Worcester County Administration Office
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Snow Hill, MD 21863
Ph. 410-632-1194

# Addendum # 4 – Parking Project at John Walter Smith (JWS) Park (Additional Questions & Answers and Documents)

Date of Addendum: **August 17, 2026**

## NOTICE TO ALL BIDDERS AND PLANHOLDERS

The Bid Documents for the above-referenced Project are modified as set forth in this Addendum. The original Bid Documents and any previously issued addenda remain in full force and effect, except as modified by this Addendum, which is hereby made part of the Bid Documents. Vendors will take this Addendum into consideration when preparing and submitting a bid and shall acknowledge receipt of this Addendum in the space provided in the Bid Documents.

## BID SUBMITTAL DEADLINE

The bid submittal time has not been changed.

## 1.0 – ATTACHMENTS

| Item | Description |
|---|---|
| 1 | Geotech report |
| 2 | Riprap protection schedule |

## 2.0 – CLARIFICATIONS

The following clarifications are provided as a matter of information to clarify issues raised about the Bid Documents.

| Item | Description |
|---|---|
| | |

## 3.0 – QUESTIONS AND ANSWERS

The following questions and answers are provided as a matter of information to clarify issues raised about the Bid Documents.

| Item | Questions and Answers |
|---|---|
| 1 | Is there a known depth average of the "impermeable surface" to be removed?<br>Attached is the Geotech report with boring information if you want to provide that as well. There isn’t stone or asphalt located in the existing impervious area, instead it is compacted ground. Outside of the proposed pavement area, which needs to be excavated to meet the requirements of the pavement section, the remainder should be scarified and reseeded. |
| 2 | Can a riprap outfall protection schedule be provided? The plans reference to see one on sheet 1.2A but I am not seeing one.<br>Riprap protection schedule has been attached. |
| 3 | Do we have to camera/video storm drainpipe runs?<br>Provide pricing as an optional alternate. |
| 4 | Are certified as-builts required or are redlined drawings sufficient?<br>Redlined drawings are sufficient for this work. |
| 5 | The asphalt calls out type B and C courses. Are these PG 64-22 or 76-22?<br>PG 64-22 |

**END OF ADDENDUM**

| Pipe Name | Pipe Size | D50 | Class | Apron | | | Blanket Thickness |
|---|---|---|---|---|---|---|---|
| | | | | Length | Width Flared | Width at Pipe | |
| | (IN) | (IN) | | (FT) | (FT) | (FT) | (IN) |
| SD-1 | 12 | 9.5 | 1 | 6 | 7 | 3 | 19 |
| SD-2 | 12 | 9.5 | 1 | 6 | 7 | 3 | 19 |
| SD-3 | 12 | 9.5 | 1 | 6 | 7 | 3 | 19 |
| SD-4 | 15 | 9.5 | 1 | 8 | 11.75 | 3.75 | 19 |
| SD-5 | 15 | 9.5 | 1 | 8 | 11.75 | 3.75 | 19 |
| SD-6 | 12 | 9.5 | 1 | 6 | 7 | 3 | 19 |
| SD-7 | 12 | 9.5 | 1 | 6 | 7 | 3 | 19 |
| SD-8 | 15 | 9.5 | 1 | 8 | 11.75 | 3.75 | 19 |

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# Geotechnical Study
# John Walter Smith Permeable Pavement Study
# 6022 Public Landing Road, Snow Hill, MD
# Project No. SAL250035A

Mr. David Rovansek
Project Manager Engineer
George Miles & Buhr, LLC
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**May 13, 2025**

May 13, 2025

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Project No. SAL250035A

Mr. Rovansek:

Hillis-Carnes Engineering Associates (HCEA) is pleased to submit this report outlining the soils exploration for the proposed John Walter Smith Permeable Pavement project in Snow Hill, Maryland. Our exploration included five proposed alternative porous surface parking areas in grass areas that have been used for parking since the 1970's in the John Walter Smith Memorial Park.

Samples taken from the project site boring locations will be stored at the Salisbury, Maryland office for a period of 30 days from the date of this letter. Should it be requested for the samples to be stored for a longer period or to be delivered elsewhere, please advise us in writing prior to the end of the 30-day period. The samples will be discarded at the end of the 30-day storage period.

HCEA appreciates having had the opportunity to provide geotechnical consultation and we will remain available for further consultation during the various design stages. Should there be any questions concerning the contents of the report, or the requirement of additional consultation, design, inspection or testing services, please contact the Salisbury HCEA office.

Best regards,

**HILLIS-CARNES ENGINEERING ASSOCIATES**

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# GEOTECHNICAL STUDY
# JOHN WALTER SMITH PERMEABLE PAVEMENT STUDY
# SNOW HILL, MARYLAND
# HCEA PROJECT NO. SAL250035A

## 1.0 PURPOSE AND SCOPE

The purpose of this study was to determine the general subsurface conditions at the boring locations and to evaluate those conditions with respect to the concept and design of the five proposed alternative porous surface areas in grass areas that have been used for parking since the 1970's in the John Walter Smith Memorial Park.

The stratification lines indicated on the Records of Subsurface Exploration (boring logs) represent the approximate boundaries between soil types. In-situ the transitions may be gradual. Such variations can best be evaluated during construction and any minor design changes can be made at that time.

An evaluation of the site with respect to potential construction problems and recommendations dealing with the earthwork and inspection during construction are also included. Such an inspection is considered necessary to verify the subsurface conditions and to verify that the soil-related construction phases are performed properly.

The *Appendix* contains a summary of the fieldwork and laboratory data on which this report is based.

## 2.0 PROJECT CHARACTERISTICS

The proposed project area consists of existing grass parking areas located within John Walter Smith Park in Snow Hill, Maryland, as shown on the Project Location Map (Figure 1) in the *Appendix* of this report. The proposed project will include five alternative porous surface areas in the existing grassy parking areas. Based on historical aerial imagery and information from the Client, the project area has been used as parking since the 1970's.

## 3.0 FIELD EXPLORATION

To obtain information related to the in-situ soils, HCEA drilled eight SPT soil borings to depths of six feet below current grades. The borings were completed on March 12, 2025. The approximate boring locations are shown on the Boring Location Plan (Figure 2) in the *Appendix* of this report. The elevations indicated on the Records of Subsurface Exploration (boring logs), as presented in the *Appendix,* were provided by Wilkins-Noble, LLC.

Representative portions of soils encountered within the depths explored were placed in glass jars and transported to HCEA's laboratory. In the laboratory, the samples were visually examined by our Geotechnical Staff to verify the driller's field classifications. The samples were classified in accordance with the Unified Soil Classification System (USCS) and the United States Department of Agriculture (USDA) textural classification system, and the field classifications were revised where necessary. The USCS and USDA soil classifications appear on the boring logs and the system nomenclature is briefly described in the *Appendix* to this report.

## 4.0 LABORATORY TESTING

HCEA performed laboratory testing on selected samples to assist with the evaluation of the subsurface materials. HCEA performed four sieve gradation analyses, four 200 washes and eight natural moisture content tests to supplement the visual soil classifications. The results of the laboratory testing are included in the *Appendix* of this report.

| Boring | Sample | Depth (ft) | Classification USCS | Test Results |
|---|---|---|---|---|
| B-2 | S-2 | 2.0-4.0 | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand)<br>12.5% fines | NMC: 9.2%<br>LL= NP; PI= NP |
| B-2 | S-3 | 4.0-6.0 | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand)<br>15.7% fines | NMC: 12.6%<br>LL= NP; PI= NP |
| B-3 | S-2 | 2.0-4.0 | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand)<br>12.8% fines | NMC: 8.8%<br>LL= NP; PI= NP |
| B-3 | S-3 | 4.0-6.0 | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand)<br>16.4% fines | NMC: 15.1%<br>LL= NP; PI= NP |
| B-6 | S-1 | 0.0-2.0 | Light brown, moist, loose, fine sandy SILT (ML, 10YR 6/4, silt loam)<br>56.2% fines | NMC: 17.1%<br>LL= NP; PI= NP |
| B-6 | S-2 | 2.0 – 3.0 | Light gray and orange, moist, loose, fine SAND, some silt (SM, 10YR 7/1, sandy loam)<br>23.3% fines | NMC: 18.8%<br>LL= NP; PI= NP |
| B-8 | S-1 | 0.0-2.0 | Brown, moist, loose, fine to medium SAND, some silt (SM, 10YR 5/2, sandy loam)<br>31.6% fines | NMC: 12.4%<br>LL= NP; PI= NP |
| B-8 | S-2 | 2.0-4.0 | Brown, moist, loose, fine to medium SAND, some silt (SM, 10YR 5/2, sandy loam)<br>22.0% fines | NMC: 22.0%<br>LL= NP; PI= NP |

Notes:
1. NMC = Natural Moisture Content
2. LL = Liquid Limit; PI = Plasticity Index

## 5.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered at the site are shown on the boring logs. We provide a brief description of the subsurface conditions and estimated engineering characteristics of the materials encountered in the borings in the following sections. We approximated the strata divisions shown on the boring logs based on visual examinations of the recovered boring samples. In the field, strata changes could occur gradually and/or at slightly different levels than indicated. The groundwater conditions indicated on the boring logs are those observed during the period of the subsurface exploration. Groundwater levels could fluctuate seasonally and may also be influenced by changes in grading, runoff, infiltration rates and other environmental factors.

### 5.1 Site Geology

The United States Geological Survey (USGS) Spatial Database maps the site soils as Undivided Deposits (Quaternary). USGS describes Undivided Deposits (Quaternary) as follows.

