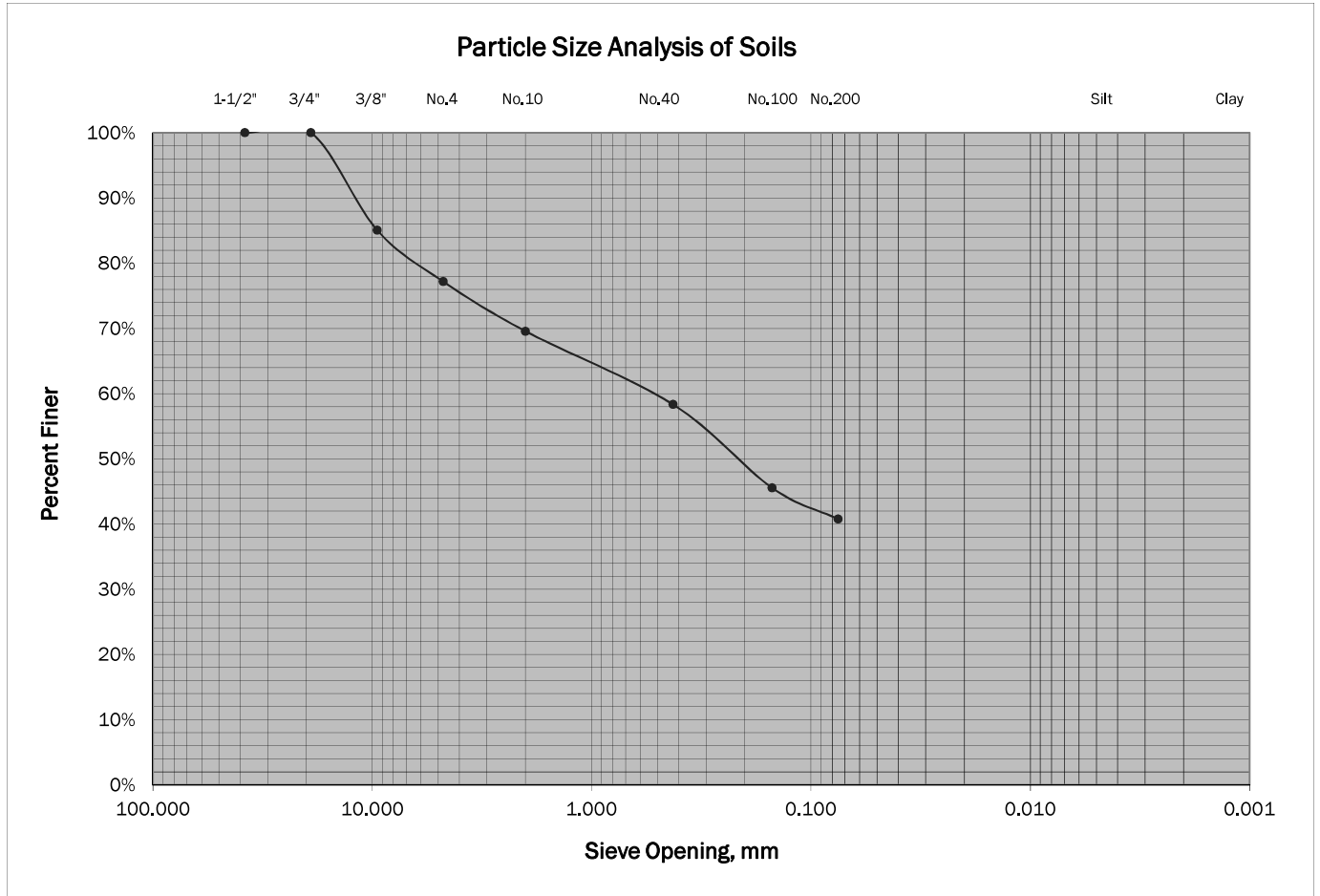
Per ASTM Designations D 2487 and D 2488



As-Received Moisture 18.7%		Particle Size Distribution							
USCS Classification: Clayey SAND (SC)		US Standard Sieve Size		Opening (mm)	%Finer				
Gravel: 1.2%	Coarse: 0.0%	Fine: 1.2%	GRAVEL	Coarse	1-1/2"	38.0	100.0%		
Sand: 55.3%	Coarse: 8.4%	Medium: 22.5%		Fine	3/4"	19.0	100.0%		
Fines: 43.5%	Silt:	Clay:		No. 4	4.75	98.8%			
Gravel Description: Subangular				No. 10	2.00	90.4%			
Sand Description: Subangular			SAND	Medium	No. 40	0.425	67.9%		
Consistency: Soft	Dry Strength: High			Fine	No. 100	0.150	48.4%		
Dilatancy: Slow	Toughness: Medium			No. 200	0.075	43.5%			
Structure: Homogeneous	Cementation: N/A			Hydrometer Analysis	Silt Size	0.005			
				Clay Size	0.001				
				D <sub>60</sub> :	D <sub>30</sub> :	D <sub>10</sub> :	Cu:	Cc:	
Boring: IT-6			Atterberg Limits		LL: 27	PL: 18	PI: 9		
Sample: S2/S3	Depth: 2'-5'			Description: Light brown to Brown Clayey SAND					
Project: Rutter's Store #82			Remarks: Stratum I						
Client: Rutter's									
Advantage Project Number: 1800941001			Report Date: November 9, 2018						

# Soil Classification Report

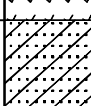

Per ASTM Designations D 2487 and D 2488



As-Received Moisture 17.4%		Particle Size Distribution					
