



REPORT OF
SUBSURFACE EXPLORATION, FIELD INFILTRATION TESTING AND
GEOTECHNICAL ENGINEERING ANALYSIS
HAMPTON INN & SUITES
BAIR BOULEVARD
NEW STANTON BOROUGH, WESTMORELAND COUNTY, PENNSYLVANIA

FOR

RED SWING GROUP

ECS PROJECT NO. 40:1547

JANUARY 19, 2016



January 19, 2016

Mr. Robert McCollim, P.E.
Red Swing Group
4154 Old William Penn Highway
Suite 300
Murrysville, Pennsylvania 15668

ECS Project No. 40:1547

Reference: Report of Subsurface Exploration, Field Infiltration Testing and Geotechnical Engineering Services, Hampton Inn & Suites, Bair Boulevard, New Stanton Borough, Westmoreland County, Pennsylvania

Dear Mr. McCollim:

As authorized by the acceptance of ECS Mid-Atlantic, LLC (ECS) Proposal No. 40:0901-GP, dated November 3, 2015, we have completed the subsurface exploration, field infiltration testing, and geotechnical engineering analysis for the above-referenced project in Westmoreland County, Pennsylvania.

The enclosed report discusses the subsurface exploration procedures, presents the results of our subsurface exploration and laboratory testing programs, and presents our recommendations for the design and construction of the proposed structure and associated site work. Additional information with regard to construction considerations, estimated settlement, as well as other factors which may influence construction at the site, are discussed in detail in the accompanying report.

We have enjoyed being of service to Red Swing Group on this project. If you have any questions with regard to the information and recommendations presented in the accompanying report, or if we may be of further assistance to you, please do not hesitate to contact us.

Respectfully,

ECS MID-ATLANTIC, LLC

Ian F. Johnson
Staff Geologist



Jeffrey A. Shelton, P.E., LEED® AP
Branch Manager/Principal Engineer

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REPORT

PROJECT

Subsurface Exploration, Field Infiltration Testing and
Geotechnical Engineering Analysis
Hampton Inn & Suites
New Stanton Borough, Westmoreland County, Pennsylvania

CLIENT

Red Swing Group
4154 Old William Penn Highway
Suite 300
Murrysville, Pennsylvania 15668

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| PROJECT No. | 40:1547 |
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| DATE | January 19, 2016 |
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PROJECT OVERVIEW

Introduction

This report presents the results of our subsurface exploration and geotechnical engineering analysis for the project site located along the northern side of Bair Boulevard, south of Broadview Road, in New Stanton Borough, Westmoreland County, Pennsylvania. The approximate location of the site is indicated on the Site Vicinity Map (sheet 1 of 6) included in the Appendix of this report. Authorization to perform this work was provided by acceptance of ECS Proposal No. 40:0901-GP, dated November 3, 2015.

Project Description

Site Location

The project site is located along the northern side of Bair Boulevard, generally in the southwestern quadrant of the intersection of Broadview Road and N. Center Avenue in New Stanton Borough, Pennsylvania. The site is bordered by an existing Comfort Inn and Suites to the south and the Borough of New Stanton Municipal building to the east. The site is comprised of two parcels, with the largest roughly L-shaped parcel to the south, and a single smaller parcel extending from the larger parcel north to Broadview Road. The site is situated with the long axis parallel to Bair Boulevard.

The majority of the site is currently moderately wooded and covered with surface vegetation, with the majority of the trees within the eastern and central portions of the site. The site is currently vacant, with the exception of a single residential structure in the smaller parcel. Based on the existing topographic information provided on the *Grading Plan* (Sheet C3.1 dated October 15, 2014) prepared and provided by the client, the site is atop a small hill, with an uphill gradient from the eastern portion of the site, and a downhill gradient towards the southwest from the central portion of the site.

Proposed Construction

The proposed development consists of a 3-story, rectangular shaped hotel building, a detached single story restaurant, and surrounding at grade parking and drive aisle areas. The proposed hotel building will be located in the central portion of the site, with the proposed restaurant building located in the proposed northwestern parking lot. The proposed hotel coincides with a wooded portion of the site, while the proposed restaurant will be within a cleared area. The proposed development will also include the construction of surrounding infrastructure, including drive aisles and at-grade parking areas. Entrances to the site will be from both Broadview Road and Bair Boulevard.

Based on the information provided, each of the proposed buildings will have a lowest level finished floor elevation of around EL. 1023.5. The proposed restaurant will bear at-grade, while the hotel will have a lower level that is partially below grade along the northern (rear) building edge and a walk-out along the north (front) side.

The existing site grades across the hotel building footprint currently range from roughly EL.1032 to EL. 1021. Therefore, we expect that cuts of up to 8.5 feet and fills of up to 2.5 feet will be

required to establish the proposed hotel building pad subgrade. The majority of the hotel footprint will be developed through cuts into the existing soil profile. The new fill will generally be limited to the southwestern corner of the proposed building. The existing site grades across the restaurant building footprint range from roughly EL.1030 to EL. 1023. Therefore, we expect that cuts of up to 6.5 feet will be required to establish the proposed restaurant building pad subgrade. Fills on the order of 10 feet are expected along the southwest corner of the parking lot, with cuts on the order of 7 feet along the central and northern portions of the parking lot.

Specific structural loading information was not provided; however, we anticipate the building will be a combination of concrete masonry unit (CMU) and wood frame construction and will be relatively lightly loaded.

The development will also include three (3) proposed underground stormwater detention basins within the eastern and western parking lot areas. The proposed invert elevations of the underground detention basins range from EL. 1011.5 to EL. 1200.

Two (2) site retaining walls are depicted on the grading plan provided, with one located south of the proposed hotel building, in front of the entrance, and one in the southwestern portion of the parking lot. Top and bottom of wall elevations were not provided, however, they are expected to be on the order of 6 feet in height for the hotel entrance, and approximately 2 to 14 feet in height in the parking lot.

A relatively steep (~2H:1V) fill slope, leading downward from the proposed parking lot, is proposed along the southern edge of the site. The overall height of the slope will be on the order of 20 feet.

The description of the proposed project is based on the information provided by you and members of the project team. If any of this information is inaccurate, either due to our misunderstanding or design changes that may occur at a later date, we recommend that ECS be contacted in order to provide alternative recommendations that may be warranted.

Scope of Work

Based on the boring plan provided and our understanding of the project, our current study included a total of thirteen (13) borings, referenced as TB-1 through TB-13, for the proposed development. Our original scope consisted of twelve (12) borings; however, an additional boring was added in the field at the toe of the proposed 2H:1V slope, along the southern property limits, since the area was accessible to the drill rig.

Five (5) of the borings (TB-2 through TB-7) were performed within the proposed hotel building footprint. Two (2) borings (TB-11 and TB-12) were performed within the footprint of the proposed restaurant. Two (2) borings (TB-8 and TB-13) were performed at the proposed 2H:1V slope, with the remaining four (4) borings (TB-1, TB-5, TB-9 and TB-10) performed within proposed pavement areas. Borings TB-1, TB-9 and TB-10 also coincided with the locations of the proposed SWM basins, with TB-1 intended to be used for infiltration testing purposes. Due to the shallow depth to the infiltration test elevations, the test pits were excavated by hand at the remaining locations. Infiltration test locations IN-1, IN-2 and IN-3 correspond to boring locations TB-1, TB-10 and TB-9, respectively.

The building borings, as well as parking lot/retaining wall boring TB-5, were scheduled to extend to a depth of 20 feet below the existing ground surface or to auger refusal, whichever was encountered first. Each of the building borings encountered auger refusal on the underlying weathered bedrock at depths ranging from 11 to 14 feet below the existing ground surface, with TB-5 encountering auger refusal at a depth of 16.5 feet. At these depths, auger refusal was encountered below the anticipated foundation bearing and final site elevations and rock coring was not performed. The parking lot/slope borings were scheduled to extend to a depth of 10 feet. Each of these borings extended to the scheduled termination depth, with the exception of Boring TB-8, which encountered auger refusal at a depth of 8.3 feet.

The boring and infiltration test locations were provided by the client and reviewed by ECS prior to our mobilization to the site. The borings were located in the field by a representative of ECS using our Global Positioning System (GPS) equipment based on the *Grading Plan* and reference points obtained from publically available aerial photographs. The approximate locations are depicted on the Boring/Infiltration Test Location Diagram (Sheet 6 of 6) included in the Appendix of this report.

The ground surface elevations noted on the boring logs were interpolated from the existing topography contained on the *Grading Plan*. Based on the contour interval utilized on the plan, and considering the accuracy with which the borings were located in the field, the elevations noted on our logs are considered to be accurate to about ± 1.0 foot. Please note the elevations shown on our boring logs are only considered to be as accurate as the topographic survey from which they were obtained.

Following drilling operations, laboratory tests were performed on selected soil samples to identify the soils and to assist in the determination of properties of the site materials. The results of the subsurface exploration, along with a Boring/Infiltration Test Location Diagram, are also included in the Appendix of this report. The Boring/Infiltration Test Location Diagram (Sheet 6 of 6) was developed from the *Grading Plan* (dated 10/15/15) provided by the client.

Purposes of Exploration

The purposes of the current exploration were to explore the soil, rock and groundwater conditions (if encountered) at the site and to develop engineering recommendations to guide design and construction planning of the project. We accomplished these purposes by:

1. drilling soil borings to explore the subsurface soil and groundwater conditions,
2. performing in-situ infiltration testing at designated SWM areas at specified depths,
3. performing laboratory tests on selected soil and rock samples to determine their pertinent engineering properties,
4. analyzing the field and laboratory data to develop appropriate engineering recommendations, and
5. preparing this geotechnical engineering report.

EXPLORATION PROCEDURES

Subsurface Exploration Procedures

Soil Borings

Prior to drilling operations, Pennsylvania One-Call was contacted to locate and clear underground utilities at the site. The soil borings were performed with a CME 55 All-terrain vehicle (ATV) - mounted auger drill rig, which utilized continuous flight, hollow stem augers to advance the boreholes. Drilling fluid was not used during the soil drilling at each boring location. Following completion of drilling operations, each of the borings was backfilled with the spoils generated during the drilling process.

In the soil borings, representative soil samples were obtained by means of the split-barrel sampling procedure in general accordance with ASTM Standard D 1586. In this procedure, a 2-inch O.D., split-barrel sampler is driven into the soil a distance of 18 inches or 24 inches by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through a 12-inch interval is termed the Standard Penetration Test (SPT) value and is indicated for each sample on the boring logs. This value can be used as a qualitative indication of the in-place relative density of cohesionless soils and, in a somewhat less reliable way, the consistency of cohesive soils.

A field log of the soils encountered in the borings was maintained by the drill crew. After recovery, each sample was removed from the sampler and visually classified. Representative portions of each sample were then sealed in jars and brought to our laboratory for further visual examination.

Infiltration Testing

As noted, a suitable test elevation was not available at location IN-1. Following excavation of test pits via hand effort at locations IN-2 and IN-3, double ring infiltration testing was performed in general accordance with the Pennsylvania Stormwater Best Management Practices (PA BMP) Manual. Tests were performed in general accordance with Appendix C of the PA BMP Manual. A one-hour presoak was utilized at each test location to determine the testing interval. Based on the pre-soak results, test readings were recorded at thirty minute intervals. A minimum of four consecutive stabilized readings were recorded, or a total of 8 readings, whichever occurred first.

Laboratory Testing Program

Representative soil samples were selected and tested in our laboratory to check field classifications and to determine pertinent engineering properties. The laboratory testing program included visual classifications, moisture content tests, Atterberg Limits tests and grain size analysis. The grain size analysis including hydrometer analysis on a representative soil sample obtained from the specified infiltration test elevation at each of the infiltration test locations. The result of the hydrometer analysis was utilized to obtain a USDA soil classification to determine theoretical infiltration rates to compare to the field obtained values. All data obtained from the laboratory tests are included on the respective boring logs or on separate sheets in the Appendix of this report.

Each soil sample was classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS). The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. A brief explanation of the Unified System is included with this report. The various soil types were grouped into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ transitions may be gradual, rather than distinct.

The soil samples will be retained in our laboratory for a period of 60 days after which they will be discarded unless other instructions are received as to their disposition.

EXPLORATION RESULTS

Site Conditions

The majority of the site is currently moderately wooded and covered with surface vegetation, with the majority of the trees within the eastern and central portions of the site. The site is currently vacant, with the exception of a single residential structure coinciding with the proposed access road from Broadview Road.

Based on the existing topographic information provided on the *Grading Plan* (Sheet C3.1 dated October 15, 2014) prepared and provided by the client, the site is atop a small ridge, a downhill gradient towards the south, east and west from the central portion of the site. Based on the existing topographic information included on the grading plan, the majority of the site is generally flat, with an overall downward gradient from a topographic high of EL. 1032 in the northern portions of the development limits to a low of EL. 1000 in the southeastern and southwestern corners. According to the USGS Smithton, PA Quadrangle, dated 2013, elevations in the vicinity of the project site generally slope downward from north to south, with elevations within the project site and the immediate surrounding area at roughly EL. 1000 to EL. 1120 feet MSL. A copy of the USGS topographic map (sheet 2 of 6) is included in the Appendix of this report.

The specific project boundaries, including the existing and proposed site features, are depicted on the Boring/Infiltration Test Location Diagram (sheet 6 of 6) included in the Appendix of this report.

Geology

Regional Geology

Based on the *PA Department of Conservation and Natural Resources Geologic Map* (PA DCNR), dated 2014, the project site is mapped as being underlain by the Glenshaw Formation (Pcg) of the Conemaugh Group of the Pennsylvanian System. The Glenshaw Formation consists primarily of cyclic sequences of Shale, Sandstone, Red Beds and thin Limestone and Coal. The base of the Glenshaw Formation is at the top of the Upper Freeport Coal. The Red Beds can increase landslide susceptibility in slopes. According to the *Engineering Characteristics of the Rocks of Pennsylvania* (PA Geologic Survey report EG-1, dated 1982), Claystone is also common. This formation is part of the Pittsburgh Low Plateau Section of the Appalachian Plateaus Physiographic Province.

A copy of the geologic map (sheet 3 of 6) is included in the Appendix of this report.

Mine Subsidence Mapping

In addition to the geologic mapping of the site, we also reviewed the information contained on the Pennsylvania Department of Environmental Protection (PA DEP) *Mine Subsidence Insurance Maps* and the PA DEP *Mine Map Atlas*. Based on the information reviewed, it does not appear that the project site is located in an area where underground mining was performed. A copy of the DEP Mine Subsidence Insurance Map (sheet 5 of 6) is included in the Appendix of this report.

Soils Mapping

We also reviewed the soils mapping of the project site as provided by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) for Westmoreland County, Pennsylvania, as provided on-line by the web soil survey (<http://websoilsurvey.nrcs.usda.gov>). The project site is mapped as being underlain by the Gilpin channery silt loam (Mapping Unit GcC).

Gilpin channery silt loam (GcC) features 8 to 15% slopes. These soils are moderately sloping, moderately shallow, well drained soils on summits and shoulders of hills. Permeability is moderately high to high, with a seasonal high water table at greater than 80 inches during wet periods. Restrictive features (bedrock) are found from 30 to 36 inches. Most areas of this soil are used for farmland. Limitations for non-farm use include moderate slopes and relatively shallow depths to bedrock. Gilpin channery silt loam soils are part of Hydrologic Soil Group C, indicating a slow infiltration rate when wet.

A copy of the USDA Soils Map (sheet 4 of 6) is included in the Appendix of this report.

Soil Conditions

The soils identified in the attached boring logs are generally consistent with the regional geology information. Based on the current exploration performed on this site, the ground cover within the area explored generally consists of surface vegetation and topsoil. Approximately 4 to 5 inches of topsoil was encountered at the surface of each boring.

Existing fill/disturbed soils were encountered in each of the borings. The existing fill/disturbed materials were generally surficial in nature and extended to depths ranging from 2 to 4 feet across the areas explored. With the exception of Boring TB-1, the existing fill consisted of primarily low plasticity Lean CLAY (USCS Classification CL), with varying amounts of Sand, roots and Rock Fragments. The fill in Boring TB-1 consisted of SAND (SP) with variable amounts of Clay and Rock Fragments. Considering the shallow nature of the fill, these materials may have been disturbed/placed during previous site activities or surrounding developments. The fill soils exhibited Standard Penetration Test (SPT) N-values ranging from 2 to 19 blows per foot (bpf), corresponding to very soft to very stiff consistencies for the cohesive soils and a dense relative density for the granular soils. The softer materials were generally encountered at the existing ground surface, where softening due to exposure to weather and precipitation is common.

Beneath the surficial existing fill/disturbed materials, natural soils consisting primarily of SAND (SP/SC) with variable amounts of Clay, Silt and Rock Fragments, were encountered in each boring. A localized CLAY (CL) layer was encountered in Boring TB-9. The natural soil materials extended to the boring termination depth in TB-7, TB-9, TB-10 and TB-13. In the remaining borings, this stratum transitioned to weathered rock at depths generally ranging from the fill/natural transition zone (TB-1, TB-3, TB-5, TB-8, TB-11, and TB-12) to 11 feet (TB-4) below the existing ground surface. The natural soils exhibited SPT N-values ranging from 15 to 52 blows per foot (bpf), corresponding to a medium dense to dense relative density for the granular soils.

In general, the soils became harder with depth and transitioned quickly into weathered rock at most locations. Materials classified as weathered rock generally exhibited N-values in excess of

60 bpf, excluding isolated strata where higher blow counts were likely due to increased gravel content within the sample. The samples classified as weathered rock exhibited very hard in-situ consistencies and maintained a relic rock structure, while breaking down into soil size particles by hand with little effort.

Each of the building borings encountered auger refusal on the underlying weathered bedrock at depths ranging from 11 to 14 feet below the existing ground surface. At these depths, auger refusal was encountered below the anticipated foundation bearing and final site elevations and rock coring was not performed. The parking lot/slope borings each extended to the scheduled termination depth of 10 feet, with the exception of Boring TB-8, which encountered auger refusal at a depth of 8.3 feet and TB-5, which was scheduled to extend to 20 feet and encountered auger refusal at a depth of 16.5 feet.

Groundwater Conditions

Observations for groundwater were made during sampling and upon completion of soil drilling operations in each of the boring locations. In auger drilling operations, water is not introduced into the boreholes during soil drilling, and the groundwater position can often be determined by observing water flowing into or out of the borings.

Groundwater was not encountered in any of the borings during our current study. Each of the borings was observed to be dry during drilling/sampling operations and following auger removal. Considering the absence of groundwater in each of the borings, the long term groundwater table is expected to be below the depths explored and we do not expect groundwater to present a significant concern on this project. However, perched water within fractures in the bedrock is very common.

Perched water conditions are common at the soil/weathered rock interface, where surface water becomes trapped on top of the less permeable rock. Perched water within granular seams within the natural soils or at the fill/natural soil interface is also common. It is possible that water seepage and accumulation may be observed in deeper excavations allowed to remain open for an extended duration.

The highest groundwater observations are normally encountered in late winter and early spring; therefore, our groundwater observations in our most recent borings are expected to be somewhat below the seasonal maximum water table. Recommendations with regard to site dewatering are included in the Construction Dewatering section of this report.

ANALYSIS AND RECOMMENDATIONS

The recommendations outlined in this report are based on the recent thirteen (13) borings performed at the site, the laboratory testing and analysis, and the information provided to us by you and other design team members. The primary factor that will affect the proposed development includes the presence of the relatively shallow weathered rock and the affect of possible difficult rock excavation on earthwork operations as well as the limited infiltration potential of the site soils. Additional recommendations and design details are provided herein.

