STORMWATER MANAGEMENT FACILITIES MAINTENANCE MANUAL

Prepared for

PROPOSED WAREHOUSE COMPLEX BUILDINGS A & B

BLOCK 88.02, LOT 13.01

TOWNSHIP OF FRANKLIN
SOMERSET COUNTY, NEW JERSEY

Prepared by:

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STORMWATER MANAGEMENT MEASURES

Maintenance Plan & Field Manuals

Development Name: Proposed Warehouse Complex – Buildings A & B

Address: _____

Block(s) / Lot(s): Block 88.02, Lot 13.01

Township, County: Township of Franklin, Somerset County, New Jersey

Party Responsible for Maintenance:

EL-ION Frankline Partners, LLC

Address: 3323 NE 163rd Street, Suite 600

Contact Person(s): Michael Stellino

Phone: (305) 933-3538

Prepared by: Craig P. Hermann, PE

Date: April 6, 2022

This plan is recorded in

Deed Book # _____ Page #_____ with _____

County Clerk on Date _____

Last Revised on _____/_____/_____

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PART I – MAINTENANCE

INTRODUCTION

This document has been prepared to provide direction in the maintenance of the Stormwater Management Facilities (SWMF) for the Proposed Warehouse Complex – Buildings A & B to be located in the Township of Franklin, Somerset County, New Jersey. This manual addresses the maintenance issues for the specific components of the stormwater system: one (1) Wetland Basin, and pervious pavement areas. This manual also addresses the functional maintenance category, as represented by the preventative maintenance component and the corrective maintenance component.

N.J.D.E.P. requires the following procedures be followed as per N.J.A.C. 7:8-5.8:

1. Copies of the maintenance plan must be provided to the owner and operator of the stormwater management measure. Copies must also be submitted to all reviewing agencies as part of each agency's approval process. In addition, a copy should be provided to the local mosquito control or extermination commission upon request.
2. The title and date of the maintenance plan and the name, address, and telephone number of the person with stormwater management measure maintenance responsibility as specified in the plan must be recorded on the deed of the property on which the measure is located. Any change in this information, for example to a change in property ownership, must also be recorded on the deed.
3. The person with maintenance responsibility must evaluate the maintenance plan for effectiveness at least annually and revise, as necessary.
4. A detailed, written log of all preventative and corrective maintenance performed at the stormwater management measure must be kept onsite, including a record of all inspections and copies of maintenance-related work orders.
5. The person with maintenance responsibility must retain and, upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site.

<u>Functional Maintenance</u>

Functional Maintenance is the maintenance required to keep a SWMF functional or operational at all times. Functional Maintenance includes both preventative (routine) maintenance and corrective (emergency) maintenance.

1. *Preventative Maintenance:* Preventative maintenance includes functional maintenance

procedures that are required to maintain a SWMF's intended operation and safe condition by preventing the occurrence of problems and malfunctions. Preventative maintenance will be performed in accordance with the direction as presented in this manual. Typical routine procedures include sediment removal from after runoff has drained. Since it is performed on a regular basis, preventative maintenance is simpler to schedule and budget for and, ultimately, is easier and less expensive to perform than corrective maintenance.

2. *Corrective Maintenance:* Corrective maintenance includes the functional maintenance procedures that are required to correct a problem or malfunction at a SWMF and to restore the facility's intended operation and safe condition. Based upon the severity of the problem, corrective maintenance must be performed on an as-needed or emergency basis and includes such procedures as structural repairs, mosquito control, and non-vegetated linings. By its nature, corrective maintenance is much more difficult to schedule and budget for and, ultimately, is generally more difficult and expensive to perform than preventative maintenance.

Aesthetic Maintenance

Aesthetic maintenance is the maintenance required to enhance or maintain the visual appeal of a facility. The storm water facilities have been designed to be an integral component of the development. As such, these facilities should not have an impact on the aesthetic quality of the development as a whole.

Project Description

The proposed Warehouse Complex – Buildings A & B, is located in the Township of Franklin, Somerset County, New Jersey. The site is otherwise known as Tax Block 88.02, Lots 13.01, 71.01, and 19. The site is bounded by commercial developments along Route 27 to the northeast, commercial developments along Veronica Avenue, wooded and wetland areas located to the northwest. In addition, a Milestone River tributary runs along the northwest side of the property. Wooded, farm/agricultural land with some residential developments are located to the southwest. Commercial developments along Bennetts Lane and Route 27 are located to the southeast. The lot generally grades down from northeast to southwest towards the existing wetlands and Milestone River tributary.

EL-ION Frankline Partners, LLC (the Applicant) is proposing the construction of two (2)

warehouse buildings (identified as buildings A & B) within the northeast portion of the property, associated pervious pavement parking and loading area, a proposed access driveway along the northeast side of the proposed buildings, and associated utilities. A proposed wetland basin to the west of the proposed development area, a proposed firepump house, and modular block retaining walls will also be constructed as part of the project. In addition, a vegetated swale will be constructed along the southeast and southwest sides of the property to direct the offsite runoff around the proposed development to the existing wetland area.