<b>USCS Classification:</b> Clayey SAND with Gravel (SC)		US Standard Sieve Size		Opening (mm)	%Finer		
<b>Gravel:</b> 22.8%	<b>Coarse:</b> 0.0%	<b>Fine:</b> 22.8%	<b>GRAVEL</b>	Coarse	1-1/2"	38.0	100.0%
<b>Sand:</b> 36.4%	<b>Coarse:</b> 7.6%	<b>Medium:</b> 11.2%		<b>Fine:</b> 17.6%	3/4"	19.0	100.0%
<b>Fines:</b> 40.8%	<b>Silt:</b>	<b>Clay:</b>		3/8"	9.50	85.1%	
<b>Gravel Description:</b> Subangular				No. 4	4.75	77.2%	
<b>Sand Description:</b> Subangular			<b>SAND</b>	Coarse	No. 10	2.00	69.6%
<b>Consistency:</b> Firm	<b>Dry Strength:</b> Medium			Medium	No. 40	0.425	58.3%
<b>Dilatancy:</b> Slow	<b>Toughness:</b> Medium			Fine	No. 100	0.150	45.5%
<b>Structure:</b> Homogeneous	<b>Cementation:</b> N/A			No. 200	0.075	40.8%	
			Hydrometer Analysis	Silt Size	0.005		
				Clay Size	0.001		
			D <sub>60</sub> :	D <sub>30</sub> :	D <sub>10</sub> :	Cu:	Cc:
<b>Boring:</b> IT-9			<b>Atterberg Limits</b>	<b>LL:</b> 34	<b>PL:</b> 15	<b>PI:</b> 19	
<b>Sample:</b> S2/S3	<b>Depth:</b> 6'-10'	<b>Description:</b> Light brown to Brown Clayey SAND with Gravel					
<b>Project:</b> Rutter's Store #82	<b>Remarks:</b> Stratum I						
<b>Client:</b> Rutter's							
<b>Advantage Project Number:</b> 1800941001	<b>Report Date:</b> November 9, 2018						

