WHITESTONE
ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

30 INDEPENDENCE BOULEVARD
SUITE 250
WARREN, NJ 07059
908.668.7777
whitestoneassoc.com

REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED WAWA FOOD MARKET & FUEL STATION
108 EGG HARBOR ROAD
BLACKWOOD (WASHINGTON TOWNSHIP)
GLOUCESTER COUNTY, NEW JERSEY

Prepared for:

THE FERBER COMPANY, INC.
151 Sawgrass Corners Drive
Suite 202
Ponte Vedra Beach, Florida 32082

Prepared by:

WHITESTONE ASSOCIATES, INC.
35 Technology Drive
Warren, New Jersey 07059

Kyle J. Kopacz, P.E.
Project Manager

Laurence W. Keller, P.E.
Principal, Geotechnical Services

Whitestone Project No.: GS1815987.000
January 15, 2019
(Updated July 9, 2020)

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January 15, 2019
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via email

THE FERBER COMPANY, INC.
151 Sawgrass Corners Drive
Suite 202
Ponte Vedra Beach, Florida 32082

Attention: Eric L. Steinfeldt, P.E., P.P.

Regarding: REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED WAWA FOOD MARKET & FUEL STATION
108 EGG HARBOR ROAD
BLACKWOOD (WASHINGTON TOWNSHIP)
GLOUCESTER COUNTY, NEW JERSEY
WHITESTONE PROJECT NO.: GS1815987.000

Dear Mr. Steinfeldt:

Whitestone Associates, Inc. (Whitestone) is pleased to submit the attached *Report of Geotechnical Investigation* for the above-referenced project. The attached report presents the results of Whitestone's soils exploration efforts and presents recommendations for design of the proposed structural foundations, floor slab, pavements, utilities, stormwater management facilities, and related earthwork associated with the proposed site redevelopment.

Whitestone's geotechnical division appreciates the opportunity to be of continued service to The Ferber Company, Inc. (Ferber). Please note that Whitestone has the capability to perform the additional geotechnical engineering services recommended herein. Please contact us at (908) 668-7777 with any questions regarding the enclosed report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Kyle J. Kopacz, P.E.
Project Manager

Laurence W. Keller, P.E.
Principal, Geotechnical Services

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Enclosures
Copy: Jeffrey Martell, PE, PP, CME, LEED AP, Stonefield Engineering & Design, LLC
Paul Mutch, P.E., Stonefield Engineering & Design, LLC
Janet Coulther, The Ferber Company, Inc.

REPORT OF GEOTECHNICAL INVESTIGATION
Proposed Wawa Food Market & Fuel Station
108 Egg Harbor Road
Blackwood (Washington Township), Gloucester County, New Jersey

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Proposed Wawa Food Market & Fuel Station
108 Egg Harbor Road
Blackwood (Washington Township), Gloucester County, New Jersey

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SECTION 1.0
Summary of Findings and Recommendations

An exploration and evaluation of the subsurface conditions has been performed on the site of the proposed Wawa Food Market and fuel station development located at 108 Egg Harbor Road in Blackwood, Washington Township, Gloucester County, New Jersey. The site of the proposed construction is shown on the *Test Location Plan* included as Figure 1.

Based on the September 18, 2018 *Concept Y* prepared by Stonefield Engineering & Design (Stonefield), the proposed site redevelopment includes clearing of the existing site and construction of a Wawa Food Market and fuel station with associated new pavements, stormwater management (SWM) facilities, underground storage tanks (USTs) and utilities. No earth retaining walls were identified on the site plan. The final types, locations, and elevations of the SWM facilities were not determined at the time of this report.

A topographic survey of the site was not available at the time of this report. However, based on visual observation, there are significant grade changes across the subject site on the order of 10 feet to 15 feet. Furthermore, based on conversations with Stonefield cuts up to about 10 feet will be required to achieve design grades.

The geotechnical investigation included performing a reconnaissance of the project site, drilling soil borings, excavating profile pits, performing *in-situ* infiltration tests, and collecting soil samples for laboratory analysis. The data from this exploration and analysis were analyzed by Whitestone in light of the project information provided by Stonefield and The Ferber Company (Ferber).

A summary of Whitestone's findings is presented in the following table and detailed descriptions of the subsurface conditions encountered are presented in Section 4.0.

Subsurface Profile	Description	Bottom of Stratum (fbgs)
Existing Fill Materials	Encountered in majority of the test locations. Consisting of silty sand with variable amounts of mulch.	1.0 to 3.0
Coastal Plains Deposits	Generally consisting of poorly graded sand (USCS: SP and SP-SM) with lessor amounts of silt and clayey sand (USCS: SC). The coastal plains deposits extended to the maximum termination depth of approximately 25 fbgs.	+25.0
Groundwater	Static groundwater was encountered at a depth of approximately 23.0 fbgs.	23.0

fbgs: feet below ground surface.

Recommendations developed upon consideration of these findings are summarized in the table below and presented in greater detail in the indicated sections of the report.

Geotechnical Consideration	Recommendation	Report Section
Foundation System	Shallow spread and continuous footings bearing on natural soils and/or imported structural fill. Isolated areas requiring overexcavation and replacement of existing fill materials are anticipated.	5.5
Groundwater Control	Static groundwater is not anticipated to be encountered during construction. However, removal of perched/trapped water is anticipated within excavations for foundations and utilities.	5.4
Floor Slab & Pavements	The site soils are suitable for a ground-supported floor slab and pavements following compaction efforts and proofroll inspections. Isolated areas requiring overexcavation should be anticipated.	5.6
On-Site Soil Reuse	Limited portions of the existing fill materials and a majority of the natural site sand soils are suitable for reuse as structural fill and/or backfill provided and that moisture levels are maintained within three percent of optimum moisture content and deleterious debris is removed.	5.3
SWM Facilities	The natural granular soils are favorable for infiltration. Discontinuous layers or pockets of impermeable clay/silt soils will need to be overexcavated and replaced with granular soils.	5.13

SECTION 2.0
Introduction

2.1 AUTHORIZATION

Eric L. Steinfeldt, P.E., P.P. of Ferber issued authorization to Whitestone to perform a geotechnical investigation on this site relevant to the construction of the proposed development. The geotechnical investigation was performed in accordance with Whitestone's September 11, 2018 proposal to Ferber.

2.2 PURPOSE

The purpose of this subsurface exploration and analysis was to:

- ascertain the various soil profile components at test locations;
- estimate the engineering characteristics of the proposed foundation bearing and subgrade materials;
- provide geotechnical criteria for use by the design engineers in preparing the foundation, slab, SWM facilities, and pavement design;
- provide recommendations for required earthwork and subgrade preparation;
- record groundwater levels (if encountered) at the time of the investigation and discuss the potential impact on the proposed construction; and
- recommend additional investigation and/or analysis (if warranted).

2.3 SCOPE

The scope of the exploration and analysis included the subsurface exploration, field testing and sampling, laboratory analysis, an engineering analysis and evaluation of the foundation materials. This *Report of Geotechnical Investigation* is limited to addressing the site conditions related to the physical support of the proposed construction. Any references to suspicious odors, materials, or conditions are provided strictly for the client's information.

Whitestone's environmental division conducted a *Phase I Environmental Site Assessment* for the subject site, the results of which are reported under separate cover.

2.3.1 Field Exploration

Field exploration of the project site was conducted by means of eight soil borings, identified as B-1 through B-8. Additionally, six soil profile pits, identified as SPP-1 through SPP-6, and five supplemental soil profile pits, identified as SSPP-1 through SSPP-5, were performed in proposed SWM areas. The soil borings were advanced with an ATV-mounted Mobile Drill rig equipped with hollow-stem augers and the profile pits were excavated with a Deere 310 track-mounted backhoe. The test locations are shown on the *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A. The test locations and termination depths are summarized in the following table:

BORING LOCATION/TERMINATION DEPTH SUMMARY TABLE		
Proposed Construction	**Test No.**	**Termination Depth (fbgs)**
Wawa Building	B-4 & B-7	20.0
Fuel Island Canopy	B-1, B-6 & B-8	20.0 to 25.0
UST Field	B-8	25.0
Pavements	B-2 & B-5	10.0 to 20.0
Trash Enclosure	B-3	20.0

fbgs: feet below ground surface

The soil borings and profile pits were conducted in the presence of a Whitestone engineer who performed field tests, recorded visual classifications, and collected samples of the various strata encountered. The test areas were located in the field using normal taping procedures and estimated right angles. These locations are presumed to be accurate within a few feet.

Soil borings and Standard Penetration Tests (SPTs) were conducted in general accordance with ASTM International (ASTM) designation D 1586. The SPT resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations.

Groundwater level observations, where encountered, were recorded during and immediately after the completion of field operations prior to backfilling the borings. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

2.3.2 Laboratory Testing Program

In addition to the field investigation, a laboratory testing program was conducted to determine additional, pertinent engineering characteristics of representative samples of on-site soils. The laboratory testing program was performed in general accordance with applicable ASTM standard test methods and included physical testing of proposed building foundation bearing and pavement subgrade stratum.

Physical/Textural Analyses: Representative samples of selected strata encountered were subjected to a laboratory testing program that included Atterberg limits determinations (ASTM D-4318), moisture content determinations (ASTM D-2216) and washed gradation analyses (ASTM D-422) in order to perform supplementary engineering soil classifications in general accordance with ASTM D-2487. The soil strata tested were classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the following table. Quantitative test results are provided in Appendix B.

PHYSICAL/TEXTURAL ANALYSES SUMMARY							
Boring No.	**Sample**	**Depth (fbgs)**	**% Passing No. 200 Sieve**	**Moisture Content (%)**	**Liquid Limit**	**Plastic Index**	**USCS Classification**
B-2	S-5	8.0 to 10.0	30.9	16.4	43	18	SC
B-4	S-6	13.0 to 15.0	5.2	6.1	Non-Plastic		SP-SM
B-7	S-3	4.0 to 6.0	6.4	6.2	Non-Plastic		SP-SM

fbgs: feet below ground surface

The engineering classifications are useful when considered in conjunction with the additional site data to estimate properties of the soil types encountered and to predict the soil's behavior under construction and service loads.

Pavement and Slab Subgrade Analyses: A representative bulk sample from the anticipated proposed pavement subgrade stratum was collected and tested to determine the soil's suitability for support of proposed pavement and slabs. A California Bearing Ratio (CBR) test was performed on a representative sample taken at the anticipated subgrade soil levels in general accordance with ASTM D 1883. The CBR value is used in conjunction with climatic factors and design loads to design an appropriate pavement section. A laboratory CBR value of 19.4 percent was obtained from the selected site sample tested, which had a unified soil classification system designation of SM with 17.2 percent fines.

A moisture-density relationship per ASTM D 1557 also was performed. The maximum dry density and optimum moisture content was obtained from the peak value of the moisture-density curve. The maximum dry density and optimum moisture content on the tested sample was 127.6 pounds per cubic foot (pcf) at 9.2 percent, respectively. More detailed quantitative results are provided in Appendix B.

SECTION 3.0
Site Description

3.1 LOCATION AND DESCRIPTION

The subject site is located at 108 Egg Harbor Road in Blackwood, Washington Township, Gloucester County, New Jersey. The site is bound to the north by an earthwork facility, to the south by Egg Harbor road followed by commercial buildings, to the east by a wooded parcel, and to the west by a commercial building. The location of the site is shown on the *Test Location Plan* included as Figure 1.

3.2 EXISTING CONDITIONS

Surface Cover/Development: At the time of the investigation, the subject site consisted of a vacant parcel and a landscaped parcel separated by an exit off of Egg Harbor Road with associated pavements and utilities.

Topography: A topographic survey of the site was not available at the time of this report. However, based on visual observation, there are significant grade changes across the subject site on the order of 10 feet to 15 feet. Futhermore, based on conversations with Stonefield, cuts up to about 10 feet will be required to achieve design grades.

Utilities: The existing site structures were serviced by natural gas, sanitary sewer, water, stormwater, electric, and telecommunications. The utility information contained in this report is presented for general discussion only and is not intended for construction purposes.

Site Drainage: Surface runoff generally consists of flow across the existing pavement towards inlets located within adjacent right-of-ways. The termini of these inlets are unknown.