Stormwater runoff under developed conditions will be collected by a proposed drainage system consisting of a series of inlets, pipes, and pervious pavement areas that will convey water to a proposed wetland basin. The stormwater quality control will occur at the proposed pavement areas and stormwater quantity control will occur at the wetland basin which outfalls into the existing wetland area.

LIST OF STORMWATER MANAGEMENT MEASURES

The stormwater management measures incorporated into this development are listed below. The corresponding Location Map is included in Appendix A.

Type of Stormwater Management Measure	BMP No	Location Description
Wetland Basin	WB-1	Within the western portion of the proposed development area
Pervious Pavement	PPVMT-1 through PPVMT-10	Parking areas and driveways
Point of Discharge	POA-1	Western portion of proposed wetland basing

PREVENTATIVE AND CORRECTIVE MAINTENANCE ACTION PLAN

As per N.J.A.C. 7:8-5.8(b) & (e), preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including, but not limited to, repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.

- Preventative Maintenance Actions

  The purpose of preventative maintenance is to assure that a SWMF always remains operational and safe, while minimizing the need for emergency or corrective maintenance.

  All access way coverage shall be maintained in passable condition to allow a maintenance vehicle to traverse the road access way.

Frequency	Preventative Maintenance Actions	Stormwater Measures/ No.
Bi-weekly	• Wetland basing inspection required when vegetation establishing / restoring. • Wetland basin vegetation mowing /trimming and removal in growing season. • Disposal of debris, trash, sediment and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.	Wetland basin and pervious pavement
Monthly	• Grass should be mowed during the growing season. • Trees, shrubs, and underbrush must be pruned or trimmed as necessary to maintain access. • Use of fertilizers, pesticides, mechanical treatments and other means to ensure optimum vegetation must not compromise the intended purpose of the standard constructed wetland.	Wetland basin
Biennial	• Inspect vegetated areas for erosion, scour and unwanted growth. • Removal of trash and debris will prevent possible damage to vegetated areas and eliminate potential mosquito breeding habitats. • A minimum of one inspection during the growing season and one during the non-growing season is required to ensure the health, density, and diversity of the vegetation. • Assess types and distribution of dominant plans, and appropriate balance between original and volunteer	Wetland basin

Frequency	Preventative Maintenance Actions	Stormwater Measures/ No.
	species in accordance with the intent of the system's original design.	
Biennial	• The drain time and water depth as indicated in the maintenance manual should be documenting and maintained during each observation. Drain time and water depth should be compared with the design drain time for the maximum design storm runoff volume and water depth as indicated in the maintenance manual. • Inspect components expected to receive and/or trap debris. • The facility inspections should also be used to determine the need for and timing of corrective maintenance procedures. It should be noted that, in addition to regularly scheduled inspections, an informal inspection should be performed during every visit to a SWMF by maintenance or supervisor personnel.	Wetland basin and pervious pavement
Quarterly	• The surface course of a pervious paving system must be vacuum swept, not power swept. Vacuum sweeping must be followed by either air blowing or high-pressure power washing performed in accordance with the specifications recommended for the system. All dislodged material must be promptly removed.	Pervious Pavement
Annual	• All structural components must be inspected for cracking, spalling, erosion, deterioration, and unwanted vegetation. • The first annual maintenance of the pervious pavement system must be performed in the spring. • Maintenance of a pervious pavement system must additionally be performed in the autumn, after the fallen leaves are collected and removed. • Each spring, after the last snow or ice event, the infiltration rate of the surface course of the pervious pavement system must be tested in accordance with the methods of either ASTM C1701 or C1781, as corresponds to the post-construction test performed for the system. At least 3 locations must be tested. One of the locations must be in an area where sediment is most likely to be deposited, such as, but not limited to, a parking lot entrance. The other test locations must be evenly spaced across the system	Wetland basin, and pervious pavement

Frequency	Preventative Maintenance Actions	Stormwater Measures/ No.
	surface. The locations and results obtained must be recorded in the maintenance plan for future reference and compared to the as-built testing results as a metric for determining if a system requires corrective action.	
Unscheduled	• Quick inspection after every 1" rain. • Snow and ice, especially from areas treated with sand, cinders or de-icing materials, may not be stockpiled on a SWMF. • Care must be taken when removing snow from the surface course; pervious paving surface courses may be damaged by snowplows or loader buckets set too low to the ground or not equipped with a rubber blade guard. • Under no circumstances may any sealants or coatings be applied to pervious paving systems, except for those approved by the manufacturer to improve surface course resistance to de-icing chemicals or refresh traffic striping. • De-icing chemicals may not be used on pervious concrete less than one year old. • De-icers containing magnesium chloride, calcium magnesium acetate or potassium acetate may never be used on pervious concrete.	Wetland basin, and pervious pavement

The chart provided below shows the approximate infiltration rate based upon the time it takes to infiltrate either 8 or 40 pounds of water specified in the above-cited tests. The infiltration rate, II, is based upon the following calculation:

$II = (KK * MM)/ (DD2 * tt)$, where

K = 126,870 in-lbs
M = water mass, lbs
D = ring diameter = 12 inches
t = time, in seconds

Test Methods Per ASTM C1701 or C1781		
Time to Infiltrate the Specified Amount of Water (seconds)	**Approximate Surface Infiltration Rate (inches per hour)**	
	M = 8 lbs	**M = 40 lbs**
30	235	1175
60	118	587
100	70.5	352
200	35.2	176
350	20.1	100.7
360	19.6	97.9
380	18.5	92.7
900	7.8	39.2
1760	4.0	20.0
1910	3.7	18.5
3600	2.0	9.8
5400	1.3	6.5
5470	1.3	6.4
6000	1.2	5.9

Note: should the test be performed with a different quantity of water, the values in the chart above cannot be used.