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble

Surface Elevation: 1108  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1108	S-1	0.0 - 2.0	6-12-10-11	22	92				6" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 2.4	50/5"	50/5"	100				0.5'-13.0' Medium dense to very dense orange-brown to gray Clayey SAND with varying amounts of Gravel	
1104	S-3	4.0 - 6.0	5-15-20-25	35	79	4				
	S-4	6.0 - 8.0	14-18-21-17	39	83	8	SC			
1100	S-5	8.0 - 10.0	15-17-20-15	37	50					
1096						12				
	S-6	13.0 - 13.3	50/3"	50/3"	0				13.0'-18.0' Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum I</b>
1092						16	GW/GP			
1088						20				
1084						24				
1080						28				
1076						32				
									-Auger Refusal at 18 Feet- -End of Boring at 18 Feet-	

Notes: N/E: Not encountered



Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble

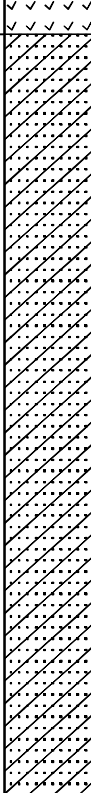
 Surface Elevation: 1109  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1108	S-1	0.0 - 2.0	2-5-9-10	14	83			▽▽▽▽	6" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	13-15-11-13	26	58	4		▽▽▽▽	0.5'-12.0' Loose to medium dense orange-brown Clayey SAND	
1104	S-3	4.0 - 6.0	3-7-5-13	12	92			▽▽▽▽		
	S-4	6.0 - 8.0	20-17-11-14	28	58	8	SC	▽▽▽▽		
1100	S-5	8.0 - 10.0	6-6-4-4	10	50			▽▽▽▽		
						12		▽▽▽▽		
1096	R-1	12.0 - 17.0		43		16	Rock	▬▬▬▬	12.0'-17.0' -Auger Refusal at 12 Feet-  Highly fractured and weathered SHALE	<b>Stratum I</b>  R-1 REC: 43% RQD: 0%
1092						20		▬▬▬▬		<b>Bedrock</b>
1088						24		▬▬▬▬		
1084						28		▬▬▬▬		
1080						32		▬▬▬▬		
1076								▬▬▬▬		
<b>-End of Boring at 17 Feet-</b>										

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble

Surface Elevation: 1103  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1100	S-1	0.0 - 2.0	2-3-3-3	6	67	4	SC		9" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	3-4-3-4	7	75			0.8'-17.0' Very loose to loose orange-brown Clayey SAND		
	S-3	4.0 - 6.0	3-3-4-7	7	75					
1096	S-4	6.0 - 8.0	4-4-5-5	9	83	8		Medium dense to dense gray Clayey SAND		
	S-5	8.0 - 10.0	3-11-12-12	23	67					
1092						12				
1088	S-6	13.0 - 14.9	3-19-20-50/5"	39	74	16				
						20				
1084						24		<b>-Auger Refusal at 17 Feet- -End of Boring at 17 Feet-</b>		
1080						28				
1076						32				
1072										
1068										

Notes: N/E: Not encountered


Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble

Surface Elevation: 1097  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1096	S-1	0.0 - 2.0	2-5-7-9	12	88			✓✓✓✓✓	7" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	13-13-11-11	24	79	4	SC	/ / / / /	0.6'-6.0' Medium dense orange-brown to gray Clayey SAND with varying amounts of Gravel	
1092	S-3	4.0 - 6.0	9-10-10-12	20	50			/ / / / /		<b>Stratum I</b>
	S-4	6.0 - 7.2	12-35-50/2"	85/8"	71		GW/GP	● ● ● ● ●	6.0'-7.0' Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum II</b>
1088						8			<b>-Auger Refusal at 7 Feet-</b> <b>-End of Boring at 7 Feet-</b>	
						12				
1084						16				
						20				
1080						24				
						28				
1076						32				
1072										
1068										
1064										