*"Undifferentiated gray to buff sand and gravel, gray to brown lignitic silt and clay, occasional boulders, and rare shell beds. Surficial deposits occur as intercalated fluvial sands and marsh muds (e.g. in upstream floodplain of the Wicomico and Nanticoke Rivers), well-sorted, stabilized dune sands (e.g. eastern Wicomico County), shell-bearing estuarine clays and silts (e.g. lower Dorchester County) and Pocomoke River basin of Worcester County), and beach zone sands (e.g. Fenwick and Assateague Islands). Wisconsin to Holocene in age. Subsurface deposits of pre-Wisconsin age consist of buff to reddish-brown sand and gravel locally incised into Miocene sediments (e.g. Salisbury area), estuarine to marine white to gray sands, and gray to blue, shell-bearing clays (e.g. Worcester County)."*

### 5.2 Surficial Materials

Surficial materials encountered in the test borings included organic-bearing soils (topsoil) approximately 6 inches thickness. The thickness of organic-bearing soils at each boring location is indicated on the boring logs. The topsoil thicknesses indicated on the boring logs represent discrete points separated by large distances and should not be used as the only source of information when estimating topsoil volumes on the site.

### 5.3 Natural Materials

The natural soils encountered in the test borings were generally consistent with the Undivided Deposits (Quaternary) as described above. Subsurface soils generally consisted of materials classified as SAND with trace silt (SP-SM), silty SAND (SM), sandy SILT (ML), and combinations thereof. The soils have estimated USDA classifications of Sand, Loamy Sand, Sandy Loam, and Silt Loam. These soils were observed from beneath the existing topsoil layer to the termination depths of six feet below existing grades.

The "N" values from the Standard Penetration Test (SPT) borings generally indicated very loose to medium dense relative densities for granular soils. The "N" values in natural soils ranged between 4 and 14 blows per foot (bpf).

## 5.4 Groundwater

Groundwater was not encountered within the depths explored during drilling operations. However, temporary piezometers were installed in borings B-1, B-5, and B-7 to monitor 24-hour readings. Based on the water level conditions in the test borings where piezometers were installed, we estimate the seasonal high groundwater elevation to be approximately 12 feet. The results of the field exploration at this site are summarized in Table 1 presented below.

**Table 1: Piezometer Readings**

| Test Location | Surface Elevation (ft) | Piezometer reading after 24 hrs. | Groundwater Elevation |
|---|---|---|---|
| **B-1** | 16.62’ | 5.49 | **11.13** |
| **B-5** | 14.65 | 4.53 | **10.12** |
| **B-7** | 14.32 | 3.63 | **10.69** |

The results of the piezometers readings after 24 hours ranged from 3.63 feet below grade to 5.29 feet below grade corresponding to elevations 10.12 to 11.13.

## 6.0 EVALUATIONS AND RECOMMENDATIONS

The site conditions are generally suitable for permeable or conventional pavement, provided that pavement subgrades are prepared appropriately. Designs for permeable pavement should avoid the use of soil fill, since compacted fill soils are expected to be less permeable than the existing soils. Due to the greater total thickness of permeable pavement compared to conventional pavement, HCEA expects that permeable pavement areas will be cut to grade.

## 6.1 General Site Preparation

Existing site features (including all above and below-ground construction) within the areas to be developed should be removed prior to the initiation of new construction. We suggest that all available information regarding the existing utilities at the site be reviewed prior to the commencement of demolition and new construction operations. We suggest that all available information regarding the previous development of the site, including any existing utilities, be reviewed prior to demolition and construction operations.

It is possible that unsuitable existing fill and other deleterious materials from previous site development activities may be encountered in the areas to be developed. If such soils are encountered, they should be removed. Stripping operations should be performed in a manner consistent with good erosion and sediment control practices.

After the stripping process is completed, areas of the site that will received conventional pavement should be proof-rolled to verify stability and firmness prior to the placement of any new structural fill or slab or pavement subbase materials. The proof-rolling operations should be performed using a 20-ton, fully loaded dump truck or another pneumatic tire vehicle of similar size and weight. The purpose of the proof rolling will be to locate any near-surface pockets of soft or loose soils requiring undercutting or in-place densification. An HCEA geotechnical engineer or experienced soils technician should witness the proof-rolling operations and should determine any areas that need undercutting and/or stabilization or additional test pit explorations to determine suitability for further construction.

Any grading for the site should be conducted during the drier weather periods, such as summer, to avoid soft, wet, unstable subgrades that can increase costs and delay construction. If unstable conditions are encountered, the geotechnical engineer should be consulted for recommendations to allow construction to proceed.

## 6.2 Fill Selection, Placement and Compaction

The Geotechnical Engineer should observe, evaluate, and approve all fill or backfill material. On-site sandy granular soils (SP or SM classifications) which are free from organic and other deleterious components can be used as structural fill in the town hall/police building pad, carport, and pavement areas. An experienced soils technician can identify materials suitable for various construction purposes during grading operations.

Any imported borrow materials should have Unified Soil Classifications of SM, SP-SM, or more granular along with combinations thereof or as set forth in the project specifications. We recommend that samples of all fill materials be submitted to our laboratory prior to placement to determine their compliance with any necessary material requirements.

Moisture conditioning (that is, wetting or drying) of the soil should be anticipated to achieve proper compaction. The moisture contents of the soil should be controlled properly to avoid extensive construction delays. If imported fill material is required, those materials should have moisture contents suitable for adequate compaction.

Care should be exercised during the grading operations at the site. The traffic of heavy construction equipment could create pumping and a general deterioration of subgrade soil conditions in the presence of excess moisture. If it is at all possible, the grading should therefore be conducted during the dry weather season. Working during dry periods should reduce potential problems associated with excessively wet conditions, although they may not be eliminated. If such problems arise, the geotechnical engineer should be consulted for an evaluation of the conditions.

All structural fills shall be placed in horizontal 8-inch (maximum) loose lifts and shall be compacted to a minimum of 95 percent of the Standard Proctor (ASTM D-698) maximum dry density. Fill materials in landscape and other non-structural areas should be compacted to at least 90 percent of the Modified Proctor maximum dry density if significant consolidation of the fill under its own weight is to be avoided. Field moisture contents should be maintained within +/-2 percentage points of the optimum moisture content to provide adequate compaction.

Final slopes should be no steeper than 3(H):1(V). An experienced engineering technician should perform testing on a full-time basis to verify that the proper degree of compaction is obtained. Note that where fill is required in the building pad, the lateral extent of the compacted structural fill should be provided for a distance of at least 5 feet beyond the limits of the structure including any extensions such as door entrance pads.

## 7.0 Permeable Pavement

According to the permeable pavement guidelines provided in the MDE Environmental Site Design Manual, Chapter 5.0, Section A-2, “Permeable pavements are alternatives that may be used to reduce imperviousness. While there are many different materials commercially available, permeable pavements may be divided into three basic types: porous bituminous asphalt, pervious concrete, and permeable interlocking concrete pavements. Permeable pavements typically consist of a porous surface course and open-graded stone base/subbase or sand drainage system. Stormwater drains through the surface course, is captured in the drainage system, and infiltrates into the surrounding soils. Permeable pavements significantly reduce the amount of impervious cover, provide water quality and groundwater recharge benefits, and may help mitigate temperature increases.”

The site conditions are generally suitable for permeable pavement. The sandy loam and loamy sand are expected to have moderate permeability, and the park pavement receives limited traffic volumes. HCEA recommends that the base of the permeable pavement section (including the storage layer) be at Elevation 14 feet or higher to provide separation from the estimated seasonal high groundwater level. HCEA notes that a layer of relatively low permeability silt was encountered at location B-6. Permeable pavements located on silt would have reduced performance.

HCEA recommends in-situ infiltration tests to be performed to determine the design infiltration rates for permeable pavements.

## 8.0 Conventional Pavement

Conventional pavement subgrade areas should be prepared in accordance with the recommendations provided in Sections 6.1 and 6.2 of this report. Pavement subgrades should be thoroughly proof-rolled to identify any isolated areas of soft or loose soils that would require undercutting and/or stabilization prior to the placement of pavement section materials.

The pavement subgrade soils are expected to consist primarily of SAND with trace to little silt (SP-SM) Silty SAND (SM) and sandy SILT (ML). Considering the potential for variability of the soil types in the pavement subgrade as noted in the test borings across the overall site, it is HCEA's opinion that a CBR of 5 would be appropriate for design of the pavement section suitable for this project.

It is anticipated that the pavement areas of the site will be subject to primarily automobile traffic with minimal truck deliveries. A trash/recycling dumpster pad was not identified on the site plans. The recommended pavement section is based on a design life of 20 years with a lifetime traffic volume of $5.0 \times 10^4$ ESALs.

HCEA should be notified if a different design traffic volume is developed later in the project design.

| Pavement Section | Thickness (inches) |
|---|---|
| Surface Course Superpave HMA – 12.5 mm | 1.5 |
| Base Course Superpave HMA – 19.0 mm | 2.5 |
| Graded Aggregate Sub-base – GAB | 6.0 |
| Compacted Fill Subgrade (Minimum CBR= 5.0) | |

The included pavement section is applicable provided that the existing subgrade soils for the proposed paved areas are similar materials considered in our analysis. Should different materials be encountered during stripping and excavation operations, or if the pavement subgrade consists of imported fill materials of lesser quality from those tested, HCEA should be contacted for a re-evaluation of the proposed pavement sections based on the different materials.

The pavement area subgrades should be compacted to a minimum of 95 percent of the Standard Proctor maximum dry density (ASTM D-698) and proof-rolled to check for a uniformly firm and stable condition. The pavement subgrade should be proof-rolled in the presence of an experienced soils technician under the direction of a geotechnical engineer. Any soft, wet, loose, or fine-grained soil areas identified at the time of proof-rolling should be undercut and/or stabilized prior to the placement of stone or asphalt paving materials.

It is strongly recommended to provide adequate drainage away from pavement areas to promote longer pavement life. The subgrade and pavement layers should be graded such that surface water is carried away from the pavement areas and other structural areas. Surface water should not be allowed to pond and run-off onto adjacent properties.

HCEA appreciates the opportunity to provide geotechnical consultation for this project and we will remain available for further consultation during the various design stages. Should there be any questions concerning the contents of the report, or any requirement for additional consultation, design, observation or testing services, please contact the Salisbury HCEA office.