- Corrective Maintenance Actions

  Depending on many factors, such as the performance of preventative maintenance actions, weather, or unexpected incidents, corrective maintenance requirements may not be precisely anticipated; however, a list of potential corrective maintenance actions may assist the responsible party in planning and estimating costs in advance.

  Corrective maintenance includes the functional maintenance procedures that are required to correct a problem or malfunction at a SWMF and to restore the facility's intended operation and safe condition. Based upon the severity of the problem, corrective maintenance must be performed on an as needed or emergency basis and includes such procedures as structural repairs. By its nature, corrective maintenance is much more difficult to schedule and budget for and, ultimately, is generally more difficult and expensive to perform than preventative maintenance.

Potential Corrective Maintenance Actions	Stormwater Management Measures/No.
• Repair/replacement of eroded or damaged riprap apron. • Revegetation of eroded side slope, aquatic bench and basin bottom. • Repair/replacement of outlet pipes or orifices.	Wetland basin

• If the actual drain time of the wetland basin is significantly different from the design drain time, the components that could provide hydraulic control must be evaluated and appropriate measures taken to return the wetland system to the design drain time.	
• Sediment, debris, leaves and trash which threaten the discharge capacity of a SWMF should be removed immediately and properly disposed of in a timely manner. Equipment and personnel must be available to perform the removal work on short notice. The lack of an available disposal site should not delay the removal of trash, debris, and sediment. Temporary disposal sites should be identified and available for immediate use. A list of qualified contractors shall be maintained in order to respond to this situation. • Stormwater BMPs may not be used for stockpiling of plowed snow and ice, compost, or any other materials. Provide the equipment, materials, and personnel to monitor and remove snow and ice from these critical areas as necessary to assure the continued functioning of the facility during the winter months.	Wetland basin, and pervious pavement
• If the pervious pavement fail to drain the Water Quality Design Storm within 72 hours, corrective action must be taken, and the maintenance manual revised accordingly to prevent similar drainage failure in the future. ✓ Inspect if overflow structures and/or storm sewer inlets and/or pipes are clogged; ✓ Remove any sediment buildup; ✓ Check the soil permeability; ✓ If standing water is present longer than 5 days, report to mosquito commission. • A list of qualified consultants and contractors shall be maintained in order to undertake the drainage failure investigation / analysis and repairs in a timely fashion. • If mud or sediment is tracked onto the surface course, it must be removed as soon as possible. Removal should take place when all runoff has drained from the surface course. • Herbicides must not be applied. • Corrective action must be immediately taken to restore the infiltration capacity of the pervious paving system if the infiltration test for the system is 6.4 or less for a system designed for water quality control only. • Over the lifetime of the surface course, no more than 10% of its surface area may be patched with impervious material such as bituminous asphalt or concrete. All patching must be recorded in the maintenance manual for future reference to prevent exceedance of this maximum.	Pervious pavement

- Inspection and Logs of All Preventative and Corrective Maintenance

  As per N.J.A.C. 7:8-5.8(f), the person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

  As per NJDEP BMP Manual, a schedule of regular inspections and tasks, detailed logs of all preventative and corrective maintenance and maintenance-related work orders performed on the stormwater management measures are provided in the Part II of this maintenance plan. The person with maintenance responsibility must retain and, upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site.

  Inspection Checklists in the Part II of this Field Manual for the stormwater management measures on this site include:

  - Wetland Basin Checklist Log
  - Wetland Basin Preventative Maintenance Log
  - Wetland Basin Corrective Maintenance Log
  - Pervious Pavement Inspection Checklist Log
  - Pervious Pavement Preventative Maintenance Log
  - Pervious Pavement Corrective Maintenance Log

  The logs of all inspections, and both preventative and corrective maintenance performed are attached in the "**Maintenance Logs and Inspection Records**" section. See Part II of the Maintenance Plan.

MAINTENANCE PERSONNEL, EQUIPMENT, TOOLS, AND SUPPLIES

The following is a list of required inspection equipment for routine maintenance procedures and inspections.