3.3 SITE BEDROCK GEOLOGY

The subject site is situated within the Atlantic Coastal Plain Physiographic Province of New Jersey. Specifically, the site is underlain by the Tertiary Aged, Lower member of the Kirkwood Formation. Specifically, the Lower member of the Kirkwood Formation consists of light yellow to white, massive to thick bedded, fine to medium grained sands interbedded with clay. Locally, areas encountered in near-surface beds are very micaceous and extensively stained by iron oxides. The thick bedded strata commonly consists of interbedded fine grained, micaceous sand and gravelly, coarse to fine grained sand. Overburden materials also include manmade fill associated with ongoing site activities.

3.4 PROPOSED CONSTRUCTION

Based on the aforementioned *Concept Y* prepared by Stonefield, the proposed site redevelopment includes clearing of the existing site and construction of a Wawa Food Market and fuel station with associated new pavements, SWM facilities, USTs and utilities. A proposed final grading plan was not available at the time of this report. Based on existing site grades and surrounding development, Whitestone anticipates that proposed grading will result in cuts and fills on the order of 10 feet. No earth retaining walls were identified on the site plan. The final types, locations, and elevations of the SWM facilities were not determined at the time of this report.

Whitestone anticipates that the proposed structures will consist of a combination of wood and steel framing with ground-supported concrete slabs with no subsurface levels. Based on past experience with similar projects, maximum design loads are anticiapted to be less than the following:

- building column load - 65 kips;
- wall load - 2.0 kips per linear foot;
- floor slab load - 125 pounds per square foot; and
- canopy overturning moment - 50 kip-foot.

The scope of Whitestone's investigation and the professional advice contained in this report were generated based on the project details and loading noted herein. Any revisions or additions to the design details enumerated in this report should be brought to the attention of Whitestone for additional evaluation as warranted.

SECTION 4.0
Subsurface Conditions

Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in Appendix A of this report. The subsurface soil conditions encountered in the soil borings and test pits consisted of the following generalized strata in order of increasing depth.

4.1 SUBSURFACE SOIL CONDITIONS

Existing Fill Materials: At the surface, the soil borings encountered existing fill materials consisting of silty sand with variable amounts of mulch. The existing fill soils were encountered to depths ranging from one fbgs to three fbgs. SPT N-values within this stratum ranged from nine blows per foot (bpf) to 30 bpf and averaged approximately 18 bpf.

Coastal Plains Deposits: Underlying the existing fill materials, the subsurface test disclosed coastal plains deposits that generally consisted of poorly graded sand (USCS: SP and SP-SM) with variable amounts of silty and thin seams of clayey sand (USCS: SC) encountered across the site. SPT N-values recorded within the granular portions of this stratum ranged between four bpf and 24 bpf, indicating loose to medium dense relative densities and averaged approximately 14 bpf.

4.2 GROUNDWATER

Static groundwater was encountered in the deeper borings performed at a depth of approximately 23 fbgs. Furthermore, perched/trapped water was encountered at variable depths within the existing fill materials and natural soils. Static and perched/trapped water conditions are expected to fluctuate seasonally and following periods of precipitation.

SECTION 5.0
Conclusions and Recommendations

5.1 GENERAL

The results of the subsurface investigation and analysis indicated that, following overexcavation of the existing fill materials encountered across the subject site, the proposed structures may be supported by a shallow foundation system designed to bear within the natural site soils and/or properly placed structural fill materials. Furthermore, a majority of the existing soils are suitable for supporting shallow floor slabs and pavements contingent upon construction phase evaluation. Some isolated areas of debris-laden fill materials requiring overexcavation and replacement with suitable on-site materials or imported structural are anticipated.

5.2 SITE PREPARATION AND EARTHWORK

Surface Cover Stripping and Demolition: Prior to stripping operations, all utilities should be identified and secured. Any surficial vegetation and pavement should be stripped at least 10 feet beyond the limits of the proposed construction area. Any remnant structures encountered including foundation walls, footings, slabs, and utilities, should be removed entirely from below proposed foundations and slabs including their zones of influence (as determined by the Geotechnical Engineer) and excavated to at least two feet below proposed construction subgrade levels elsewhere.

Surface Preparation/Proofrolling: Prior to placing any fill, backfill or subbase materials to raise or restore grades to the desired subgrade elevations, the exposed soils should be compacted to a firm and unyielding surface with a minimum of four passes in two perpendicular directions of a minimum 10-ton, vibratory smooth drum roller. The surface should be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify soft or loose pockets that may require removal and replacement or further investigation. Any fill or backfill should be placed and compacted in accordance with Section 5.3.

Weather Performance Criteria: The existing fill materials and glacial site soils will soften when exposed to water; every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be performed during favorable weather conditions. Overexcavation of saturated soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on disturbed subgrade soils.

On-Site Soil Protection and Maintenance: The site soils (existing fill and natural) will degrade when exposed to inclement weather, freeze-thaw cycles, or repeated construction traffic. However, if properly protected and maintained as recommended herein, the site soils will provide adequate support for the proposed construction. The site contractors should employ appropriate means and methods to protect the subgrade including, but not limited to the following:

- leaving existing asphalt pavement in-place as long as practical to help minimize subgrade exposure to inclement weather;
- sealing exposed subgrade soils on a daily basis with a vibratory smooth drum roller;
- regrading the site as needed to maintain positive drainage away from open earthwork construction areas and to prevent standing water;
- removing wet surficial soils immediately; and
- limiting exposure to construction traffic and precipitation especially following inclement weather and subgrade thawing.

Pavement Subgrade Stabilization and Inspection: Pavement subgrade soils which are exposed to inclement weather and heavy construction traffic will degrade and require either extensive drying time or overexcavation and replacement in order to provide a suitable subgrade for pavements. Overexcavation of unstable soils (existing fill materials or natural soils) within pavement areas typically should be limited to approximately 1.5 feet below planned subgrade unless directed otherwise by the owner's geotechnical engineer, provided that a reinforcing geogrid approved by the owner's geotechnical engineer is used. Alternatively, unstable materials may be completely overexcavated and either aerated and recompacted or replaced with imported structural fill per Section 5.3. However, this option is likely least economical.

Geogrids typically are economical when proposed undercut depths exceed approximately 18 inches. The geogrid (Tensar TriAx TX130S, or similar) should be placed directly on the exposed subgrade and backfill should consist of a well-graded gravel and sand blend. The services of the geotechnical engineer should be retained to inspect soil conditions during construction and to provide specific recommendations for stabilizing subgrades. Additionally, a geotechnical engineer should be retained to verify the suitability of prepared foundation, floor slab and pavement subgrades for support of design loads.

5.3 STRUCTURAL FILL AND BACKFILL

Imported Fill Material: Any imported material placed as structural fill or backfill to raise elevations or restore design grades should consist of clean, relatively well-graded sand or gravel with a maximum particle size of two inches and five percent to 15 percent of material finer than a #200 sieve. Silts, clays, and silty or clayey sands and gravels with higher percentage of fines and with a liquid limit less than 40 and a plasticity index less than 20 may be considered subject to the owner's approval, provided that the

required moisture content and compaction controls are met during favorable weather conditions. The material should be free of clay lumps, organics, and deleterious material. Imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

On-Site Materials: Whitestone anticipates that a limited portions of the existing fill materials and the majority of the natural soil will be suitable for reuse as structural fill/backfill material provided that soil moisture contents are controlled within three percent of optimum moisture level and organic debris is segregated. Immediate re-use of the finer grained site soils (USCS: SC) should not be expected. Additionally, the site soils must be properly evaluated during the construction phase as described in Section 5.11.

Compaction and Placement Requirements: On-site soils used as fill or backfill should be placed in maximum nine-inch loose lifts and compacted using a 10-ton smooth drum vibratory drum roller during mass grading activities or a small walk-behind roller or hand-held vibratory compactor within excavations. All structural fill and backfill, including 10 feet outside exterior walls, should be compacted to at least 95 percent of the maximum dry density within three percent of the optimum moisture content as determined by ASTM D 1557 (Modified Proctor). Structural fill and backfill placed within non-building pad areas may be compacted to at least 92 percent of the maximum dry density within three percent of optimum moisture content as determined by ASTM D 1557 (Modified Proctor).

Structural Fill Testing: A sample of the imported fill material or any on-site material proposed for reuse as structural fill or backfill should be submitted to the geotechnical engineer for analysis and approval at least one week prior to its use. The placement of all fill and backfill should be monitored by a qualified engineering technician to ensure that the specified material and lift thicknesses are properly installed. A sufficient number of in-place density tests should be performed to ensure that the specified compaction is achieved throughout the height of the fill or backfill.

5.4 GROUNDWATER CONTROL

Static groundwater was encountered at a depth of approximately 23 fbgs. As such, Whitestone anticipates that groundwater will not be encountered during construction activities. However, temporary dewatering including the use of mechanical pumps to remove trapped/perched water within footing and utility excavations, especially following precipitation events, should be anticipated.

5.5 FOUNDATIONS

Shallow Foundation Design Criteria: Following overexcavation of existing fill materials encountered at or below proposed foundation elevations, Whitestone recommends supporting the proposed Wawa building, canopy, and trash enclosure on conventional shallow spread and continuous footings designed to bear within the natural soils and/or structural fill materials, provided these materials are properly

evaluated, placed and compacted in accordance with Sections 5.2, 5.3, and 5.11 of this report. Foundations bearing within these materials may be designed using a maximum allowable net bearing pressure of 3,000 pounds per square foot.

All footing bottoms should be improved by in-trench compaction in the presence of the geotechnical engineer. Regardless of loading conditions, proposed foundations should be sized no less than minimum dimensions of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Footings should be designed so that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete. Side friction should be neglected when proportioning the footings so that lateral resistance should be provided by friction resistance at the base of the footings. An allowable coefficient of friction against sliding of 0.35 is recommended for use in the design of concrete foundations bearing within the on-site soils or imported structural backfill.

Inspection Criteria: Whitestone recommends that the suitability of the bearing soils along the footing bottoms be verified by a geotechnical engineer prior to placing concrete for the footings. Special attention should be given to areas underlain by existing fill materials or soft materials. In the event that isolated areas of unsuitable materials are encountered in footing excavations, overexcavation and replacement of the materials or deeper foundation embedment may be necessary to provide a suitable footing subgrade. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be eliminated if grade is restored with lean concrete. The bottoms of overexcavated areas should be compacted with vibratory smooth drum rollers, walk-behind compactors, vibrating plates or plate tampers ("jumping jacks") to compact locally disturbed materials and densify any underlying loose zones. Any standing water within the footing excavation should be removed with a mechanical pump prior to concrete placement.

Settlement: Whitestone estimates post construction settlements of new foundations will be on the order of less than one inch if the recommendations outlined in this report are properly implemented. Differential settlement between individual footings should be less than one-half inch.

Frost Coverage: Footings subject to frost action should be placed at least 30 inches below adjacent exterior grades or the depth required by local building codes to provide protection from frost penetration. Interior footings not subject to frost action may be placed at a minimum depth of 18 inches below the slab subgrade.

5.6 FLOOR SLAB

Whitestone anticipates that majority of the site soils will provide suitable support for the floor slab, contingent upon construction phase evaluation. Areas of overexcavation should be anticipated due to the inherent variability of the existing fill materials. The exposed subgrade should be compacted and inspected via proofrolling in accordance with Sections 5.2, 5.3 and of this report. Any areas that become softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural fill. The properly prepared site soils and structural fill/backfill materials are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum four inch layer of three-quarter inch crushed stone (AASHTO No. 57 stone or similar) should be installed below the floor slab to provide a uniform subgrade and capillary break. A moisture vapor barrier should be placed beneath the floor slab where recommended by the flooring manufacturer.

5.7 PAVEMENT DESIGN CRITERIA

General: The majority of the site soils and/or compacted structural fill/backfill placed to raise or restore design elevations will be suitable for support of the proposed pavements provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions. Subgrade stabilization with a triaxial geogrid, approved by the owner's geotechnical engineer, may be used to minimize depths of overexcavation (if necessary) as discussed further in Section 5.3.

Design Criteria: A CBR value of 13 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible and rigid pavement designs per the AASHTO *Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20 year life. An estimated maximum load of 35,000 ESAL was used for all pavement areas assuming the pavement primarily will accommodate both automobile and limited heavier truck traffic.