Subgrade Preparation and Earthwork Operations

The majority of the project site is currently vacant. A small residential structure currently coincides with the proposed access road from Broadview Road. Where not removed by rough grading or excavation, all foundation elements and utilities associated with the existing structures should be removed or abandoned during stripping operations. Existing foundations in any planned landscaped or parking areas may remain in place provided they are cut off at least 2 feet below final subgrade and any hollow cores are grouted solid. Although not expected, any remnants of existing structures, including all foundations, floor slabs, underground utilities, septic tanks, drains, and any other below grade structures should be removed from the proposed building footprint in their entirety. Removal of any tanks or hazardous materials should be performed under the observation of the project environmental consultant.

The subgrade preparation operations should consist of stripping any vegetation, rootmat, topsoil, and any other soft or unsuitable material from the proposed building and pavement areas. We recommend that site stripping depths account for the topsoil of any deeper rootball systems (if present) and possible variations in topsoil thickness between boring locations. The stripping within the proposed building and pavement areas should be extended at least 10 feet, where possible, beyond the planned limits of the proposed building and pavements. Stripping limits should be extended an additional 1 foot for each foot of fill required at the building or pavements exterior edge. The limits discussed in this paragraph define the expanded building limits.

Near surface, existing fill/disturbed materials were encountered in each of the borings performed. These materials may be associated with previous site usage or the surrounding development. The majority of the fill/disturbed materials extended to a depth of 2 feet. Localized areas of deeper fill, extended to a depth on the order of 4 feet, were also encountered. These materials are considered to be undocumented fill and are not considered to be suitable for direct structural support or as a subgrade for new fill without improvement. Undocumented fill materials often have variability in consistency, moisture content and composition, which make it difficult to assess the engineering properties of the soil.

The majority of these materials will be removed through rough grading operations to achieve the proposed subgrade elevations in the cut portion of the building. In the southwestern corner of the building, where shallow cuts or placement of new fill is planned, these materials will not be removed by design grading. The lower risk option would be to completely remove these materials from the proposed building pad during initial site stripping and replace them as engineered fill placed and compacted in accordance with the recommendations outlined herein. Considering the shallow nature of these materials, a portion of the existing fill/disturbed materials may be able to remain in place, particularly in new fill areas, provided that it is densified in-place and is stable during proofrolling operations as discussed in subsequent

sections of this report. Where the fill is surficial in nature (~2 ft), in-place densification and proofrolling should be adequate; however, some undercutting of deeper fill should also be expected.

It will be important that the fill materials be further evaluated at the time of construction. Building foundations are expected to bear in natural soils. If existing fill is still in place following rough grading, we recommend that all new footings extend through any remaining existing fill and bear in natural soils. In addition, although our exploration encountered surficial fill to depths ranging from approximately 2 to 4 feet below the existing ground surface, it is possible that deeper zones of fill exist at the site. If encountered, such fill should be evaluated by the geotechnical engineer during construction so that recommendations for removal or other appropriate stabilization can be developed.

In parking lot areas, a portion of the existing fill (where not removed by grading operations) may remain in place provided it is stable during proofrolling operations and the owner is willing to accept some risk of a reduced pavement life. Within planned pavement areas, the use of geosynthetics may also be appropriate to improve unstable subgrades.

After stripping to the desired grade and performing all necessary rough grading and prior to any engineered fill placement, the exposed soils should be carefully examined by the geotechnical engineer or their authorized representative to identify any localized loose, yielding or otherwise unsuitable materials. After examining the exposed soils, loose and yielding areas can be identified by proofrolling with an approved piece of equipment, such as a loaded dump truck, having an axle weight of at least 10 tons. Any soft or unsuitable materials encountered during this proofrolling should be removed and replaced with an approved backfill compacted according to the criteria in the section entitled Fill Placement.

The preparation of any areas to receive engineered fill, as well as proposed building and pavement subgrades should be observed on a full-time basis. These observations should be performed by the geotechnical engineer, or their authorized representative, to document that all unsuitable materials have been removed, and that the subgrade is suitable for support of the proposed construction and/or engineered fills.

We strongly recommend against utilizing soil bridging lifts to span over soft fill subgrade soils within the proposed development limits. We recommend the use of a reinforcing geotextile or geogrid where excessively soft materials are encountered and cannot be effectively removed by undercutting. These materials should be covered by a minimum of 1 foot of select granular materials. Alternate reinforcing or stabilization of soft subgrades should be determined in the field by the geotechnical engineer.

The importance of performing comprehensive construction phase evaluations of final foundation, slab and pavement subgrades cannot be over-emphasized. The construction phase testing should include observation of proofrolling of existing and final subgrades, as well as hand auger borings and dynamic cone penetrometer testing at frequent intervals within foundation excavations.

Fill Placement

Fill materials for use as backfill, or for support of structures and pavements should consist of an approved material, free of organic matter, debris, cobbles, and rock fragments greater than 6

inches. The engineered fill should also have a Liquid Limit and Plasticity Index less than or equal to 40 and 20, respectively. Unacceptable fill materials include topsoil and organic materials (OH, OL), and high plasticity SILT (MH) or CLAY (CH). High-plasticity soils should not be used as fill material in proposed structural areas.

The on-site soils may require moisture content adjustments, such as the application of discing or other drying techniques or spraying of water to the soils prior to their use as controlled fill materials. The planning of earthwork operations should recognize and account for these efforts and increased costs.

The on-site materials may be reused as engineered fill provided that they do not contain organics or foreign debris, are not highly plastic, are not environmentally impacted and conform to the criteria outlined above. Based on observations made during the subsurface exploration program and following visual observation of the recovered soil samples, the majority of the soils encountered at each of the boring locations are likely to be suitable for reuse as engineered fill material. Any materials not considered to be suitable for reuse in structural areas should either be disposed of off-site or stockpiled for later use as fill material in green areas. The suitability of the on-site materials for use as engineered fill should be further evaluated in the field at the time of construction. **It is important to note that the reuse of weathered rock and rock materials may require significant mechanical manipulation in order to achieve a useable fill material.** Earthwork budgets should account for the time associated with manipulating rock materials prior to reuse if deeper excavations that extend into these materials are anticipated.

If off-site borrow materials are required in order to achieve the final site grades, a sample should be submitted to the site testing agency at least five days prior to importing the material to the site for appropriate lab testing to determine if the material meets the criteria outlined above.

Fill materials should be placed in lifts not exceeding 8 inches in loose thickness and moisture conditioned to within ± 2 percentage points of the optimum moisture content. The soils should be compacted to a minimum of 95% of the maximum dry density obtained in accordance with ASTM Standard D 698, Standard Proctor Method. The upper one foot of soils supporting slabs-on-grade, pavements, or sidewalks should be compacted to a minimum of 100% of the maximum dry density obtained in accordance with the ASTM Specification D-698, Standard Proctor Method discussed above.

The expanded footprint of the proposed structures or pavement and fill areas should be well-defined, including the limits of the fill zones at the time of fill placement. Grade control should be maintained throughout the fill placement operations. All fill operations should be observed on a full-time basis by a qualified soil technician to determine that the specified compaction requirements are being met. A minimum of one compaction test per 2,500 square feet of area should be tested in each lift placed. The elevation and location of the tests should be clearly identified at the time of fill placement.

Compaction equipment suitable to the soil type used as fill should be used to compact the fill material. Theoretically, any equipment type can be used as long as the required density is achieved. Ideally, a steel drum roller would be most efficient for compacting and sealing the surface soils. All areas receiving fill should be graded to facilitate positive drainage from building pad and pavement areas of any free water associated with precipitation and surface runoff.

Fill materials should not be placed on frozen soils. All frozen soils should be removed prior to continuation of fill operations. Borrow fill materials should not contain frozen materials at the

time of placement. All frost-heaved soils should be removed prior to placement of fill, stone, concrete, or asphalt.

Building Foundations

The proposed buildings are each expected to have a finished floor elevation of EL. 1023.5. Based on the anticipated foundation bearing elevations and the results of our borings, the building foundations are expected to bear in dense to very dense natural soils. Based on the results of the borings performed, it is our opinion the proposed building may be supported by traditional shallow foundations consisting of a spread and/or continuous footing system. Footings may be designed for an allowable soil bearing pressure of 4,000 psf. Although not expected, any footings that will bear in newly placed engineered fill should be designed for an allowable bearing pressure of 3,000 psf or lowered to bear in natural soils capable of supporting the 4,000 psf bearing pressure. Soils suitable to support the recommended bearing pressure are those natural soils indicated on the attached boring logs having a minimum SPT N-value of 14 bpf for the 4,000 psf bearing capacity.

Higher bearing capacities are available in the very dense soils/weathered rock expected at the bearing elevation in the majority of the building footprint. However, higher bearing capacities are not expected to be required given the anticipated loading conditions. If higher bearing capacities will result in a more economical foundation design, we should be contacted for additional recommendations.

The allowable soil bearing pressure refers to that pressure which may be transmitted to the foundation bearing soil in excess of the final minimum surrounding overburden pressure. During construction, the bearing capacity at the final footing excavation should be tested in the field by the geotechnical engineer or their representative to document that the in-situ conditions at the bottom of each footing excavation is adequate for the design loads.

Due to the potential variability of the natural soils and variations in the depth of existing fill, some localized overexcavation or undercutting of the foundations may be required to achieve the recommended bearing pressure. Where undercutting is performed, the excavation should be backfilled with properly compacted fill or lean concrete to the original design bearing elevation. If compacted fill is used to backfill overexcavated areas, the overexcavation should be extended a horizontal distance of 1 foot for each foot of undercut. Open graded gravel (ie. AASHTO #57 stone) should not be used to backfill foundation undercuts as this could result in a reservoir condition, allowing the accumulation of water and potential softening of the bearing soils. All foundation installation should be observed on a full time basis by the geotechnical engineer or their authorized representative to determine actual undercut depths.

Depending on the excavation methods used to reach the proposed building subgrade elevation, particularly when excavations will extend into weathered rock, it is possible that the bearing surface may be disturbed during excavation. The recommended bearing pressure provided above is based on the foundations bearing directly on undisturbed materials. Should the bearing subgrade be disturbed during excavation, the footings will need to be lowered/undercut to undisturbed materials or the disturbed materials removed and replaced as described above.

We recommend the structural engineer anticipate settlement of the structure(s). Based on the column loads provided and allowable bearing pressures, for footings placed to bear on natural

soils, total settlement tolerances should be on the order of 1 inch, with differential settlement on the order of ½ inch or less.

We recommend that continuous footings have a minimum width of 18 inches and that isolated column footings have a minimum lateral dimension of 24 inches. The minimum dimensions recommended above help reduce the possibility of foundation bearing failure and excessive settlement due to local shear or "punching" action. In addition, footings should be placed at a depth to provide adequate frost cover protection. Therefore, we recommend footings in unheated areas and perimeter footings subject to climatic variations are located at a minimum depth of 36 inches below finished grade or in accordance with local building code requirements. Interior footings can be located on acceptable bearing materials at nominal depths compatible with architectural and structural considerations.

Ground-Supported Slabs

For the preparation of the ground-supported slabs, bearing on suitable natural soils or new engineered fill, the general recommendations provided in the section entitled Subgrade Preparation and Earthwork Operations should be followed. Subgrade materials should then be thoroughly compacted to the criteria in the Fill Placement section of this report. Due to the potential variability of the support characteristics of the exposed soils and disturbance from construction traffic and exposure to weather, some undercutting and/or alternate stabilization of the near surface soils may be necessary prior to floor slab construction. Slabs should not be allowed to bear directly on the surficial disturbed soils or existing fill unless specifically evaluated by the geotechnical engineer.

The composition of the floor slab subgrade is expected to consist of natural SAND soils encountered in our borings. A modulus of subgrade reaction, "k", of 175 pci can be used for design of the slab on grade based on the primarily SAND soils encountered in the borings. New fill placed within the proposed building pad should consist of on-site SAND soils or select granular fill to maintain the recommended "k" value of 175 pci.

We recommend that the slabs-on-grade be underlain by a minimum of 6 inches of granular material having a maximum aggregate size of 1.5 inches and no more than 2% fines. This granular layer will facilitate the fine grading of the subgrade and help prevent the rise of water through the floor slab. Prior to placing the granular fill, the floor slab subgrade soils should be properly compacted, and be free of standing water, mud, or frozen soil. Before the placement of concrete, a vapor barrier should be placed on top of the granular material to provide additional moisture protection.

In order to reduce the crack width of any shrinkage cracks that may develop near the surface of the slab, we recommend mesh reinforcement or reinforcing steel, as determined by the structural engineer, be included in the design of the floor slab.

Even though ground-supported slabs may be constructed during the warm months of the year, exposure of the interior slabs to freezing temperatures can result in frost heave if constructed during colder months. Consequently, to reduce the potential for frost heave beneath any previously installed slabs, it is recommended that any footing excavations and/or unpoured sections within the slab area be pumped out to reduce water flow into the subbase and/or subgrade materials. In addition, all slab joints should be sealed to reduce surface water infiltration into the subbase materials.

Rock/Weathered Rock Excavation

Based on the anticipated finished floor elevations and site grades provided, excavations/cuts below our auger refusal depths are not expected to be required. However, excavations/cuts are expected to require excavations into very dense/hard weathered rock to achieve the expected foundation bearing elevations and pavement subgrades in cut portions of the site. Excavations into very dense/weathered rock materials should also be expected for the installation of site utilities.

Excavation difficulties which may slow down the construction process or require the use of alternate excavation methods should be expected for excavations that extend into the weathered rock stratum. Difficult excavation may also be encountered at shallower depths due to variations in the rock surface between boring locations.

The final method of excavation and sizing of equipment for excavation and weathered rock removal should be determined by the earthwork contractor.

Construction Dewatering

The long term continuous groundwater table at the site is considered to be below the depth of auger refusal. However, groundwater conditions encountered at the site are strongly influenced by surface water flow and infiltration. Specifically, water that enters the site migrates downward to the interface of the soil and rock. Once the water reaches the relatively impermeable rock, the water travels laterally, often over large distances. Such perched groundwater conditions may be encountered during construction operations, especially depending on the time of year.

Based on the groundwater observations as well as the proposed site layout, we do not anticipate groundwater will be a significant construction consideration; however some temporary dewatering, including sump pits and pumps and/or diversion of water, should be expected during below grade excavation and foundation installation due to perched water. The perched groundwater conditions are seasonal in nature. While perched groundwater conditions may not be encountered during the summer months, such conditions can occur in the winter and late spring months.

The surface of the site should be kept properly graded in order to enhance drainage of the surface water away from the proposed building areas during the construction phase. We recommend that an attempt be made to enhance the natural drainage without interrupting its pattern.

Site Seismic Considerations

The subsurface exploration completed at this site included the drilling of borings to depths on the order of 16.5± feet below the existing site grades. The International Building Code (IBC) 2009 requires site classification for seismic design based on the upper 100 feet of a soil profile. Where site specific data are not available to a depth of 100 feet, appropriate soil properties are permitted to be estimated by the registered design professional preparing the soils report based on known geologic conditions.

Utilizing the data obtained from Standard Penetration Resistance (ASTM D 1586-84) tests conducted in the borings and our previous experience at neighboring sites, a mean SPT "N"-

value within 100 feet of the ground surface was determined. Three methods are utilized in classifying sites, namely the shear wave velocity, v_s , method; the unconfined compressive strength, s_u , method; and the Standard Penetration Resistance, N-value method. The latter method was used in classifying this site.

Based on our interpretation of the IBC 2009 Building Code, Section 1613 and Table 1613, the project site should be considered a "Site Class C" for seismic design considerations. The Site Class definition should not be confused with the Seismic Design Category designation, which the Structural Engineer typically assesses.

Considering that the foundations will bear in close proximity to bedrock, Site Class B may be possible; however, site specific seismic testing to determine the shear wave velocity of the soil and rock would be required to evaluate this site classification. Please note that IBC does not permit the determination of Site Class B based on the N-value method. ECS can provide additional analysis and testing, if desired, to further evaluate the site class or provide site specific response spectra if it is determined by the structural engineer that an improvement in the site class for the project site will result in significant economic savings in the final design.

Site Retaining Walls

To facilitate the placement of the new fill required for the grade change in the southern and western portion of the site, two (2) site retaining walls are proposed. One of the walls will be located south of the proposed hotel building, in front of the entrance, and one in the southwestern portion of the parking lot. Top and bottom of wall elevations were not provided, however, they are expected to be on the order of 6 feet in height for the hotel entrance, and approximately 2 to 14 feet in height in the parking lot.

Specific design details were not provided. The following design recommendations are provided to guide the design engineer responsible for the final wall design. Detailed design drawings and specifications for the new retaining walls can be provided as an additional service once the final wall type has been selected, if requested.

Considering the overall exposed height of the southwestern retaining wall (+/- 14 feet), we recommend that a global stability analysis of the wall be performed. This analysis is performed in addition to the standard retaining wall stability analyses, such as sliding, overturning, bearing, etc. We would be happy to provide the global stability analysis at the appropriate time, if requested.

Since retaining walls are free to rotate at the top, they effectively mobilize more of the shear strength of the soil (active conditions). Therefore, the retaining wall can be designed for a lower lateral load than walls that are restricted from rotation. The design lateral earth pressure for the wall will be highly dependent on the materials utilized as backfill within the reinforced and retained zones of the wall. For the design of permanent site retaining walls with level backfill, an equivalent fluid pressure of 55 psf per vertical foot of wall is recommended. This lateral earth pressure assumes that soils of "very low" expansion potential (LL less than or equal to 40 and PI less than or equal to 20) materials are used for the wall backfill and that drainage of the backfill is provided as discussed below. Lower equivalent fluid pressures may be used for granular soils such as SM or more granular or select granular fill such as PennDOT 2A stone. The design should also account for any surcharge loads that are within a 45° slope from the

base of the wall, and any slope of the backfill. A base sliding coefficient of 0.3 may be used for footing analyses if founded on soil and 0.6 if founded on weathered rock or rock.

The following table summarizes the soil parameters recommended for retaining wall design:

Table 1 – Recommended Soil Parameter for Retaining Walls

| Soil Type - Unified Soil Classification | Unit Weight (pcf) | Internal Angle of Friction (ϕ) | Cohesion (tsf) | Equivalent Fluid Pressure (psf/ft) |
|---|-------------------|---------------------------------------|----------------|------------------------------------|
| Site Soils – CL | 120 | 24 | ----- | 55 |
| Site Soils – SM/SP | 130 | 32 | ----- | 45 |
| Select Import – ie PennDOT 2A | 135 | 36 | ----- | 40 |

The retaining wall should be designed so that the resultant of the overturning forces remains in the central one-third of the footing. The foundations for the proposed retaining wall should be designed for a net allowable soil bearing pressure on the order of 3,000 psf, provided that the footings are founded within firm natural soils or engineered fill placed over firm natural soils. Furthermore, sliding resistance of retaining walls can be achieved either through the use of a shear key or through the frictional forces developed at the base of the retaining wall. A shear key, if installed, can be designed for a passive pressure of 325 psf per foot of depth. This assumes that the soils at the base of the retaining wall are suitable natural soils. If new fills, placed in accordance with our recommendations in the sections entitled Subgrade Preparation and Earthwork Operations and Fill Placement are placed under the wall, the passive resistance should be decreased to 300 psf per foot of depth.

The recommendations contained above assume that the backfill behind the retaining wall is properly drained through the use of a gravel chimney drain or suitable man-made drainage medium. Drainage of the backfill may be accomplished through the use of 4-inch diameter weep holes at 8 feet spacing through the wall, immediately above proposed grade at the front of the wall. Alternatively, a longitudinal drain line could be used behind the retaining wall. The drain should consist of a 6-inch perforated pipe surrounded by a minimum of 6 inches of #57 stone. The geotextile used should be reviewed and approved by the geotechnical engineer.