## 9.0 CONCLUSION

This report has been prepared to aid in the evaluation of the site for the proposed construction. It is considered that adequate information has been provided to fulfil our services as described in the project scope and contract.

These analyses and recommendations are based on the information made available at the time of writing the report as relevant to on-site conditions, including surface and subsurface existing at the time the exploratory borings were drilled. A further assumption has been made that the exploratory borings, limited in relation both to the area of the site and to depth, are representative of conditions across the site. The recommendations contained herein have been based on a series of widely spaced soil borings. Actual subsurface conditions encountered could vary from those outlined in this report.

If subsurface conditions are encountered that differ from those reported herein, this office should be notified immediately so that the analyses and recommendations can be reviewed and/or revised, as necessary. It is also recommended that the following action be allowed:

A geotechnical engineer or experienced soils technician should be present at the site during the construction phase to verify installation according to the approved plans and specifications. The presence of an HCEA representative is particularly important during the excavation of stormwater management features to final grade in order to confirm that the expected conditions are encountered.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties either implied or expressed. Hillis-Carnes Engineering Associates assumes no responsibility for interpretations made by others based on work or recommendations made by HCEA.

## Appendix

Important Information about this Geotechnical Engineering Report

Figure 1: Project Location Map

Figure 2: Boring Location Plan

Records of Subsurface Exploration

Laboratory Testing Results

Field Classification Sheet

USDA Textural Triangle

# Important Information about This

# Geotechnical-Engineering Report

**Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.**

**While you cannot eliminate all such risks, you can manage them. The following information is provided to help.**

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

## Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will <u>not</u> likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will <u>not</u> be adequate to develop geotechnical design recommendations for the project.

*Do <u>not</u> rely on this report* if your geotechnical engineer prepared it:
- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do <u>not</u> rely on an executive summary. Do <u>not</u> read selective elements only. *Read and refer to the report in full.*

## You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:
- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

## This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

## This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

## Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

## Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

## Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

Telephone: 301/565-2733
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**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

417 Maryland Avenue
Delmar, Maryland 21875
PHONE: (410) 749-0940
FAX: (410) 896-3478

## PROJECT LOCATION MAP

## FIGURE 1

John Walter Smith Park
Snow Hill, Maryland

| | | | |
|---|---|---|---|
| **Project No:** | SAL250035A | **Base Map:** | Google |
| **Date:** | 4/17/2025 | **Drawn By:** | DEM |
| **Scale:** | As Shown | | |

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## BORING LOCATION PLAN
## FIGURE 2
John Walter Smith Park
Snow Hill, Maryland

| | | | |
|---|---|---|---|
| **Project No:** | SAL250035A | **Base Map:** | Google |
| **Date:** | 4/17/2025 | **Base Drawing:** | GMB |
| **Scale:** | As Shown | **Drawn By:** | DEM |

# Appendix A: Records of Subsurface Exploration

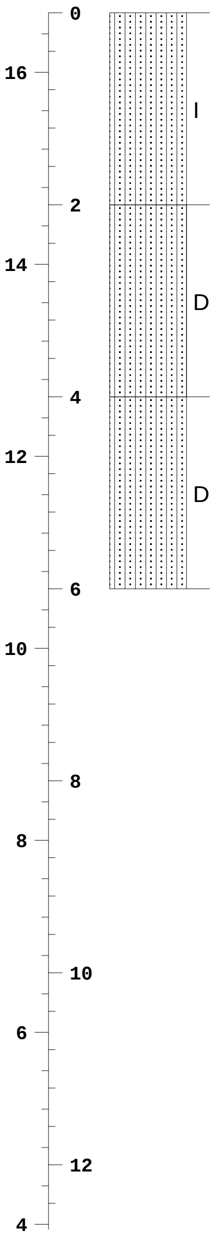
**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

# RECORD OF SUBSURFACE EXPLORATION

Project Name **John Walter Smith Permeable Pavement**
Boring No. B-1
Location Snow Hill, Maryland
Job # SAL250035A

**SAMPLER**

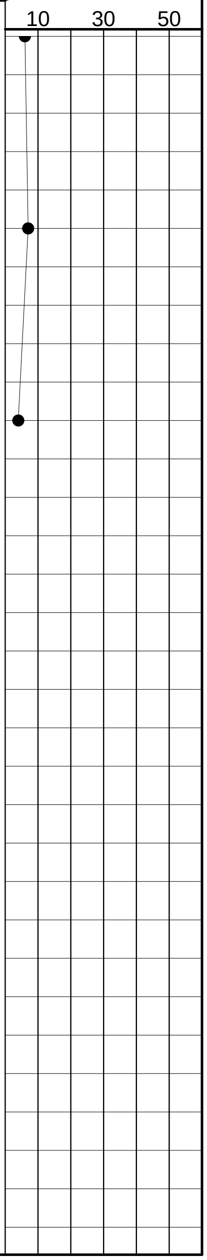
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Datum | USGS84 | Hammer Wt. | 140 lbs. | Hole Diameter | 8" | Foreman | Jake K. |
| Surf. Elev. | 16.62 Ft. | Hammer Drop | 30 in. | Rock Core Diameter | n/a | Classified By | Kelsey C. |
| Date Started | 3-12-2025 | Pipe Size | 2.0 in. | Boring Method | HSA | Date Completed | 3-12-2025 |



| Elevation/ Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | N | Boring & Sampling Notes |
|---|---|---|---|---|---|---|---|
| 0 | I | Brown, moist, loose, fine to medium silty SAND (SM, 10YR 4/2, sandy loam) | 22 | | 3-3-3-3 | 6 | Approximately 6" of topsoil encountered |
| 2 | D | Brown, moist, loose, fine to medium silty SAND (SM, 10YR 5/2, sandy loam) | 13 | | 3-3-4-4 | 7 | |
| 4 | D | Light tan, moist, very loose, fine to medium silty SAND (SM, 10YR 7/2, sandy loam) | 24 | | 3-2-2-2 | 4 | |
| 6 | | End of boring at 6' | | | | | Groundwater encountered at 5.49' after 24 hours<br>Piezomter installed at 6.0' |

SPT Blows/Foot

Curve



**SAMPLER TYPE**
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

**SAMPLE CONDITIONS**
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

| | GROUND WATER | CAVE IN DEPTH |
|---|---|---|
| AT COMPLETION | - ft. | n/a ft. |
| AFTER 24 HRS. | ft. | ft. |
| AFTER ____ HRS. | ft. | ft. |

**BORING METHOD**
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

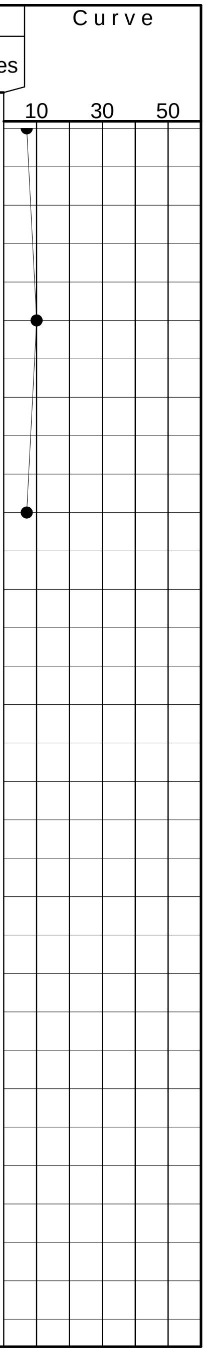
# RECORD OF SUBSURFACE EXPLORATION

Project Name **John Walter Smith Permeable Pavement** Boring No. B-2
Location Snow Hill, Maryland Job # SAL250035A

**SAMPLER**

Datum USGS84 Hammer Wt. 140 lbs. Hole Diameter 8" Foreman Jake K.
Surf. Elev. 15.73 Ft. Hammer Drop 30 in. Rock Core Diameter n/a Classified By Kelsey C.
Date Started 3-12-2025 Pipe Size 2.0 in. Boring Method HSA Date Completed 3-12-2025

| Elevation/ Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | SPT Blows/Foot N | Boring & Sampling Notes |
|---|---|---|---|---|---|---|---|
| 0 | I | Brown, moist, loose, fine to medium silty SAND (SM, 10YR 5/2, sandy loam) | 12 | | 3-3-4-4 | 7 | Approximately 6" of topsoil encountered |
| 14<br>2 | D | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand) | 20 | 9.2 | 4-5-5-5 | 10 | Passing #200: 12.5% |
| 12<br>4 | D | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand) | 20 | 12.6 | 5-4-3-3 | 7 | Passing #200: 15.7% |
| 10<br>6 | | End of boring at 6' | | | | | |
| 8<br>8 | | | | | | | |
| 6<br>10 | | | | | | | |
| 4<br>12 | | | | | | | |



**SAMPLER TYPE**
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

**SAMPLE CONDITIONS**
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

| | GROUND WATER | | CAVE IN DEPTH | |
|---|---|---|---|---|
| AT COMPLETION | - | ft. | n/a | ft. |
| AFTER 24 HRS. | | ft. | | ft. |
| AFTER ___ HRS. | | ft. | | ft. |

**BORING METHOD**
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

# RECORD OF SUBSURFACE EXPLORATION

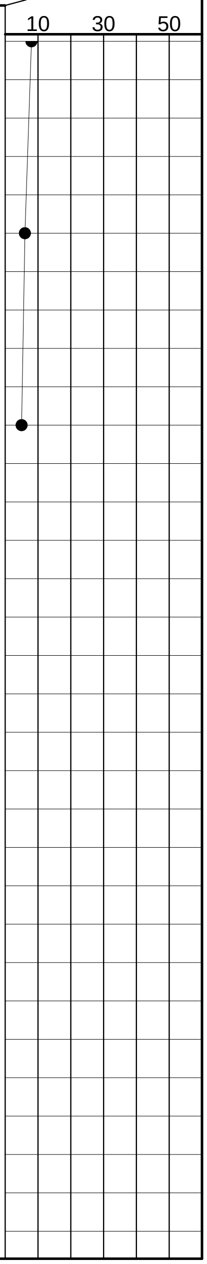
Project Name **John Walter Smith Permeable Pavement** Boring No. B-3
Location Snow Hill, Maryland Job # SAL250035A