- Maintenance Personnel/Equipment/Tools/Supplies

Personnel/Equipment/Tools Name	Quantity
General maintenance crew	2 laborers
Debris, Trash and Sediment Removal Tools & Equipment:	
Shovels	2
Rakes	2
Picks	2
Wheelbarrows	1
Loader	1
Lightweight backhoe	1
Vacuum Truck	1
Water Jetting Units	1
Transportation Equipment:	
Truck For Transportation of Materials	1
Truck For Transportation of Equipment	1
Vehicles For Transportation of Personnel	1
Miscellaneous Equipment:	
A clipboard, a pencil, and the inspection checklist	1
A standard 6-foot collapsible ruler	1
A camera-photographs to record conditions of the facilities	1

A flashlight to observe the inside of subsurface trench drain	1
Working Garments/ Gloves/ Protective measure	2
A measuring tape	1

DISPOSAL PLAN

As per NJDEP BMP Manual, the maintenance plan should include approved disposal and recycling sites and procedures for sediment, trash, debris and other material removed from stormwater management measures during maintenance operations.

- Disposal/Recycling Procedures

  Dewatering shall be filtered through sediment control tanks or bags. Bags must be located away from receiving waters, other environmentally sensitive areas, and/or construction activities. Bags must be installed per manufacturer's requirements. Bags must be disposed of according to manufacturer's instructions.

- Disposal Field – Onsite not permitted

- Permits for the Proposed Onsite Disposal Field

  Local/State permits ☐ not required
  ☐ required
  ☒ not applicable

- Disposal Field – Offsite

  At approved receiving site in accordance with NJDEP guidelines.

- Description of the Offsite Disposal

  By the township, by a private operator and conveyance entity, etc.

  _____

  _____

  _____

  A copy of the contract should be included in the Documents section of the Maintenance Plan if available.

COST ESTIMATE

- Cost Overview

Cost Type	Cost	Details
Cost of sediment, trash, and debris removal. Vegetation mowing /trimming in growing season.	$280.00	2 laborers crew at $70.00 per hour
General cost for routine quarterly maintenance	$1,610.00	Table A
General cost – unscheduled maintenance	$161.00	Table B
Cost associated with vegetation replacement and sand layer restoration if the permeability of the bed has decreased – biannually maintenance	$2,921.00	Table C
Total cost	$4,972.00	

Table A: ***General cost for quarterly routine maintenance.***

Clean SSIB and test infiltration rates.

Cost Type	Required Quantity	Unit Price	Cost
Personnel			
Crew (1 laborer & 1 operator)	2 hours	$170.00	$340.00
Equipment			
Truck	2 hours	$100.00	$200.00
Mower	2 hours	$100.00	$200.00
Supplies			
Seed	(e.g., bags required)		
Topsoil	12 cubic yards	$30.00	$360.00
Working garments/ gloves/protective measures	LS		
Services			
Subcontractor for disposal	LS	$300.00	$300.00
Subtotal			

Cost Type	Required Quantity	Unit Price	Cost
			$1,400.00
Overhead/Profit (15%)			
			$210.00
Total Cost			
			$1,610.00

Table A: ***General cost for quarterly routine maintenance.***

Clean SSIB and test infiltration rates.

Cost Type	Required Quantity	Unit Price	Cost
Crew (2 laborers)	**2 hours**	**$70.00**	**$140.00**
Subtotal			$140.00
Overhead/Profit (15%)			$21.00
Total Cost			$161.00

Table C: General cost for biannually maintenance.

Cost Type	Required Quantity	Unit Price	Cost
Personnel			
Crew (1 laborer & 1 operator)	2 hours	$170.00	$340.00
Equipment			
Truck	2 hours	$100.00	$200.00
Lightweight Backhoe rental	2 hours	$100.00	$200.00
Supplies			
Sand Layer Replacement	50 cubic yards	$30.00	$1,500.00
Services			

Cost Type	Required Quantity	Unit Price	Cost
Subcontractor for disposal	LS	$300.00	$300.00
Subtotal			$2,540.00
Overhead/Profit (15%)			$381.00
Total Cost			$2,921.00

SAFETY MEASURES AND PROCEDURES

As per NJDEP BMP Manual, maintenance plans should include procedures and equipment required to protect the safety of inspection and maintenance personnel.

- Safety Regulations and Requirements

  Maintenance and operation of stormwater management measures shall be in accordance with any applicable codes (i.e. OSHA)

- Safety Tools, Equipment and Garments

Safety Tools and Equipment	Location	Responsible Person/Contact #

- Qualification for Performing the Task in Special Circumstances

Stormwater Measures	Location	(OSHA) Confined-Space Entry Permit

- Safety Training

  See the Training Plan and Records section of this Maintenance Plan.

- Safety Procedures

  Use precaution before entering the BMPs, such as wearing safety ropes, checking whether hazardous gases are present, or checking whether poisonous plants are present. Follow safety procedures for operating equipment (e.g., signs around operation zones or slope stability when operating a backhoe). Safety to be in accordance with all applicable local, state, and federal laws and regulations, and the safety instructions provided by the equipment or device manufacturers.

- Emergency Procedures

  Contact local authorities at 911, for emergencies.

TRAINING PLAN AND RECORDS

As per NJDEP BMP Manual, maintenance training begins with an understanding the purpose and function of the overall stormwater management measure and its major components. Such understanding will enable maintenance personnel to provide more effective component maintenance and more readily detect maintenance-related problems. Depending on the size, character, location, and components of each stormwater management measure, maintenance personnel may also require training in specialized inspection and maintenance tasks and/or the operation and care of specialized maintenance equipment. Training should also be provided in the need for and use of all required safety equipment and procedures.