Notes: N/E: Not encountered


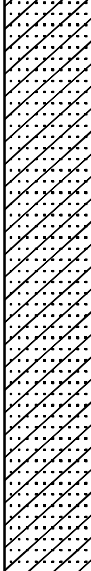

Project Name: <u>Rutter's Store #82</u>	Surface Elevation: <u>1100</u>
Project Number: <u>1800941001</u>	Topo Estimate: <input checked="" type="checkbox"/> Field Surveyed: <input type="checkbox"/>
Client: <u>Rutter's</u>	Water: Depth: <u>N/E</u> Time: <u>   </u> Date: <u>   </u>
Drilling Method: <u>HSA</u> Rig Type: <u>CME-45</u> Hammer Type: <u>Automatic</u>	Depth: <u>   </u> Time: <u>   </u> Date: <u>   </u>
Date Drilled: <u>11/8/2018</u> Logged By: <u>B. Mosser</u> Checked By: <u>J. Trimble</u>	Cave-In Depth: <u>   </u>

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1100	S-1	0.0 - 2.0	2-3-4-5	7	67			✓✓✓✓✓	8" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	6-7-6-8	13	58	4		SC	Loose to medium dense orange-brown to gray Clayey SAND with varying amounts of Gravel	
1096	S-3	4.0 - 6.0	3-6-9-6	15	42					
	S-4	6.0 - 8.0	5-7-7-7	14	33	8				
1092	S-5	8.0 - 10.0	5-7-7-11	14	75					
						12				
1088	S-6	13.0 - 15.0	3-4-4-5	8	67					
						16				
1084	S-7	18.0 - 18.3	50/3"	50/3"	100			18.0'-21.0'	Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum I</b>
1080						20	GW/GP		-Auger Refusal at 21 Feet- -End of Boring at 21 Feet-	<b>Stratum II</b>
						24				
1076						28				
						32				
1072										
1068										

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/7/2018 Logged By: B. Mosser Checked By: J. Trimble

 Surface Elevation: 1082  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1080	S-1	0.0 - 2.0	2-3-2-3	5	58				6" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	5-6-5-6	11	92	4		SC 	0.5'-13.0' Very loose to medium dense brown Clayey SAND with varying amounts of Gravel	
	S-3	4.0 - 6.0	2-3-3-3	6	100					
1076	S-4	6.0 - 8.0	4-4-3-3	7	58	8				
	S-5	8.0 - 10.0	4-3-3-4	6	58					
1072						12				
1068	S-6	13.0 - 14.4	3-15-50/5"	65/11"	94		GW/GP		13.0'-15.0' Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum I</b>
						16			<b>-Auger Refusal at 15 Feet- -End of Boring at 15 Feet-</b>	
1064						20				
						24				
1060						28				
1056						32				
1052										
1048										

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/4/2018 Logged By: B. Mosser Checked By: J. Trimble





















































 Surface Elevation: 1086  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1084	S-1	0.0 - 2.0	2-3-3-5	6	75			✓✓✓✓✓	13" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	4-4-4-5	8	50	4		✓✓✓✓✓	1.1'-20.0' Very loose to loose orange-brown Clayey SAND with varying amounts of Gravel	
	S-3	4.0 - 6.0	2-3-4-7	7	58			✓✓✓✓✓		
1080	S-4	6.0 - 8.0	3-2-7-9	9	58	8		✓✓✓✓✓	Dense to very dense orange-brown Clayey SAND with varying amounts of Gravel	
	S-5	8.0 - 8.4	50/5"	50/5"	20			✓✓✓✓✓		
1076						12	SC	✓✓✓✓✓		
1072	S-6	13.0 - 15.0	12-22-22-26	44	17			✓✓✓✓✓	Medium dense orange-brown Clayey SAND with varying amounts of Gravel	
						16		✓✓✓✓✓		
1068	S-7	18.0 - 20.0	7-8-9-9	17	67	20		✓✓✓✓✓		<b>Stratum I</b>
1064						24		✓✓✓✓✓	<b>-End of Boring at 20 Feet-</b>	
1060						28		✓✓✓✓✓		
1056						32		✓✓✓✓✓		
1052								✓✓✓✓✓		