**SAMPLER**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Datum | USGS84 | Hammer Wt. | 140 lbs. | Hole Diameter | 8" | Foreman | Jake K. |
| Surf. Elev. | 15.75 Ft. | Hammer Drop | 30 in. | Rock Core Diameter | n/a | Classified By | Kelsey C. |
| Date Started | 3-12-2025 | Pipe Size | 2.0 in. | Boring Method | HSA | Date Completed | 3-12-2025 |

| Elevation/ Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | SPT Blows/Foot N | Boring & Sampling Notes |
|---|---|---|---|---|---|---|---|
| 0 | D | Brown, moist, loose, fine to medium silty SAND (SM, 10YR 5/2, sandy loam) | 20 | | 3-4-4-5 | 8 | Approximately 6" of topsoil encountered |
| 14 / 2 | D | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand) | 18 | 8.8 | 4-3-3-4 | 6 | Passing #200: 12.8% |
| 12 / 4 | D | Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand) | 16 | 15.1 | 3-3-2-2 | 5 | Passing #200: 16.4% |
| 10 / 6 | | End of boring at 6' | | | | | |
| 8 / 8 | | | | | | | |
| 6 / 10 | | | | | | | |
| 4 / 12 | | | | | | | |

Curve



**SAMPLER TYPE**
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

**SAMPLE CONDITIONS**
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

| | GROUND WATER | CAVE IN DEPTH |
|---|---|---|
| AT COMPLETION | - ft. | n/a ft. |
| AFTER 24 HRS. | ft. | ft. |
| AFTER ____ HRS. | ft. | ft. |

**BORING METHOD**
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

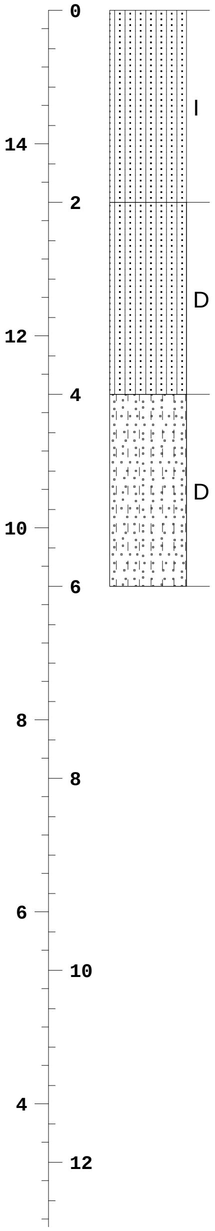
**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

# RECORD OF SUBSURFACE EXPLORATION

Project Name **John Walter Smith Permeable Pavement** Boring No. B-4
Location Snow Hill, Maryland Job # SAL250035A

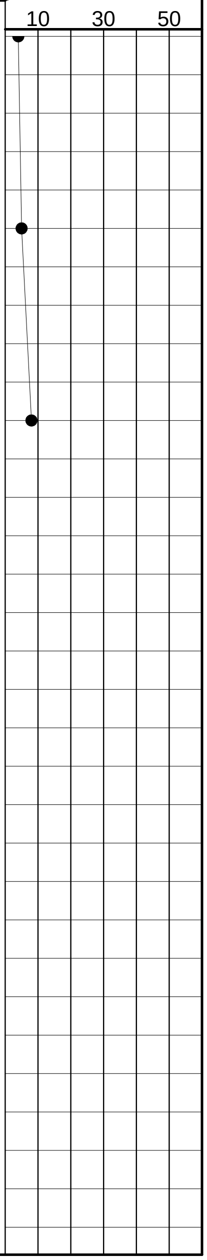
**SAMPLER**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Datum | USGS84 | Hammer Wt. | 140 lbs. | Hole Diameter | 8" | Foreman | Jake K. |
| Surf. Elev. | 15.39 Ft. | Hammer Drop | 30 in. | Rock Core Diameter | n/a | Classified By | Kelsey C. |
| Date Started | 3-12-2025 | Pipe Size | 2.0 in. | Boring Method | HSA | Date Completed | 3-12-2025 |



| Elevation/ Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | N | Boring & Sampling Notes |
|---|---|---|---|---|---|---|---|
| 0 | I | Brown, moist, very loose, fine to medium silty SAND (SM, 10YR 5/2, sandy loam) | 20 | | 2-2-2-2 | 4 | Approximately 6" of topsoil encountered |
| 2 | D | Light brown, moist, loose, fine to coarse SAND, some silt (SM, 10YR 6/4, sandy loam) | 17 | | 2-2-3-3 | 5 | |
| 4 | D | Tan, moist, loose, fine to medium SAND, trace silt (SP-SM, 10YR 7/2, sand) | 14 | | 3-4-4-4 | 8 | |
| 6 | | End of boring at 6' | | | | | |

SPT Blows/Foot — Curve



**SAMPLER TYPE**
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

**SAMPLE CONDITIONS**
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

| | GROUND WATER | | CAVE IN DEPTH | |
|---|---|---|---|---|
| AT COMPLETION | - | ft. | n/a | ft. |
| AFTER 24 HRS. | | ft. | | ft. |
| AFTER ___ HRS. | | ft. | | ft. |

**BORING METHOD**
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

# RECORD OF SUBSURFACE EXPLORATION

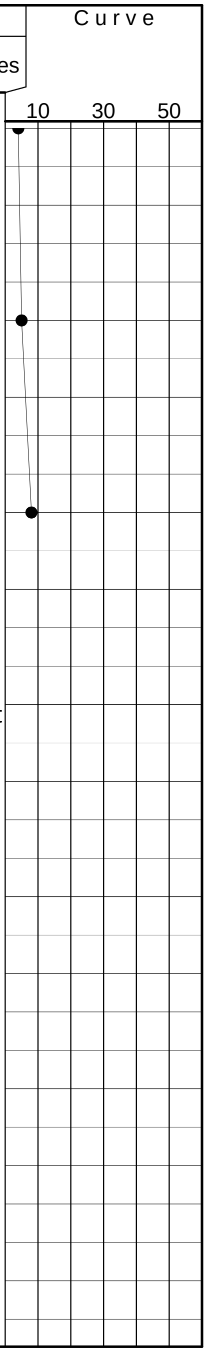
Project Name **John Walter Smith Permeable Pavement** Boring No. B-5

Location Snow Hill, Maryland Job # SAL250035A

**SAMPLER**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Datum | USGS84 | Hammer Wt. | 140 | lbs. | Hole Diameter | 8" | | Foreman | Jake K. |
| Surf. Elev. | 14.65 Ft. | Hammer Drop | 30 | in. | Rock Core Diameter | n/a | | Classified By | Kelsey C. |
| Date Started | 3-12-2025 | Pipe Size | 2.0 | in. | Boring Method | HSA | | Date Completed | 3-12-2025 |

| Elevation/ Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | SPT Blows/Foot N | Boring & Sampling Notes |
|---|---|---|---|---|---|---|---|
| 0 / 14 | I | Brown, moist, very loose, fine to medium silty SAND (SM) | 24 | | 2-2-2-3 | 4 | Approximately 6" of topsoil encountered |
| 2 / 12 | D | Light brown, moist, loose, fine to medium silty SAND (SM) | 17 | | 2-2-3-3 | 5 | |
| 4 / 10 | D | Light brown, moist, loose, fine to medium SAND, some silt (SM) | 16 | | 3-4-4-4 | 8 | Groundwater encountered at 4.53' after 24 hours |
| 6 / 8 | | End of boring at 6' | | | | | Piezomter installed at 6.0' |
| 8 / 6 | | | | | | | |
| 10 / 4 | | | | | | | |
| 12 / 2 | | | | | | | |



**SAMPLER TYPE**
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

**SAMPLE CONDITIONS**
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

| | GROUND WATER | CAVE IN DEPTH |
|---|---|---|
| AT COMPLETION | - ft. | n/a ft. |
| AFTER 24 HRS. | ft. | ft. |
| AFTER ____ HRS. | ft. | ft. |

**BORING METHOD**
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

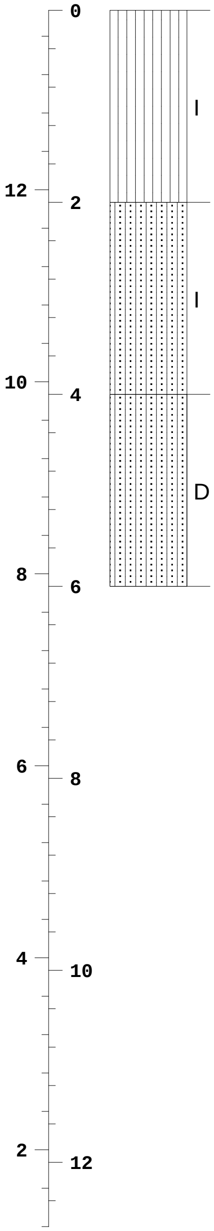
# RECORD OF SUBSURFACE EXPLORATION

Project Name **John Walter Smith Permeable Pavement** Boring No. B-6

Location Snow Hill, Maryland Job # SAL250035A

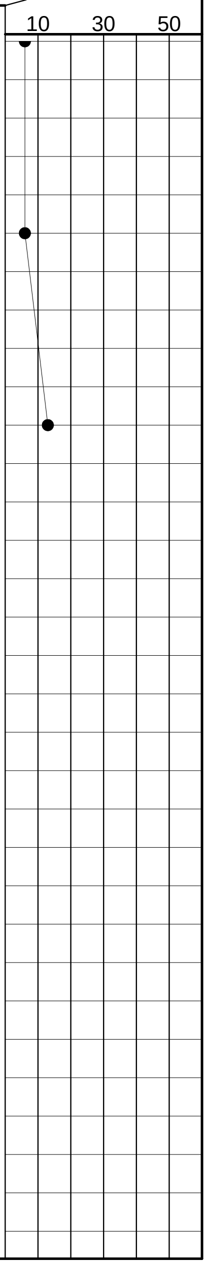
**SAMPLER**

|  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|
| Datum | USGS84 | Hammer Wt. | 140 | lbs. | Hole Diameter | 8" | Foreman | Jake K. |
| Surf. Elev. | 13.87 | Ft. | Hammer Drop | 30 | in. | Rock Core Diameter | n/a | Classified By | Kelsey C. |
| Date Started | 3-12-2025 | Pipe Size | 2.0 | in. | Boring Method | HSA | Date Completed | 3-12-2025 |