- Training Plan
    1. *Types of Training*
        - Mandatory Stormwater Management Basic Training and Field Manual Usage Training for new maintenance crews
        - Occupational Safety Training
        - Subcontractor training, if applicable

    2. *Content of Training*
        - Stormwater Management Basic Training
            a. Purposes and Functions of BMPs:
                - NJDEP Stormwater BMP Manual, Chapter Nine: Structural Stormwater Management Measures
                    - Chapter 9.6 – Pervious Paving System
                - NJDEP Stormwater BMP Manual, Chapter Ten: Structural Stormwater Management Measures
                    - Chapter 10.4 – Standard Constructed Wetlands

                More training information is available at NJ Stormwater.org http://www.nj.gov/dep/stormwater/training.htm

            b. Vegetation Care: Example Training Material
                - NJDEP Stormwater BMP Manual, Chapter Seven: Landscaping *(provides information on vegetation and landscaping for stormwater management measures)*
            c. Field Manual Usage Training: Example Training Material

- Field Manuals attached to this Maintenance Plan
- Other

d. Equipment and Tools Operation Training: Example Training Material
   - Equipment or tool manufacturer's Operation & Maintenance Manual
   - Other

e. Occupational Safety Training: Example Training Material
   - OSHA Training
   - Equipment or tool manufacturer's Operation & Maintenance Manual
   - Other

3. Training Records

Training attendance sheets should be attached by the responsible party after each training.

ANNUAL EVALUATION OF THE EFFECTIVENESS OF THE PLAN

As per N.J.A.C. 7:8-5.8(g), the person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

The responsible party should evaluate the effectiveness of the maintenance plan by comparing the maintenance plan with the actual performance of the maintenance. The items to evaluate may include, but not limited to,

- Whether the inspections have been performed as scheduled;
- Whether the preventive maintenance has been performed as scheduled;
- Whether the frequency of preventative maintenance needs to increase or decrease;
- Whether the planned resources were enough to perform the maintenance;
- Whether the repairs were completed on time;
- Whether the actual cost was consistent with the estimated cost; and
- Whether the inspection, maintenance, and repair records have been kept.

If actual performance of those items has been deviated from the maintenance plan, the responsible party should find the causes and implement solutions in a revised maintenance plan.

- Annual Evaluation Records

Evaluator(s)	Date of Evaluation	Decision
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)
		__Maintain current version OR __Revise current version Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)
		__Maintain current version OR __Revise current version

Evaluator(s)	Date of Evaluation	Decision
		Revision date _____ (also update the last revision date on the cover page) __Requires a new deed recording (also update the last recording information on the cover page)

REFERENCE DOCUMENTS

Reference Documents in this manual include the following:

- As-built Drawings with Drainage Plans and Landscape Drawings
- Geotechnical Report which includes:
  1. *Soil Boring Logs*
  2. *Permeability Tests*
- Stormwater Management Report

Check Maintenance Guidance in NJDEP Stormwater Management Website for details and links to the relevant permits and program areas (http://www.njstormwater.org).

Refer to the Appendices for copies of reference documents.

PART II – FIELD MANUALS

AND MAINTENANCE RECORDS

PERVIOUS PAVING SYSTEM MANUAL
SYSTEM IDENTIFIED ON THE LOCATION MAP

Development Name: Proposed Warehouse Complex – Buildings A & B

Township, County: Township of Franklin, Somerset County, New Jersey

Location Description: See Location Map

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PERVIOUS PAVEMENT SYSTEM OVERVIEW

Functionality

Pervious paving systems are paved areas that produce less stormwater runoff than areas paved with conventional paving. This reduction is achieved primarily through the infiltration of a greater portion of the rain falling on the area than would occur with conventional paving. This increased infiltration occurs either through the paving material itself or through void spaces between individual paving blocks known as pavers.

Pervious paving systems are divided into two general types. Each type depends primarily upon the nature of the pervious paving surface course and the presence or absence of a runoff storage bed beneath the surface course. Porous paving and permeable paver with storage bed systems treat the stormwater quality design storm runoff through storage and infiltration. Therefore, these systems have adopted TSS removal rates similar to infiltration structures. The adopted TSS removal rate for each type of pervious paving system is from 80%.

Pervious paving systems are used to reduce runoff rates and volumes from paved, on-grade surfaces such as patios, walkways, driveways, fire lanes, and parking spaces. Pervious paving systems with runoff storage beds achieve these reductions through storage of runoff and eventual infiltration into the subgrade soils. Through this infiltration process, these types of pervious paving systems also achieve stormwater quality requirements.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Stormwater Management Measure

The pervious pavement system shall fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of the porous pavement failure. It may also contribute to mosquito breeding and other health and safety issues. At no time shall there be ponding on the surface of the pavement.

BASIC DESIGN INFORMATION

Hydrology Design Targets

1. The system consists of porous pavement with a choke and a crushed stone storage bed.
2. This system is designed with an underdrain system.
3. The design drain time is less than 72 hours.
4. The elevation of the seasonal high-water table of this pavement area was observed during geotechnical investigation and it was 1 or more feet below the storage bed bottom surface, at EL. 99.8 to 109.8 feet.
5. The TSS removal rate is 80 %.