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/4/2018 Logged By: B. Mosser Checked By: J. Trimble






Surface Elevation: 1104  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1104	S-1	0.0 - 2.0	2-2-3-5	5	75				10" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	2-3-3-4	6	83	4			0.8'-17.0' Very loose to medium dense orange-brown Clayey SAND with varying amounts of Gravel	
1100	S-3	4.0 - 6.0	2-3-5-11	8	67					
	S-4	6.0 - 8.0	7-10-11-10	21	0	8				
1096	S-5	8.0 - 10.0	10-10-14-26	24	75		SC			
						12				
1092	S-6	13.0 - 15.0	6-6-7-11	13	50					
						16				
1088										
										
	S-7	18.0 - 18.9	11-50/5"	50/5"	100		GW/GP		17.0'-19.0' Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum I</b>
						20				
1084										
						24				
1080										
						28				
1076										
						32				
1072										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										
										

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/4/2018 Logged By: B. Mosser Checked By: J. Trimble

 Surface Elevation: 1089  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

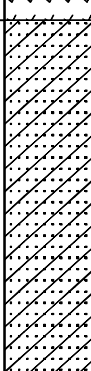
Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1088	S-1	0.0 - 2.0	5-7-7-12	14	75				14" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	5-7-9-11	16	83				1.2'-8.0' Medium dense brown to orange-brown Clayey SAND with varying amounts of Gravel	
1084	S-3	4.0 - 4.9	3-50/5"	50/5"	100	4	SC			
	S-4	6.0 - 8.0	5-9-11-12	20	75	8				
1080	S-5	8.0 - 8.2	50/2"	50/2"	100	8	GW/GP		8.0'-8.5' Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum I</b> <b>Stratum II</b>
						12				
1076										
						16				
1072										
						20				
1068										
						24				
1064										
						28				
1060										
						32				
1056										

Notes: N/E: Not encountered



Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble






 Surface Elevation: 1112  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks	
1112	S-1	0.0 - 2.0	2-5-16-18	21	50	4	SC		6" Topsoil	<b>Topsoil</b>	
	S-2	2.0 - 4.0	4-5-6-8	11	50				0.5'-8.0'		Medium dense orange-brown Clayey SAND with varying amounts of Gravel
1108	S-3	4.0 - 6.0	4-5-6-8	11	67						
	S-4	6.0 - 8.0	15-9-7-4	16	58						
1104						8			<b>-Auger Refusal at 8 Feet- -End of Boring at 8 Feet-</b>	<b>Stratum I</b>	
1100						12					
1096						16					
1092						20					
1088						24					
1084						28					
1080						32					

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble



Surface Elevation: 1112  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1112	S-1	0.0 - 2.0	2-3-3-4	6	50	4	SC		8" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	5-5-5-5	10	50				0.7'-8.0' Loose to medium dense orange-brown Clayey SAND with varying amounts of Gravel	
1108	S-3	4.0 - 6.0	2-3-4-7	7	83					
	S-4	6.0 - 8.0	11-7-6-15	13	67					
1104	S-5	8.0 - 8.3	50/4"	50/4"	100	8	GW/GP		8.0'-10.0' Very dense brown to gray GRAVEL (weathered rock)	
						12			<b>Stratum II</b>	
1100						16			-Auger Refusal at 10 Feet- -End of Boring at 10 Feet-	
1096						20				
1092						24				
1088						28				
1084						32				
1080										