Pavement Section: The recommended flexible pavement section is presented below in tabular format:

FLEXIBLE PAVEMENT SECTION DESIGN		
Layer	**Material**	**Standard Duty Thickness (Inches)**
Asphalt Surface	NJDOT I-5 Surface	1.5

FLEXIBLE PAVEMENT SECTION DESIGN (cont'd)		
Layer	**Material**	**Standard Duty Thickness (Inches)**
Asphalt Base	NJDOT I-2 Base	2.5
Granular Subbase	NJDOT DGA Base Course	6.0

A rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns (such as loading areas, driveway aprons, and garbage dumpster aprons). The recommended rigid pavement is presented below in tabular format:

RIGID PAVEMENT SECTION DESIGN		
Layer	**Material**	**Standard Duty Thickness (Inches)**
Surface	4000 psi air-entrained concrete	6.0
Base	NJDOT Dense-Graded Aggregate	6.0

Additional Design Considerations: The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local code. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, all subgrade soil and supporting fill or backfill must be properly evaluated, placed, and prepared as detailed in Sections 5.2, 5.3, and 5.11 of this report. Proper drainage must be provided for the pavement structure including appropriate grading and surface water control, as well as measures to drain water from the subgrade.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that NJDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. All rigid concrete pavements should be suitably air-entrained, jointed, and reinforced.

5.8 RETAINING WALL/LATERIAL EARTH PRESSURES

General: No retaining walls currently are planned for the site redevelopment. However, Whitestone anticipates that temporary shoring structures will be required during installation of the proposed USTs.

Lateral Earth Pressures/Recommendations: Below-grade walls must be capable of withstanding active and at-rest earth pressures. Walls free to rotate generally can be designed to resist active earth pressures. Wall corners and restrained walls need to be designed to resist at-rest earth pressures. The following parameters may be used for design of below-grade walls or other structures.

LATERAL EARTH PRESSURE PARAMETER SUMMARY		
Parameter	**On-Site Soils**	**Imported Granular Backfill**
Moist Density (γ_{moist})	140 pcf	140 pcf
Internal Friction Angle (φ)	28°	30°
Active Earth Pressure Coefficient (K_a)	0.36	0.33
Passive Earth Pressure Coefficient (K_p)	2.77	3.00
At-Rest Earth Pressure Coefficient (K_o)	0.53	0.50

Lateral earth pressure will depend on the backfill slope angle and the wall batter angle. A sloped backfill will add surcharge load and affect the angle of the resultant force. The effect of other surcharges will also need to be included in earth pressure calculations, including the loads imposed by adjacent structures and traffic. The effects of proposed sloped backfill surface grades, and proposed slopes beyond the toe of the retaining structure, if applicable, must be considered when calculating resultant forces to be resisted by the retaining structure.

5.9 SEISMIC AND LIQUEFACTION CONSIDERATIONS

The subsurface conditions are most consistent with a Site Class D as defined by the *International Building Code* (IBC) – *New Jersey Edition*. Based on the seismic zone and soil profile, liquefaction considerations are not expected to have a substantial impact on design. Based on the seismic zone and soil profile, liquefaction considerations are considered unlikely and not expected to have a substantial impact on design.

5.10 EXCAVATIONS

The existing fill materials and natural soils encountered during this investigation typically are, at a minimum, consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) which require a maximum unbraced excavation angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA) to ensure that safe excavation methods and/or shoring and bracing requirements are implemented.

5.11 SUPPLEMENTAL POST INVESTIGATION SERVICES

Supplemental Evaluation of Existing Fill Materials: The conditions disclosed by the investigation indicate that limited portions of the existing fill materials encountered will be suitable for reuse as structural backfill/fill and for supporting proposed slab and pavement construction if evaluated and prepared as described herein. However, there is a potential risk of variability in existing fill materials, which may not be disclosed by soils borings performed throughout the site. As such, Whitestone

recommends confirming further the condition of the existing fill by means of supplemental test pit excavations or subgrade proofroll in the early stages of construction to enable an assessment for the depths, areal extent, presence of voids, uncontrolled conditions, or deleterious materials. If unsuitable conditions are encountered, alternative recommendations, such as additional overexcavation and replacement, or subgrade stabilization methods may be required.

Demolition and Construction Inspection and Monitoring: The owner's geotechnical engineer should perform inspection, testing, and consultation during construction as described in previous sections of this report. Monitoring and testing should also be performed to verify that the existing structures are properly demolished, any encountered underground structures, such as the existing building foundations, are properly backfilled, the existing surface cover materials are properly removed, and suitable materials are used for controlled fill and that they are properly placed and compacted over suitable subgrade soils. Any overexcavation of existing fill materials encountered within the proposed building footprint that are unsuitable for foundation and floor slab support should be witnessed and documented by the owner's geotechnical engineer. The proper placement of structural backfill within the building should also be documented by the owner's geotechnical engineer.

5.12 UST TIE DOWNS AND EMBEDMENT

Based on the groundwater levels encountered during this investigation, Whitestone anticipates that static groundwater will not be encountered within the UST excavation. However, perched groundwater conditions may be encountered within the proposed UST excavations. As such, the USTs are anticipated to be located at least partially in groundwater during their design life. All USTs should be tied down and/or embedded at least 36 inches below a properly designed concrete mat to provide protection from frost penetration and to counteract potential buoyancy. The maximum anticipated buoyancy force may be calculated considering empty USTs that are completely submerged below the groundwater table. Optional tie down methods include the following:

- **Deadmen:** Concrete deadmen may be designed such that the weight of the concrete compensates buoyancy forces.
- **Mat Foundation:** A mat foundation may be designed such that the weight of the mat compensates buoyancy forces.

5.13 SWM AREA EVALUATION

Whitestone's field investigation within the proposed SWM areas consisted of excavating 11 soil profile pits (identified as SPP-1 through SPP-6 and SSPP-1 through SSPP-5), examining soil profiles, and performing six in-situ infiltration tests. The soils encountered were classified based on the United States Department of Agriculture (USDA) classification system. Soil profile pit locations are depicted on the attached *Test Location Plan* included as Figure 1.

Groundwater/Seasonal High Groundwater Levels: Static groundwater or indications of seasonal high groundwater were not encountered within the soil profile pits performed to depths of approximately 12 fbgs. The method used in determining the estimated seasonal high groundwater (SHGW) level included evaluating the soil morphology within a test excavation and identifying consistent irregular spots or blotches of different colors or minerals unlike that of the surrounding soil (mottles). *Records of Subsurface Exploration* showing the estimated seasonal high groundwater elevations observed are attached in Appendix A.

In-situ field tests were performed within each soil profile pit excavated at depths provided below. The results of the field infiltration testing are summarized in tabular format below:

SOIL PROFILE PIT SUMMARY				
Soil Profile Pit Number	**ESHGW (fbgs)**	**USDA Classification**	**Test Depth (fbgs)**	**Infiltration Rate (inch/hour)**
SPP-1	NE	Sand	6.0	>20.0
SPP-2	NE	Sand	4.0	>20.0
SPP-3	NE	Sand	6.0	>20.0
SPP-4	NE	Sand	4.0	>20.0
SPP-5	NE	Sand	3.0	>20.0
SPP-6	NE	Sand	4.0	>20.0
SSPP-1	NE	Sand	4.0	>20.0
SSPP-2	NE	Sand	4.0	>20.0
SSPP-3	NE	Sand	4.0	>20.0
SSPP-4	NE	Sand	4.0	>20.0
SSPP-5	NE	Sand	4.0	>20.0

SECTION 6.0
General Comments

Supplemental recommendations may be required upon finalization of construction plans or if significant changes are made in the characteristics or location of the proposed structure. Soil bearing conditions should be checked at the appropriate time for consistency with those conditions encountered during Whitestone's geotechnical investigation.

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. The engineer should consider these recommendations as minimum physical standards which may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the sole use of The Ferber Company, Inc. for the specific project detailed and should not be used by any third party. These recommendations are relevant to the design phase and should not be substituted for construction specifications.

The possibility exists that conditions between borings may differ from those at specific testing locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may alter soil and rock conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered.

Whitestone assumes that a qualified contractor will be employed to perform the construction work, and that the contractor will be required to exercise care to ensure all excavations are performed in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties and maintaining slope stability.

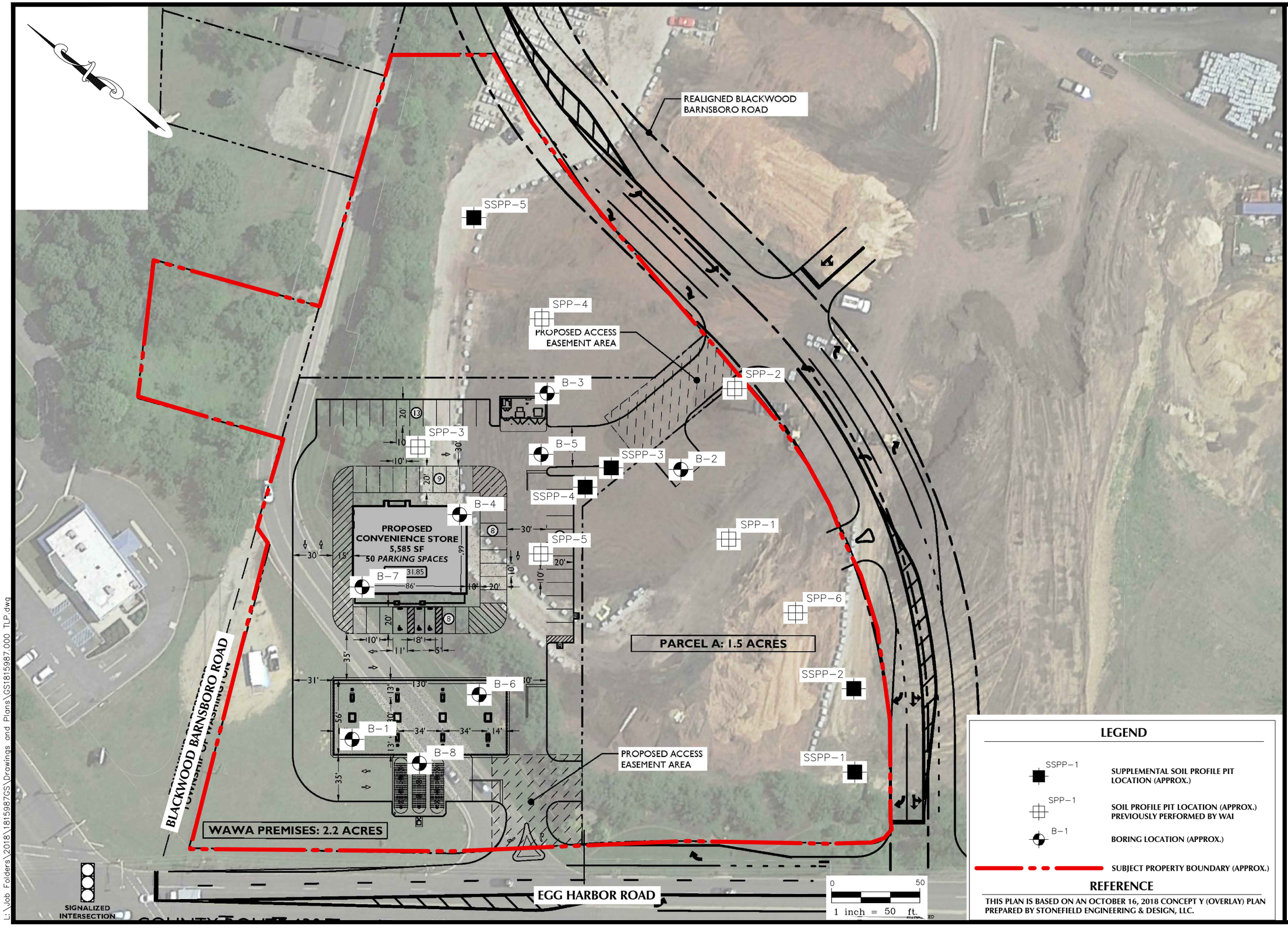
Whitestone recommends that the services of the geotechnical engineer be engaged to test and evaluate the soils in the footing excavations prior to concreting in order to determine that the soils will support the bearing capacities. Monitoring and testing also should be performed to verify that suitable materials are used for controlled fills and that they are properly placed and compacted over suitable subgrade soils.

The exploration and analysis of the foundation conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed construction are based on the available soil information and the design details furnished by The Ferber Company, Inc. and Stonefield Engineering & Design. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

WHITESTONE ASSOCIATES, INC.

FIGURE 1
Test Location Plan



LEGEND

- SSPP-1 — SUPPLEMENTAL SOIL PROFILE PIT LOCATION (APPROX.)
- SPP-1 — SOIL PROFILE PIT LOCATION (APPROX.) PREVIOUSLY PERFORMED BY WAI
- B-1 — BORING LOCATION (APPROX.)
- SUBJECT PROPERTY BOUNDARY (APPROX.)