Laboratory testing in accordance with ASTM D 698, Standard Proctor Method, should be performed on a representative sample of the on-site soils in order to obtain the theoretical maximum dry density for use during backfilling operations.

The wall system should be designed for both global stability as well as internal and external (sliding, overturning, bearing) stability. Global stability analysis of the current wall configuration was not included in our current study.

Infiltration Test Results and SWM recommendations

As noted previously, field infiltration testing was performed at proposed SWM areas as delineated on the *Grading Plan*. The following table summarizes the field and laboratory testing results.

Table 2 – Infiltration Testing Summary

| SWM Basin | Test Location | Test Depth (ft) | USDA Soil Classification | Field Infiltration Rate (FS=2.0) (in/hr) | Recommended Design Infiltration Rate (in/hr) |
|-----------|---------------|-----------------|--------------------------|--|--|
| Western | IN-2 | 1.5 | Loam | 0.09 | 0.09 |
| Central | IN-3 | 2.5 | Loam | 0.09 | 0.09 |

Prior to infiltration testing, each area was explored via hand auger for the presence of limiting layers within a depth of 2 feet below the proposed invert elevations as required by Appendix C. Based on our exploration, restrictive layers were not encountered within a depth of 2 feet below the estimated test elevations at test location IN-2 and IN-3. The testing elevation at IN-2 was lowered by 1 foot (from the scheduled invert elevation of 0.5 feet) to facilitate the infiltration testing due the presence of existing fill. The testing elevation at IN-3 was below the existing fill. All infiltration facilities will need to extend into natural soils. A weathered rock restrictive layer was encountered approximately 3 feet below existing grades at test location IN-1 and a suitable test elevation was not available.

The field infiltration rates obtained at IN-2 and IN-3 (0.09 in/hr) are considered to have negligible potential for infiltration and groundwater recharge. Groundwater recharge may not be possible in these areas and underdrains may need to be incorporated into the design. Stormwater management facilities at these locations may also consist of BMP facilities to address water quality. Water quality requirements can typically be addressed through the use of rain gardens and bioretention areas. If required, the subgrade in these locations can also be overexcavated then re-established with a suitable blend of topsoil and sand to satisfy water quality requirements prior to discharge. Additional recommendations for amended soil can be provided, if requested.

During excavation, the materials at the bottom of the basins should be documented to be consistent with those encountered in the exploration. Care should be taken during construction to reduce trafficking of heavy equipment and construction vehicles in proposed infiltration areas. We recommend that construction equipment be prevented from operating within 2 feet vertically of any proposed infiltration layer in order to reduce the chance of compaction of underlying infiltration layers. If the soils at the infiltration elevation are subject to construction traffic and/or compacted, a tiller or disk harrow may be needed to loosen the soils to acceptable densities for the intended purpose of infiltration.

We recommend that field verification of the subgrade conditions be performed at the time of construction. We recommend that specific construction notes appear on the plans requiring full-time observation of the excavation of the basins by a qualified geotechnical engineer to document suitable conditions are present. We would be pleased to provide this service, if requested. If additional or shallower limiting layers are encountered within the elevations of the excavation for the stormwater management facilities, the Engineer should be contacted for further direction or possible reconfiguration of the facility.

For infiltration basin areas that are used as sediment basins during construction, the basin should not be utilized for stormwater infiltration until stabilization of contributing areas has been completed. Any accumulated sediments in the basin area(s) should also be removed. If infiltration areas are not intended to serve for sediment control during construction, appropriate

protection measures should be in-place during construction to prevent the accumulation of sediments which may affect the long-term performance of the basin's infiltration characteristics.

Global Stability Analysis – 2H:1V Slope

A relatively steep (~2H:1V) fill slope, leading downward from the proposed parking lot, is proposed along the southern edge of the site. The overall height of the slope will be on the order of 20 feet. Due to the proposed height and steepness of the slope, a slope stability analysis was performed as part of our current scope.

Design Parameters Used for Stability Analysis

The analyzed section was developed from the boring data and the *Grading Plan* prepared and provided to us by the client to create the cross-section. The soil strength parameters used for our analyses were developed from our interpretation of the Standard Penetration Test (SPT) data, Atterberg Limit test data, and our experience with similar soils on past projects. Where appropriate, the parameters selected are also in general accordance with the correlations provided in Table 10.8.3.5.2b-1P of PennDOT Design Manual Part 4 (DM-4), dated May 2012. A nominal amount of cohesion was included for the existing fill due to the cohesive nature of the samples obtained. Cohesion was conversely neglected for the remaining soils and weathered rock.

The following table outlines our soil strength parameters used in our current slope stability analyses.

Table 3 – Summary of Assumed Soil Strength Parameters

| Soil Designation | Soil Description | Moist Unit Weight | Friction Angle, Ø | Cohesion |
|-------------------------|----------------------------------|--------------------------|--------------------------|-----------------|
| 1 | New FILL (assumed on-site soils) | 120 pcf | 32° | 0 psf |
| 2 | Existing Fill (CL) | 120 pcf | 26° | 15 psf |
| 2 | Natural Soils (SM/SP) | 125 pcf | 36° | 0 psf |
| 3 | Weathered Rock | 145 pcf | 38° | 0 psf |

Groundwater was not encountered in any of the borings performed during our current study. The global stability analysis was performed with assumed perched water conditions, assuming a high seasonal perched groundwater condition on top of the weathered rock surface. Although ground water was not encountered in the majority of the borings, the assumed water conditions resulted in partial saturation of the weathered rock, representing a conservative scenario for the proposed slope. The proposed parking lot was modeled as a surcharge load at the top of the slope.

The global stability analysis was performed using the GSTABL7 two-dimensional computer global stability program. The factor of safety against global instability computed by the program is defined as the ratio of the sum of the moments, or forces, resisting and driving along a specified potential failure surface. Hence a factor of safety greater than 1.0 indicates a stable structure, while a factor of safety less than 1.0 indicates a potentially unstable structure.

Because of the margin of uncertainty regarding soil parameters and groundwater conditions in situ, we consider factors of safety of 1.5 as the minimum adequate factor of safety for the proposed slope.

Analysis and Results

Section A-A was developed through a point of greater overall slope height utilizing the data from Borings TB-7, TB-8 and TB-13. The location of cross section A-A is shown on the Boring/Infiltration Test Location Diagram (sheet 6 of 6) included in the Appendix. The proposed grades along this profile will consist of a new 2H:11V slope constructed primarily through the placement of new fill. The existing subgrade consists of a surficial stratum of existing fill (CL) underlain by sandy natural soils (SM) and, ultimately, relatively shallow weathered rock.

Based on the results of our analysis, Cross Section A-A possesses a long term factor of safety of 1.51 (>1.5) against global failure surfaces.

All output from the global stability analysis performed, including a plot of the ten most critical surfaces and a plot of all failure surfaces analyzed, is included in the Appendix of this report.

Pavement Design

For the design and construction of exterior pavements, we recommend the topsoil and any other soft or unsuitable materials be removed from the area to be paved, extending to a limit of 5 feet beyond the back of curb or edge of shoulder. The stripped surface should be proofrolled and carefully observed at the time of construction in order to aid in identifying any localized soft or unsuitable materials, which should be removed. In addition, the guidelines provided in the section entitled Subgrade Preparation and Earthwork Operations should be followed. At the time of subgrade preparation, additional laboratory testing, consisting of California Bearing Ratio (CBR) and Atterberg limit tests, should be performed on representative subgrade materials in the proposed pavement areas to confirm final design of these pavements prior to installation.

In areas where new engineered fill is required to establish the final pavement subgrade elevations, new fill should be placed and compacted in accordance with the Fill Placement section of this report.

California Bearing Ratio (CBR) testing was not performed as part of our current study. Based on our experience with similar soils, we recommend a design CBR value of 5 be used for preliminary design. We recommend CBR samples be obtained within the upper 12 inches of the subgrade soils during construction for final pavement design. Please note that any imported fill materials used in proposed pavement areas will need to meet the CBR value used in design in order to be placed as pavement subgrade material.

Based on an assumed CBR value of 5, we have developed a preliminary pavement section design for the project site.

Table 4 – Preliminary Pavement Recommendations

| Pavement Materials | Compacted Layer Thickness (Inches) For Indicated Traffic Condition | |
|---|---|-------------------------------------|
| | Medium Duty Drive Lane Access | Light Duty Parking Areas |
| Surface Course Asphalt 9.5mm SUPERPAVE | 1.5 | 1.5 |
| Base or Binder Course Asphalt 25mm SUPERPAVE | 3.0 | 3.0 |
| Stone Aggregate Base (2A) | 6.0 | 4.0 |
| Total Pavement Thickness (in.) | 10.5 | 8.5 |

It should be noted that these design recommendations are for parking and driveways only and may not satisfy the State traffic guidelines. Any roadways constructed for public use, to be dedicated to the State for repair and maintenance must, be designed in accordance with the State requirements. The above are preliminary recommendations provided to guide the design process. The final pavement design should be based on traffic loading, frequency, design life, etc.

An important consideration in the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should reduce the possibility of the subgrade materials becoming saturated over a long period of time.

It is common practice in construction to install only the base aggregate and the base course asphalt during initial construction, and then the final topping surface asphalt much later in the construction process. Often, depending upon the sequence and timing of construction, the final pavement surface may not be placed until several months after the initial base asphalt is placed. Studies have shown that the most critical load conditions for most development occur during the construction phase. In particular, the pavement system is subjected to loading that includes construction equipment, low-boys, concrete trucks, pre-fabricated joist and dry wall deliveries, and other heavy, high concentrated truck loading which does not occur once the development is finished. Not only does this represent the highest traffic loading condition, but it occurs at a time when the pavement section is not at its full strength, simply because the surface asphalt has not been placed.

Any roadways constructed for public use, to be dedicated to the State for repair and maintenance must, be designed in accordance with the State requirements. The final pavement design should be based on traffic loading, frequency, design life, etc.

Rigid concrete pavement may be used instead of flexible pavement. Rigid pavement is recommended to be used where trash dumpsters or semi-trailers are to be parked on the pavement or where a considerable load is transferred from relatively small steel wheels. This should provide better distribution of surface loads to the sub grade without causing surficial deformation. Actual pavement section thickness and joint spacing, if applicable, should be determined by the design engineer based on traffic loads, volume, and the owner's design life requirements.

Temporary and Permanent Slopes

With the exception of the proposed 2H:1V fill slope discussed herein, our scope of services did not include specific analysis of proposed temporary or remaining permanent site slopes. However, in general, temporary excavation slopes cut in the native soils should be no steeper than 1H:1V or as indicated by OSHA protocol. Temporary fill slopes constructed of on site native silty or clayey soils should be limited to a maximum gradient of approximately 2H:1V. The temporary slopes should also be thoroughly vegetated to help reduce erosion of the surficial soils. During foundation excavation, we recommend that the existing on-site soils be examined and sloped back at gradients in accordance with OSHA 29 CFR 1926

Permanent slopes constructed of native soils should generally be 3H:1V or flatter unless specifically analyzed by the geotechnical engineer. Fill slopes should be over-built and cut back to their planned inclination. The potential for surface erosion of earth slopes should be reduced by establishing deep rooted vegetation on the slope face as soon as the final slope geometry is achieved. Slopes steeper than 3H:1V should be evaluated by the geotechnical engineer. Gradients as steep as 2H:1V may be achieved in rock cut slopes or through the use of select aggregate or engineered rock fills, as well as through the installation of geosynthetics in native soils. Small landscape berms (< 5 feet in height) may be as steep as 1H:1V but should be compacted as structural fill and thoroughly vegetated immediately upon completion.

General Construction Considerations

Precautionary measures should be taken to document that preparation of the subgrade and footing bearing surfaces are accomplished by the recommended procedures. These precautions are necessary, as the materials, observed in our borings, are moisture and disturbance sensitive, and will become weakened if water intrudes into the footing excavations. Therefore, we recommend that all excavations be properly dewatered. The site should be graded such that surface water runoff is directed away from the excavations.

Exposure to the environment may weaken the natural soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, lean concrete mud-mats should be placed the same day that excavations are performed. If the bearing materials are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, we recommend that a 1 to 3 inch thick "mud-mat" of "lean" concrete be placed on the bearing soils before the placement of reinforcing steel.

The site soils are considered moisture and disturbance sensitive. When wet, these soils will degrade quickly with disturbance from contractor operations. Discing and/or drying of the site soils may be required prior to using the site soils for placement as engineered fill. Therefore, good site drainage should be maintained during earthwork operations which will help maintain the integrity of the soil.

The surface of the site should be kept properly graded in order to enhance drainage of the surface water away from the proposed building areas during the construction phase. We recommend that an attempt be made to enhance the natural drainage without interrupting its pattern.

The surficial soils contain fines which are considered moderately to highly erodible. The Contractor should provide and maintain good site drainage during earthwork operations to help maintain the integrity of the surficial soils. All erosion and sedimentation shall be controlled in accordance with sound engineering practice and current local requirements.

Closing

This report has been prepared in order to aid in the evaluation of this project. The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings and tests performed at the locations as indicated on the Boring/Infiltration Test Location Diagram and other information referenced in this report. This report does not reflect any variations that may occur between the test locations. In the performance of the subsurface exploration, specific information is obtained at specific locations at specific times. However, it is a well known fact that variations in soil and rock conditions exist on most sites between boring locations and also such situations as groundwater levels vary from time to time. The nature and extent of variations may not become evident until the course of construction. If variations then appear evident, it will become necessary for a reevaluation of the recommendations for this report after performing onsite observations during the construction period and noting the characteristics and variations.

The scope is limited to this specific project and locations described herein and our description of the project represents our understanding of the significant aspects relative to it. In the event that any change in the nature or location of the proposed construction outlined in this report or the accompanying plans and specifications, we should be informed so that the changes can be reviewed and the conclusion of this report modified or approved in writing by the design engineer. No other party should rely on the information contained herein without prior written consent of ECS Mid-Atlantic, LLC.

We cannot be responsible for the evaluations, opinions, interpretations or conclusions of others based on our data and recommendations, including any recommended undercuts or re-design. We recommend that ECS be retained to observe the soil conditions once construction begins in order that we may check that our recommendations are valid. We reserve the right to modify our recommendations based on observations during construction, if it is appropriate to do so at that time.

APPENDIX

Unified Soil Classification System

Reference Notes for Boring Logs

Boring Logs TB-1 through TB-13

Test Pit Logs IN-1 through IN-3

Laboratory Testing Summary (2 pages)

Atterberg Limits Testing Results (1 page)

Particle Size Distribution (1 page)

USDA Textural Classification (1 page)

Infiltration Test Results (2 pages)

Lateral Earth Pressure Diagram – Shallow Foundations

Global Stability Output (7 pages)

Figures

Site Vicinity Map (Sheet 1 of 6)

USGS Topographic Map (Sheet 2 of 6)

Regional Geologic Map (Sheet 3 of 6)

USDA Soils Map (Sheet 4 of 6)

DEP Mine Subsidence Insurance Map (Sheet 5 of 6)

Boring/Infiltration Test Location Diagram (Sheet 6 of 6)

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

| Major Divisions | | Group Symbols | Typical Names | Laboratory Classification Criteria | |
|--|--|--|---|---|--|
| Coarse-grained soils (More than half of material is larger than No. 200 Sieve size) | Gravels (More than half of coarse fraction is larger than No. 4 sieve size) | GW | Well-graded gravels, gravel-sand mixtures, little or no fines | $C_u = D_{60}/D_{10}$ greater than 4 $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ between 1 and 3 | |
| | | GP | Poorly graded gravels, gravel-sand mixtures, little or no fines | Not meeting all gradation requirements for GW | |
| | | GM ^a | d | Atterberg limits below "A" line or P.I. less than 4 | Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols |
| | | | u | | |
| | Sands (More than half of coarse fraction is smaller than No. 4 sieve size) | Gravels with fines (Appreciable amount of fines) | | GC | Clayey gravels, gravel-sand-clay mixtures |
| | | Clean gravels (Little or no fines) | | SW | Well-graded sands, gravelly sands, little or no fines |
| | | Sands with fines (Appreciable amount of fines) | | SP | Poorly graded sands, gravelly sands, little or no fines |
| | | SM ^a | d | Atterberg limits above "A" line or P.I. less than 4 | Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols |
| | | | u | | |
| | | Clayey sands (Appreciable amount of fines) | | SC | Clayey sands, sand-clay mixtures |
| Fine-grained soils (More than half material is smaller than No. 200 Sieve) | Silts and clays (Liquid limit less than 50) | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity | <div style="text-align: center;"> Plasticity Chart </div> | |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays | | |
| | | OL | Organic silts and organic silty clays of low plasticity | | |
| | Silts and clays (Liquid limit greater than 50) | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | | |
| | | CH | Inorganic clays of high plasticity, fat clays | | |
| | | OH | Organic clays of medium to high plasticity, organic silts | | |
| | Highly Organic soils | Pt | Peat and other highly organic soils | | |

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:
 Less than 5 percent GW, GP, SW, SP
 More than 12 percent GM, GC, SM, SC
 Borderline cases requiring dual symbols ^b

^a Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.
^b Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder. (From Table 2.16 - Winterkorn and Fang, 1975)

REFERENCE NOTES FOR BORING LOGS

I. Drilling Sampling Symbols

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

II. Correlation of Penetration Resistances to Soil Properties

Standard Penetration (blows/ft) refers to the blows per foot of a 140 lb. hammer falling 30 inches on a 2-inch OD split-spoon sampler, as specified in ASTM D 1586. The blow count is commonly referred to as the N-value.