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble


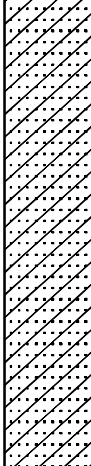
Surface Elevation: 1110  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
	S-1	0.0 - 0.8	6-50/3"	50/3"	67				3" Topsoil	<b>Topsoil</b>
1108							GW/GP		0.3'-2.0' Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum II</b>
						4			<b>-Auger Refusal at 2 Feet- -End of Boring at 2 Feet-</b>	Boring was offset 5 feet; refusal at 1'. Bedrock at surface near boring. No perc test conducted.
1104					8					
1100					12					
1096					16					
1092					20					
1088					24					
1084					28					
1080					32					
1076										

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/8/2018 Logged By: B. Mosser Checked By: J. Trimble


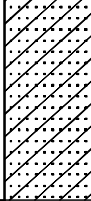
Surface Elevation: 1110  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1108	S-1	0.0 - 2.0	2-3-5-6	8	75				9" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	5-6-7-7	13	50	4	SC		0.8'-11.0' Loose to medium dense brown Clayey SAND with varying amounts of Gravel	
1104	S-3	4.0 - 6.0	2-7-10-8	17	83	8				
	S-4	6.0 - 8.0	8-8-7-6	15	50					
1100	S-5	8.0 - 10.0	6-5-4-4	9	13					
						12				
1096						16				
1092						20				
1088						24				
1084						28				
1080						32				
1076										

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/7/2018 Logged By: B. Mosser Checked By: J. Trimble

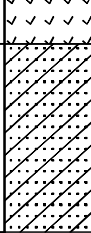
Surface Elevation: 1080  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1080	S-1	0.0 - 2.0	2-2-2-4	4	92				7" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	2-2-4-4	6	100	4	SC		0.6'-5.0' Very loose to loose brown Clayey SAND	
1076	S-3	4.0 - 5.0	6-5		100					<b>Stratum I</b>
									<b>-End of Boring at 5 Feet-</b>	
1072						8				
1068						12				
1064						16				
1060						20				
1056						24				
1052						28				
1048						32				

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/4/2018 Logged By: B. Mosser Checked By: B. Mosser

Surface Elevation: 1080  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1080	S-1	0.0 - 2.0	1-2-2-2	4	75	4	SC		12" Topsoil	<b>Topsoil</b>
		2.0 - 4.0	2-3-3-2	6	100				1.0'-5.0' Very loose to loose orange-brown Clayey SAND	
1076	S-3	4.0 - 5.0	4-3		100				<b>Stratum I</b>	
									<b>-End of Boring at 5 Feet-</b>	
1072						8				
1068						12				
1064						16				
1060						20				
1056						24				
1052						28				
1048						32				

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/7/2018 Logged By: B. Mosser Checked By: J. Trimble

 Surface Elevation: 1112  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1112	S-1	0.0 - 2.0	2-7-5-11	12	50			✓✓✓✓✓	8" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	7-9-9-10	18	75	4		/ / / / /	0.7'-23.0' Medium dense orange-brown to gray Clayey SAND with varying amounts of Gravel	
1108	S-3	4.0 - 6.0	2-15-14-13	29	92			/ / / / /		
	S-4	6.0 - 8.0	8-6-9-13	15	50	8		/ / / / /		
1104	S-5	8.0 - 10.0	7-15-15-20	30	54			/ / / / /		
						12	SC	/ / / / /		
1100	S-6	13.0 - 15.0	2-3-3-2	6	25			/ / / / /	Loose orange-brown to gray Clayey SAND with varying amounts of Gravel	
						16		/ / / / /	Medium dense orange-brown to gray Clayey SAND with varying amounts of Gravel	
1096	S-7	15.0 - 17.0	1-5-9-9	14	17			/ / / / /		
						20		/ / / / /	Very dense orange-brown to gray Clayey SAND with varying amounts of Gravel	
1092	S-8	18.0 - 20.0	15-20-33-99	53	88			/ / / / /		
						24		/ / / / /		<b>Stratum I</b>
1088								/ / / / /	<b>-Auger Refusal at 23 Feet- -End of Boring at 23 Feet-</b>	
						28		/ / / / /		
1084								/ / / / /		
						32		/ / / / /		
1080								/ / / / /		