REFERENCE

THIS PLAN IS BASED ON AN OCTOBER 16, 2018 CONCEPT Y (OVERLAY) PLAN PREPARED BY STONEFIELD ENGINEERING & DESIGN, LLC.

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
30 INDEPENDENCE BOULEVARD, SUITE 250, WARREN, NJ 07059
908.668.7777 WHITESTONEASSOC.COM

DRAWING TITLE: TEST LOCATION PLAN

CLIENT: THE FERBER COMPANY, INC.

PROJECT: PROPOSED BLACKWOOD BARNSBORO ROAD REALIGNMENT
108 EGG HARBOR ROAD
BLACKWOOD (WASHINGTON TOWNSHIP), GLOUCESTER COUNTY, NJ

PROJECT #: GS1815987.000

DESIGNED BY:	PROJ. MGR.:
GR	NK
DATE: 7/1/20	FIGURE: 1
SCALE: 1" = 50'	

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WHITESTONE
ASSOCIATES, INC.

APPENDIX A
Records of Subsurface Exploration

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Page 1 of 1

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/26/2018		
Termination Depth:	20.0 feet bgs	**Date Completed:**	11/26/2018		
Proposed Location:	Canopy	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** 14.0 | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1	X	11 - 16 - 14 - 12	16	30	1.0	FILL		Brown to Light Brown Silty Sand, Moist (FILL)	Trace Brick Trace Concrete Trace Mulch
2 - 4	S-2	X	7 - 6 - 6 - 6	20	12		COASTAL PLAIN DEPOSITS		Brown to Light Brown Poorly Graded Sand, Moist, Dense (SP)	Trace Gravel
4 - 6	S-1	X	4 - 5 - 6 - 8	20	11	5.0			As Above (SP)	
6 - 8	S-2	X	7 - 5 - 4 - 4	18	9				As Above, Loose (SP)	
8 - 10	S-3	X	4 - 4 - 3 - 4	20	7				As Above, Loose (SP)	
						10.0				
13 - 15	S-6	X	4 - 7 - 8 - 12	20	15				As Above, Medium Dense (SP)	Finer Sand
						15.0				
18 - 20	S-7	X	5 - 6 - 9 - 10	20	15				As Above (SP)	Trace Gravel, Silt Lenses, Very Moist @ 19.0 fbgs to 19.5 fbgs
						20.0			Boring Log B-1 Terminated at a Depth of 20.0 Feet Below Ground Surface	
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Page 1 of 1

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/26/2018		
Termination Depth:	20.0 feet bgs	**Date Completed:**	11/26/2018		
Proposed Location:	Roadway	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** 14.0 | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		14 - 8 - 5 - 5	18	13		FILL		Brown Silty Sand with Gravel, Moist (FILL)	50% Concrete 25% Mulch Trace Brick
						2.0				
2 - 4	S-2		8 - 11 - 11 - 10	20	22		COASTAL PLAIN DEPOSITS		Light Brown Poorly Graded Sand with Gravel, Very Moist, Medium Dense (SP)	Spoon Wet
4 - 6	S-3		4 - 4 - 4 - 4	20	8	5.0			As Above, Moist, Loose (SP)	Less Gravel
6 - 8	S-4		3 - 3 - 3 - 3	20	6				As Above (SP)	More Gravel
8 - 10	S-5		4 - 5 - 5 - 5	18	10	9.0			As Above, Medium Dense (SP)	
						10.0			Brown Clayey Sand, Moist, Medium Dense (SC)	
						13.0				
13 - 15	S-6		3 - 5 - 5 - 5	20	10				Brown Poorly Graded Sand, Moist, Medium Dense (SP)	
						15.0				
18 - 20	S-7		3 - 4 - 8 - 8	20	12				As Above, Brown to Dark Brown (SP)	
						20.0				
									Boring Log B-2 Terminated at a Depth of 20.0 Feet Below Ground Surface	
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Page 1 of 1

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/26/2018		
Termination Depth:	20.0 feet bgs	**Date Completed:**	11/26/2018		
Proposed Location:	Trash Enclosure	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** 15.0 | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		1 - 7 - 7 - 9	16	14	1.5	FILL		Reddish-Brown to Black Mulch with Gravel, Very Moist (FILL)	
2 - 4	S-2		5 - 7 - 9 - 8	18	18		COASTAL PLAIN DEPOSITS		Brown Poorly Graded Sand, Moist, Medium Dense (SP) As Above (SP)	
4 - 6	S-1		4 - 3 - 5 - 4	20	6	5.0			As Above, Loose (SP)	
6 - 8	S-2		5 - 4 - 3 - 4	20	7				As Above (SP)	Trace Gravel
8 - 10	S-3		4 - 4 - 5 - 5	20	9	10.0			As Above (SP)	Trace Gravel
13 - 15	S-6		3 - 3 - 4 - 5	22	7	15.0			As Above, Gravel (SP)	Larger Granular Sand
18 - 20	S-7		4 - 6 - 7 - 8	20	13	20.0			As Above, Medium Denes (SP)	
						25.0			Boring Log B-3 Terminated at a Depth of 20.0 Feet Below Ground Surface	

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-4

Page 1 of 1

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/26/2018		
Termination Depth:	20.0 feet bgs	**Date Completed:**	11/26/2018		
Proposed Location:	Building	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** 15.0 | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		15 - 6 - 10 - 16	16	16		FILL		Brown Silty Sand with Gravel, Moist (FILL)	25% Concrete Trace Wood Trace Brick
2 - 4	S-2		10 - 14 - 10 - 14	18	24	3.0			As Above (FILL)	Trace Brick
							COASTAL PLAIN DEPOSITS		Brown to Gray Poorly Graded Sand, Moist, Medium Dense (SP)	
4 - 6	S-1		5 - 4 - 4 - 5	18	8	5.0			As Above, Loose (SP)	
6 - 8	S-2		4 - 3 - 3 - 4	20	6				As Above (SP)	Trace Gravel
8 - 10	S-3		2 - 2 - 2 - 4	20	4				As Above (SP)	Clay Lenses
						10.0				
13 - 15	S-6		3 - 5 - 5 - 5	20	10				Light Brown Poorly Graded Sand with Silt, Moist, Medium Dense (SP-SM)	
						15.0				
18 - 20	S-7		3 - 5 - 5 - 6	20	10				As Above (SP-SM)	Clay Lenses
						20.0				
									Boring Log B-4 Terminated at a Depth of 20.0 Feet Below Ground Surface	
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-5

Page 1 of 1

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/26/2018		
Termination Depth:	10.0 feet bgs	**Date Completed:**	11/26/2018		
Proposed Location:	Parking Area	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** --- | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		2 - 4 - 7 - 6	12	11		FILL		Brown Silty Sand, Moist (FILL)	Mulch Trace Wood
						2.0				
2 - 4	S-2		5 - 5 - 4 - 5	18	9		COASTAL PLAIN DEPOSITS		Light to Gray Brown Poorly Graded Sand, Moist, Loose (SP)	
4 - 6	S-1		2 - 2 - 2 - 2	20	9	5.0			As Above (SP)	
6 - 8	S-2		3 - 3 - 3 - 3	20	6				As Above (SP)	Trace Gravel
8 - 10	S-3		3 - 3 - 3 - 4	20	6				As Above (SP)	
						10.0				
									Boring Log B-6 Terminated at a Depth of 10.0 Feet Below Ground Surface	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-6

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/27/2018		
Termination Depth:	20.0 feet bgs	**Date Completed:**	11/27/2018		
Proposed Location:	Canopy	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** 14.0 | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	TOPSOIL		6" Topsoil	
0 - 2	S-1		1 - 6 - 5 - 6	20	11	1.0	FILL		Brown Silty Sand with Gravel, Trace Roots (FILL)	Re-Worked Material
							COASTAL PLAIN DEPOSITS		Brown to Light Brown Poorly Graded Sand, Moist, Medium Dense (SP)	
2 - 4	S-2		4 - 4 - 4 - 4	20	8				As Above, Loose (SP)	
4 - 6	S-1		3 - 4 - 4 - 5	20	8	5.0			As Above, Gravel (SP)	
6 - 8	S-2		4 - 5 - 4 - 5	22	9				As Above (SP)	Less Gravel
8 - 10	S-3		5 - 5 - 6 - 6	22	11				As Above, Medium Denes (SP)	Clay Lenses
						10.0				
13 - 15	S-6		3 - 4 - 6 - 5	22	10				As Above, No Gravel (SP)	
						15.0				
18 - 20	S-7		4 - 5 - 6 - 7	22	11				As Above (SP)	
						20.0				
									Boring Log B-7 Terminated at a Depth of 20.0 Feet Below Ground Surface	
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-7

Page 1 of 1

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/27/2018		
Termination Depth:	20.0 feet bgs	**Date Completed:**	11/27/2018		
Proposed Location:	Building	**Logged By:**	MH	**During:** NE | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** 15.0 | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	TOPSOIL		6" Topsoil	
0 - 2	S-1		1 - 4 - 6 - 5	18	11		FILL		Brown Silty Sand, Trace Roots, Moist (FILL)	Re-Worked Material
						2.0				
2 - 4	S-2		4 - 4 - 4 - 4	20	8		COASTAL PLAIN DEPOSITS		Brown Poorly Graded Sand with Silt, Moist, Loose (SP-SM)	
4 - 6	S-1		3 - 1 - 5 - 5	22	6	5.0			As Above (SP-SM)	
6 - 8	S-2		6 - 4 - 5 - 6	22	9				As Above (SP-SM)	Trace Gravel
8 - 10	S-3		6 - 4 - 5 - 5	22	9				As Above, Orange Brown, Gravel (SP-SM)	
						10.0				
13 - 15	S-6		3 - 5 - 6 - 8	22	11				As Above, Light Brown, Medium Dense (SP-SM)	
						15.0				
18 - 20	S-7		5 - 8 - 11 - 11	22	19				As Above, Orange Brown (SP-SM)	
						20.0				
									Boring Log B-8 Terminated at a Depth of 20.0 Feet Below Ground Surface	
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-8

Page 1 of 1

Project:	Proposed Blackwood Barnsboro Road Realignment	**WAI Project No.:**	GJ1815988.000
Location:	108 Egg Harbor Road; Blackwood (Washington Township); Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth | Elevation (feet bgs) | (feet)	Cave-In Depth | Elevation (feet bgs) | (feet)
Surface Elevation:	± NS feet	**Date Started:**	11/27/2018		
Termination Depth:	25.0 feet bgs	**Date Completed:**	11/27/2018		
Proposed Location:	UST Area	**Logged By:**	MH	**During:** 23.0 | ---	
Drill / Test Method:	HSA / SPT	**Contractor:**	ETD	**At Completion:** --- | ---	**At Completion:** 21.0 | ---
		Equipment:	Geoprobe 7822DT	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	TOPSOIL		6" Topsoil	
0 - 2	S-1		1 - 1 - 1 - 1	18	2		COASTAL PLAIN DEPOSITS		Brown Clayey Sand, Moist, Very Loose (SC)	
						2.0				
2 - 4	S-2		1 - 1 - 3 - 4	20	4				Brown Poorly Graded Sand, Moist, Loose (SP)	
4 - 6	S-1		3 - 3 - 3 - 3	20	6	5.0			As Above, Orange Brown (SP)	
6 - 8	S-2		3 - 3 - 4 - 4	20	7				As Above (SP)	Trace Gravel
8 - 10	S-3		5 - 5 - 4 - 4	18	9				As Above (SP)	
						10.0				
13 - 15	S-6		3 - 4 - 6 - 6	22	10				As Above, Light Brown, Medium Dense (SP)	
						15.0				
18 - 20	S-7		5 - 5 - 7 - 8	22	12				As Above, Orange Brown (SP)	
						20.0				
23 - 25	S-8		6 - 5 - 5 - 7		10				As Above, Wet (SP)	
						25.0				
									Boring Log B-9 Terminated at a Depth of 20.0 Feet Below Ground Surface	

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-1

Project:	Proposed Wawa Food Market & Restaurant Site	**WAI Project No.:**	GJ1815987.000
Location:	108 Egg Harbor Road; Blackwood (Washingtown Township), Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