A. Non-Cohesive Soils (Silt, Sand, Gravel and Combinations)

| <i>Density</i> | | <i>Relative Properties</i> | |
|-------------------|--------------|----------------------------|------------|
| Under 4 blows/ft | Very Loose | Adjective Form | 12% to 49% |
| 5 to 10 blows/ft | Loose | With | 5% to 12% |
| 11 to 30 blows/ft | Medium Dense | | |
| 31 to 50 blows/ft | Dense | | |
| Over 51 blows/ft | Very Dense | | |

| <i>Particle Size Identification</i> | | |
|-------------------------------------|--------|--|
| Boulders | | 8 inches or larger |
| Cobbles | | 3 to 8 inches |
| Gravel | Coarse | 1 to 3 inches |
| | Medium | ½ to 1 inch |
| | Fine | ¼ to ½ inch |
| Sand | Coarse | 2.00 mm to ¼ inch (dia. of lead pencil) |
| | Medium | 0.42 to 2.00 mm (dia. of broom straw) |
| | Fine | 0.074 to 0.42 mm (dia. of human hair) |
| Silt and Clay | | 0.0 to 0.074 mm (particles cannot be seen) |

B. Cohesive Soils (Clay, Silt, and Combinations)

| <i>Blows/ft</i> | <i>Consistency</i> | <i>Unconfined Comp. Strength Q_p (tsf)</i> | <i>Degree of Plasticity</i> | <i>Plasticity Index</i> |
|-----------------|--------------------|--|---------------------------------|-----------------------------|
| Under 2 | Very Soft | Under 0.25 | None to slight | 0 – 4 |
| 3 to 4 | Soft | 0.25-0.49 | Slight | 5 – 7 |
| 5 to 8 | Medium Stiff | 0.50-0.99 | Medium | 8 – 22 |
| 9 to 15 | Stiff | 1.00-1.99 | High to Very High | Over 22 |
| 16 to 30 | Very Stiff | 2.00-3.00 | | |
| 31 to 50 | Hard | 4.00–8.00 | | |
| Over 51 | Very Hard | Over 8.00 | | |

III. Water Level Measurement Symbols

| | | | | | |
|----|----------------|-----|------------------------|-----|------------------------|
| WL | Water Level | BCR | Before Casing Removal | DCI | Dry Cave-In |
| WS | While Sampling | ACR | After Casing Removal | WCI | Wet Cave-In |
| WD | While Drilling | ▽ | Est. Groundwater Level | ▽ | Est. Seasonal High GWT |

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 a granular soil. In clay and plastic silts, the accurate determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally applied.

| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-1 | | SHEET 1 OF 1 | | |
|--|------------|-----------------------------|-------------------|--|--|--|--------------|------------------------|-----------------------------------|---------------------|
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |
| NORTHING | | EASTING | | STATION | | <div style="display: flex; justify-content: space-between;"> <div> -○- CALIBRATED PENETROMETER TONS/FT² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - </div> <div> PLASTIC LIMIT% X WATER CONTENT% ● LIQUID LIMIT% △ ⊗ STANDARD PENETRATION BLOWS/FT </div> </div> | | | | |
| | | | | | | | | | | |
| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" | |
| 0 | | | | | BOTTOM OF CASING SURFACE ELEVATION 1023 | LOSS OF CIRCULATION | | | | |
| 0 | S-1 | SS | 24 | 24 | Topsoil Depth [4"] | | | 1020 | 1 13 24 28 31 50/3 | |
| | S-2 | SS | 9 | 9 | (SP FILL) SAND, Trace Clay, Roots, and Rock Fragments, Brown and Tan, Moist, Dense | | | 1020 | 9.1 7.9 | |
| | | | | | (SP) SAND WITH ROCK FRAGMENTS, Trace Clay, Light Gray and Tan, Moist, Very Dense | | | 1020 | 37-⊗ 50/3 | |
| 5 | S-3 | SS | 9 | 7 | | | | 1020 | 50/3 | |
| | S-4 | SS | 2 | 2 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Tan, Dry, Dense to Very Dense | | | 1015 | 50/2 | |
| | S-5 | SS | 24 | 24 | | | | 1015 | 48 | |
| 10 | | | | | END OF BORING @ 10' | | | 1010 | | |
| 15 | | | | | | | | 1005 | | |
| 20 | | | | | | | | 1000 | | |
| 25 | | | | | | | | 995 | | |
| 30 | | | | | | | | | | |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | | | |
| WL DRY | | WS <input type="checkbox"/> | | WD <input checked="" type="checkbox"/> | | BORING STARTED | | 12/18/15 | | CAVE IN DEPTH |
| WL(BCR) DRY | | WL(ACR) DRY | | | | BORING COMPLETED | | 12/18/15 | | HAMMER TYPE Auto |
| WL | | | | | | RIG Acker XLS | | FOREMAN Chrys | | DRILLING METHOD HSA |

| | | | | | | | | | | |
|--|--|--|--|--|--|-------------------------|--|------------------------|--|--|
| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-2 | | SHEET 1 OF 1 | | |
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|----------|--|--|--|--|---------|--|--|--|--|---------|--|--|--|--|
| NORTHING | | | | | EASTING | | | | | STATION | | | | |
|----------|--|--|--|--|---------|--|--|--|--|---------|--|--|--|--|

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS ELEVATION (FT) | BLOWS/6" |
|------------|------------|-------------|-------------------|---------------|--|---------------|--------------------------------|----------|
| | | | | | BOTTOM OF CASING LOSS OF CIRCULATION | | | |
| | | | | | SURFACE ELEVATION 1029 | | | |

| | | | | | | | | |
|----|-----|----|----|----|---|--|------|--|
| 0 | S-1 | SS | 24 | 24 | Topsoil Depth [4"] (CL FILL) SANDY LEAN CLAY, Trace Rock Fragments, Brown and Tan, Moist, Very Stiff | | 3 | WOH 3 4 4 10 14 26 31 16 50/5 38 29 30 32 18 24 36 40 50/4 |
| | S-2 | SS | 24 | 22 | (SP) SAND WITH ROCK FRAGMENTS, Trace Clay, Brown, Light Gray, and Tan, Moist, Dense | | 10 | |
| | S-3 | SS | 11 | 10 | (SP) SAND WITH ROCK FRAGMENTS, Tan, Dry, Very Dense | | 14 | |
| 5 | | | | | | | 16 | |
| | S-4 | SS | 24 | 12 | | | 26 | |
| | S-5 | SS | 24 | 24 | | | 31 | |
| 10 | | | | | | | 36 | |
| | | | | | | | 40 | |
| | S-6 | SS | 4 | 4 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Tan, Dry, Very Dense | | 50/4 | |
| | | | | | AUGER REFUSAL @ 13.4' | | | |

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

| | | |
|--|----------------------------------|---------------------|
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | BORING STARTED 12/18/15 | CAVE IN DEPTH |
| WL(BCR) DRY WL(ACR) DRY | BORING COMPLETED 12/18/15 | HAMMER TYPE Auto |
| WL | RIG Acker XLS FOREMAN Chrys | DRILLING METHOD HSA |

| | | | | | | | | | | |
|--|--|--|--|--|--|-------------------------|--|------------------------|--|--|
| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-4 | | SHEET 1 OF 1 | | |
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |

| | | | | | | | |
|----------|--|---------|--|---------|--|--|--|
| NORTHING | | EASTING | | STATION | | ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% STANDARD PENETRATION BLOWS/FT | |
| | | | | | | | |

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS ELEVATION (FT) | BLOWS/6" |
|------------|------------|-------------|-------------------|---------------|--|---------------|--------------------------------|----------|
| | | | | | BOTTOM OF CASING LOSS OF CIRCULATION | | | |
| | | | | | SURFACE ELEVATION 1031 | | | |
| 0 | | | | | Topsoil Depth [4"] | | 1030 | 1 |
| | S-1 | SS | 24 | 18 | (SC FILL) CLAYEY SAND, Trace Rock Fragments, Brown and Dark Brown, Moist, Very Loose | | | 1 |
| | S-2 | SS | 24 | 24 | (SC) CLAYEY SAND, Brown and Tan, Moist, Medium Dense to Dense | | | 1 |
| 5 | S-3 | SS | 24 | 19 | | | | 10 |
| | S-4 | SS | 24 | 17 | (SP) SAND WITH ROCK FRAGMENTS, Brown and Tan, Dry, Dense | | 1025 | 12 |
| | S-5 | SS | 24 | 21 | | | | 13 |
| 10 | | | | | | | | 23 |
| | | | | | | | | 10 |
| | | | | | | | | 13 |
| | | | | | | | | 16 |
| | | | | | | | | 31 |
| | | | | | | | | 22 |
| | | | | | | | | 21 |
| | | | | | | | | 28 |
| | | | | | | | | 33 |
| | | | | | | | | 10 |
| | | | | | | | | 11 |
| | | | | | | | | 31 |
| 15 | | | | | | | | 42 |
| | S-6 | SS | 4 | 4 | WEATHERED ROCK SAMPLED AS SAND, Brown and Tan, Dry, Very Dense | | 1020 | |
| | | | | | | | | 50/4 |
| | | | | | AUGER REFUSAL @ 14' | | | |
| 30 | | | | | | | | |

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

| | | |
|--|----------------------------------|---------------------|
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | BORING STARTED 12/18/15 | CAVE IN DEPTH |
| WL(BCR) DRY WL(ACR) DRY | BORING COMPLETED 12/18/15 | HAMMER TYPE Auto |
| WL | RIG Acker XLS FOREMAN Chrys | DRILLING METHOD HSA |

| | | | | | | | | | | |
|--|--|--|--|--|--|-------------------------|--|------------------------|--|--|
| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-5 | | SHEET 1 OF 1 | | |
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |

| | | | | | | | |
|----------|--|---------|--|---------|--|--|--|
| NORTHING | | EASTING | | STATION | | ROCK QUALITY DESIGNATION & RECOVERY RQD% --- REC% --- PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% ⊗ STANDARD PENETRATION BLOWS/FT | |
| | | | | | | | |

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS ELEVATION (FT) | BLOWS/6" |
|------------|------------|-------------|-------------------|---------------|---|---------------|--------------------------------|----------|
| | | | | | BOTTOM OF CASING LOSS OF CIRCULATION | | | |
| | | | | | SURFACE ELEVATION 1020 | | | |
| 0 | | | | | Topsoil Depth [4"] | | 1020 | 1 |
| | S-1 | SS | 24 | 24 | (CL FILL) LEAN CLAY WITH SAND, Trace Rock Fragments, Brown and Tan, Moist, Soft | | | 2 |
| | S-2 | SS | 15 | 15 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Light Gray and Tan, Dry, Very Dense | | | 4 |
| | S-3 | SS | 3 | 0 | | | | 13 |
| 5 | | | | | | | | 24 |
| | S-4 | SS | 2 | 2 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Trace Roots, Orange, Light Gray, and Tan, Dry, Very Dense | | | 50/3 |
| | S-5 | SS | 8 | 6 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Light Gray, Dry, Very Dense | | | 50/3 |
| 10 | | | | | | | | 50/2 |
| | S-6 | SS | 15 | 14 | WEATHERED ROCK SAMPLED AS LEAN CLAY WITH ROCK FRAGMENTS, Dark Gray Tan and Black, Dry, Very Hard | | | 50/1 |
| 15 | | | | | | | | 23 |
| | | | | | | | | 34 |
| | | | | | | | | 50/3 |
| 20 | | | | | AUGER REFUSAL @ 16.5' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |

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

| | | |
|--|---|----------------------------|
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | BORING STARTED 12/18/15 | CAVE IN DEPTH |
| WL(BCR) DRY WL(ACR) DRY | BORING COMPLETED 12/18/15 | HAMMER TYPE Auto |
| WL | RIG Acker XLS FOREMAN Chrys | DRILLING METHOD HSA |

| | | | | | | | | | | |
|--|--|--|--|--|--|-------------------------|--|------------------------|--|--|
| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-6 | | SHEET 1 OF 1 | | |
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |

| | | | | | | | |
|----------|--|---------|--|---------|--|--|--|
| NORTHING | | EASTING | | STATION | | ROCK QUALITY DESIGNATION & RECOVERY RQD% — — — REC% — — — PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% STANDARD PENETRATION BLOWS/FT | |
| | | | | | | | |

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|------------|------------|-------------|-------------------|---------------|---|---------------------|--------------|----------------|----------|
| | | | | | BOTTOM OF CASING | LOSS OF CIRCULATION | | | |
| 0 | | | | | SURFACE ELEVATION 1027 | | | | |
| 0 | S-1 | SS | 24 | 24 | Topsoil Depth [4"] (CL FILL) LEAN CLAY WITH SAND, Trace Roots and Rock Fragments, Brown and Tan, Moist, Soft | | | 1025 | 2 |
| 0 | S-2 | SS | 24 | 24 | (SP) SAND WITH ROCK FRAGMENTS, Light Gray and Tan, Dry, Dense to Very Dense | | | 1020 | 7 |
| 5 | S-3 | SS | 24 | 24 | (SP) SAND WITH ROCK FRAGMENTS, Trace Clay, Tan, Dry, Dense | | | 1015 | 12 |
| 5 | S-4 | SS | 24 | 24 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Light Gray and Tan, Dry, Very Dense | | | 1010 | 25 |
| 5 | S-5 | SS | 3 | 3 | AUGER REFUSAL @ 12' | | | 1005 | 41 |
| 10 | | | | | | | | 1000 | 50/3 |

| | | | | | | | | | |
|--|--|------------------|--|---------------|--|---------------------|--|--|--|
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | | |
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | | BORING STARTED | | 12/17/15 | | CAVE IN DEPTH | | | |
| WL(BCR) DRY WL(ACR) DRY | | BORING COMPLETED | | 12/17/15 | | HAMMER TYPE Auto | | | |
| WL | | RIG Acker XLS | | FOREMAN Chrys | | DRILLING METHOD HSA | | | |

| | | | | | | | | | | |
|--|--|--|--|--|--|-------------------------|--|------------------------|--|--|
| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-7 | | SHEET 1 OF 1 | | |
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |

| | | | | | | | | | |
|----------|--|---------|--|---------|--|--|--|--|--|
| NORTHING | | EASTING | | STATION | | ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% ⊗ STANDARD PENETRATION BLOWS/FT | | | |
| | | | | | | | | | |

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS ELEVATION (FT) | BLOWS/6" |
|------------|------------|-------------|-------------------|---------------|---|---------------------|--------------------------------|----------|
| | | | | | BOTTOM OF CASING | LOSS OF CIRCULATION | | |
| | | | | | SURFACE ELEVATION 1023 | | | |
| 0 | S-1 | SS | 24 | 24 | Topsoil Depth [4"] (CL FILL) SANDY LEAN CLAY, Trace Roots, Brown and Tan, Moist, Medium Stiff to Hard | | 1020 | 6 |
| | S-2 | SS | 24 | 24 | | | | 33 |
| 5 | S-3 | SS | 24 | 24 | (SP) SAND WITH ROCK FRAGMENTS, Brown Light Gray and Tan, Dry, Dense | | 1015 | 32 |
| | S-4 | SS | 24 | 24 | | | | 42 |
| | S-5 | SS | 24 | 24 | | | | 44 |
| 10 | | | | | AUGER REFUSAL @ 11.5' | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |

| | | | | | |
|--|--|--|--|------------------------|--|
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | |
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | | BORING STARTED 12/17/15 | | CAVE IN DEPTH | |
| WL(BCR) DRY WL(ACR) DRY | | BORING COMPLETED 12/17/15 | | HAMMER TYPE Auto | |
| WL | | RIG Acker XLS FOREMAN Chrys | | DRILLING METHOD HSA | |

| | | | | | | | | | | |
|--|--|--|--|--|--|-------------------------|--|------------------------|--|--|
| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-8 | | SHEET 1 OF 1 | | |
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|----------|--|--|--|--|---------|--|--|--|--|---------|--|--|--|--|
| NORTHING | | | | | EASTING | | | | | STATION | | | | |
|----------|--|--|--|--|---------|--|--|--|--|---------|--|--|--|--|

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" | ROCK QUALITY DESIGNATION & RECOVERY | | | | | | |
|------------|----------------------|-------------|-------------------|---------------|---|---------------|---------------------|----------------|----------|-------------------------------------|------------|------|------|--|--|--|
| | | | | | | | | | | RQD% - - - | REC% - - - | | | | | |
| | | | | | BOTTOM OF CASING | | LOSS OF CIRCULATION | | | | | | | | | |
| | | | | | SURFACE ELEVATION 1012 | | | | | | | | | | | |
| 0 | S-1 | SS | 24 | 24 | Topsoil Depth [4"] (CL FILL) LEAN CLAY WITH SAND, Trace Roots, Brown, Light Gray, and Tan, Moist, Very Stiff | | | 1010 | 3 | 10.1 | 17 | 65/9 | | | | |
| | S-2 | SS | 15 | 15 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Brown and Tan, Dry, Very Dense | | | 1005 | 12 | 6.5 | | | | | | |
| | S-3 | SS | 11 | 11 | | | | | 50/3 | NP | | | | | | |
| 5 | S-4 | SS | 5 | 5 | | | | | 50/5 | NP | | | 50/5 | | | |
| | S-5 | SS | 3 | 3 | | | | | 50/5 | | | | 50/5 | | | |
| 10 | AUGER REFUSAL @ 8.3' | | | | | | | | 50/3 | | | | 50/3 | | | |
| 15 | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | |

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

| | | | | | |
|--|--|--|--|------------------------|--|
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | | BORING STARTED 12/17/15 | | CAVE IN DEPTH | |
| WL(BCR) DRY WL(ACR) DRY | | BORING COMPLETED 12/17/15 | | HAMMER TYPE Auto | |
| WL | | RIG Acker XLS FOREMAN Chrys | | DRILLING METHOD HSA | |

| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-9 | | SHEET 1 OF 1 | | |
|--|------------|------------------|-------------------|--|--|---|--------------|------------------------|----------|--|
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |
| NORTHING | | EASTING | | STATION | | <div style="display: flex; justify-content: space-between;"> <div> -○- CALIBRATED PENETROMETER TONS/FT² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - </div> <div> PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% X ● △ ⊗ STANDARD PENETRATION BLOWS/FT </div> </div> | | | | |
| | | | | | | | | | | |
| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" | |
| | | | | | BOTTOM OF CASING | LOSS OF CIRCULATION | | | | |
| | | | | | SURFACE ELEVATION | 1013 | | | | |
| 0 | S-1 | SS | 24 | 24 | (CL FILL) LEAN CLAY WITH SAND, Trace Roots and Rock Fragments, Brown and Light Gray, Moist, Medium Stiff to Very Stiff | | | 1010 | 7-14.8 | |
| | S-2 | SS | 24 | 23 | | | | | 10.2 | |
| 5 | S-3 | SS | 24 | 24 | (SP) SAND WITH ROCK FRAGMENTS, Light Gray and Tan, Dry, Dense | | | 1005 | 30 | |
| | S-4 | SS | 24 | 24 | (CL) LEAN CLAY WITH SAND, Trace Rock Fragments, Orange Tan and Black, Moist, Hard | | | | 31 | |
| | S-5 | SS | 24 | 24 | (SP) SAND WITH ROCK FRAGMENTS, Light Gray and Tan, Dry, Dense | | | | 44 | |
| 10 | | | | | END OF BORING @ 10' | | | | 34 | |
| 15 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | | | |
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | | BORING STARTED | | 12/17/15 | | CAVE IN DEPTH | | | | |
| WL(BCR) DRY WL(ACR) DRY | | BORING COMPLETED | | 12/17/15 | | HAMMER TYPE Auto | | | | |
| WL | | RIG Acker XLS | | FOREMAN Chrys | | DRILLING METHOD HSA | | | | |

| | | | | | | | | | | |
|--|--|--|--|--|--|--------------------------|--|------------------------|--|--|
| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-10 | | SHEET 1 OF 1 | | |
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | |
|----------|--|--|--|--|---------|--|--|--|--|---------|--|--|--|--|---|--|--|--|--|
| NORTHING | | | | | EASTING | | | | | STATION | | | | | -○- CALIBRATED PENETROMETER TONS/FT ² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% X ● △ ⊗ STANDARD PENETRATION BLOWS/FT | | | | |
| | | | | | | | | | | | | | | | | | | | |