| Elevation/ Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | SPT Blows/Foot N | Boring & Sampling Notes |
|---|---|---|---|---|---|---|---|
| 0 | I | Light brown, moist, loose, fine sandy SILT (ML, 10YR 6/4, silt loam) | 18 | 17.1 | 2-3-3-3 | 6 | Approximately 6" of topsoil encountered<br>Passing #200: 56.2% |
| 2 | I | Light gray and orange, moist, loose, fine SAND, some silt (SM, 10YR 7/1, sandy loam) | 24 | 18.8 | 3-3-3-4 | 6 | Passing #200: 23.3% |
| 4 | D | Light gray and brown, moist, medium dense, fine to coarse SAND, little silt (SM, 10YR 6/1 and 10YR 5/3, loamy sand) | 24 |  | 7-7-6-6 | 13 |  |
| 6 |  | End of boring at 6' |  |  |  |  |  |

Curve



|  |  | GROUND WATER |  | CAVE IN DEPTH |  |
|---|---|---|---|---|---|
| AT COMPLETION |  | - | ft. | n/a | ft. |
| AFTER 24 HRS. |  |  | ft. |  | ft. |
| AFTER | HRS. |  | ft. |  | ft. |

**SAMPLER TYPE**
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

**SAMPLE CONDITIONS**
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

**BORING METHOD**
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

**HILLIS-CARNES**
**ENGINEERING ASSOCIATES**

# RECORD OF SUBSURFACE EXPLORATION

Project Name **John Walter Smith Permeable Pavement** Boring No. B-7

Location Snow Hill, Maryland Job # SAL250035A

**SAMPLER**

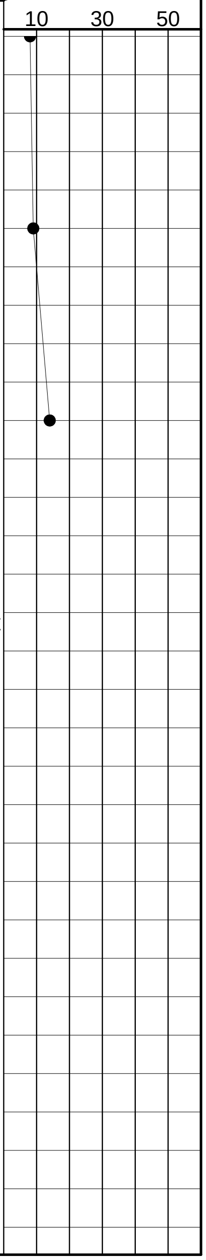
Datum USG84 Hammer Wt. 140 lbs. Hole Diameter 8" Foreman Jake K.

Surf. Elev. 14.32 Ft. Hammer Drop 30 in. Rock Core Diameter n/a Classified By Kelsey C.

Date Started 3-12-2025 Pipe Size 2.0 in. Boring Method HSA Date Completed 3-12-2025

| Elevation/ | Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | SPT Blows/Foot | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | N | Boring & Sampling Notes |
| 14 | 0 | I | Light gray and brown, moist, loose, fine to medium silty SAND (SM, 10YR 6 1 and 10YR 6/2, sandy loam) | 19 | | 2-3-5-4 | 8 | Approximately 6" of topsoil encountered |
| 12 | 2 | I | Light gray and orange, moist, loose, fine to medium SAND, some silt (SM, 10YR 7/2 and 10YR 7/2, sandy loam) | 20 | | 3-4-5-5 | 9 | |
| 10 | 4 | D | Light gray and brown, moist, medium dense, fine to coarse SAND, some silt (SM, 10YR 6/1 and 10YR 6/4, sandy loam) | 24 | | 8-8-6-5 | 14 | Groundwater encountered at 3.63' after 24 hours |
| 8 | 6 | | End of boring at 6' | | | | | Piezomter installed at 6.0' |
| 6 | 8 | | | | | | | |
| 4 | 10 | | | | | | | |
| 2 | 12 | | | | | | | |

Curve



**SAMPLER TYPE**

DRIVEN SPLIT SPOON UNLESS OTHERWISE

PT - PRESSED SHELBY TUBE

CA - CONTINUOUS FLIGHT AUGER

RC - ROCK CORE

**SAMPLE CONDITIONS**

D - DISINTEGRATED

I - INTACT

U - UNDISTURBED

L - LOST

| | GROUND WATER | CAVE IN DEPTH |
|---|---|---|
| AT COMPLETION | - ft. | n/a ft. |
| AFTER 24 HRS. | ft. | ft. |
| AFTER ___ HRS. | ft. | ft. |

**BORING METHOD**

HSA - HOLLOW STEM AUGERS

CFA - CONTINUOUS FLIGHT AUGERS

DC - DRIVING CASING

MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

# HILLIS-CARNES
ENGINEERING ASSOCIATES

## RECORD OF SUBSURFACE EXPLORATION

Project Name **John Walter Smith Permeable Pavement**

Boring No. B-8

Location Snow Hill, Maryland

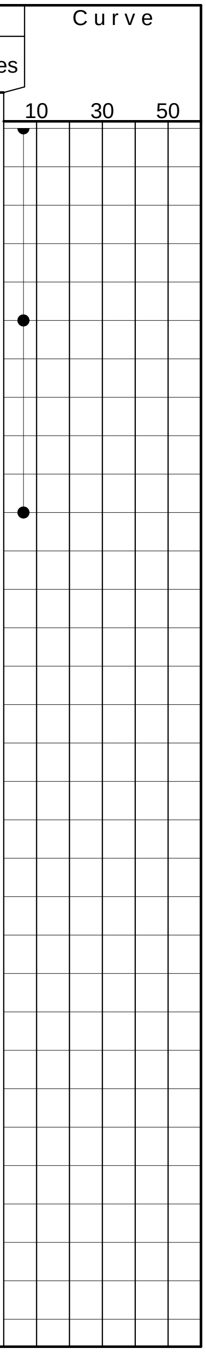
Job # SAL250035A

**SAMPLER**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Datum | USGS84 | Hammer Wt. | 140 | lbs. | Hole Diameter | 8" | Foreman | Jake K. |
| Surf. Elev. | 14.60 | Ft. | Hammer Drop | 30 | in. | Rock Core Diameter | n/a | Classified By | Kelsey C. |
| Date Started | 3-12-2025 | Pipe Size | 2.0 | in. | Boring Method | HSA | Date Completed | 3-12-2025 | |

| Elevation/ Depth | SOIL SYMBOLS/ SAMPLE CONDITIONS | Description | Rec. | NM % | SPT Blows | SPT Blows/Foot N | Boring & Sampling Notes |
|---|---|---|---|---|---|---|---|
| 0 | I | Brown, moist, loose, fine to medium SAND, some silt (SM, 10YR 5/2, sandy loam) | 24 | 12.4 | 2-3-3-4 | 6 | Approximately 6" of topsoil encountered<br>Passing #200: 31.5% |
| 2 | D | Brown, moist, loose, fine to medium SAND, some silt (SM, 10YR 5/2, sandy loam) | 18 | 10.8 | 3-3-3-3 | 6 | Passing #200: 22.0% |
| 4 | D | Light brown, moist, loose, fine to medium SAND, some silt (SM, 10YR 6/4, sandy loam) | 17 | | 3-3-3-4 | 6 | |
| 6 | | End of boring at 6' | | | | | |