				Water Depth (feet bgs) | Elevation (feet)		Estimated Seasonal High Groundwater Depth (feet bgs) | Elevation (feet)	
Surface Elevation:	± NS feet	**Date Started:**	11/26/2018	**During:**	NE | ---		
Termination Depth:	10.0 feet bgs	**Date Completed:**	11/26/2018	**At Completion:**	--- | ---	**At Completion:**	--- | ---
Proposed Location:	SWM	**Logged By:**	MH	**24 Hours:**	--- | ---		
Excavating Method:	Test Pit Excavation	**Contractor:**	PW				
Test Method:	Visual Observation	**Rig Type:**	Case 580				

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 1.5	FILL	Buried Mulch and Topsoil; No Gravel; No Cobbles; Very Moist; Loose; No Mottling	
			1.0				
				1.5 - 10	COASTAL PLAIN DEPOSITS	Olive Brown (2.5Y 4/3) SAND; 5% Gravel; Granular; Moist; No Roots; No Mottling; Gradual Boundary	
			2.0				
			3.0				
			4.0				Sidewall Collapse @ 4.0 fbgs to 6.0 fbgs Trace Gravel @ 4.0 fbgs to 10.0 fbgs
			5.0				
			6.0				Infiltration Test @ 6.0 fbgs
			7.0				
			8.0				
			9.0				
			10.0				
						Soil Profile Pit SPP-1 Terminated at a Depth of 10.0 Feet Below Ground Surface Due to Sidewall Collapse	
			11.0				
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-2

Project:	Proposed Wawa Food Market & Restaurant Site	**WAI Project No.:**	GJ1815987.000
Location:	108 Egg Harbor Road; Blackwood (Washingtown Township), Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	11/26/2018		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	10.0 feet bgs	**Date Completed:**	11/26/2018				
Proposed Location:	SWM	**Logged By:**	MH	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	PW	**At Completion:**	---	---	**At Completion:** --- / ---
Test Method:	Visual Observation	**Rig Type:**	Case 580	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 2.5	FILL	Topsoil and Mulch Blend	
			1.0				
			2.0				
				2.5 - 10	COASTAL PLAIN DEPOSITS	Olive Brown (2.5Y 4/3) SAND; Trace Gravel; Granular; Moist; No Roots; No Mottling; Gradual Boundary	
			3.0				
			4.0				
			5.0				Sidewall Collapse @ 5.0 fbgs to 10.0 fbgs
			6.0				
			7.0				
			8.0				
			9.0				
			10.0				
			11.0			Soil Profile Pit SPP-2 Terminated at a Depth of 10.0 Feet Below Ground Surface Due to Sidewall Collapse	
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-3

Project:	Proposed Wawa Food Market & Restaurant Site	**WAI Project No.:**	GJ1815987.000
Location:	108 Egg Harbor Road; Blackwood (Washingtown Township), Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	11/26/2018	**Water Depth (feet bgs) | Elevation (feet)**		**Estimated Seasonal High Groundwater Depth (feet bgs) | Elevation (feet)**	
Termination Depth:	10.0 feet bgs	**Date Completed:**	11/26/2018				
Proposed Location:	SWM	**Logged By:**	MH	**During:**	NE | ---		
Excavating Method:	Test Pit Excavation	**Contractor:**	PW	**At Completion:**	--- | ---	**At Completion:**	--- | ---
Test Method:	Visual Observation	**Rig Type:**	Case 580	**24 Hours:**	--- | ---		

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 1.5	TOPSOIL	Topsoil and Mulch Blend	Blended with Cobbles
			1.0				
				1.5 - 10	COASTAL PLAIN DEPOSITS	Olive Brown (2.5Y 4/3) SAND; Trace Gravel; Granular; Moist; No Roots; No Mottling; Gradual Boundary	
			2.0				
			3.0				
			4.0				
			5.0				
			6.0				No Gravel @ 6.0 fbgs to 10.0 fbgs
			7.0				
			8.0				
			9.0				
			10.0				
						Soil Profile Pit SPP-1 Terminated at a Depth of 10.0 Feet Below Ground Surface Due to Sidewall Collapse	
			11.0				
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-4

Project:	Proposed Wawa Food Market & Restaurant Site	**WAI Project No.:**	GJ1815987.000
Location:	108 Egg Harbor Road; Blackwood (Washingtown Township), Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	11/26/2018	**Water Depth (feet bgs) | Elevation (feet)**		**Estimated Seasonal High Groundwater Depth (feet bgs) | Elevation (feet)**
Termination Depth:	10.0 feet bgs	**Date Completed:**	11/26/2018			
Proposed Location:	SWM	**Logged By:**	MH	**During:**	NE | ---	
Excavating Method:	Test Pit Excavation	**Contractor:**	PW	**At Completion:**	--- | ---	**At Completion:** --- | ---
Test Method:	Visual Observation	**Rig Type:**	Case 580	**24 Hours:**	--- | ---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0- 1.5	TOPSOIL	Topsoil and Mulch Blend	
			1.0				
				1.5 - 10	COASTAL PLAIN DEPOSITS	Olive Brown (2.5Y 4/3) SAND; 5% Gravel; Granular; Moist; No Roots; No Mottling; Gradual Boundary	
			2.0				
			3.0				
			4.0				Infiltration Test @ 4.0 fbgs
			5.0				Sidewall Collapse @ 5.0 fbgs to 10.0 fbgs
			6.0				Less Gravel Content @ 6.0 fbgs to 10.0 fbgs
			7.0				
			8.0				
			9.0				
			10.0				
			11.0			Soil Profile Pit SPP-4 Terminated at a Depth of 10.0 Feet Below Ground Surface Due to Sidewall Collapse	
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-5

Project:	Proposed Wawa Food Market & Restaurant Site	**WAI Project No.:**	GJ1815987.000
Location:	108 Egg Harbor Road; Blackwood (Washingtown Township), Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	11/26/2018	**Water Depth (feet bgs) | Elevation (feet)**		**Estimated Seasonal High Groundwater Depth (feet bgs) | Elevation (feet)**
Termination Depth:	11.0 feet bgs	**Date Completed:**	11/26/2018			
Proposed Location:	SWM	**Logged By:**	MH	**During:**	NE | ---	
Excavating Method:	Test Pit Excavation	**Contractor:**	PW	**At Completion:**	--- | ---	**At Completion:** --- | ---
Test Method:	Visual Observation	**Rig Type:**	Case 580	**24 Hours:**	--- | ---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 1	FILL	Dark Gray (5Y 4/1) LOAMY SAND; 15% Cobbles, 10% Gravel; Granular; Moist; Trace Roots; No Mottling; Gradual Boundary	Trace Brick Pieces
			1.0				
				1 - 11	COASTAL PLAIN DEPOSITS	Dark Reddish-Brown (5YR 2.5/2) SAND; 5% Gravel; Granular; Moist; No Roots; No Mottling; Gradual Boundary	
			2.0				
			3.0				Infiltration Test @ 3.0 fbgs
			4.0				
			5.0				
			6.0				
			7.0				
			8.0				
			9.0				
			10.0				
			11.0			Soil Profile Pit SPP-5 Terminated at a Depth of 11.0 Feet Below Ground Surface	
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-6

Project:	Proposed Wawa Food Market & Restaurant Site	**WAI Project No.:**	GJ1815987.000
Location:	108 Egg Harbor Road; Blackwood (Washingtown Township), Gloucester County, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	11/26/2018		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	11.0 feet bgs	**Date Completed:**	11/26/2018				
Proposed Location:	SWM	**Logged By:**	MH	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	PW	**At Completion:**	---	---	**At Completion:** --- / ---
Test Method:	Visual Observation	**Rig Type:**	Case 580	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 3	FILL	Dark Gray (5Y 4/1) LOAMY SAND; 20% Cobbles, 25% Gravel; Granular; Moist; Trace Roots; No Mottling; Gradual Boundary	
			1.0				
			2.0				
			3.0				
				3 - 11	COASTAL PLAIN DEPOSITS	Olive Brown (2.5Y 4/3) SAND; 5% Gravel; Granular; Moist; No Roots; No Mottling; Gradual Boundary	
			4.0				
			5.0				
			6.0				
			7.0				
			8.0				
			9.0				
			10.0				
			11.0				
						Soil Profile Pit SPP-6 Terminated at a Depth of 11.0 Feet Below Ground Surface	
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SSPP-1

Project:	Proposed Wawa Food Market & Fuel Station	**WAI Project No.:**	GS1815987.000
Location:	108 Egg Harbor Road, Blackwood, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	6/30/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	6/30/2020				
Proposed Location:	SWM Basin	**Logged By:**	R. Lombreglia	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	JPC	**At Completion:**	NE	---	**At Completion:** NE / ---
Test Method:	Visual Observation	**Rig Type:**	460 Volvo	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet	inches			
0 - 4	1		0.0 – 4.0		FILL	10 YR 4/6 Sand, Moist, Fraible Structure: Course, Moderate, Granular, No Roots, No Mottling, 10% Gravel	Trace Asphalt Reworked Natural Soils
4 - 12	2		4.0 – 12.0		COASTAL PLAIN DEPOSITS	10 YR 6/8 Sand, Moist, Friable, Structure: Coarse, Moderate, Granular, No roots, No Mottling 10% Gravel	
			12.0 – 15.0				

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SSPP-2

Project:	Proposed Wawa Food Market & Fuel Station	**WAI Project No.:**	GS1815987.000
Location:	108 Egg Harbor Road, Blackwood, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	6/30/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	6/30/2020				
Proposed Location:	SWM Basin	**Logged By:**	R. Lombreglia	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	JPC	**At Completion:**	NE	---	**At Completion:** NE / ---
Test Method:	Visual Observation	**Rig Type:**	460 Volvo	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet	inches			
0 - 1.5			0.0 – 1.0		FILL	10 YR 4/6 Sand, Moist, Fraible Structure: Course, Moderate, Granular, No Roots, No Mottling, 10% Gravel	
1.5 - 12.0			2.0 – 12.0		COASTAL PLAIN DEPOSITS	10 YR 6/8 Sand, Moist, Friable, Structure: Coarse, Moderate, Granular, No roots, No Mottling 10% Gravel	
			13.0 – 15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SSPP-3

Project:	Proposed Wawa Food Market & Fuel Station	**WAI Project No.:**	GS1815987.000
Location:	108 Egg Harbor Road, Blackwood, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	6/30/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	6/30/2020				
Proposed Location:	SWM Basin	**Logged By:**	R. Lombreglia	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	JPC	**At Completion:**	NE	---	**At Completion:** NE / ---
Test Method:	Visual Observation	**Rig Type:**	460 Volvo	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet	inches			
0 - 3.0			0.0 – 3.0		FILL	10 YR 4/6 Sand, Moist, Fraible Structure: Course, Moderate, Granular, No Roots, No Mottling, 30% Gravel, 10 % Benlde	Asphalt and Worked
3.0 - 12.0			3.0 – 12.0			10 YR 6/8 Sand, Moist, Friable, Structure: Coarse, Moderate, Granular, No roots, No Mottling 10% Gravel	
			13.0 – 15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SSPP-4

Project:	Proposed Wawa Food Market & Fuel Station	**WAI Project No.:**	GS1815987.000
Location:	108 Egg Harbor Road, Blackwood, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± NS feet	**Date Started:**	6/30/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	6/30/2020				
Proposed Location:	SWM Basin	**Logged By:**	R. Lombreglia	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	JPC	**At Completion:**	NE	---	**At Completion:** NE / ---
Test Method:	Visual Observation	**Rig Type:**	460 Volvo	**24 Hours:**	---	---	

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet	inches			
0 - 0.5	1		0.0		FILL	10 YR 4/6 Sand, Moist, Fraible Structure: Course, Moderate, Granular, No Roots, No Mottling, 10% Gravel	Asphalt Debris
0.5 - 12.0	2		1.0		COASTAL PLAIN DEPOSITS	10 YR 6/8 Sand, Moist, Friable, Structure: Coarse, Moderate, Granular, No roots, No Mottling 10% Gravel	
			2.0				
			3.0				
			4.0				
			5.0				
			6.0				
			7.0				
			8.0				
			9.0				
			10.0				
			11.0				
			12.0				
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SSPP-5

Project:	Proposed Wawa Food Market & Fuel Station	**WAI Project No.:**	GS1815987.000
Location:	108 Egg Harbor Road, Blackwood, NJ	**Client:**	The Ferber Company, Inc.