Hydraulic Design Targets

1. This system is designed to infiltrate the runoff from the Water Quality Design Storm and groundwater recharge storm, which generates 35,205 cubic feet of runoff (sum of all areas). The peak flow entering the system ranges from 0.307 to 7.883 cubic feet per second.
2. The invert elevation of the overflow outlet is at EL. Varies feet.

System Configuration Targets

1. The system has no pretreatment.
2. The depth of uniformly graded coarse aggregate in the storage bed is 24 inches below choke.

Critical Maintenance Features

1. Avoid sand or silt onto the porous pavement area.
2. Sweep and vacuum the porous pavement area often to prevent clog.
3. Do not apply sealant to cracks or entire surface.

Wetland Disturbance Notice:

Maintenance of this BMP may disturb a wetland area. Contact NJDEP Division of Land Use Regulation for guidance and any required permit(s) before performing maintenance.

REFERENCE DOCUMENTS

- As-built Drawings with Drainage Plans and Landscape Drawings
- Geotechnical Report which includes:
    1. *Soil Boring Logs*
    2. *Permeability Tests*
- Stormwater Management Report

Refer to the Appendices for copies of reference documents.

INSPECTION CHECKLIST / MAINTENANCE ACTIONS
PERVIOUS PAVEMENT SYSTEM

Checklist (circle one)**:** Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____

Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):

Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):

Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
A Pavement Surface (Porous Pavement)	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours. Excessive sediment or mud accumulation on top of the pavement	Y__ N__	Recheck to determine if there is standing water after 72 hours. If standing water is present longer than 5 days, report to mosquito commission. If excessive sediment is present, the system may be clogged - Sweep the surface - Power wash (at 45 degree angle to the top) - Vacuum the surface - Excavate to inspect the storage bed for clogging, replace the storage bed material if it is severely clogged - Check the permeability rate of the subsoil Work Order # _____
A Pavement Surface (Porous Pavement)	2	Cracking, subsidence, spalling, or other damage to the pavement	Y__ N__	Repair according to the manufacturer's procedures and material. See Reference Documents section. Work Order # _____
	3	Weeds or other vegetation on the porous pavement	Y__ N__	Remove the vegetation
Note:				
B Outlet	1	Clogged overflow outlet	Y__ N__	Clear and remove sediment
Note:				

Follow Up Items (Component No. / Inspection Item No.):

(e.g., A/3, B/1)_____

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____	_____	_____
Inspector Name	**Signature**	**Date**

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____

Component No._____, Inspection Item No._____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal	A – Pavement Surface (Porous Pavement)	
	B – Outlet	

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____/_____ Date: _____

(name/ signature)

Supervisor: _____/_____ Date: _____

(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

CORRECTIVE MAINTENANCE RECORD

1. **Work Order #** _____ **Date Issued** _____

2. **Issue to be resolved**:

(e.g., clogged surface)

3. The issue was from **Corresponding Checklist No.** _____,
   Component No. (e.g., B – Pavement Surface) _____,
   Inspection Item No. (e.g., 2, 3) _____.

4. **Required Actions**

Actions	Planned Date	Date Completed

5. **Responsible person(s):**

   _____

6. **Special requirements**
   - Time of the season or weather condition: _____
   - Tools/equipment: _____
   - Subcontractor (name or specific type): _____

Approved by _____/_____ **Date** _____

(name/signature)

Verification of completion by _____/_____ **Date** _____

(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

STANDARD CONSTRUCTED WETLAND MANUAL
SYSTEM IDENTIFIED ON THE LOCATION MAP

Development Name: Proposed Warehouse Complex – Buildings A & B

Township, County: Township of Franklin, Somerset County, New Jersey

Location Description: See Location Map

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STANDARD CONSTRUCTED WETLAND OVERVIEW

Functionality

Standard constructed wetlands are stormwater management systems design to maximize the removal of pollutants from stormwater runoff. Flow is directed through an engineered, open marsh system where pollutants are removed through settling and vegetative uptake/filtration.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Wetland Basin

A constructed wetland is a type of **wet** basin, in which water is retained in a permanent pool. This standard constructed wetland is designed for **extended detention of runoff**. It is **not** design to infiltrate the runoff.

Standard constructed wetlands shall have a water surface elevation approximately at the design water surface elevation year round. Standard constructed wetlands consist of a combination of two or more of the following components: pool zone, marsh zone and semi-wet zone. The different zones of the constructed wetland require different water depths, shapes, and vegetation; therefore, it is normal to see varying water depths throughout the system.