Elevation scale: 14, 12, 10, 8, 6, 4, 2; Depth scale: 0, 2, 4, 6, 8, 10, 12

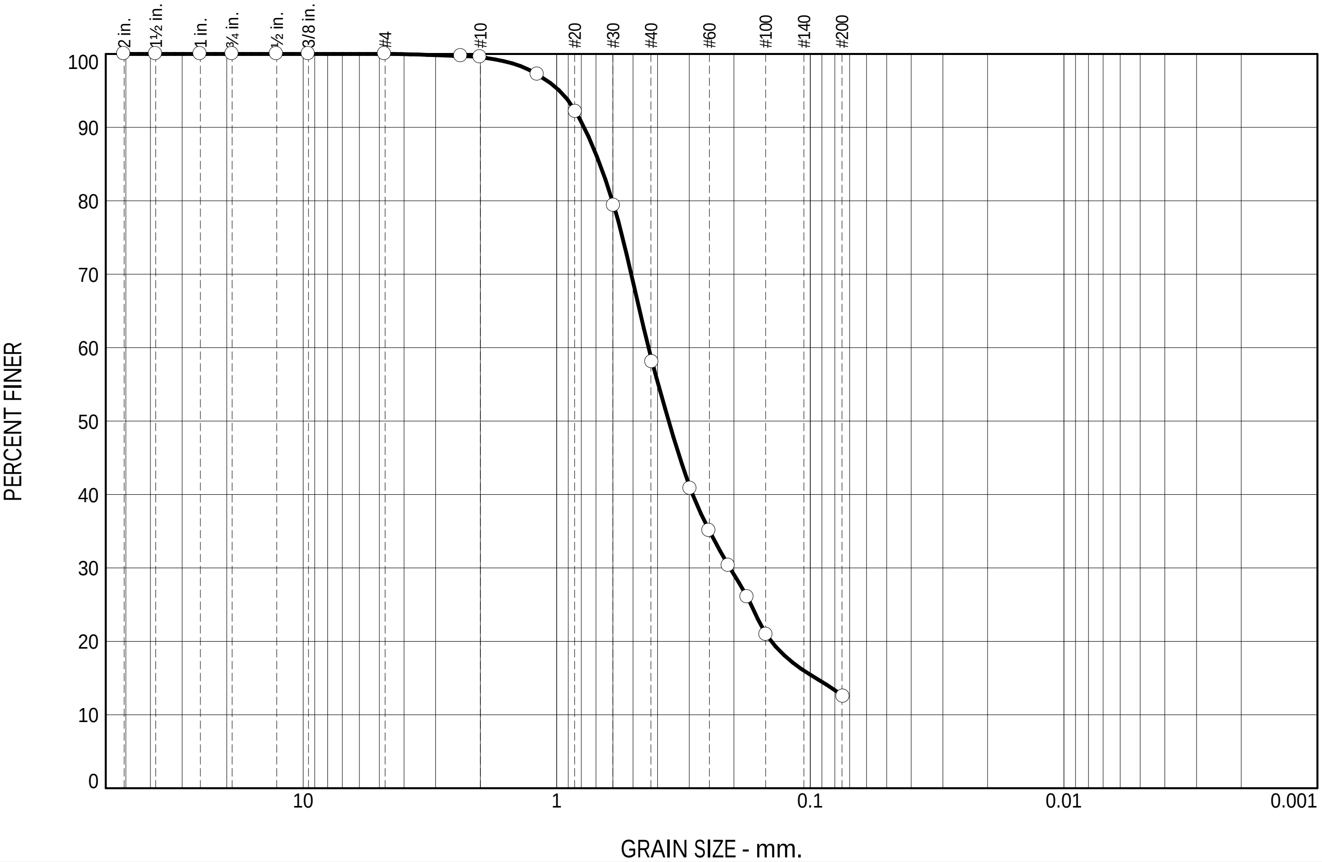


| SAMPLER TYPE | SAMPLE CONDITIONS | | GROUND WATER | | CAVE IN DEPTH | | BORING METHOD |
|---|---|---|---|---|---|---|---|
| DRIVEN SPLIT SPOON UNLESS OTHERWISE | D - DISINTEGRATED | AT COMPLETION | - | ft. | n/a | ft. | HSA - HOLLOW STEM AUGERS |
| PT - PRESSED SHELBY TUBE | I - INTACT | AFTER 24 HRS. | | ft. | | ft. | CFA - CONTINUOUS FLIGHT AUGERS |
| CA - CONTINUOUS FLIGHT AUGER | U - UNDISTURBED | AFTER ____ HRS. | | ft. | | ft. | DC - DRIVING CASING |
| RC - ROCK CORE | L - LOST | | | | | | MD - MUD DRILLING |

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

# Appendix B: Laboratory Testing

# Particle Size Distribution Report



| % +3" | % Gravel |  | % Sand |  |  | % Fines |
|---|---|---|---|---|---|---|
|  | Coarse | Fine | Coarse | Medium | Fine |  |
| 0.0 | 0.0 | 0.0 | 0.4 | 40.9 | 46.1 | 12.6 |

| SIEVE SIZE OR DIAMETER | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 2 | 100.0 |  |  |
| 1.5 | 100.0 |  |  |
| 1 | 100.0 |  |  |
| 0.75 | 100.0 |  |  |
| 0.5 | 100.0 |  |  |
| 0.375 | 100.0 |  |  |
| #4 | 100.0 |  |  |
| #8 | 99.7 |  |  |
| #10 | 99.6 |  |  |
| #16 | 97.2 |  |  |
| #20 | 92.1 |  |  |
| #30 | 79.3 |  |  |
| #40 | 58.0 |  |  |
| #50 | 40.8 |  |  |
| #60 | 35.1 |  |  |
| #70 | 30.3 |  |  |
| #80 | 26.0 |  |  |
| #100 | 20.9 |  |  |
| #200 | 12.5 |  |  |

* (no specification provided)

### Soil Description

Light brown, moist, loose, fine to medium SAND, little silt (SM, 10YR 6/4, loamy sand)

### Atterberg Limits

PL= LL= PI=

### Coefficients

$D_{90}$= 0.7799 $D_{85}$= 0.6760 $D_{60}$= 0.4346
$D_{50}$= 0.3616 $D_{30}$= 0.2075 $D_{15}$= 0.0953
$D_{10}$= $C_u$= $C_c$=

### Classification

USCS= SM AASHTO=

### Remarks

Source of Sample: B-2 Depth: 2
Sample Number: 2

Date: 3-17-2025

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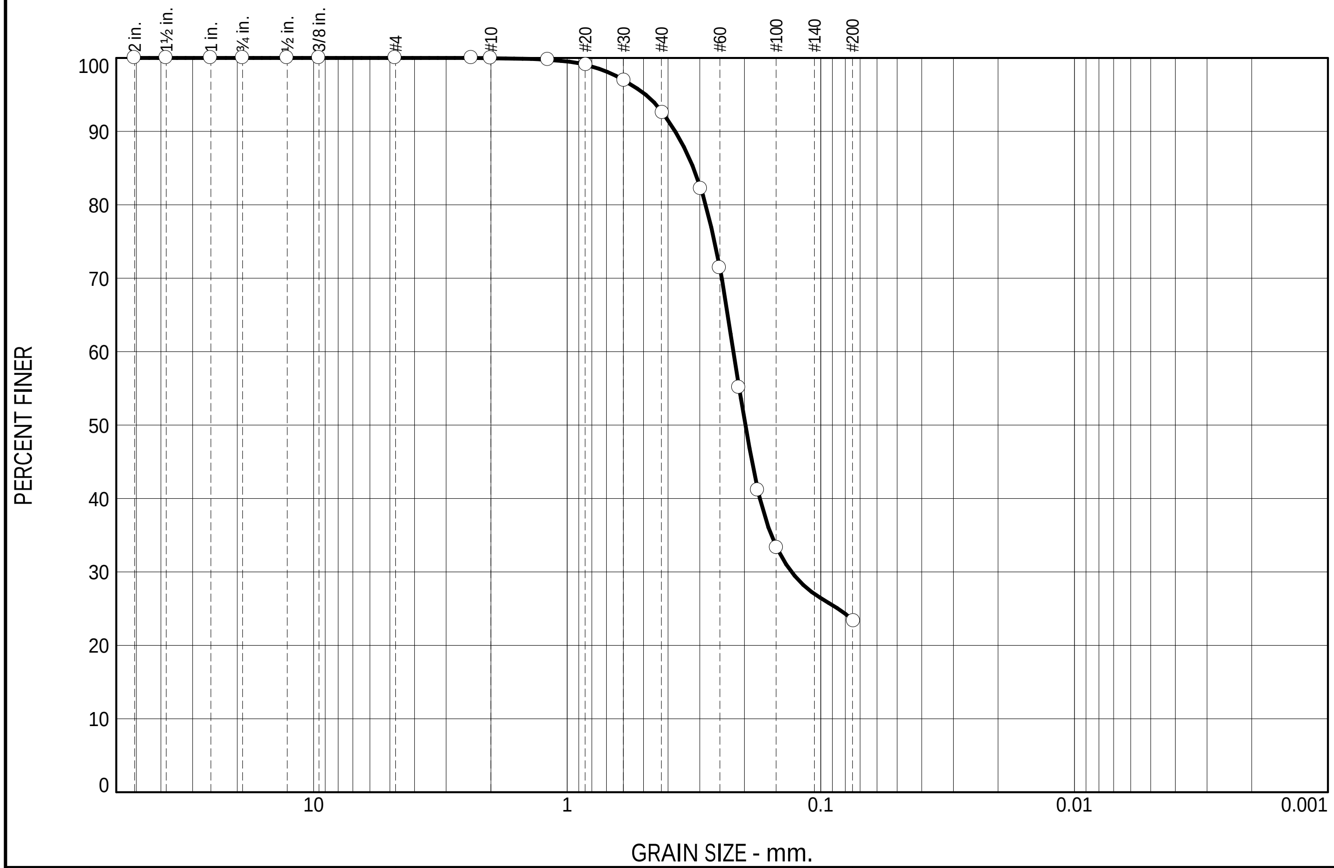
Project: John Walter Smith Permeable Pavement
Project No: SAL250035A Figure

# Particle Size Distribution Report



| % +3" | % Gravel |  | % Sand |  |  | % Fines |
|---|---|---|---|---|---|---|
|  | Coarse | Fine | Coarse | Medium | Fine |  |
| 0.0 | 0.0 | 0.0 | 0.0 | 7.2 | 69.3 | 23.5 |

| SIEVE SIZE OR DIAMETER | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 2 | 100.0 |  |  |
| 1.5 | 100.0 |  |  |
| 1 | 100.0 |  |  |
| 0.75 | 100.0 |  |  |
| 0.5 | 100.0 |  |  |
| 0.375 | 100.0 |  |  |
| #4 | 100.0 |  |  |
| #8 | 100.0 |  |  |
| #10 | 100.0 |  |  |
| #16 | 99.7 |  |  |
| #20 | 99.0 |  |  |
| #30 | 96.9 |  |  |
| #40 | 92.5 |  |  |
| #50 | 82.2 |  |  |
| #60 | 71.4 |  |  |
| #70 | 55.1 |  |  |
| #80 | 41.1 |  |  |
| #100 | 33.3 |  |  |
| #200 | 23.3 |  |  |

* (no specification provided)

## Soil Description

Light gray and orange, moist, loose, fine SAND, some silt (SM, 10YR 7/1, sandy loam)

## Atterberg Limits

PL= LL= PI=

## Coefficients

$D_{90}$= 0.3752 $D_{85}$= 0.3176 $D_{60}$= 0.2213
$D_{50}$= 0.1982 $D_{30}$= 0.1304 $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