Surface Elevation:	± 0.0 feet	**Date Started:**	6/30/2020		**Water Depth (feet bgs)**	**Elevation (feet)**	**Estimated Seasonal High Groundwater Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	12.0 feet bgs	**Date Completed:**	6/30/2020				
Proposed Location:	SWM Basin	**Logged By:**	R. Lombreglia	**During:**	NE	---	
Excavating Method:	Test Pit Excavation	**Contractor:**	JPC	**At Completion:**	NE	---	**At Completion:** NE / ---
Test Method:	Visual Observation	**Rig Type:**	460 Volvo	**24 Hours:**	---	---	

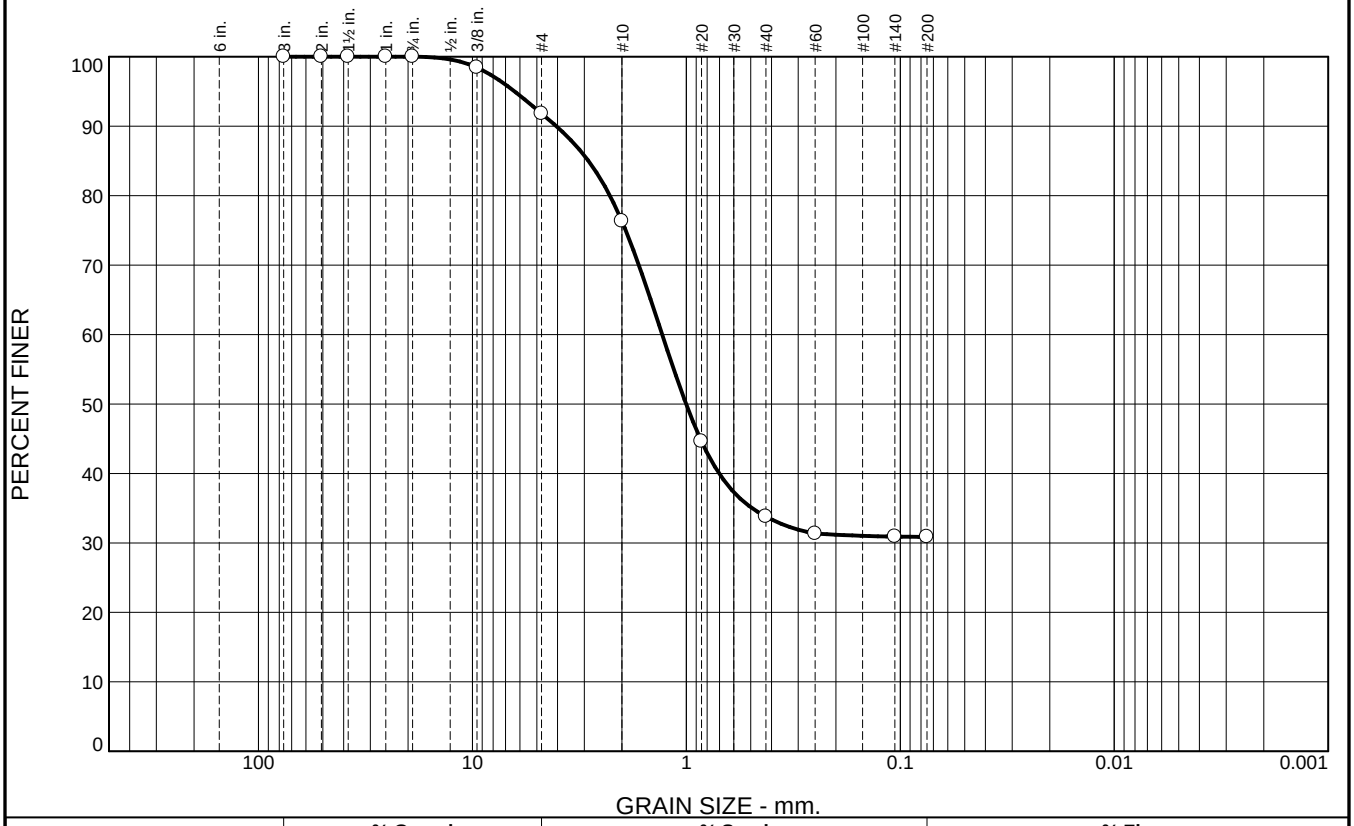
SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet	inches			
0 - 12.0	1		0.0 – 12.0		COASTAL PLAIN DEPOSITS	10 YR 4/6 Sand, Moist, Fraible Structure: Course, Moderate, Granular, No Roots, No Mottling, 10% Gravel	
			13.0 – 15.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

APPENDIX B
Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.2	15.5	42.5	2.9	30.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	98.4		
#4	91.8		
#10	76.3		
#20	44.6		
#40	33.8		
#60	31.3		
#140	30.9		
#200	30.9		

* (no specification provided)

Material Description

Clayey Sand

Atterberg Limits

PL= 25 LL= 43 PI= 18

Coefficients

D_{90}= 4.0573 D_{85}= 2.8692 D_{60}= 1.2972
D_{50}= 1.0027 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-7(1)

Remarks

W_n = 16.4%

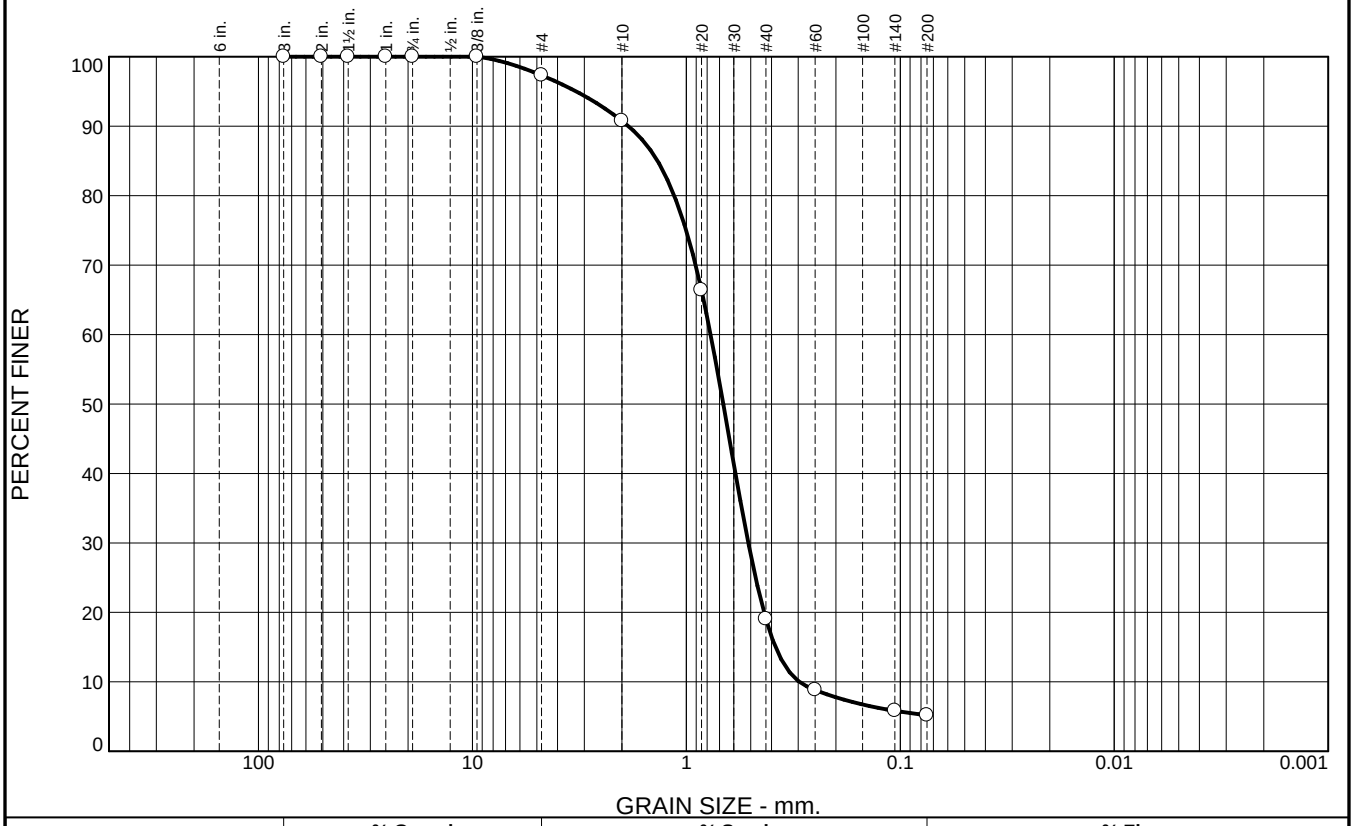
Source of Sample: B-2 **Depth:** 8.0' - 10.0'
Sample Number: S-5

Date: 11/30/18

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: The Ferber Company, Inc.
Project: Proposed Blackwood Barnsboro Rd Realignment
108 Egg Harbor Road, Blackwood, Gloucester Co, NJ
Project No: GS1815988.000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	6.5	71.8	13.8	5.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	97.3		
#10	90.8		
#20	66.4		
#40	19.0		
#60	8.8		
#140	5.8		
#200	5.2		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 1.8668 D_{85}= 1.3639 D_{60}= 0.7707
D_{50}= 0.6722 D_{30}= 0.5132 D_{15}= 0.3831
D_{10}= 0.2965 C_u= 2.60 C_c= 1.15

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

W_n = 6.1%

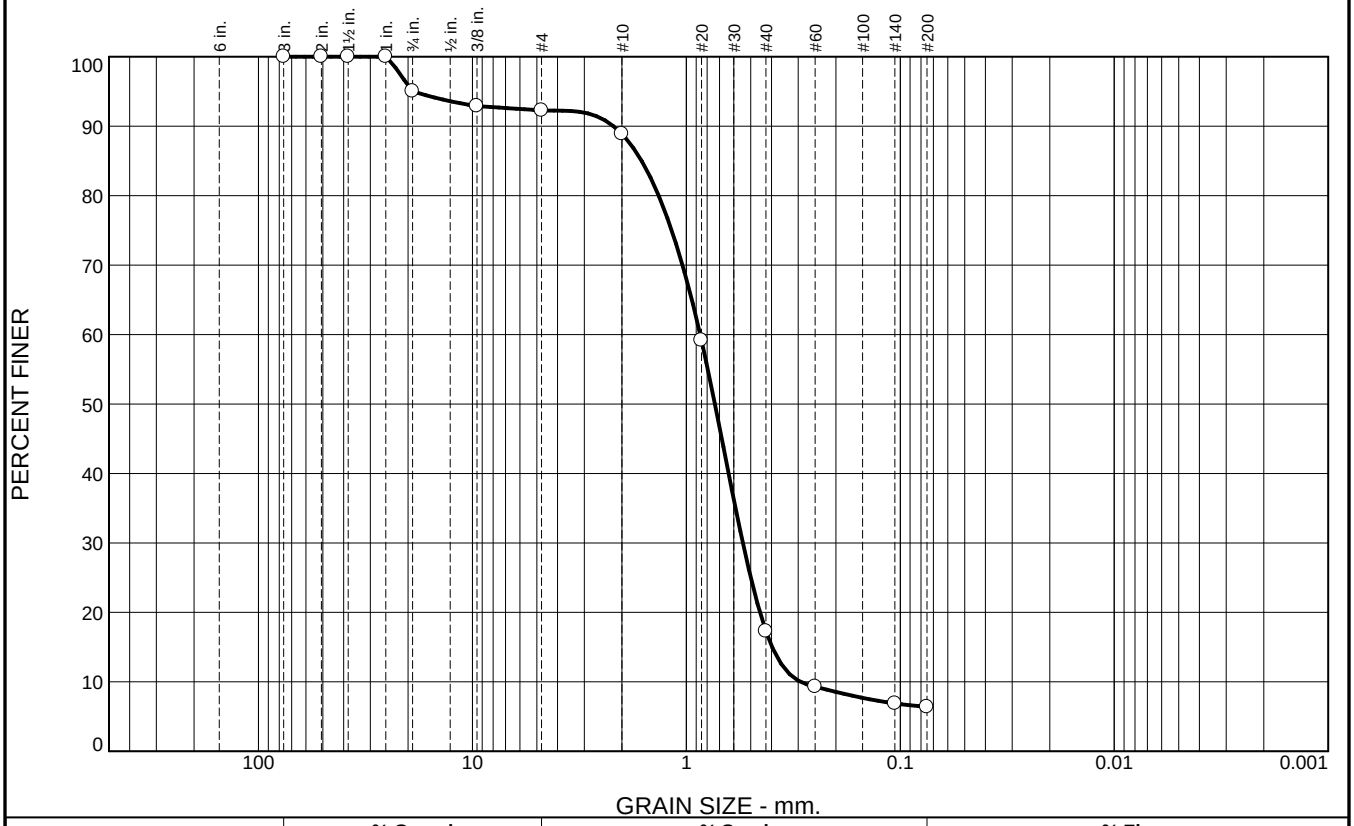
Source of Sample: B-4 **Depth:** 13.0' - 15.0'
Sample Number: S-6