Notes: N/E: Not encountered

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/7/2018 Logged By: B. Mosser Checked By: J. Trimble

Surface Elevation: 1124  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    






Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1124	S-1	0.0 - 2.0	7-9-12-18	21	58			✓✓✓✓✓	8" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	12-12-10-11	22	71	4		SC	0.7'-33.0' Medium dense orange-brown Clayey SAND with varying amounts of Gravel	
1120	S-3	4.0 - 6.0	8-8-8-11	16	75	8				
	S-4	6.0 - 8.0	9-8-4-2	12	25	12				
1116	S-5	8.0 - 10.0	3-7-9-11	16	50	16				
						20				
1112	S-6	13.0 - 15.0	5-2-4-8	6	54	24				
						28				
1108	S-7	18.0 - 20.0	2-6-11-17	17	50	32				
1104	S-8	23.0 - 25.0	2-7-12-8	19	83					
1096	S-9	28.0 - 30.0	28-27-9-8	36	63					
1092								<b>Stratum I</b>		
<b>-Auger Refusal at 33 Feet- -End of Boring at 33 Feet-</b>										

Notes: N/E: Not encountered



Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/4/2018 Logged By: B. Mosser Checked By: B. Mosser


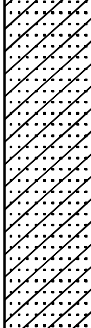

Surface Elevation: 1088  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: 6.5' Time: 24 Date: 11/5/18  
 Depth: 6.2' Time: 72 Date: 11/7/18  
 Cave-In Depth: \_\_\_\_\_

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1088	S-1	0.0 - 2.0	2-3-4-4	7	75				12" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	5-6-6-8	12	75				1.0'-10.0' Loose to medium dense orange-brown Clayey SAND with varying amounts of Gravel	
1084	S-3	4.0 - 6.0	2-3-4-2	7	58	4	SC			H2O @ 6.2'
	S-4	6.0 - 8.0	3-3-4-4	7	58					
1080	S-5	8.0 - 10.0	5-3-3-3	6	58	8				<b>Stratum I</b>
									<b>-End of Boring at 10 Feet-</b>	
1076						12				
1072						16				
1068						20				
1064						24				
1060						28				
1056						32				

Notes:

Project Name: Rutter's Store #82  
 Project Number: 1800941001  
 Client: Rutter's  
 Drilling Method: HSA Rig Type: CME-45 Hammer Type: Automatic  
 Date Drilled: 11/7/2018 Logged By: B. Mosser Checked By: J. Trimble

Surface Elevation: 1104  
 Topo Estimate:  Field Surveyed:   
 Water: Depth: N/E Time:     Date:      
 Depth:     Time:     Date:      
 Cave-In Depth:    

Elevation (feet)	Sample Number	Sample Depth (feet)	Blow Counts	N-Value	Percent Recovery	Depth (feet)	USCS Group Symbol	Graphic Log	Soil Description	Remarks
1104	S-1	0.0 - 2.0	2-3-3-4	6	50				8" Topsoil	<b>Topsoil</b>
	S-2	2.0 - 4.0	6-8-12-12	20	50	4			0.7'-8.0' Loose to medium dense brown to gray Clayey SAND with varying amounts of Gravel	
1100	S-3	4.0 - 6.0	7-19-26-32	45	75	8	SC		Dense brown to gray Clayey SAND with varying amounts of Gravel	
	S-4	6.0 - 8.0	12-21-25-33	46	83					
1096	S-5	8.0 - 8.3	50/3"	50/3"	0		GW/GP		8.0'-10.0' Very dense brown to gray GRAVEL (weathered rock)	<b>Stratum I</b>
									<b>-Auger Refusal at 10 Feet- -End of Boring at 10 Feet-</b>	<b>Stratum II</b>
1092						12				
1088						16				
1084						20				
1080						24				
1076						28				
1072						32				