## Classification

USCS= SM AASHTO=

## Remarks

Source of Sample: B-6 Depth: 2
Sample Number: 2

Date: 3-17-2025

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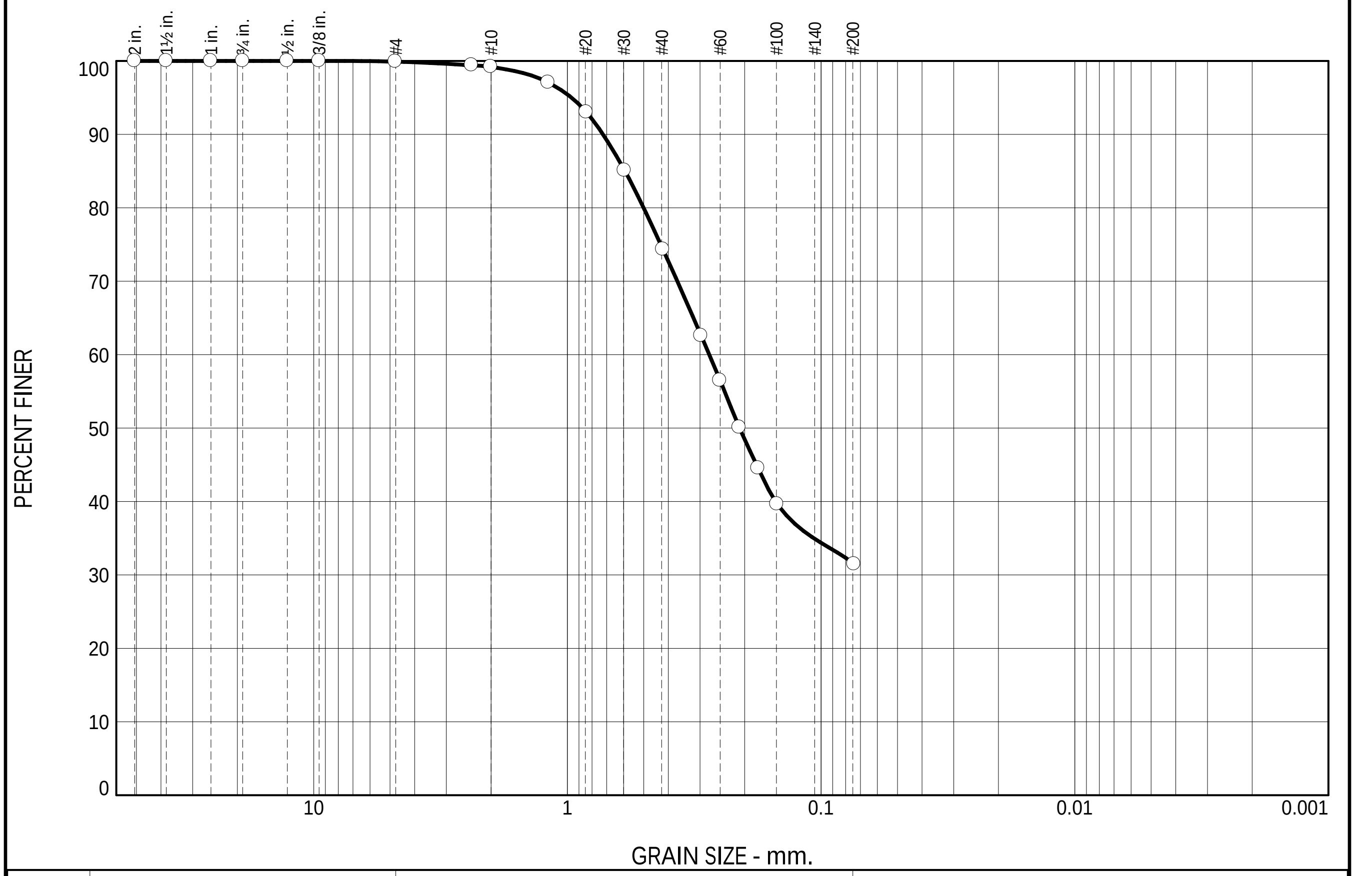
Project No: SAL250035A Figure

# Particle Size Distribution Report



| % +3" | % Gravel | | % Sand | | | % Fines |
|---|---|---|---|---|---|---|
| | Coarse | Fine | Coarse | Medium | Fine | |
| 0.0 | 0.0 | 0.1 | 0.7 | 24.5 | 43.1 | 31.6 |

| SIEVE SIZE OR DIAMETER | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 2 | 100.0 | | |
| 1.5 | 100.0 | | |
| 1 | 100.0 | | |
| 0.75 | 100.0 | | |
| 0.5 | 100.0 | | |
| 0.375 | 100.0 | | |
| #4 | 99.9 | | |
| #8 | 99.4 | | |
| #10 | 99.2 | | |
| #16 | 97.1 | | |
| #20 | 93.0 | | |
| #30 | 85.1 | | |
| #40 | 74.3 | | |
| #50 | 62.6 | | |
| #60 | 56.5 | | |
| #70 | 50.1 | | |
| #80 | 44.5 | | |
| #100 | 39.6 | | |
| #200 | 31.5 | | |

* (no specification provided)

### Soil Description

Brown, moist, loose, fine to medium SAND, some silt (SM, 10YR 5/2, sandy loam)

### Atterberg Limits

PL=
LL=
PI=

### Coefficients

$D_{90}$= 0.7240
$D_{85}$= 0.5930
$D_{60}$= 0.2759
$D_{50}$= 0.2095
$D_{30}$=
$D_{15}$=
$D_{10}$=
$C_u$=
$C_c$=

### Classification

USCS= SM
AASHTO=

### Remarks

Source of Sample: B-8
Depth: 0
Sample Number: 1

Date: 3-17-2025

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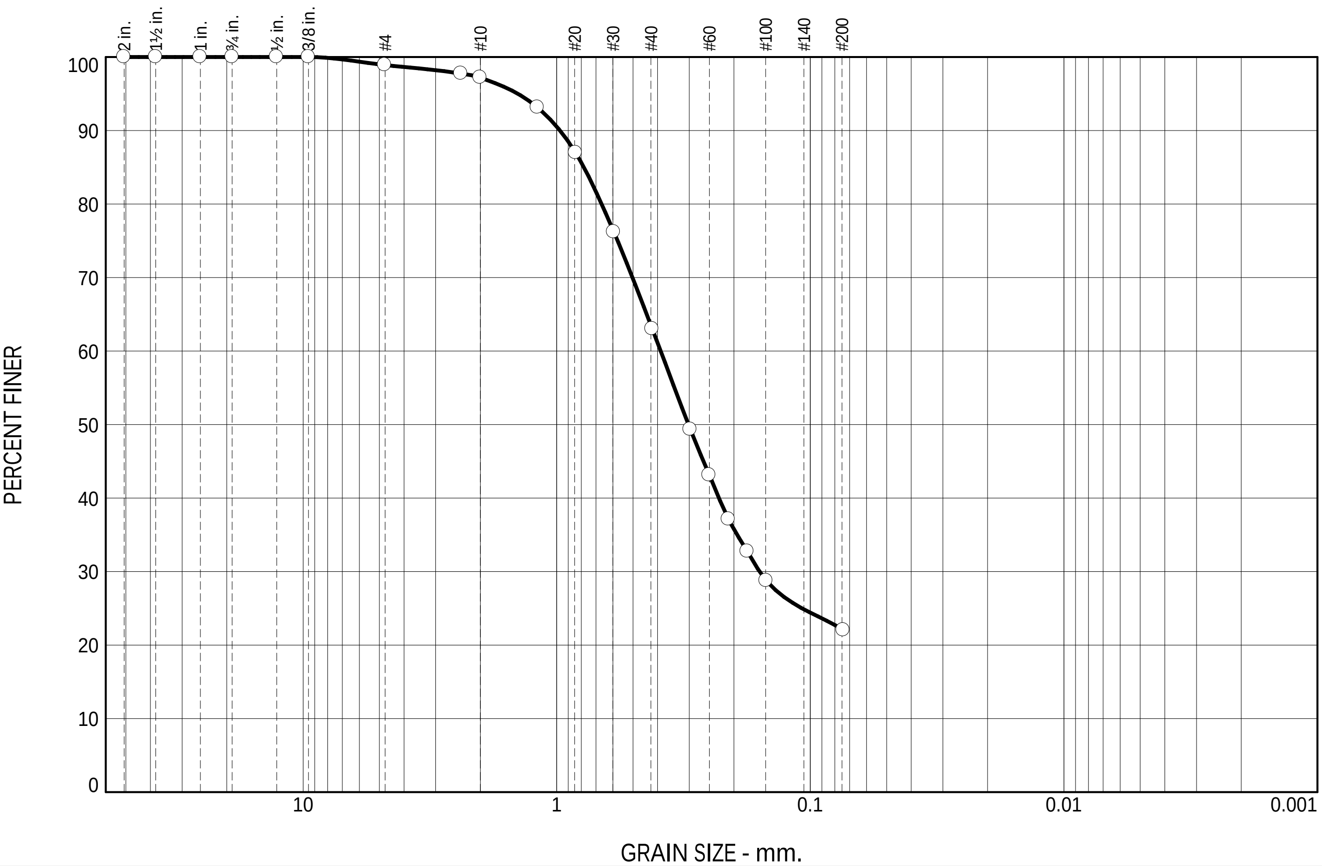
Project No: SAL250035A
Figure