Date: 11/30/18

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: The Ferber Company, Inc.
Project: Proposed Blackwood Barnsboro Rd Realignment
108 Egg Harbor Road, Blackwood, Gloucester Co, NJ
Project No: GS1815988.000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.0	2.7	3.4	71.6	10.9	6.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	95.0		
.375	92.9		
#4	92.3		
#10	88.9		
#20	59.2		
#40	17.3		
#60	9.3		
#140	6.9		
#200	6.4		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 2.1926 D_{85}= 1.6183 D_{60}= 0.8619
D_{50}= 0.7359 D_{30}= 0.5443 D_{15}= 0.3973
D_{10}= 0.2925 C_u= 2.95 C_c= 1.17

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

W_n = 6.2%

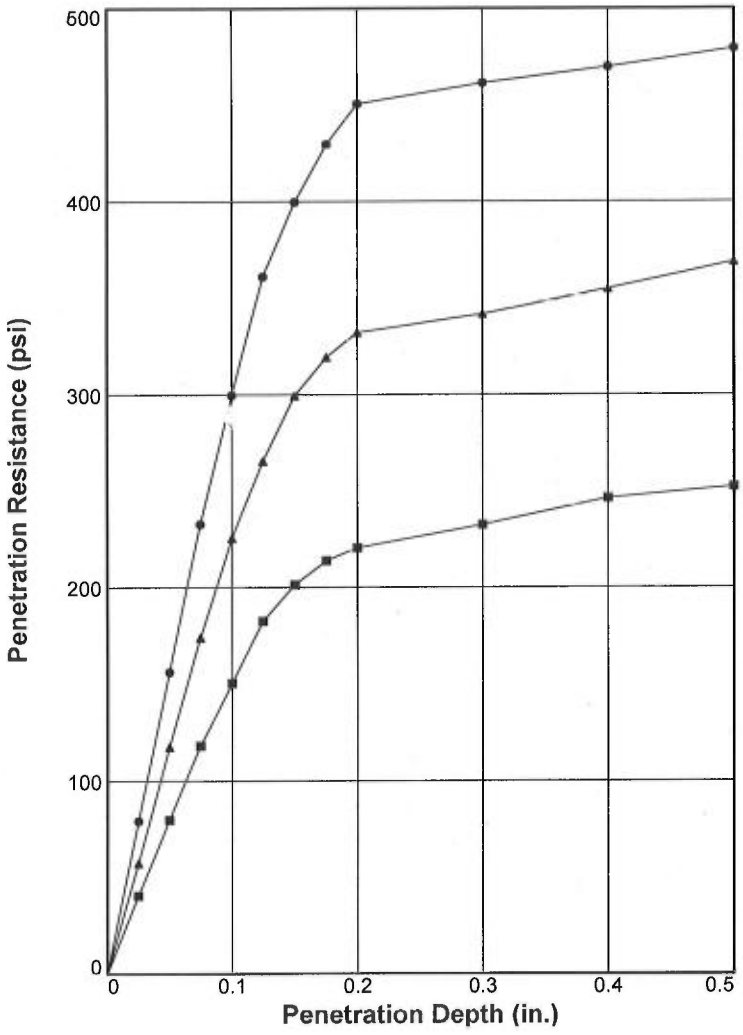
Source of Sample: B-7 **Depth:** 4.0' - 6.0'
Sample Number: S-3

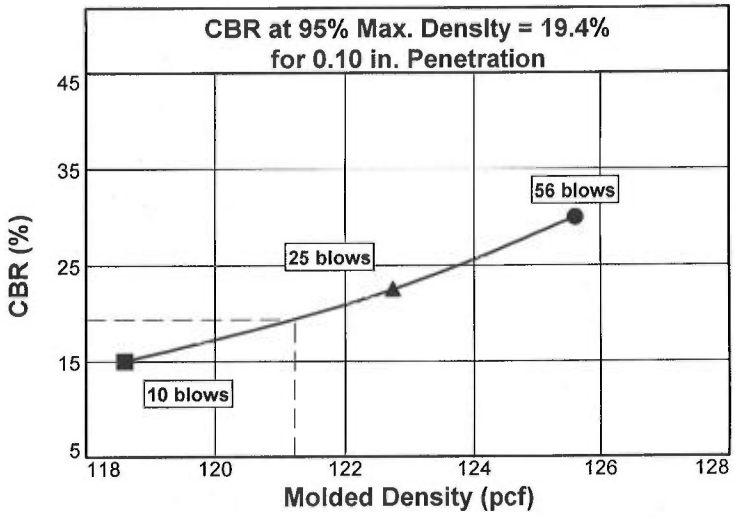
Date: 11/30/18

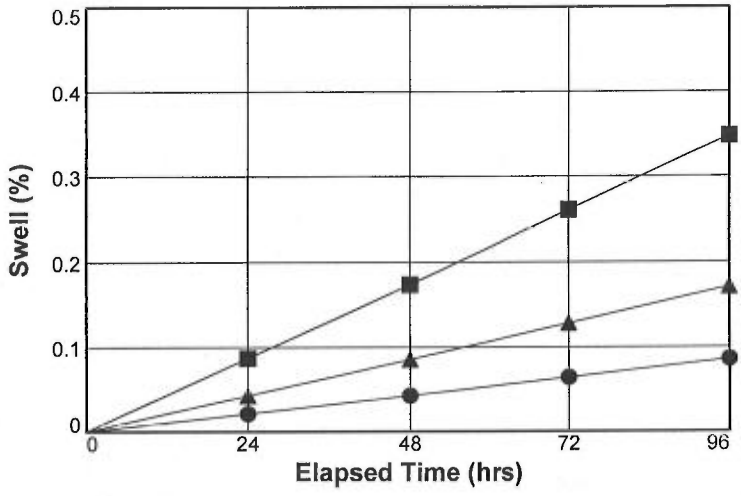
WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: The Ferber Company, Inc.
Project: Proposed Blackwood Barnsboro Rd Realignment
108 Egg Harbor Road, Blackwood, Gloucester Co, NJ
Project No: GS1815988.000 **Figure**

BEARING RATIO TEST REPORT
ASTM D 1883-07







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	125.6	98.4	9.2	125.5	98.4	9.7	30.0	30.0	0.000	10	0.1
2 △	122.7	96.2	9.2	122.5	96	10.9	22.5	22.2	0.000	10	0.2
3 □	118.6	92.9	9.2	118.2	92.6	12.0	15.0	14.7	0.000	10	0.3

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Orange brown in color. silty sand	SM	127.6	9.2	NV	NP

Project No: BYK-496

Project: GJ1815988.000, Proposed Development, 108 Egg Harbor Washington Twp., NJ

Source of Sample: On-Site material

Sample Number: S-1

Date: 12/04/2018

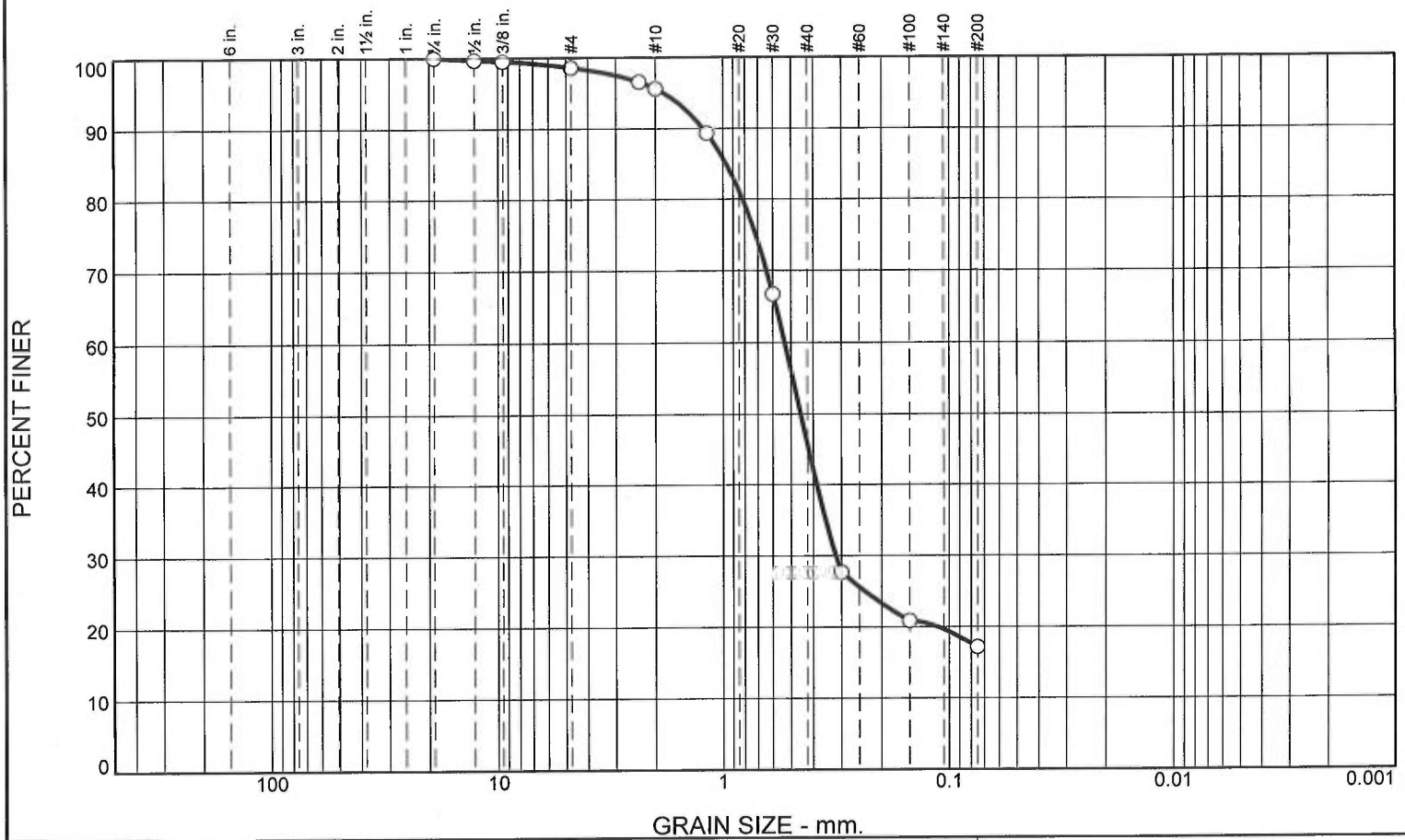
Test Description/Remarks:

BEARING RATIO TEST REPORT

ANS CONSULTANTS, INC.