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|------------|------------|-------------|-------------------|---------------|--|---------------------|--------------|----------------|----------|
| | | | | | BOTTOM OF CASING | LOSS OF CIRCULATION | | | |
| | | | | | SURFACE ELEVATION 1009 | | | | |
| 0 | S-1 | SS | 24 | 24 | Topsoil Depth [4"] (CL FILL) LEAN CLAY WITH SAND, Trace Roots, Brown, Tan, and Black, Moist, Medium Stiff | | | 1005 | 22.6 |
| | S-2 | SS | 24 | 24 | (SP) SAND WITH ROCK FRAGMENTS, Trace Clay, Orange, Brown, and Black, Moist, Medium Dense to Dense | | | 1005 | 17.6 |
| 5 | S-3 | SS | 24 | 24 | | | | 1005 | 26 |
| | S-4 | SS | 24 | 24 | | | | 1005 | 41 |
| 10 | S-5 | SS | 24 | 24 | | | | 1000 | 52 |
| | | | | | END OF BORING @ 10' | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |




| | | | | | | | | | |
|--|--|---|--|----------------------------|--|--|--|--|--|
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | | |
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | | BORING STARTED 12/17/15 | | CAVE IN DEPTH | | | | | |
| WL(BCR) DRY WL(ACR) DRY | | BORING COMPLETED 12/17/15 | | HAMMER TYPE Auto | | | | | |
| WL | | RIG Acker XLS FOREMAN Chrys | | DRILLING METHOD HSA | | | | | |




| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-11 | | SHEET 1 OF 1 | | |
|--|------------|-------------|-------------------|--|--|---|--------------|------------------------|----------------------------|---------------------------------|
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |
| NORTHING | | EASTING | | STATION | | <div style="display: flex; justify-content: space-between;"> <div> -○- CALIBRATED PENETROMETER TONS/FT² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - </div> <div> PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% X ● △ ⊗ STANDARD PENETRATION BLOWS/FT </div> </div> | | | | |
| | | | | | | | | | | |
| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" | |
| 0 | | | | | TOPSOIL DEPTH [4"] (CL FILL) SANDY LEAN CLAY WITH ROCK FRAGMENTS, Trace Roots, Brown and Tan, Moist, Very Stiff WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Brown Light Gray and Tan, Dry to Moist, Very Dense | | | 1023 | | |
| 3 | S-1 | SS | 24 | 24 | | | | 1020 | 3 6 13 14 50/5 | |
| | S-2 | SS | 5 | 3 | | | | | | 5.6 12.9 19 50/5 |
| 5 | S-3 | SS | 11 | 11 | | | | | | 30 50/5 |
| | S-4 | SS | 3 | 3 | | | | | | 50/3 |
| | S-5 | SS | 11 | 10 | | | | | | 36 50/5 |
| 10 | | | | | AUGER REFUSAL @ 11' | | | | 50/5 | |
| 15 | | | | | | | | | | |
| 20 | | | | | | | | | | |
| 25 | | | | | | | | | | |
| 30 | | | | | | | | | | |

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

| | | |
|--|----------------------------------|---------------------|
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | BORING STARTED 12/17/15 | CAVE IN DEPTH |
| WL(BCR) DRY WL(ACR) DRY | BORING COMPLETED 12/17/15 | HAMMER TYPE Auto |
| WL | RIG Acker XLS FOREMAN Chrys | DRILLING METHOD HSA |

| CLIENT Red Swing Group | | | | JOB # 1547 | | BORING # TB-12 | | SHEET 1 OF 1 | | |
|--|------------|------------------|-------------------|--|--|---|--------------|------------------------|----------|--|
| PROJECT NAME Hampton Inn & Suites | | | | ARCHITECT-ENGINEER Red Swing Group | | | | | | |
| SITE LOCATION New Stanton Borough, Westmoreland County, PA | | | | | | | | | | |
| NORTHING | | EASTING | | STATION | | <div style="display: flex; justify-content: space-between;"> <div> -○- CALIBRATED PENETROMETER TONS/FT² ROCK QUALITY DESIGNATION & RECOVERY RQD% - - - REC% - - - </div> <div> PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT% ✕ ● △ ⊗ STANDARD PENETRATION BLOWS/FT </div> </div> | | | | |
| | | | | | | | | | | |
| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" | |
| | | | | | BOTTOM OF CASING LOSS OF CIRCULATION SURFACE ELEVATION 1030 | | | | | |
| 0 | S-1 | SS | 24 | 24 | Topsoil Depth [4"] (CL FILL) SANDY LEAN CLAY WITH ROCK FRAGMENTS, Trace Roots, Brown and Tan, Moist, Very Stiff to Hard | | | 1030 | 3 | |
| | S-2 | SS | 24 | 21 | | | | 1028 | 5 | |
| | S-3 | SS | 5 | 4 | | | | 1026 | 12 | |
| 5 | S-4 | SS | 3 | 1 | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Brown, Light Gray, and Tan, Dry, Very Dense | | | 1025 | 12 | |
| | S-5 | SS | 2 | 1 | | | | 1023 | 19 | |
| 10 | | | | | | | | 1020 | 26 | |
| | | | | | | | | 1018 | 16 | |
| 15 | | | | | | | | 1015 | 50/5 | |
| | | | | | | | | 1013 | 50/3 | |
| 20 | | | | | | | | 1010 | 50/2 | |
| 25 | | | | | | | | 1008 | | |
| 30 | | | | | | | | 1005 | | |
| | | | | | AUGER REFUSAL @ 12.5' | | | 1000 | | |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | | | |
| WL DRY WS <input type="checkbox"/> WD <input checked="" type="checkbox"/> | | BORING STARTED | | 12/17/15 | | CAVE IN DEPTH | | | | |
| WL(BCR) DRY WL(ACR) DRY | | BORING COMPLETED | | 12/17/15 | | HAMMER TYPE Auto | | | | |
| WL | | RIG Acker XLS | | FOREMAN Chrys | | DRILLING METHOD HSA | | | | |

| PROJECT NAME: Hampton Inn & Suites | | | | | | TEST PIT #: IN-1 | |  | |
|--|-------------|---|-------------------------|--|-----|---------------------------|------------|---|--|
| CLIENT: Red Swing Group | | | | JOB #: 1547 | | SURFACE ELEVATION 1022 | | | |
| LOCATION: New Stanton Borough, Westmoreland County, PA | | ARCH/ENG: Red Swing Group | | | | | | | |
| DEPTH (FT.) | ELEV. (FT.) | DESCRIPTION OF MATERIAL | | EXCAV. EFFORT | DCP | QP (TSF) | SAMPLE NO. | MOIST. CONT. (%) | |
| 0 | | Topsoil Depth [4"] (SP FILL) SAND, Trace Clay, Roots, and Rock Fragments, Brown and Tan, Moist | | M | | | | | |
| 1020 | | WEATHERED ROCK SAMPLED AS SAND WITH ROCK FRAGMENTS, Tan, Dry | | D | | | | | |
| 5 | | END OF TEST PIT @ 3.5' | | | | | | | |
| 1015 | | | | | | | | | |
| 10 | | | | | | | | | |
| 1010 | | | | | | | | | |
| 15 | | | | | | | | | |
| 1005 | | | | | | | | | |
| 20 | | | | | | | | | |
| 1000 | | | | | | | | | |
| 25 | | | | | | | | | |
| 995 | | | | | | | | | |
| 30 | | | | | | | | | |
| 990 | | | | | | | | | |
| REMARKS: | | | | | | | | | |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | | |
| GROUND WATER: FIRST CHECK  SECOND CHECK  | | | | EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT | | | | | |
| CONTRACTOR: ECS Mid-Atlantic, LLC. | | | OPERATOR: I. Johnson | | | MAKE: | | | |
| MODEL: | | | REACH: | | | CAPACITY: | | | |
| ECS REP.: I. Johnson | | DATE: 12/15/15 | | UNITS: English | | Cave-in Depth: | | Groundwater While Drilling: Groundwater: None | |

| | | | | | | | | |
|---|-------------------|--|------------------------------|-----------------------------|---------------------------|-----------|---|------------------|
| PROJECT NAME: Hampton Inn & Suites | | | | | TEST PIT #: IN-2 | |  | |
| CLIENT: Red Swing Group | | | JOB #: 1547 | | SURFACE ELEVATION 1009 | | | |
| LOCATION: New Stanton Borough, Westmoreland County, PA | | | ARCH/ENG: Red Swing Group | | EXCAV. EFFORT | | | |
| DEPTH (FT.) | ELEV. (FT.) | | | | DCP | QP (TSF) | SAMPLE NO. | MOIST. CONT. (%) |
| DESCRIPTION OF MATERIAL | | | | | | | | |
| 0 | | Topsoil Depth [8"] | | | M | | | |
| | | (SP FILL) GRAVELLY SAND WITH CLAY, Trace Silt and Roots, Dark Brown, Moist | | | M | | | |
| | | (GM) SILTY GRAVEL WITH SAND, Trace Clay, Brown and Orange, Moist | | | | | | |
| 1005 | | END OF TEST PIT @ 3.5' | | | | | | |
| 5 | | | | | | | | |
| 1000 | | | | | | | | |
| 10 | | | | | | | | |
| 995 | | | | | | | | |
| 15 | | | | | | | | |
| 990 | | | | | | | | |
| 20 | | | | | | | | |
| 985 | | | | | | | | |
| 25 | | | | | | | | |
| 980 | | | | | | | | |
| 30 | | | | | | | | |
| REMARKS: | | | | | | | | |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | |
| GROUND WATER: FIRST CHECK  SECOND CHECK  EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT | | | | | | | | |
| CONTRACTOR: ECS Mid-Atlantic, LLC. | | | OPERATOR: I. Johnson | | | MAKE: | | |
| MODEL: | | | REACH: | | | CAPACITY: | | |
| ECS REP.: I. Johnson | DATE: 12/15/15 | UNITS: English | Cave-in Depth: | Groundwater While Drilling: | Groundwater: None | | | |

| PROJECT NAME: Hampton Inn & Suites | | | | | TEST PIT #: IN-3 | | | |
|--|-------------------|--|------------------------------|-----------------------------|---------------------------|------------|------------------|--|
| CLIENT: Red Swing Group | | | JOB #: 1547 | | SURFACE ELEVATION 1013 | | | |
| LOCATION: New Stanton Borough, Westmoreland County, PA | | | ARCH/ENG: Red Swing Group | | | | | |
| DEPTH (FT.) | ELEV. (FT.) | DESCRIPTION OF MATERIAL | EXCAV. EFFORT | DCP | QP (TSF) | SAMPLE NO. | MOIST. CONT. (%) | |
| 0 | | Topsoil Depth [8"] (GP FILL) GRAVELLY SAND WITH CLAY, Trace Silt and Roots, Dark Brown, Moist | M | | | | | |
| 1010 | | (ML) SANDY SILT WITH ROCK FRAGMENTS, Trace Clay, Brown, Moist | M | | | | | |
| 5 | | (SM) SILTY SAND WITH ROCK FRAGMENTS, Trace CLay, Orangish Tan and Brown, Moist END OF TEST PIT @ 4.5' | M | | | | | |
| 1005 | | | | | | | | |
| 10 | | | | | | | | |
| 1000 | | | | | | | | |
| 15 | | | | | | | | |
| 995 | | | | | | | | |
| 20 | | | | | | | | |
| 990 | | | | | | | | |
| 25 | | | | | | | | |
| 985 | | | | | | | | |
| 30 | | | | | | | | |
| 980 | | | | | | | | |
| REMARKS: | | | | | | | | |
| THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL. | | | | | | | | |
| GROUND WATER: FIRST CHECK SECOND CHECK EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT | | | | | | | | |
| CONTRACTOR: ECS Mid-Atlantic, LLC. | | | OPERATOR: I. Johnson | | | MAKE: | | |
| MODEL: | | | REACH: | | | CAPACITY: | | |
| ECS REP.: I. Johnson | DATE: 12/15/15 | UNITS: English | Cave-in Depth: | Groundwater While Drilling: | Groundwater: None | | | |

Laboratory Testing Summary

Page 1 of 2

| Sample Source | Sample Number | Depth (feet) | MC ¹ (%) | Soil Type ² | Atterberg Limits ³ | | | Percent Passing No. 200 Sieve ⁴ | Moisture - Density (Corr.) ⁵ | | CBR Value ⁶ | Other |
|---------------|---------------|--------------|---------------------|------------------------|-------------------------------|----|----|--|---|----------------------|------------------------|-------|
| | | | | | LL | PL | PI | | Maximum Density (pcf) | Optimum Moisture (%) | | |
| TB-1 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 9.1 | | | | | | | | | |
| | S-2 | 2.00 - 2.75 | 7.9 | | | | | | | | | |
| TB-2 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 7.8 | | | | | | | | | |
| | S-2 | 2.00 - 4.00 | 6.1 | | | | | | | | | |
| TB-3 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 14.6 | | | | | | | | | |
| | S-2 | 2.00 - 2.75 | 5.0 | | | | | | | | | |
| TB-4 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 17.3 | SC | 24 | 16 | 8 | 39.0 | | | | |
| | S-2 | 2.00 - 4.00 | 5.5 | | | | | | | | | |
| TB-5 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 11.0 | | | | | | | | | |
| | S-2 | 2.00 - 3.25 | 4.2 | | | | | | | | | |
| TB-6 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 16.3 | | | | | | | | | |
| | S-2 | 2.00 - 4.00 | 7.8 | | | | | | | | | |
| TB-7 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 15.2 | | | | | | | | | |
| TB-8 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 10.1 | | | | | | | | | |
| | S-2 | 2.00 - 3.25 | 6.5 | | | | | | | | | |
| | S-3 | 4.00 - 4.92 | | SP | NP | NP | NP | 11.0 | | | | |
| TB-9 | | | | | | | | | | | | |
| | S-1 | 0.00 - 2.00 | 14.8 | | | | | | | | | |
| | S-2 | 2.00 - 4.00 | 10.2 | | | | | | | | | |
| TB-10 | | | | | | | | | | | | |

Notes:

1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

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 (ASTM D 2974)

Project No. 1547
 Project Name: Hampton Inn & Suites
 PM: Joel W. Glazer
 PE: Jeffrey A. Shelton
 Printed On: Friday, January 15, 2016

 **ECS MID-ATLANTIC, LLC**
 500 Bursca Drive, Suite 506
 Bridgeville, PA 15017
 Phone: (412) 206-1470
 Fax: (412) 221-3131

Laboratory Testing Summary

Page 2 of 2

[illegible]

Notes:

1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

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 (ASTM D 2974)

Project No.

1547

Project Name:

Hampton Inn & Suites

PM:

Joel W. Glazer

PE:

Jeffrey A. Shelton

Printed On:

Friday, January 15, 2016



ECS MID-ATLANTIC, LLC

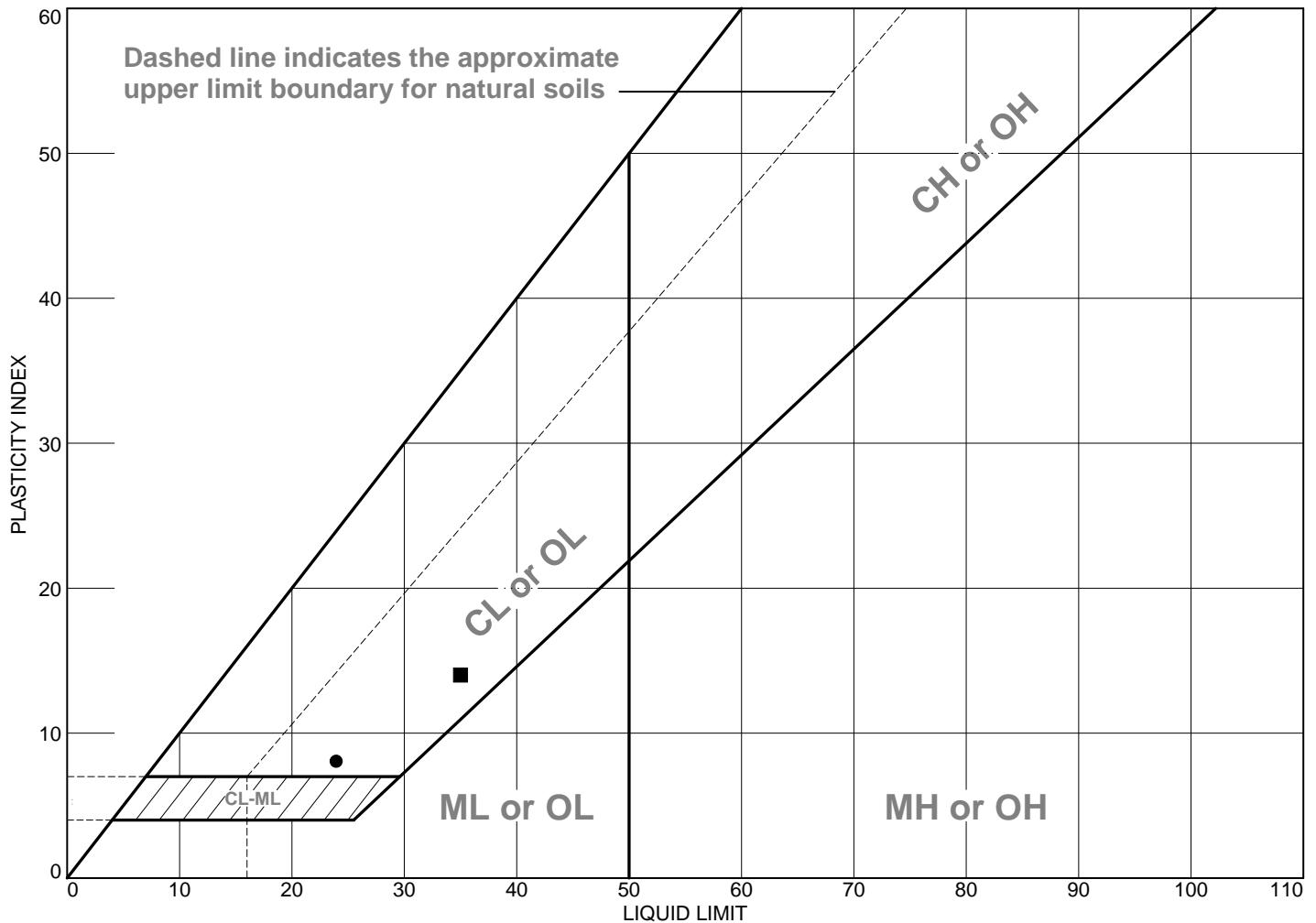
500 Bursca Drive, Suite 506

Bridgeville, PA 15017

Phone: (412) 206-1470

Fax: (412) 221-3131

LIQUID AND PLASTIC LIMITS TEST REPORT



| | MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS |
|---|--|----|----|----|-------|--------|------|
| ● | (SC FILL) CLAYEY SAND, Trace Rock Fragments, Brown and Dark Brown, Moist, Very Loose | 24 | 16 | 8 | NV | 39.0 | SC |
| ■ | (CL FILL) LEAN CLAY, Trace Sand and Gravel, Brown and Tan, Moist, Medium Stiff | 35 | 21 | 14 | 12.0 | 85.1 | CL |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Project No. 1547 **Client:** Red Swing Group

Project: Hampton Inn & Suites

● **Source of Sample:** TB-4

Depth: 0.00-2.00

Sample Number: S-1

■ **Source of Sample:** TB-13

Depth: 2.00-4.00

Sample Number: S-2

Remarks:



ECS MID-ATLANTIC, LLC

500 Bursca Drive, Suite 506
Bridgeville, PA 15017

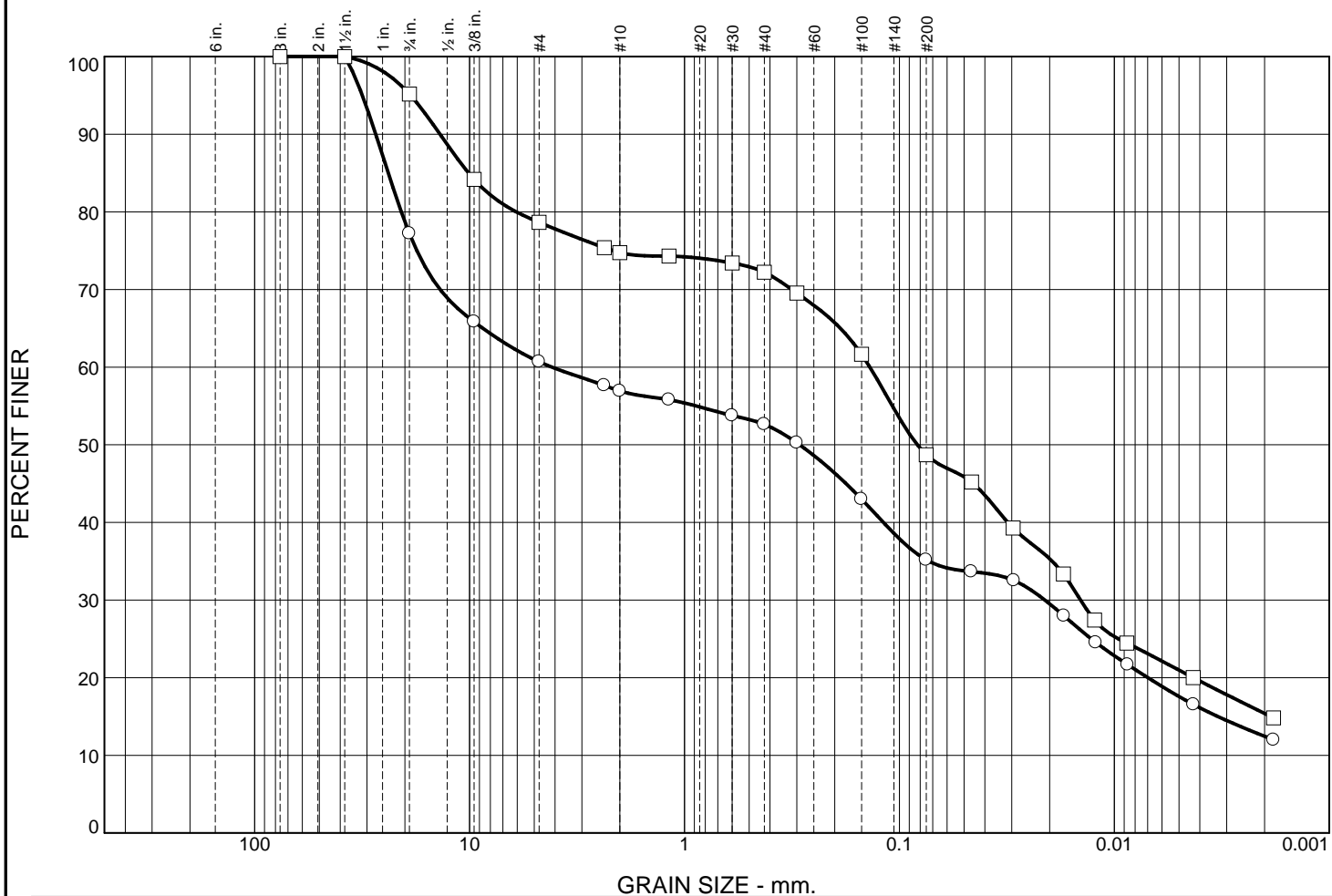
Phone: (412) 206-1470
Fax: (412) 221-3131

Figure

Tested By: PTS



Checked By: IFJ

Particle Size Distribution Report



| | % Stones | % +3" | % Gravel | | | % Sand | | | | | % Silt | | % Clay |
|---|----------|-------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|--------|------|--------|
| | | | Coarse | Medium | Fine | V. Crs. | Crs. | Med. | Fine | V. Fine | Crs. | Fine | |
| ○ | 0.0 | 0.0 | 22.8 | 16.5 | 3.8 | 1.5 | 2.1 | 4.7 | 10.7 | 4.0 | 4.4 | 17.0 | 12.5 |
| □ | 0.0 | 0.0 | 4.8 | 16.5 | 3.9 | 0.6 | 1.3 | 4.9 | 14.5 | 7.2 | 11.0 | 19.9 | 15.4 |
| × | LL | PL | D ₈₅ | D ₆₀ | D ₅₀ | D ₃₀ | D ₁₅ | D ₁₀ | C _c | C _u | | | |
| ○ | | | 23.8925 | 4.1368 | 0.2912 | 0.0210 | 0.0033 | | | | | | |
| □ | | | 10.1003 | 0.1372 | 0.0825 | 0.0144 | 0.0019 | | | | | | |

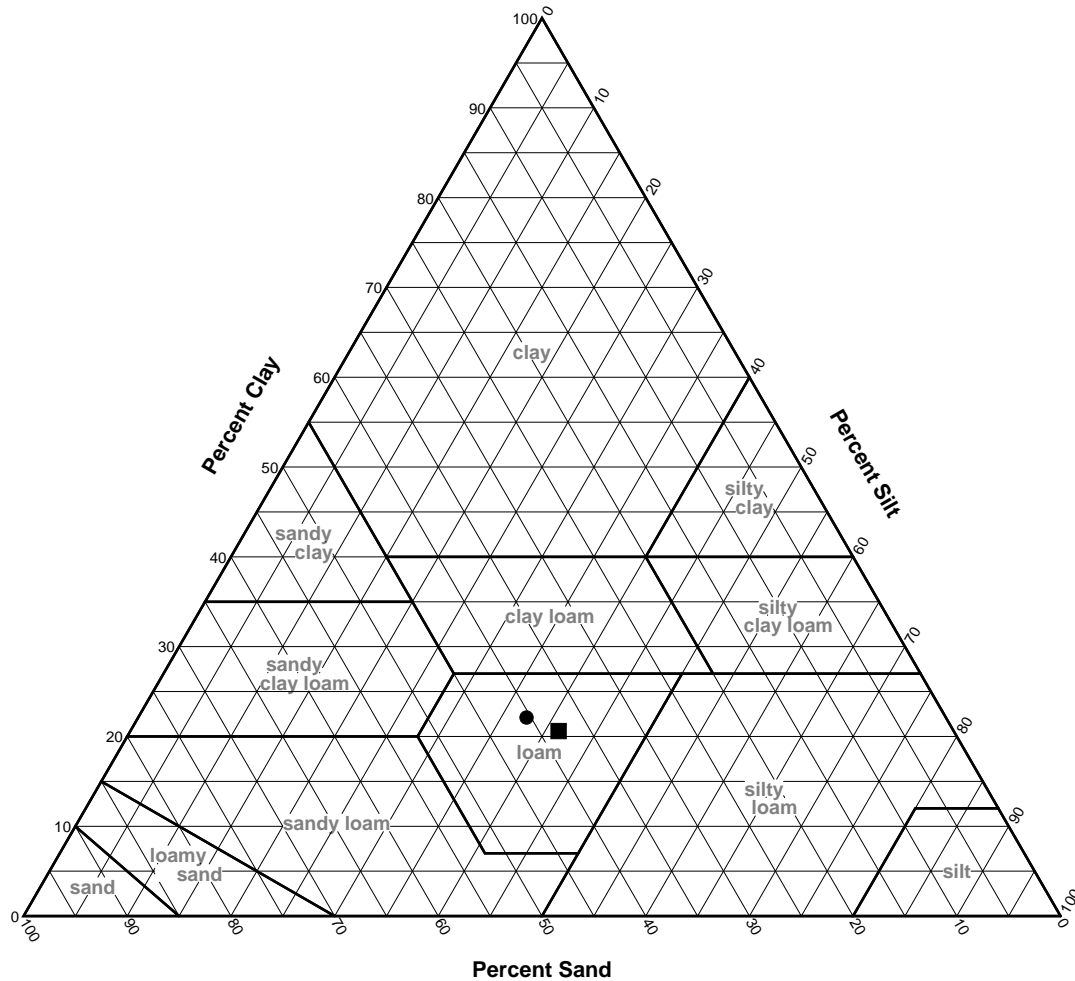
| MATERIAL DESCRIPTION | | | | | | | | | | TEST DATE | USCS | NM |
|--|--|--|--|--|--|--|--|--|--|-----------|------|----|
| ○ (GM) SILTY GRAVEL WITH SAND, Trace Clay, Brown and Orange, Moist | | | | | | | | | | 12/22/15 | | |
| □ (ML) SANDY SILT WITH ROCK FRAGMENTS, Trace Clay, Brown, Moist | | | | | | | | | | 12/22/15 | | |

| | | |
|---|--|---|
| Project No. 1547 Client: Red Swing Group Project: Hampton Inn & Suites | | Remarks: ○ USDA Classification: Loam □ USDA Classification: Loam |
| ○ Source of Sample: TP-2 Depth: 1.50-2.00 Sample Number: BS-1 □ Source of Sample: TP-3 Depth: 2.50-3.00 Sample Number: BS-1 | | |
| <div>  ECS MID-ATLANTIC, LLC 500 Bursca Drive, Suite 506 Bridgeville, PA 15017 </div> <div> Phone: (412) 206-1470 Fax: (412) 221-3131 </div> | | |
| <div>  ECS MID-ATLANTIC, LLC 500 Bursca Drive, Suite 506 Bridgeville, PA 15017 </div> <div> Phone: (412) 206-1470 Fax: (412) 221-3131 </div> | | |

Figure

Tested By: PTS Checked By: IFJ

USDA Soil Classification



SOIL DATA

| | Source | Sample No. | Depth | Percentages From Material Passing a #10 Sieve | | | Classification |
|---|--------|------------|-----------|---|------|------|----------------|
| | | | | Sand | Silt | Clay | |
| ● | TP-2 | BS-1 | 1.50-2.00 | 40.4 | 37.6 | 22.0 | Loam |
| ■ | TP-3 | BS-1 | 2.50-3.00 | 38.1 | 41.3 | 20.6 | Loam |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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ECS MID-ATLANTIC, LLC
 500 Bursca Drive, Suite 506
 Bridgeville, PA 15017
 Phone: (412) 206-1470
 Fax: (412) 221-3131

Client: Red Swing Group
Project: Hampton Inn & Suites

Project No.: 1547

Figure

ECS Project # 40.1547
Hampton Inn and Suites
New Stanton, Westmoreland County, Pennsylvania

Infiltration Testing Field Measurements

Date Tested: 12/18/2015

| Field Data Test Depth | IN-2 | |
|--|----------|--------------|
| | 1.5 feet | |
| | Time | Reading (in) |
| Presoak Start/Water Depth | 9:58 | 0.000 |
| Presoak 30 Min | 10:28 | 0.250 |
| Presoak 60 Min | 10:58 | 0.125 |
| START TEST | | |
| Reading Interval | 30 min | |
| Reading # 1 (in) | 11:28 | 0.125 |
| Reading # 2 (in) | 11:58 | 0.125 |
| Reading # 3 (in) | 12:28 | 0.063 |
| Reading # 4 (in) | 12:58 | 0.063 |
| Reading # 5 (in) | | |
| Reading # 6 (in) | | |
| Reading # 7 (in) | | |
| Reading # 8 (in) | | |
| O.D. of Double Ring Infiltrometer (in) | 6.00 | |
| Initial Water Depth (in) | 10.00 | |
| Final Water Level Drop (in) | 0.06 | |
| Average Reading (in) | 0.09 | |
| Infiltration Rate (in/hr) | 0.19 | |
| Infiltration Rate (in/hr) (w/ FOS = 2) | 0.09 | |

Notes:

1. Infiltrometer refilled to water depth of 10 inches (inner and outer ring) after each reading.

ECS Project # 40.1547
Hampton Inn and Suites
New Stanton, Westmoreland County, Pennsylvania

Infiltration Testing Field Measurements

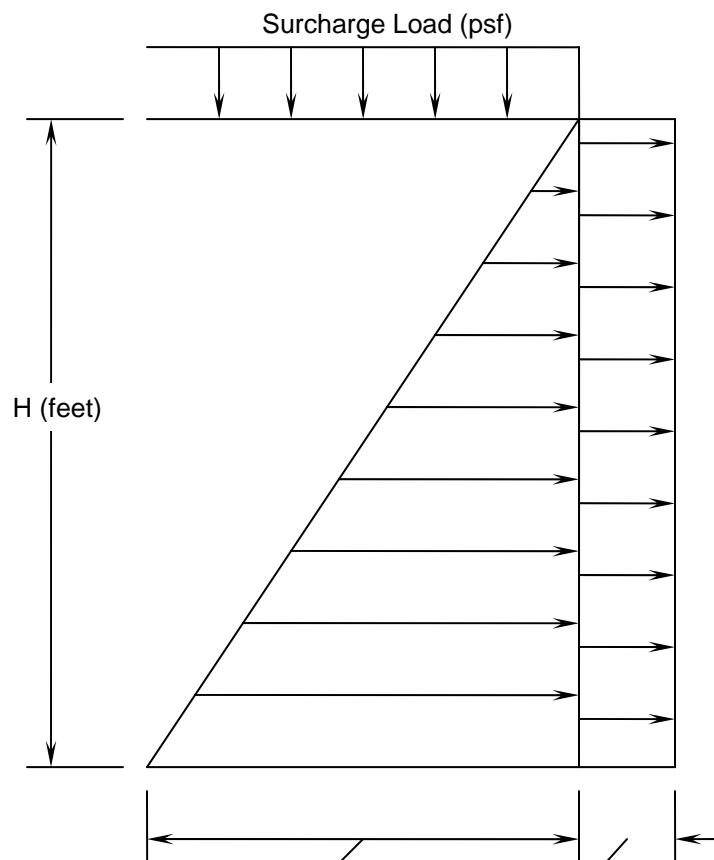
Date Tested: 12/18/2015

| Field Data Test Depth | IN-3 | |
|--|----------|--------------|
| | 2.5 feet | |
| | Time | Reading (in) |
| Presoak Start/Water Depth | 9:55 | 0.000 |
| Presoak 30 Min | 10:25 | 0.375 |
| Presoak 60 Min | 10:55 | 0.125 |
| START TEST | | |
| Reading Interval | 30 min | |
| Reading # 1 (in) | 11:25 | 0.125 |
| Reading # 2 (in) | 11:55 | 0.063 |
| Reading # 3 (in) | 12:25 | 0.125 |
| Reading # 4 (in) | 12:55 | 0.063 |
| Reading # 5 (in) | | |
| Reading # 6 (in) | | |
| Reading # 7 (in) | | |
| Reading # 8 (in) | | |
| O.D. of Double Ring Infiltrometer (in) | 6.00 | |
| Initial Water Depth (in) | 10.00 | |
| Final Water Level Drop (in) | 0.06 | |
| Average Reading (in) | 0.09 | |
| Infiltration Rate (in/hr) | 0.19 | |
| Infiltration Rate (in/hr) (w/ FOS = 2) | 0.09 | |

Notes:

1. Infiltrometer refilled to water depth of 10 inches (inner and outer ring) after each reading.

LATERAL EARTH PRESSURE DIAGRAM
(DRAINED CONDITION) – SPREAD FOOTINGS



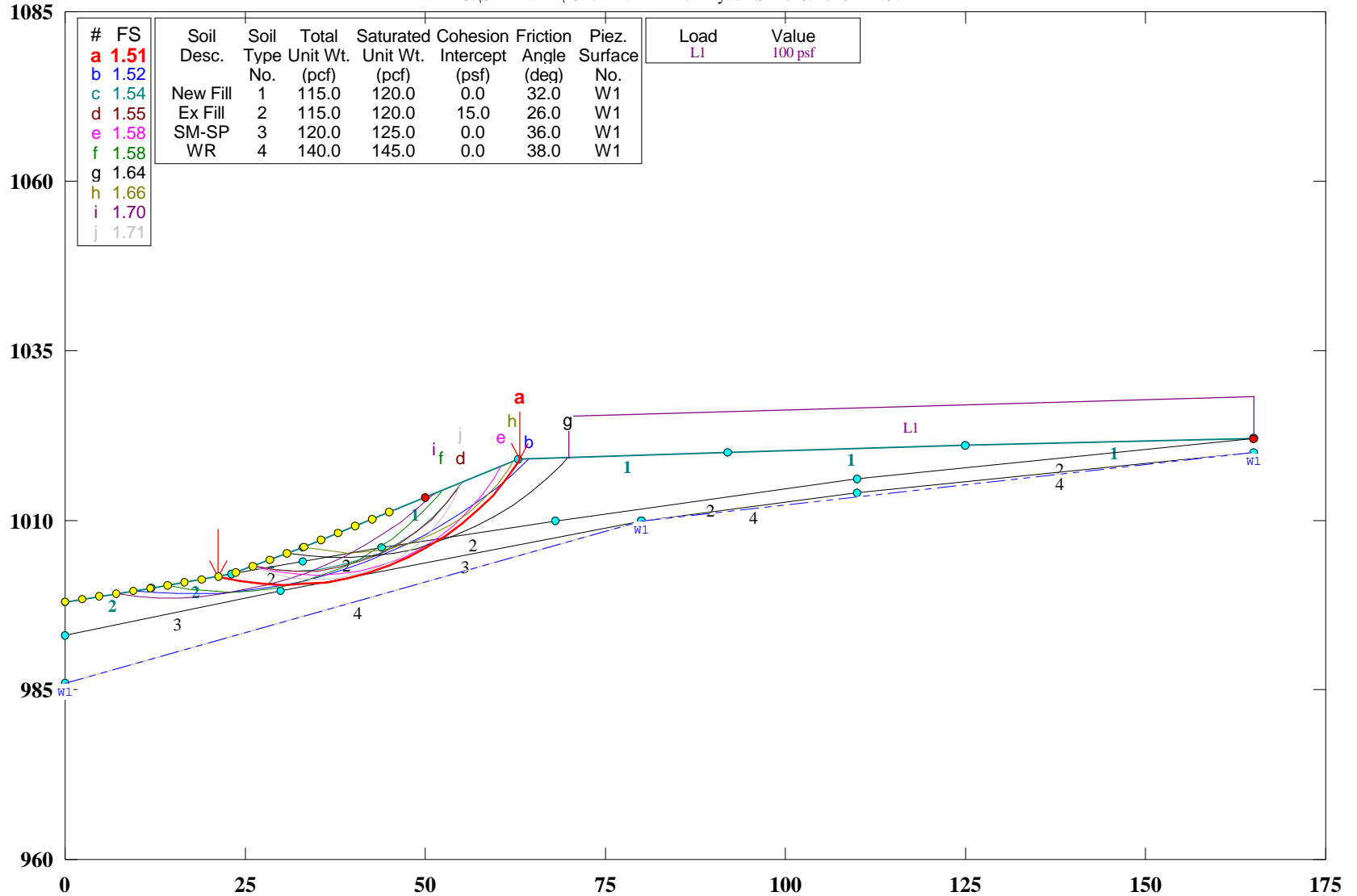
Lateral Earth Pressure = $60 H$ psf
(For below grade walls restrained from movement
at top and bottom, drained conditions presumed)