Notes: N/E: Not encountered

# TEST PIT LOG

PROJECT NAME: Rutter's Store #82

TEST PIT NO.: TP-1

PROJECT NUMBER: 1800941001

CLIENT: Rutter's

LOCATION: See: Exploration Plan (Figure 3)

E TOP OF GROUND: ±1104'

L GROUNDWATER DATA: Dry

V DEPTH: Not Encountered Time: Completion

FIELD SURVEYED

TOPO ESTIMATE

DEPTH (feet)	SOIL DESCRIPTION	REMARKS
	0.0' - 1.2' 14" Topsoil	<b>Topsoil</b>
	1.2' - 15.0' Orange-brown Sandy CLAY with Gravel	
5		
10	Orange-brown to gray Clayey SAND with Gravel; soil mottling	
15		<b>Stratum I</b>
	<b>-Extent of Equipment at 15 Feet-</b>	
	<b>-End of Test Pit at 15 Feet-</b>	
20		
25		
30		



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 www.advantageengineers.com

EXCAVATION METHOD: CAT 318B  
 ADVANTAGE REPRESENTATIVE: B. Mosser  
 DATE EXCAVATED: November 5, 2018  
 DRAWN/COMPILED BY: B. Mosser

# TEST PIT LOG

PROJECT NAME: Rutter's Store #82

TEST PIT NO.: TP-2

PROJECT NUMBER: 1800941001

CLIENT: Rutter's

LOCATION: See: Exploration Plan (Figure 3)

E TOP OF GROUND: ±1105'

L GROUNDWATER DATA: Dry

V DEPTH: Not Encountered Time: Completion

FIELD SURVEYED

TOPO ESTIMATE

DEPTH (feet)	SOIL DESCRIPTION	REMARKS
	0.0' - 1.0' 12" Topsoil	<b>Topsoil</b>
	1.0' - 6.0' Orange-brown Sandy CLAY with Gravel	
5		
	Orange-brown Clayey GRAVEL with Sand	<b>Stratum I</b>
	6.0' - 11.0' Brown to gray cobble- to boulder-sized rock fragments	
10		
		<b>Stratum II</b>
	<b>-Bucket Refusal at 11 Feet-</b>	
	<b>-End of Test Pit at 11 Feet-</b>	
15		
20		
25		
30		



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EXCAVATION METHOD: CAT 318B  
 ADVANTAGE REPRESENTATIVE: B. Mosser  
 DATE EXCAVATED: November 5, 2018  
 DRAWN/COMPILED BY: B. Mosser

# TEST PIT LOG

PROJECT NAME: Rutter's Store #82

TEST PIT NO.: TP-3

PROJECT NUMBER: 1800941001

CLIENT: Rutter's

LOCATION: See: Exploration Plan (Figure 3)

E TOP OF GROUND: ±1114'

L GROUNDWATER DATA: Dry

E  
V DEPTH: Not Encountered Time: Completion

FIELD SURVEYED

TOPO ESTIMATE

DEPTH (feet)	SOIL DESCRIPTION	REMARKS
	0.0' - 1.0' 12" Topsoil	<b>Topsoil</b>
	1.0' - 5.0' Orange-brown Sandy CLAY with Gravel	
5	Orange-brown Clayey GRAVEL with Sand	<b>Stratum I</b>
	5.0' - 10.5' Brown to gray cobble- to boulder-sized rock fragments	
10		<b>Stratum II</b>
	<b>-Bucket Refusal at 10.5 Feet- -End of Test Pit at 10.5 Feet-</b>	
15		
20		
25		
30		



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EXCAVATION METHOD: CAT 318B  
 ADVANTAGE REPRESENTATIVE: B. Mosser  
 DATE EXCAVATED: November 5, 2018  
 DRAWN/COMPILED BY: B. Mosser