# Particle Size Distribution Report



| % +3" | % Gravel |  | % Sand |  |  | % Fines |
|---|---|---|---|---|---|---|
|  | Coarse | Fine | Coarse | Medium | Fine |  |
| 0.0 | 0.0 | 1.1 | 1.7 | 33.7 | 41.3 | 22.2 |

| SIEVE SIZE OR DIAMETER | PERCENT FINER | SPEC.* PERCENT | PASS? (X=NO) |
|---|---|---|---|
| 2 | 100.0 |  |  |
| 1.5 | 100.0 |  |  |
| 1 | 100.0 |  |  |
| 0.75 | 100.0 |  |  |
| 0.5 | 100.0 |  |  |
| 0.375 | 100.0 |  |  |
| #4 | 98.9 |  |  |
| #8 | 97.7 |  |  |
| #10 | 97.2 |  |  |
| #16 | 93.1 |  |  |
| #20 | 87.0 |  |  |
| #30 | 76.2 |  |  |
| #40 | 63.0 |  |  |
| #50 | 49.3 |  |  |
| #60 | 43.1 |  |  |
| #70 | 37.1 |  |  |
| #80 | 32.7 |  |  |
| #100 | 28.7 |  |  |
| #200 | 22.0 |  |  |

* (no specification provided)

### Soil Description

Brown, moist, loose, fine to medium SAND, some silt (SM, 10YR 5/2, sandy loam)

### Atterberg Limits

PL= LL= PI=

### Coefficients

$D_{90}$= 0.9703 $D_{85}$= 0.7809 $D_{60}$= 0.3889
$D_{50}$= 0.3022 $D_{30}$= 0.1586 $D_{15}$=
$D_{10}$= $C_u$= $C_c$=

### Classification

USCS= SM AASHTO=

### Remarks

Source of Sample: B-8 Depth: 2
Sample Number: 2

Date: 3-17-2025

**HILLIS-CARNES ENGINEERING ASSOCIATES**

SALISBURY, MD

Client: Mr. David Rovansek
Project: John Walter Smith Permeable Pavement

Project No: SAL250035A Figure

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## DESCRIPTION OF SOILS - PER ASTM D2487

| MAJOR COMPONENT | COMPONENT TYPE | COMPONENT DESCRIPTION | SYMBOL | GROUP NAME |
|---|---|---|---|---|
| **Coarse-Grained Soils**, More than 50% is retained on the No. 200 sieve | **Gravels** – More than 50% of the coarse fraction is retained on the No. 4 sieve.<br>Coarse = 1" to 3"<br>Medium = ½" to 1"<br>Fine = ¼" to ½" | Clean Gravels <5% Passing No. 200 sieve | GW | Well Graded Gravel |
| | | | GP | Poorly Graded Gravel |
| | | Gravels with fines, >12% Passing the No. 200 sieve | GM | Silty Gravel |
| | | | GC | Clayey Gravel |
| | **Sands** – More than 50% of the coarse fraction passes the No. 4 sieve. Coarse = No.10 to No.4<br>Medium = No. 10 to No. 40<br>Fine = No. 40 to No. 200 | Clean Sands <5% Passing No. 200 sieve | SW | Well Graded Sand |
| | | | SP | Poorly Graded Sand |
| | | Sands with fines, >12% Passing the No. 200 sieve | SM | Silty Sand |
| | | | SC | Clayey Sand |
| **Fine Grained Soils**, More than 50% passes the No. 200 sieve | Silts and Clays<br>Liquid Limit is less than 50 Low to medium plasticity | Inorganic | ML | Silt |
| | | | CL | Lean Clay |
| | | Organic | OL | Organic Silt |
| | | | | Organic Clay |
| | Silts and Clays<br>Liquid Limit of 50 or greater Medium to high plasticity | Inorganic | MH | Elastic Silt |
| | | | CH | Fat Clay |
| | | Organic | OH | Organic Silt |
| | | | | Organic Clay |
| **Highly Organic Soils** | Primarily Organic matter, dark color, organic odor | | PT | Peat |

## PROPORTIONS OF SOIL COMPONENTS

| COMPONENT FORM | DESCRIPTION | APPROXIMATE PERCENT BY WEIGHT |
|---|---|---|
| Noun | Sand, Gravel, Silt, Clay, etc. | 50% or more |
| Adjective | Sandy, silty, clayey, etc. | 35% to 49% |
| Some | Some sand, some silt, etc. | 12% to 34% |
| Trace | Trace sand, trace mica, etc. | 1% to 11% |
| With | With sand, with mica, etc. | Presence only |

## PARTICLE SIZE IDENTIFICATION

| PARTICLE SIZE | PARTICLE DIMENSION |
|---|---|
| Boulder | 12" diameter or more |
| Cobble | 3" to 12" diameter |
| Gravel | ¼" to 3" diameter |
| Sand | 0.005" to ¼" diameter |
| Silt/Clay (fines) | Cannot see particle |

## COHESIVE SOILS

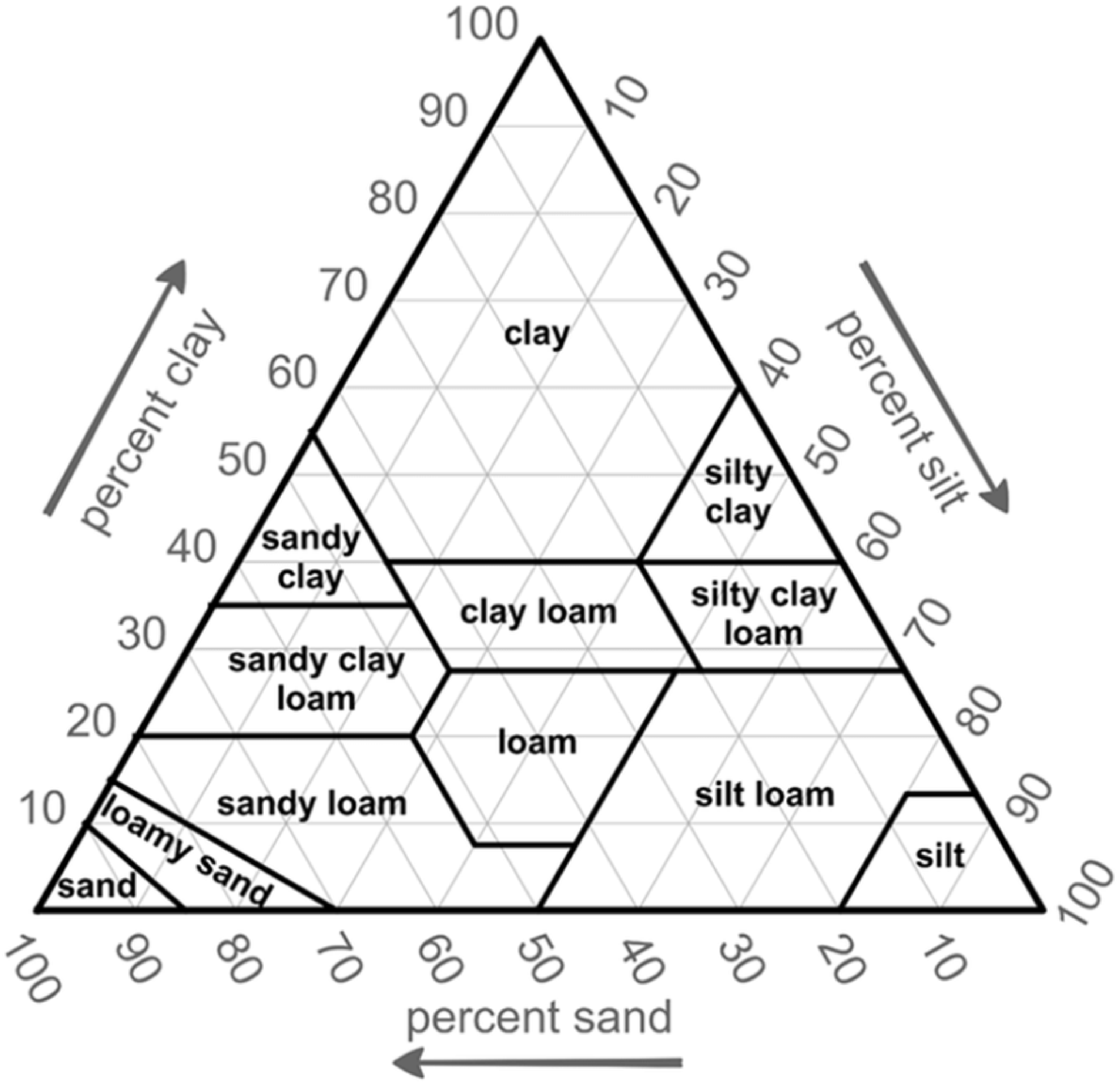
| FIELD DESCRIPTION | NO. OF SPT BLOWS/FT | CONSISTENCY |
|---|---|---|
| Easily Molded in Hands | Less than 2 | Very Soft |
| Easily Penetrated several inches by thumb | 2 - 4 | Soft |
| Penetrated by thumb with moderate effort | 5 - 8 | Medium Stiff |
| Penetrated by thumb with great effort | 9 - 15 | Stiff |
| Indented by thumb only with moderate effort | 16 - 30 | Very Stiff |
| Indented by thumb only with great effort | Greater than 30 | Hard |

## GRANULAR SOILS

| NO. OF SPT BLOWS/FT. | RELATIVE DENSITY |
|---|---|
| Less than 5 | Very Loose |
| 5 - 10 | Loose |
| 11 - 30 | Medium Dense |
| 31 - 50 | Dense |
| Greater than 50 | Very Dense |

## OTHER DEFINITIONS:

- **Fill:** Encountered soils that were placed by man. Fill soils may be controlled (engineered structural fill) or uncontrolled fills that may contain rubble and/or debris.
- **Saprolite:** Soil material derived from the in-place chemical and physical weathering of the parent rock material. May contain relic structure. Also called residual soils. Occurs in Piedmont soils, found west of the fall line.
- **Karst:** Descriptive term which denotes the potential for solutioning of the limestone rock and the development of sinkholes.
- **Alluvium:** Recently deposited soils placed by water action, typically stream or river floodplain soils.
- **Groundwater Level:** Depth within borehole where water is encountered either during drilling, or after a set period of time to allow groundwater conditions to reach equilibrium.
- **Caved Depth:** Depth at which borehole collapsed after removal of augers/casing. Indicative of loose soils and/or groundwater conditions.



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**USDA TEXTURAL TRIANGLE**

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