Horizontal Pressure from Surcharge
= $0.5 \times$ Vertical Surcharge



Hampton Inn and Suites Section A-A

C:\STEDWIN\1547AA.PL2 Run By: JAS 1/15/2016 11:57AM



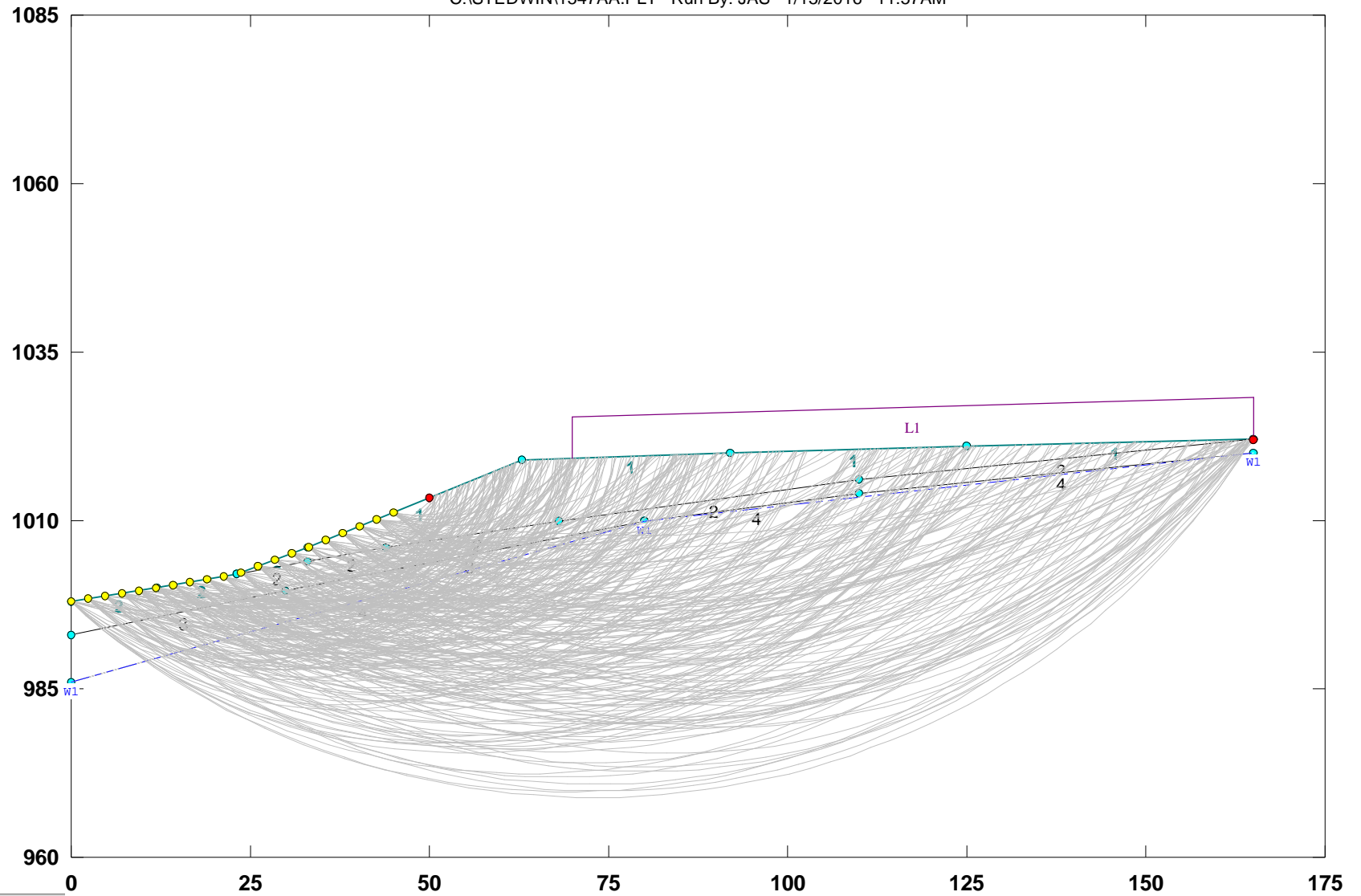
GSTABL7 FSmin=1.51

Safety Factors Are Calculated By The Modified Bishop Method



Hampton Inn and Suites Section A-A

C:\STEDWIN\1547AA.PLT Run By: JAS 1/15/2016 11:57AM



*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **
 ** Version 1.0, January 1996; Version 1.14, Sept 1999 **

--Slope Stability Analysis--
 Simplified Janbu, Modified Bishop
 or Spencer's Method of Slices

(Based on STABL6-1986, by Purdue University)

Run Date: 1/15/2016
 Time of Run: 11:57AM
 Run By: JAS
 Input Data Filename: C:1547aa.
 Output Filename: C:1547aa.OUT
 Unit System: English
 Plotted Output Filename: C:1547aa.PLT
 PROBLEM DESCRIPTION Hampton Inn and Suites
 Section A-A

BOUNDARY COORDINATES

Note: User origin value specified.
 Add 0.00 to X-values and 960.00 to Y-values listed.

| 7 Top Boundaries | | | | | |
|---------------------|-------------|-------------|--------------|--------------|---------------------|
| 17 Total Boundaries | | | | | |
| Boundary No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Soil Type Below Bnd |
| 1 | 0.00 | 38.00 | 12.00 | 40.00 | 2 |
| 2 | 12.00 | 40.00 | 23.00 | 42.00 | 2 |
| 3 | 23.00 | 42.00 | 33.00 | 46.00 | 2 |
| 4 | 33.00 | 46.00 | 63.00 | 59.00 | 1 |
| 5 | 63.00 | 59.00 | 92.00 | 60.00 | 1 |
| 6 | 92.00 | 60.00 | 125.00 | 61.00 | 1 |
| 7 | 125.00 | 61.00 | 165.00 | 62.00 | 1 |
| 8 | 23.00 | 42.00 | 33.00 | 44.00 | 2 |
| 9 | 33.00 | 44.00 | 44.00 | 46.00 | 2 |
| 10 | 44.00 | 46.00 | 68.00 | 50.00 | 2 |
| 11 | 68.00 | 50.00 | 110.00 | 56.00 | 2 |
| 12 | 110.00 | 56.00 | 165.00 | 62.00 | 2 |
| 13 | 0.00 | 32.90 | 30.00 | 39.50 | 3 |
| 14 | 30.00 | 39.50 | 80.00 | 50.00 | 3 |
| 15 | 80.00 | 50.00 | 110.00 | 54.00 | 4 |
| 16 | 110.00 | 54.00 | 165.00 | 60.00 | 4 |
| 17 | 0.00 | 26.00 | 80.00 | 50.00 | 4 |

ISOTROPIC SOIL PARAMETERS

| 4 Type(s) of Soil | | | | | | | |
|-------------------|----------------------|--------------------------|--------------------------|----------------------|----------------------|-------------------------|-------------------|
| Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Param. | Pressure Constant (psf) | Piez. Surface No. |
| 1 | 115.0 | 120.0 | 0.0 | 32.0 | 0.00 | 0.0 | 1 |
| 2 | 115.0 | 120.0 | 15.0 | 26.0 | 0.00 | 0.0 | 1 |
| 3 | 120.0 | 125.0 | 0.0 | 36.0 | 0.00 | 0.0 | 1 |
| 4 | 140.0 | 145.0 | 0.0 | 38.0 | 0.00 | 0.0 | 1 |

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

| Point No. | X-Water (ft) | Y-Water (ft) |
|-----------|--------------|--------------|
| 1 | 0.00 | 26.00 |
| 2 | 80.00 | 50.00 |
| 3 | 165.00 | 60.00 |

BOUNDARY LOAD(S)

| 1 Load(s) Specified | | | | |
|---------------------|-------------|--------------|-----------------|------------------|
| Load No. | X-Left (ft) | X-Right (ft) | Intensity (psf) | Deflection (deg) |
| 1 | 70.00 | 165.00 | 100.0 | 0.0 |

NOTE - Intensity Is Specified As A Uniformly Distributed
 Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random

Technique For Generating Circular Surfaces, Has Been Specified.
400 Trial Surfaces Have Been Generated.

20 Surfaces Initiate From Each Of 20 Points Equally Spaced
Along The Ground Surface Between X = 0.00(ft)

and X = 45.00(ft)

Each Surface Terminates Between X = 50.00(ft)

and X = 165.00(ft)

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)

3.00(ft) Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation.

The Angle Has Been Restricted Between The Angles Of -45.0

And -5.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial

Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 21.32 | 41.69 |
| 2 | 24.25 | 41.06 |
| 3 | 27.22 | 40.66 |
| 4 | 30.22 | 40.50 |
| 5 | 33.22 | 40.58 |
| 6 | 36.20 | 40.90 |
| 7 | 39.15 | 41.46 |
| 8 | 42.04 | 42.25 |
| 9 | 44.86 | 43.27 |
| 10 | 47.59 | 44.51 |
| 11 | 50.22 | 45.97 |
| 12 | 52.72 | 47.63 |
| 13 | 55.07 | 49.48 |
| 14 | 57.28 | 51.52 |
| 15 | 59.31 | 53.73 |
| 16 | 61.16 | 56.09 |
| 17 | 62.81 | 58.59 |
| 18 | 63.04 | 59.00 |

Circle Center At X = 30.7 ; Y = 78.0 and Radius, 37.5

*** 1.512 ***

| Slice No. | Width (ft) | Weight (lbs) | Individual data on the | | 22 slices | | Earthquake | | |
|--------------|---------------|-----------------|--------------------------------|--------------------------------|-------------------------------|------------------------------|-----------------------|-----------------------|----------------------------|
| | | | Water Force Top (lbs) | Water Force Bot (lbs) | Tie Force Norm (lbs) | Tie Force Tan (lbs) | Force Hor (lbs) | Force Ver (lbs) | Surcharge Load (lbs) |
| 1 | 1.7 | 64.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 1.2 | 151.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 3.0 | 763.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 4 | 3.0 | 1276.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 2.8 | 1569.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 | 0.2 | 136.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | 3.0 | 2057.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 8 | 2.9 | 2320.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | 2.9 | 2474.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10 | 2.0 | 1743.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11 | 0.9 | 778.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12 | 2.7 | 2463.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 | 2.6 | 2309.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 14 | 2.1 | 1790.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 15 | 0.3 | 279.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 | 2.4 | 1762.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 17 | 2.2 | 1403.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 18 | 2.0 | 1014.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 19 | 1.8 | 615.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20 | 1.7 | 232.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 21 | 0.2 | 4.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

22 0.0 0.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0

Failure Surface Specified By 22 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 9.47 | 39.58 |
| 2 | 12.46 | 39.30 |
| 3 | 15.46 | 39.15 |
| 4 | 18.46 | 39.14 |
| 5 | 21.45 | 39.27 |
| 6 | 24.44 | 39.54 |
| 7 | 27.42 | 39.94 |
| 8 | 30.37 | 40.47 |
| 9 | 33.29 | 41.14 |
| 10 | 36.18 | 41.94 |
| 11 | 39.04 | 42.88 |
| 12 | 41.84 | 43.94 |
| 13 | 44.60 | 45.12 |
| 14 | 47.29 | 46.43 |
| 15 | 49.93 | 47.87 |
| 16 | 52.50 | 49.42 |
| 17 | 54.99 | 51.09 |
| 18 | 57.41 | 52.86 |
| 19 | 59.74 | 54.75 |
| 20 | 61.99 | 56.74 |
| 21 | 64.14 | 58.83 |
| 22 | 64.34 | 59.05 |

Circle Center At X = 17.1 ; Y = 105.0 and Radius, 65.9

*** 1.519 ***

Failure Surface Specified By 13 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 26.05 | 43.22 |
| 2 | 29.01 | 42.73 |
| 3 | 32.01 | 42.56 |
| 4 | 35.00 | 42.73 |
| 5 | 37.96 | 43.23 |
| 6 | 40.85 | 44.05 |
| 7 | 43.62 | 45.19 |
| 8 | 46.26 | 46.63 |
| 9 | 48.71 | 48.35 |
| 10 | 50.97 | 50.33 |
| 11 | 52.99 | 52.55 |
| 12 | 54.75 | 54.98 |
| 13 | 55.08 | 55.57 |

Circle Center At X = 32.0 ; Y = 69.6 and Radius, 27.1

*** 1.543 ***

Failure Surface Specified By 13 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 26.05 | 43.22 |
| 2 | 29.00 | 42.66 |
| 3 | 31.99 | 42.45 |
| 4 | 34.99 | 42.58 |
| 5 | 37.95 | 43.05 |
| 6 | 40.84 | 43.86 |
| 7 | 43.62 | 45.00 |
| 8 | 46.24 | 46.45 |
| 9 | 48.69 | 48.19 |
| 10 | 50.91 | 50.20 |
| 11 | 52.89 | 52.45 |
| 12 | 54.60 | 54.92 |
| 13 | 54.91 | 55.49 |

Circle Center At X = 32.4 ; Y = 68.5 and Radius, 26.1

*** 1.555 ***

Failure Surface Specified By 15 Coordinate Points

| Point | X-Surf | Y-Surf |
|-------|--------|--------|
|-------|--------|--------|

| No. | (ft) | (ft) |
|-----|-------|-------|
| 1 | 26.05 | 43.22 |
| 2 | 28.96 | 42.47 |
| 3 | 31.92 | 42.02 |
| 4 | 34.92 | 41.88 |
| 5 | 37.91 | 42.06 |
| 6 | 40.87 | 42.55 |
| 7 | 43.77 | 43.34 |
| 8 | 46.56 | 44.43 |
| 9 | 49.23 | 45.81 |
| 10 | 51.74 | 47.45 |
| 11 | 54.06 | 49.35 |
| 12 | 56.17 | 51.48 |
| 13 | 58.05 | 53.82 |
| 14 | 59.68 | 56.34 |
| 15 | 60.47 | 57.90 |

Circle Center At X = 34.7 ; Y = 70.6 and Radius, 28.8
 *** 1.576 ***

Failure Surface Specified By 16 Coordinate Points

| Point | X-Surf | Y-Surf |
|-------|--------|--------|
| No. | (ft) | (ft) |
| 1 | 14.21 | 40.40 |
| 2 | 17.16 | 39.84 |
| 3 | 20.14 | 39.53 |
| 4 | 23.14 | 39.45 |
| 5 | 26.14 | 39.62 |
| 6 | 29.11 | 40.03 |
| 7 | 32.04 | 40.69 |
| 8 | 34.90 | 41.57 |
| 9 | 37.69 | 42.69 |
| 10 | 40.37 | 44.02 |
| 11 | 42.94 | 45.57 |
| 12 | 45.38 | 47.32 |
| 13 | 47.66 | 49.27 |
| 14 | 49.78 | 51.39 |
| 15 | 51.72 | 53.68 |
| 16 | 52.18 | 54.31 |

Circle Center At X = 22.6 ; Y = 76.4 and Radius, 36.9
 *** 1.580 ***

Failure Surface Specified By 16 Coordinate Points

| Point | X-Surf | Y-Surf |
|-------|--------|--------|
| No. | (ft) | (ft) |
| 1 | 30.79 | 45.12 |
| 2 | 33.76 | 44.70 |
| 3 | 36.75 | 44.49 |
| 4 | 39.75 | 44.51 |
| 5 | 42.74 | 44.74 |
| 6 | 45.71 | 45.19 |
| 7 | 48.64 | 45.85 |
| 8 | 51.51 | 46.73 |
| 9 | 54.31 | 47.81 |
| 10 | 57.02 | 49.09 |
| 11 | 59.63 | 50.56 |
| 12 | 62.13 | 52.22 |
| 13 | 64.51 | 54.05 |
| 14 | 66.74 | 56.05 |
| 15 | 68.82 | 58.21 |
| 16 | 69.67 | 59.23 |

Circle Center At X = 38.1 ; Y = 85.7 and Radius, 41.2
 *** 1.644 ***

Failure Surface Specified By 13 Coordinate Points

| Point | X-Surf | Y-Surf |
|-------|--------|--------|
| No. | (ft) | (ft) |
| 1 | 33.16 | 46.07 |
| 2 | 36.10 | 45.50 |
| 3 | 39.09 | 45.27 |

| | | |
|----|-------|-------|
| 4 | 42.09 | 45.39 |
| 5 | 45.06 | 45.85 |
| 6 | 47.95 | 46.66 |
| 7 | 50.72 | 47.79 |
| 8 | 53.35 | 49.24 |
| 9 | 55.79 | 50.99 |
| 10 | 58.01 | 53.00 |
| 11 | 59.99 | 55.26 |
| 12 | 61.69 | 57.73 |
| 13 | 62.17 | 58.64 |

Circle Center At X = 39.6 ; Y = 71.1 and Radius, 25.9
 *** 1.661 ***

Failure Surface Specified By 18 Coordinate Points

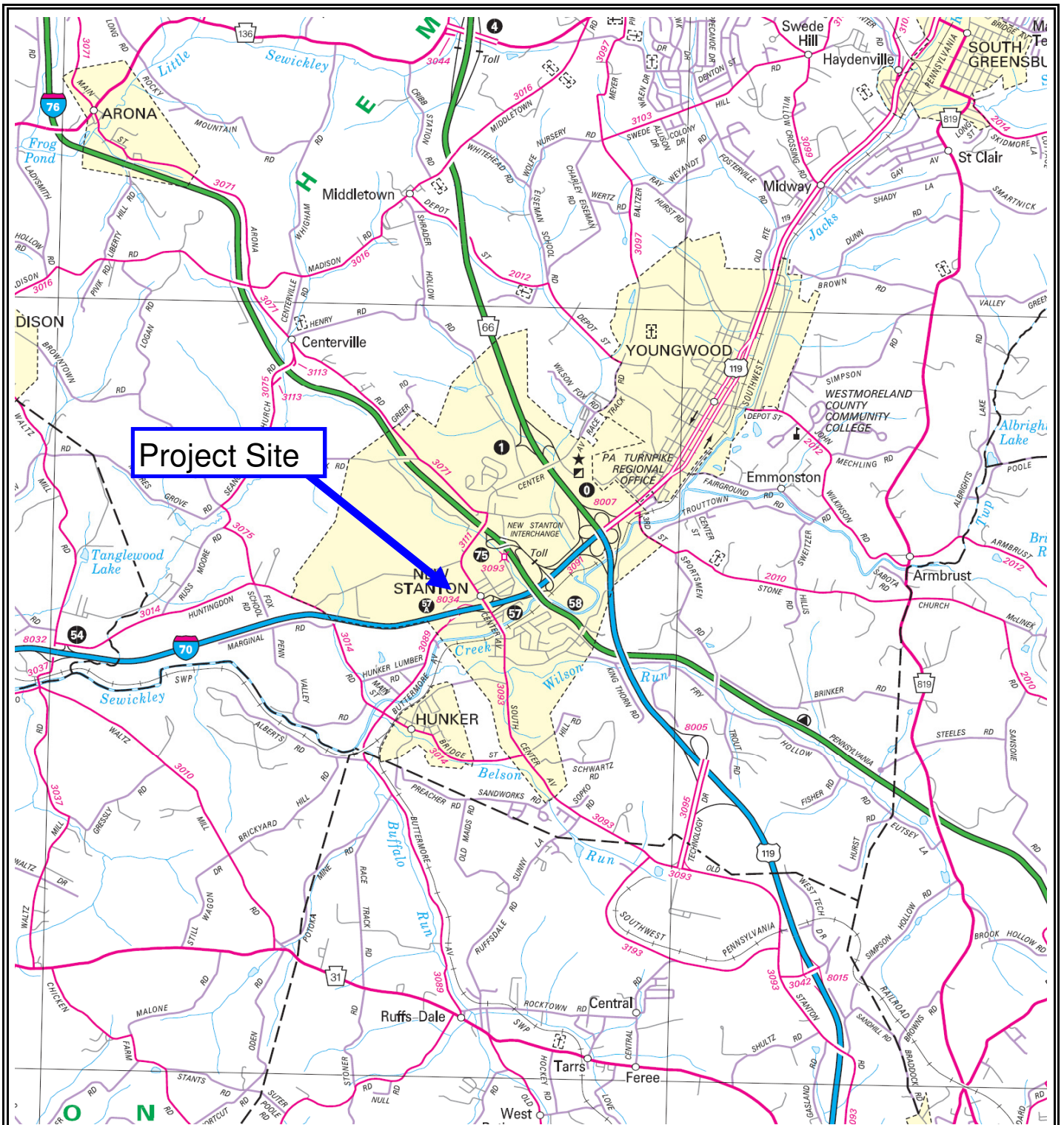
| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 7.11 | 39.18 |
| 2 | 10.09 | 38.84 |
| 3 | 13.08 | 38.66 |
| 4 | 16.08 | 38.66 |
| 5 | 19.08 | 38.84 |
| 6 | 22.06 | 39.19 |
| 7 | 25.01 | 39.71 |
| 8 | 27.93 | 40.40 |
| 9 | 30.80 | 41.26 |
| 10 | 33.62 | 42.29 |
| 11 | 36.38 | 43.47 |
| 12 | 39.06 | 44.82 |
| 13 | 41.66 | 46.32 |
| 14 | 44.16 | 47.97 |
| 15 | 46.57 | 49.76 |
| 16 | 48.87 | 51.69 |
| 17 | 51.05 | 53.74 |
| 18 | 51.18 | 53.88 |