Figure 1 F 5

Particle Size Distribution Report As per ASTM D -422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	3.0	49.8	28.6	17.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	99.7		
3/8	99.5		
#4	98.6		
#8	96.5		
#10	95.6		
#16	89.3		
#30	66.8		
#50	27.7		
#100	20.9		
#200	17.2		

* (no specification provided)

Material Description

Orange brown in color. silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 1.2259 D_{85}= 0.9674 D_{60}= 0.5332
D_{50}= 0.4542 D_{30}= 0.3180 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

Sample was dropped off by client on 11/27/18 and tested on 11/30/18. In-Situ %MC=8.5
F.M.=2.01

Source of Sample: On-Site material
Sample Number: S-1

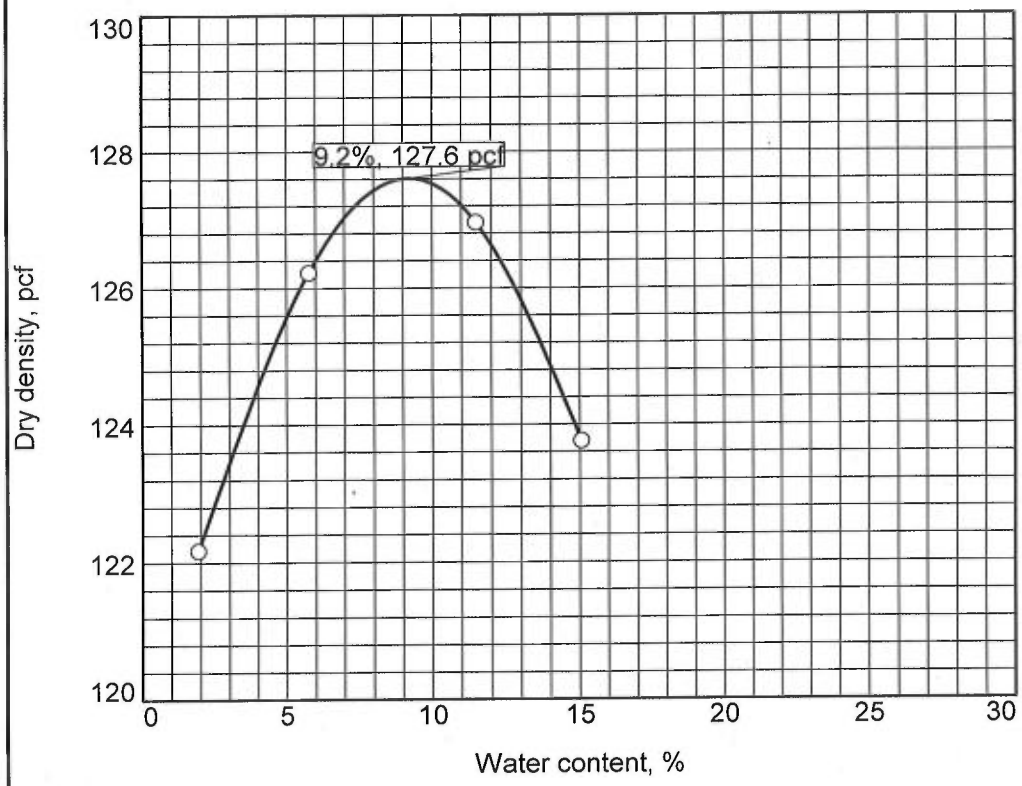
Date:

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Client: Whitestone Associates, Inc.
Project: GJ1815988.000, Proposed Development, 108 Egg Harbor Washington Twp., NJ
Project No: BYK-496 **Figure 1 F 1**

COMPACTION TEST REPORT



Curve No.
S-1

Test Specification:
ASTM D 1557-12 Method C Modified

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 56
Mold Size: 0.075 cu. ft.

Test Performed on Material Passing 3/4 in. **Sieve**

Soil Data

NM _____ **Sp.G.** _____
LL NV **PI** NP
%>3/4 in. 0.0 **%<#200** 17.2
USCS SM **AASHTO** A-1-b

TESTING DATA

	1	2	3	4	5	6
WM + WS	23.27	23.95	24.55	24.61		
WM	13.94	13.94	13.94	13.94		
WW + T #1	860.6	730.6	1040.4	885.3		
WD + T #1	844.4	690.8	933.2	769.4		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	1.9	5.8	11.5	15.1		
DRY DENSITY	122.2	126.2	127.0	123.8		

TEST RESULTS

Maximum dry density = 127.6 pcf

Optimum moisture = 9.2 %

Material Description

Orange brown in color. silty sand

Project No. BYK-496 **Client:** Whitestone Associates, Inc.
Project: GJ1815988.000, Proposed Development, 108 Egg Harbor Washington Twp., NJ

○ **Source of Sample:** On-Site material **Sample Number:** S-1

ANS CONSULTANTS, INC.

South Plainfield, New Jersey

Remarks:
Sample was dropped off by cient on 11/27/18 and tested on 11/27/18

Figure 1 F 2

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SPP-1
Project:	Wawa Food Market & Restaurant Site	**Date:**	11/26/2018
Location:	Blackwood (Washington Twp), NJ	**Weather:**	Cloudy, 48° F
File No.	GS1815987.000	**Field Engineer:**	M. Hengler
Surf. Elev.	NS	**Test Depth Ft. | Elev.:**	6.00 | NS

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
P.S.	9:15 A.M.	9:35 A.M.	24.0	0.0	24.0	0.33	>20.0
R-1	9:35 A.M.	9:55 A.M.	24.0	0.0	24.0	0.33	>20.0
R-2	9:55 A.M.	10:15 A.M.	24.0	0.0	24.0	0.33	>20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SPP-2
Project:	Wawa Food Market & Restaurant Site	**Date:**	11/26/2018
Location:	Blackwood (Washington Twp), NJ	**Weather:**	Cloudy, 48° F
File No.	GS1815987.000	**Field Engineer:**	M. Hengler
Surf. Elev.	NS	**Test Depth Ft. | Elev.:**	4.00 | NS

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
P.S.	10:15 A.M.	10:35 A.M.	24.0	0.0	24.0	0.33	>20.0
R-1	10:35 A.M.	10:55 A.M.	24.0	0.0	24.0	0.33	>20.0
R-2	10:55 A.M.	11:15 A.M.	24.0	0.0	24.0	0.33	>20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SPP-3
Project:	Wawa Food Market & Restaurant Site	**Date:**	11/26/2018
Location:	Blackwood (Washington Twp), NJ	**Weather:**	Cloudy, 48° F
File No.	GS1815987.000	**Field Engineer:**	M. Hengler
Surf. Elev.	NS	**Test Depth Ft. | Elev.:**	6.00 | NS

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
P.S.	10:15 A.M.	10:35 A.M.	24.0	0.0	24.0	0.33	>20.0
R-1	10:35 A.M.	10:55 A.M.	24.0	0.0	24.0	0.33	>20.0
R-2	10:55 A.M.	11:15 A.M.	24.0	0.0	24.0	0.33	>20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SPP-4
Project:	Wawa Food Market & Restaurant Site	**Date:**	11/26/2018
Location:	Blackwood (Washington Twp), NJ	**Weather:**	Cloudy, 48° F
File No.	GS1815987.000	**Field Engineer:**	M. Hengler
Surf. Elev.	NS	**Test Depth Ft. | Elev.:**	4.00 | NS

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
P.S.	10:50 A.M.	11:10 A.M.	24.0	0.0	24.0	0.33	>20.0
R-1	11:10 A.M.	11:30 A.M.	24.0	0.0	24.0	0.33	>20.0
R-2	11:30 A.M.	11:50 A.M.	24.0	0.0	24.0	0.33	>20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SPP-5
Project:	Wawa Food Market & Restaurant Site	**Date:**	11/26/2018
Location:	Blackwood (Washington Twp), NJ	**Weather:**	Cloudy, 48° F
File No.	GS1815987.000	**Field Engineer:**	M. Hengler
Surf. Elev.	NS	**Test Depth Ft. | Elev.:**	3.00 | NS

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
P.S.	12:10 P.M.	12:30 P.M.	24.0	0.0	24.0	0.33	>20.0
R-1	12:30 P.M.	12:50 P.M.	24.0	0.0	24.0	0.33	>20.0
R-2	12:50 P.M.	1:10 P.M.	24.0	0.0	24.0	0.33	>20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SPP-6
Project:	Wawa Food Market & Restaurant Site	**Date:**	11/26/2018
Location:	Blackwood (Washington Twp), NJ	**Weather:**	Cloudy, 48° F
File No.	GS1815987.000	**Field Engineer:**	M. Hengler
Surf. Elev.	NS	**Test Depth Ft. | Elev.:**	4.00 | NS

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
P.S.	1:10 P.M.	1:30 P.M.	24.0	0.0	24.0	0.33	>20.0
R-1	1:30 P.M.	1:50 P.M.	24.0	0.0	24.0	0.33	>20.0
R-2	1:50 P.M.	2:10 P.M.	24.0	0.0	24.0	0.33	>20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SSPP-1
Project:	Proposed Wawa Food Market & Fuel Station	**Date:**	6/30/2020
Location:	Blackwood, Gloucester County, NJ	**Weather:**	Clear
File No.	GS1815987.000	**Field Engineer:**	R. Lombreglia
Surf. Elev.	N/S	**Test Depth Ft. | Elev.:**	4.00 | N/S

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	8:51 A.M.	8:53 A.M.	12.0	0.0	12.0	0.375	> 20.0
1	8: 54 A.M.	8:55 A.M.	12.0	2.0	10.0	0.014	> 20.0
2	8:55 A.M.	8:56 A.M.	12.0	2.0	10.0	0.014	> 20.0
3	8:56 A.M.	8:57 A.M.	12.0	2.0	10.0	0.014	> 20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SSPP-2
Project:	Proposed Wawa Food Market & Fuel Station	**Date:**	6/30/2020
Location:	Blackwood, Gloucester County, NJ	**Weather:**	Clear
File No.	GS1815987.000	**Field Engineer:**	R. Lombreglia
Surf. Elev.	N/S	**Test Depth Ft. | Elev.:**	4.00 | N/S

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	9:32 A.M.	9:32 A.M.	12.0	0.0	12.0	0.01	> 20.0
1	9:32 A.M.	9:33 A.M.	12.0	2.0	10.0	0.005	> 20.0
2	9:33 A.M.	9:34 A.M.	12.0	2.0	10.0	0.005	> 20.0
3	9:34 A.M.	9:35 A.M.	12.0	2.0	10.0	0.005	> 20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SSPP-3
Project:	Proposed Wawa Food Market & Fuel Station	**Date:**	6/30/2020
Location:	Blackwood, Gloucester County, NJ	**Weather:**	Clear
File No.	GS1815987.000	**Field Engineer:**	R. Lombreglia
Surf. Elev.	N/S	**Test Depth Ft. | Elev.:**	4.00 | N/S

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	10:20 A.M.	10:20 A.M.	12.0	0.0	12.0	0.008	> 20.0
1	10:21 A.M.	10:22 A.M.	12.0	2.0	10.0	0.003	> 20.0
2	10:22 A.M.	10:22 A.M.	12.0	2.0	10.0	0.003	> 20.0
3	10:23 A.M.	10:23 A.M.	12.0	2.0	10.0	0.003	> 20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SSPP-4
Project:	Proposed Wawa Food Market & Fuel Station	**Date:**	6/30/2020
Location:	Blackwood, Gloucester County, NJ	**Weather:**	Clear
File No.	GS1815987.000	**Field Engineer:**	R. Lombreglia
Surf. Elev.	N/S	**Test Depth Ft. | Elev.:**	4.00 | N/S

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	11:02 A.M.	11:02 A.M.	12.0	0.0	12.0	0.005	> 20.0
1	11:03 A.M.	11:03 A.M.	12.0	2.0	10.0	0.002	> 20.0
2	11:03 A.M.	11:03 A.M.	12.0	2.0	10.0	0.002	> 20.0
3	11:04 A.M.	11:04 A.M.	12.0	2.0	10.0	0.002	> 20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

INFILTRATION TEST

Client:	The Ferber Company, Inc.	**Test Hole No.:**	SSPP-5
Project:	Proposed Wawa Food Market & Fuel Station	**Date:**	6/30/2020
Location:	Blackwood, Gloucester County, NJ	**Weather:**	Clear
File No.	GS1815987.000	**Field Engineer:**	R. Lombreglia
Surf. Elev.	N/S	**Test Depth Ft. | Elev.:**	4.00 | N/S

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	11:41 A.M.	11:42 A.M.	12.0	0.0	12.0	0.014	> 20.0
1	11:43 A.M.	11:43 A.M.	12.0	2.0	10.0	0.005	> 20.0
2	11:44 A.M.	11:44 A.M.	12.0	2.0	10.0	0.005	> 20.0
3	11:45 A.M.	11:45 A.M.	12.0	2.0	10.0	0.005	> 20.0

Field *i* > 20.0 iph

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

APPENDIX C
Supplemental Information (USCS, Terms and Symbols)

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

MT. BETHEL CORPORATE CENTER
35 TECHNOLOGY DRIVE
WARREN, NJ 07059
908.668.7777
whitestoneassoc.com

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			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
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

L:\Geotechnical Forms and References\Reports\USCSTRMSSYM NJ.docx

Other Office Locations:

CHALFONT, PA 215.712.2700
SOUTHBOROUGH, MA 508.485.0755
ROCKY HILL, CT 860.726.7889
WALL, NJ 732.592-2101
STERLING, VA 703.464.5858
EVERGREEN, CO 303.670.6905

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants

MT. BETHEL CORPORATE CENTER
35 TECHNOLOGY DRIVE
WARREN, NJ 07059
908.668.7777
whitestoneassoc.com

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

Other Office Locations:

CHALFONT, PA 215.712.2700 | SOUTHBOROUGH, MA 508.485.0755 | ROCKY HILL, CT 860.726.7889 | WALL, NJ 732.592-2101 | STERLING, VA 703.464.5858 | EVERGREEN, CO 303.670.6905