Circle Center At X = 14.6 ; Y = 90.2 and Radius, 51.6
 *** 1.696 ***

Failure Surface Specified By 13 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 26.05 | 43.22 |
| 2 | 28.85 | 42.14 |
| 3 | 31.78 | 41.47 |
| 4 | 34.77 | 41.22 |
| 5 | 37.76 | 41.40 |
| 6 | 40.70 | 41.99 |
| 7 | 43.52 | 43.01 |
| 8 | 46.18 | 44.41 |
| 9 | 48.60 | 46.17 |
| 10 | 50.75 | 48.26 |
| 11 | 52.59 | 50.64 |
| 12 | 54.07 | 53.25 |
| 13 | 54.95 | 55.51 |

Circle Center At X = 35.0 ; Y = 62.3 and Radius, 21.1
 *** 1.712 ***



REF : PennDOT Type 10 General Highway Map of Westmoreland County, 2015

NORTH ↑

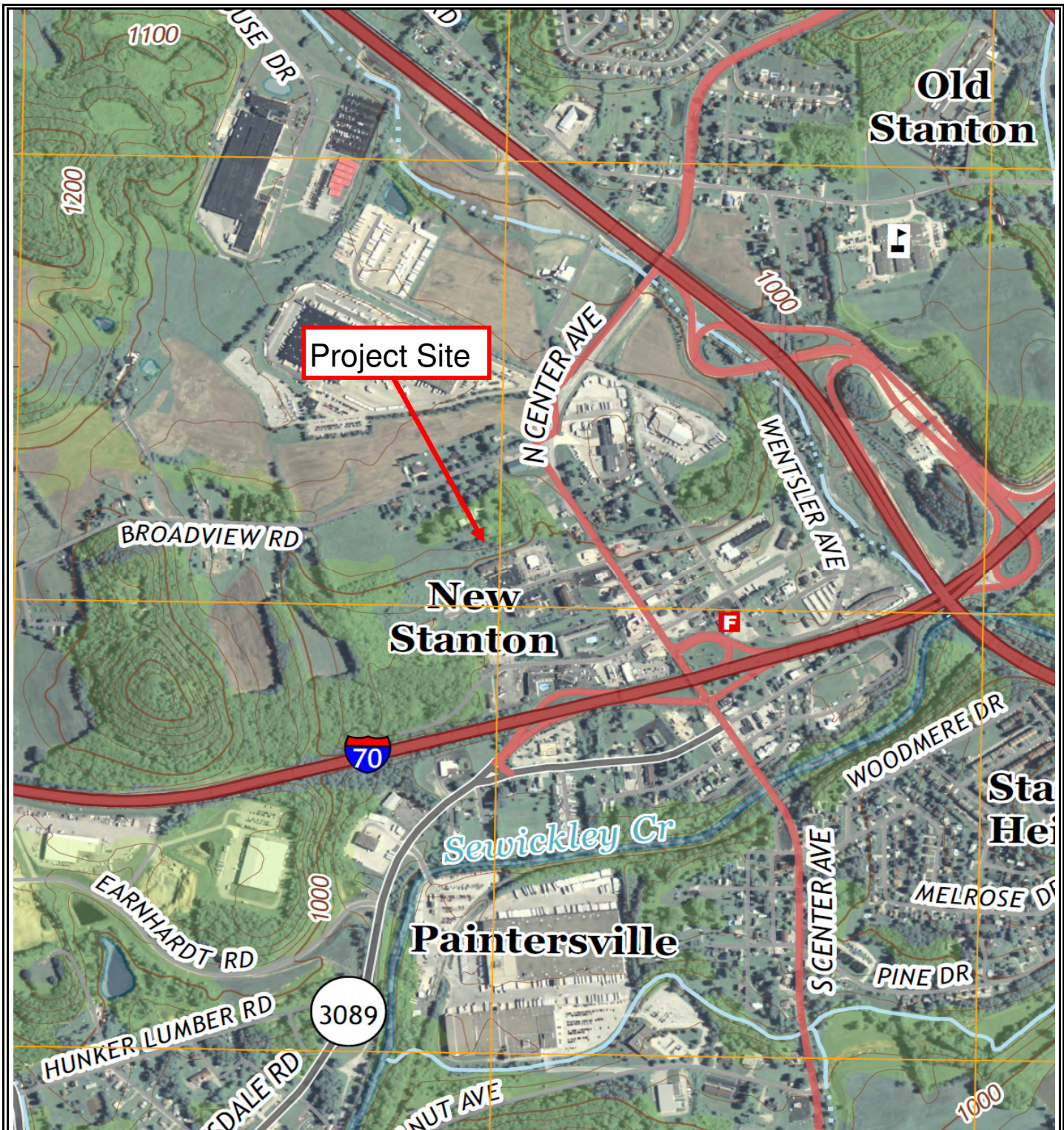


SITE VICINITY MAP

Hampton Inn and Suites

New Stanton Borough, Westmoreland County, Pennsylvania

| | | | | | | | | | |
|-------------|-----|-----------------|--|----------|--|--------------|--|--------------|--------|
| Drawn By: | IFJ | Client: | | Date: | | ECS Job No.: | | Scale: | NTS |
| Checked By: | JAS | Red Swing Group | | 01/08/16 | | 40:1547 | | Drawing No.: | 1 of 6 |



REF : USGS 7.5' x 7.5' Smithton, PA Quadrangle Topographic Map (2013), www.usgs.gov

NORTH ↑

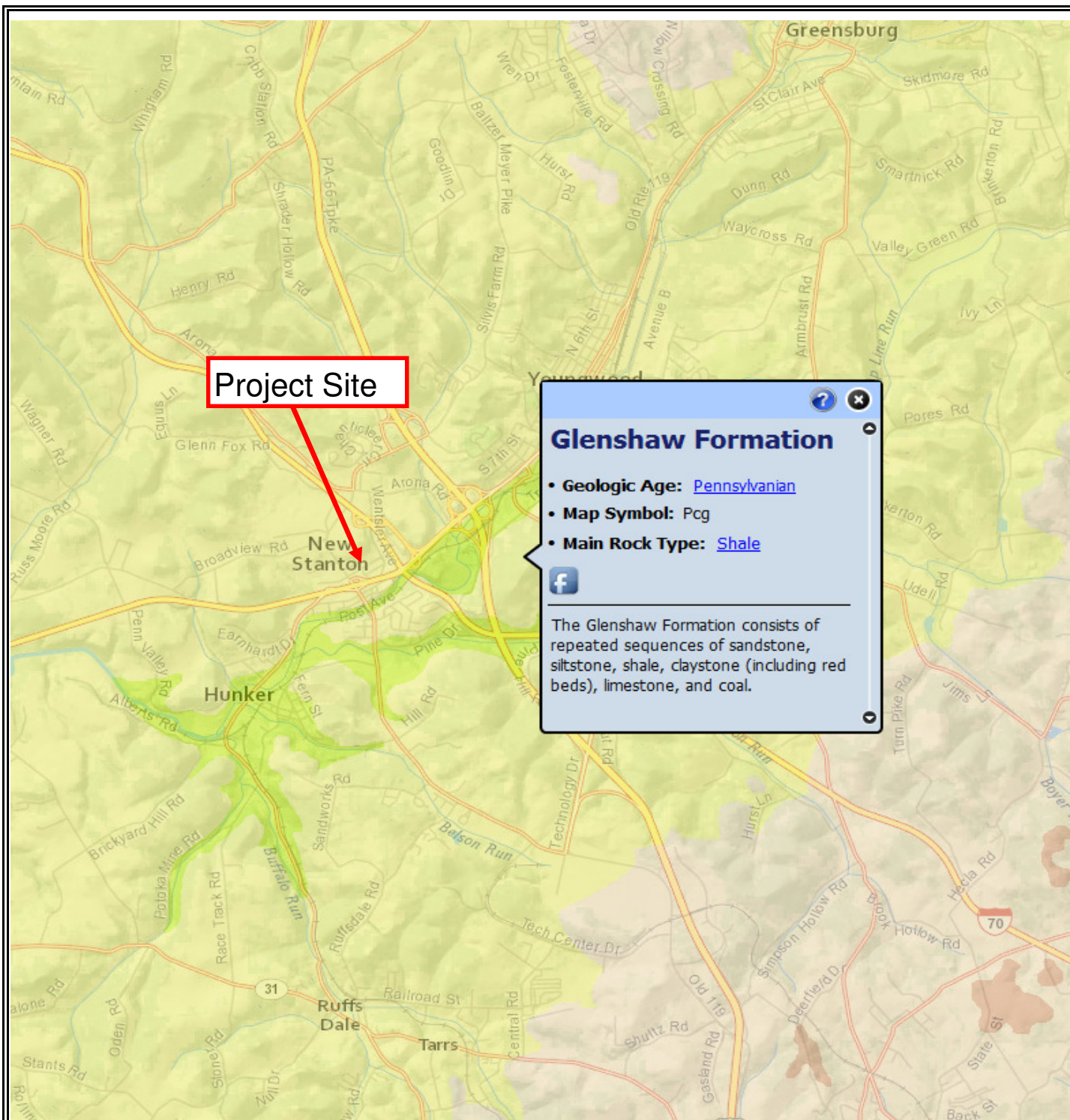


USGS TOPOGRAPHIC MAP

Hampton Inn and Suites

New Stanton Borough, Westmoreland County, Pennsylvania

| | | | | |
|-----------------|-------------------------|----------------|----------------------|---------------------|
| Drawn By: IFJ | Client: Red Swing Group | Date: 01/08/16 | ECS Job No.: 40:1547 | Scale: NTS |
| Checked By: JAS | | | | Drawing No.: 2 of 6 |



REF : Geologic Map of Pennsylvania, <http://www.gis.dcnr.state.pa.us/maps/>

NORTH ↑



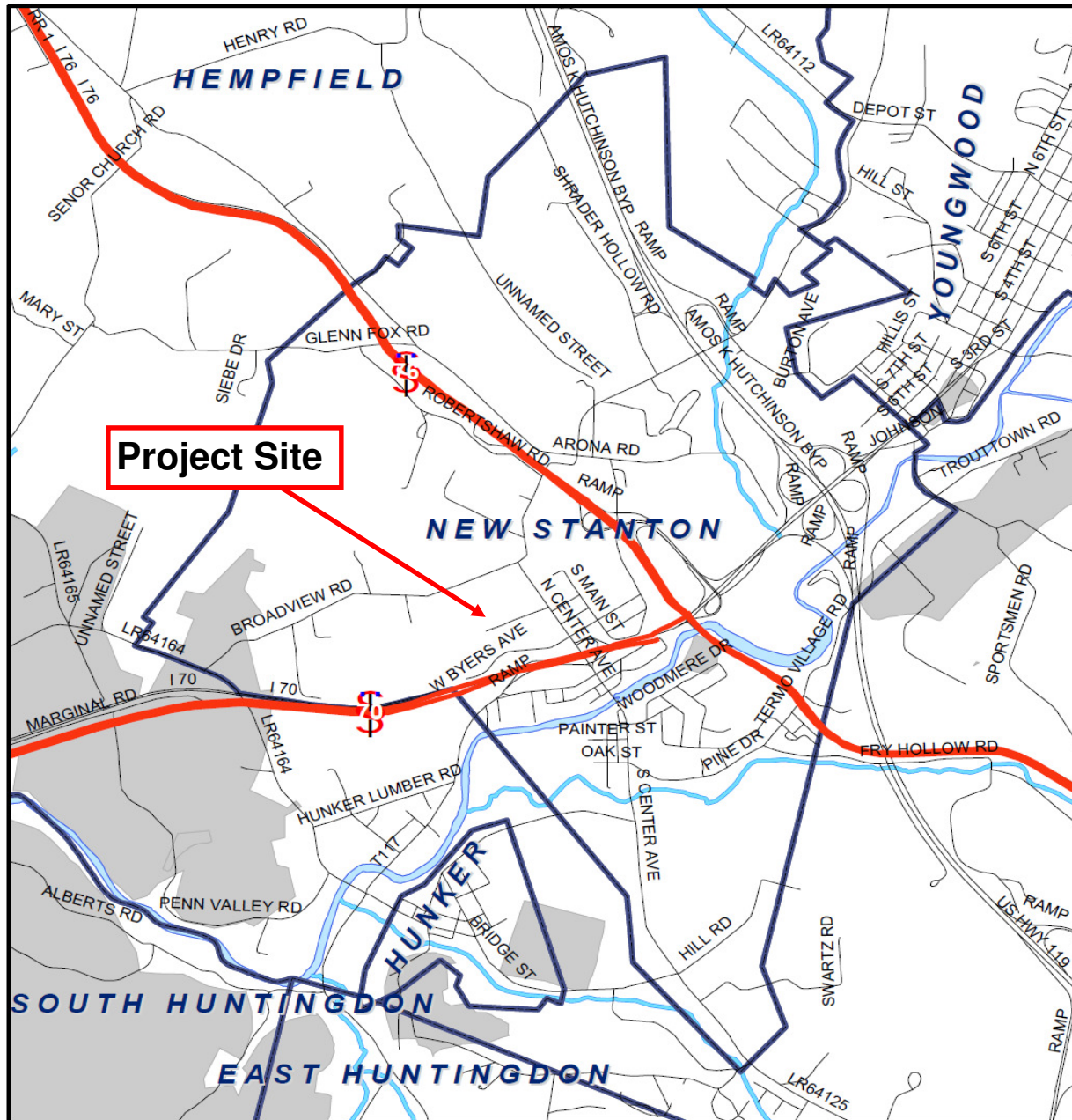
REGIONAL GEOLOGIC MAP

Hampton Inn and Suites

New Stanton Borough, Westmoreland County, Pennsylvania

| | | | | |
|-----------------|-------------------------|----------------|----------------------|---------------------|
| Drawn By: IFJ | Client: Red Swing Group | Date: 01/08/16 | ECS Job No.: 40:1547 | Scale: NTS |
| Checked By: JAS | | | | Drawing No.: 3 of 6 |

New Stanton Boro, Westmoreland County



Legend

- Municipality Boundary
- Underserved Area

This map was prepared using information considered to be the best historical data available.

The Department cannot verify the accuracy or completeness of this information.

Prepared by: Pennsylvania Department of Environmental Protection, Mine Subsidence Section, 11/15/2005
To learn more, visit our website at: www.pamsi.org

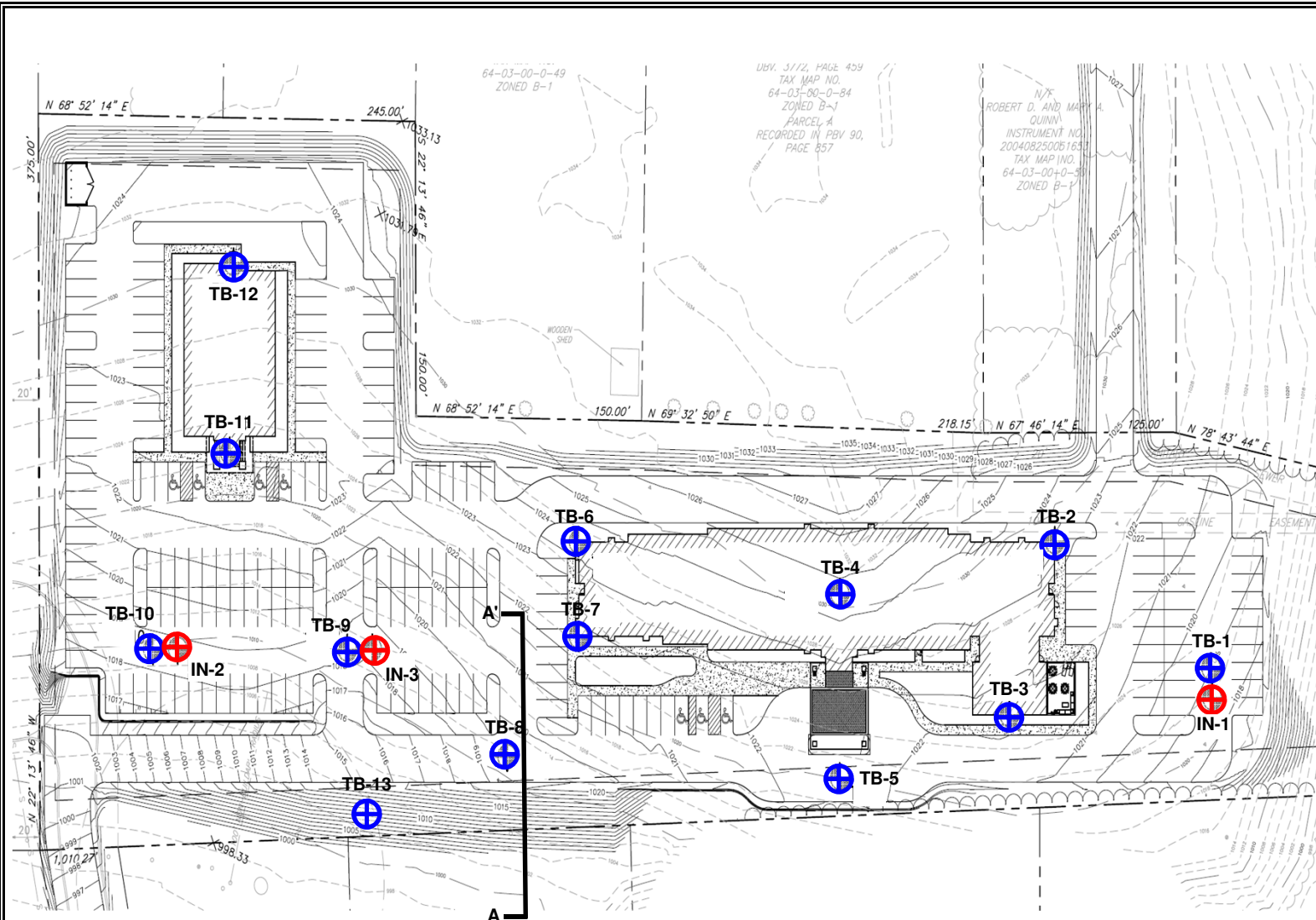
NORTH ↑



DEP MINE SUBSIDENCE INSURANCE MAP

Hampton Inn and Suites
New Stanton Borough, Westmoreland County, Pennsylvania

| | | | | |
|-----------------|-------------------------|----------------|----------------------|---------------------|
| Drawn By: IFJ | Client: Red Swing Group | Date: 01/08/16 | ECS Job No.: 40:1547 | Scale: NTS |
| Checked By: JAS | | | | Drawing No.: 5 of 6 |



- ⊕ - Approximate Boring Location
- ⊕ - Approximate Test Pit/Infiltration Test Location
- | - Approximate Location of Global Stability Corss Section

Reference : Grading Plan (dated 10/15/15) prepared by Red Swing Group

NORTH →



BORING/INFILTRATION TEST LOCATION DIAGRAM

Hampton Inn and Suites

New Stanton Borough, Westmoreland County, Pennsylvania

| | | | | | |
|---------------|-------------------------|----------------|----------------------|-----------------|---------------------|
| Drawn By: IFJ | Client: Red Swing Group | Date: 01/08/16 | ECS Job No.: 40:1547 | Scale: NTS | Drawing No.: 6 of 6 |
| | | | | Checked By: JAS | |