BASIC DESIGN INFORMATION

Hydrology Design Targets

1. This standard constructed wetland is designed as a wetland basin, consisting of the following zones and water depths:

Extended Detention Constructed Wetland Design Specifications	
Drainage Area	13.44 Acres
Standing Water Depth: High Marsh Zone	6 Inches
Standing Water Depth: Low Marsh Zone	6 – 18 Inches
Standing Water Depth: Pool Zone	4.37 Feet
Standing Water Depth: Semi-Wet Zone	Dry under normal conditions, inundated during 2, 10, 100 years events, Detention time: 48 hours

2. This basin will be discharged to existing wetland.

Hydraulic Design Targets

- Design parameters

	Water Quality Design Storm	**2-year storm**	**10-year storm**	**100-year storm**
Rainfall Depth (inches)	N/A	3.34 inches in 24 hours	5.01 inches In 24 hours	8.21 inches In 24 hours
Runoff Volume (cubic feet)	N/A	65,135	138,676	287,404
Peak Outflow Rate (cfs)	N/A	2.050	8.149	12.03
Water Surface Elevation (feet)	N/A	104.18	104.93	106.82

- The emergency spillway is at EL. 107.7 feet (if applicable)

Basin Configuration Targets

1. Pretreatment is not required.
2. Outlet Information:

Outlet Description	Outlet Type	Orifice Size / Weir Length	Invert Elevation (ft)
Water Quality Orifice	Orifice	3-inch Dia.	102.00
Weir	Weir	1.3 feet x 2 feet	106.00

3. The basin is not lined.
4. The wet pond does not intercept groundwater.
5. A Landscaping Plan that specifies the vegetation required in each zone of the constructed wetland is included in the plans.
6. The pond is designed without a bottom drain pipe to empty the pond.

Critical Maintenance Features

1. Floatables need to be cleaned and removed from the wetland.
2. Remove dead vegetation to prevent mosquito problem.
3. Water depth in each different zone must be maintained at design level.
4. Sediment level in the Pool Zone needs to be checked and cleaned frequently to ensure sufficient storage space and detention time.
5. Maintain vegetation.

Attach the following Disturbance Notices, if applicable to the site:

Wetland Disturbance Notice:

Maintenance of this BMP may disturb a wetland area. Contact NJDEP Division of Land Use Regulation for guidance and any required permit(s) before performing maintenance.

Wildlife Disturbance Notice:

Maintenance of this BMP may disturb or remove vegetation in an area designated to endangered and/or threatened species. Contact NJDEP Division of Fishing and Wildlife for guidance and any required permit(s) before performing maintenance.

VISUAL AID FOR WET TYPE STORMWATER BASIN INSPECTION

Issues: The forebay has not drained. Note the sediment accumulation in the forebay.

Corrective Action: Clear and remove sediment. Check if the drain hole is clogged.

Preventative Action: Routine inspection and maintenance to remove sediment. If sediment accumulates too fast, find the source of sediment and method to reduce the sediment.

Issues: Algae blooming.

Corrective Action: Remove algae.

Preventative Action: Routine inspection and aeration of the pond. Remove algae before blooming. A finding of the nutrient source and method to reduce the nutrient loading may be needed.

Issues: The outlet grating is covered by trash. Excessive trash in the pond.

Corrective Action: Clear and remove trash.

Preventative Action: Routine inspection and removal of trash. A finding of the trash source and method to reduce the trash may be needed.

Issues: The water level in the wet pond is significantly below the design water surface elevation.

Corrective Action: Check if the outlet structure or the liner is damaged. Repair any damage.

Preventative Action: Routine inspection of the basin and the liner.

Issues: Erosion on the embankment.

Corrective Action: Repair the embankment. Report to local authority and DEP Dam Safety as required by the local and DEP rules.

Preventative Action: Construct a riprap apron on the slope. Routine inspection before erosion becomes severe.

If the original design information is not available, the pond configuration may signal whether it was designed as a wet basin or dry basin. As shown here, the water level is at the invert elevation of the outlet (orifice behind the trash rack). If the water level is at the first outlet from the basin bottom (this can be determined by checking the inside the outlet box), then it is a wet basin and is at correct water surface level. However, if there is another outlet below the water, then it may signal that it is a failed dry basin now filled with water.

Also the pond has a circle of riprap (also known as an energy dissipater) around the edge at the water level. A dry basin will generally not have this configuration; therefore, it suggests a wet pond.

REFERENCE DOCUMENTS

- As-built Drawings with Drainage Plans and Landscape Drawings
- Geotechnical Report which includes:
    3. *Soil Boring Logs*
    4. *Permeability Tests*
- Stormwater Management Report

Refer to the Appendices for copies of reference documents.

INSPECTION CHECKLIST / MAINTENANCE ACTIONS

Standard Constructed Wetland

Checklist (circle one)**:** Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____

Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):

Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):

Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
A1 Marsh Zone	1	The water depth in the marsh zone is significantly above or below the design water depth Dry spot(s) appearing in the marsh zone Growth of trees or bushes in the marsh zone	Y__ N__	Check for: * Damages to the liner (if applicable) * Changes in inflow patterns (less runoff, lower groundwater table) Repair any structural damages Remove sediment, reconfigure the marsh zone, remove trees, or repair the liner (if necessary) Work Order # _____
	2	Vegetation loss in the high marsh zone	Y__ N__	Check whether the water level is higher than the design level Check the Landscaping Plan for remedial actions Work Order # _____
	3	Significant changes of the sinuous path pattern from the original design Channelization in the wetland	Y__ N__	Check whether the incoming flow is larger than the design inflow Check if excessive sediment has accumulated in the marsh zone Remove sediment and reconfigure the flow path, if necessary Work Order # _____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
Note:				
A2 Pond Zone	1	The water depth in the marsh zone is significantly above or below the design water depth	Y__ N__	Check for: - Changes in inflow patterns (less runoff, lower groundwater table) - Damages to the outlet structure - Damages to the liner (if applicable) Repair any structural damages Work Order # _____
	2	Islands or shallow marsh emerging out of the pond zone	Y__ N__	Check whether there is excessive sediment in the pond Check whether the incoming flow has excessive sediment Remove excessive sediment Find the source of excessive sediment and method to reduce the source Work Order # _____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
Note: If emptying the pond is required before sediment removal, it shall be noted that a permit may be required before discharging the pond water. Contact NJDEP Division of Land Use Regulation before discharge.				
A2 Pond Zone	3	The observed detention time is longer than the design detention time. The observed detention time is approximately _____ hours.	Y__ N__	Check whether the outlets are clogged, see section E-Outlet of this checklist
	4	Debris or trash floating on the water	Y__ N__	Remove debris and trash If trash and debris are excessive, find the source and the method to reduce the source.
	5	Excessive dead vegetation in the pond	Y__ N__	Clear and remove vegetation
	6	Mosquitoes breeding	Y__ N__	Remove dead vegetation Consult local mosquito commission for guidance Work Order # _____
	7	Subsidence of safety ledge	Y__ N__	Drain the pond and repair the safety ledge Work Order # _____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
Note: If emptying the pond is required, a permit may be required before discharging the pond water. Contact NJDEP Division of Land Use Regulation before discharge.				
A3 Semi-Wet Zone	1	Erosion on the side slopes	Y__ N__	See D – Pond Embankment and Side Slopes
	2	Overgrown trees and bushes	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____
B Vegetation	1	Invasive plants are present	Y__ N__	Remove the invasive plants and restore the vegetation in accordance with the landscaping plan Work Order # _____
	2	Algae blooming	Y__ N__	Remove algae Find the nutrient source and the solution to reduce the nutrient loading Work Order # _____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
Note:				
C Pond Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y__ N__	Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Restabilize the bank Work Order # _____
D Outlet	1	Trash or debris accumulation more than 20%	Y__ N__	Clean and remove Determine source of trash and address to reduce future maintenance costs or basin failure
	2	Trash rack is damaged or rusted greater than 50% Trash rack is bent, loose, or missing parts	Y__ N__	Repair or replace trash rack Work Order #_____
	3	Outlet components (e.g., orifice plates or weir plate) skewed, misaligned, or missing	Y__ N__	Repair or replace component Work Order #_____

	For Inspector			For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**		**Result**	**Preventative / Corrective Maintenance Actions**
	4	Discharge pipe apron is eroded or scoured	Y__ N__	Restabilize the discharge riprap apron Work Order #_____
	5	Standing water is present in the outlet structure longer than 72 hours	Y__ N__	Pump out the standing water Work Order # _____
Note:				
E Emergency Spillway	1	Trees or excessive vegetation present	Y__ N__	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y__ N__	Repair Work Order #_____
	3	Sign/plate: tiled, missing, or faded	Y__ N__	Repair or replace Work Order #_____
	4	Excessive or overgrown vegetation blocking access to the basin	Y__ N__	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order #_____

	For Inspector		For Maintenance Crew
Component No. Component Name	**Inspection Item and Inspection Item No.**	**Result**	**Preventative / Corrective Maintenance Actions**
Note:			

Follow Up Items (Component No. / Inspection Item No.):

_(e.g., B/1, C/2)_____

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

_____ _____ _____

Inspector Name **Signature** **Date**

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance

PREVENTATIVE MAINTENANCE RECORD

Corresponding Checklist No. _____

Component No._____, Inspection Item No._____

Work Logs

Activities	**Components**	**Check if finished**
Sediment/debris removal **Sediment removal should take place when the pond zone is thoroughly dry.**	A2 – Pond Zone	
	C – Pond Embankment and Side Slopes	
	D – Outlet	
Vegetation removal	A1 – Marsh Zone	
	A2 – Pond Zone	
	A3 – Semi-Wet Zone	
	C – Pond Embankment and Side Slopes	
	D – Outlet	
	E – Emergency Spillway	

Vegetation is removed by _____ (type of equipment) with minimum disruption to the remaining vegetation.

All use of fertilizers, pesticides, mechanical treatments, and other means to ensure optimum vegetation health must not compromise the intended purpose of the stormwater management measure. The fertilizer applied is _____ (type), and _____ (quantity per usage) is applied _____ (frequency of use).

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member:_____/_____ Date: _____

(name/ signature)

Supervisor:_____/_____ Date: _____

A permit may be required to discharge when emptying the pond. Contact NJDEP Division of Land Use Regulation before discharging.

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

CORRECTIVE MAINTENANCE RECORD

1. **Work Order # _____ Date Issued _____**

2. **Issue to be resolved**:

(e.g., orifice plate is loose and bent)

3. The issue was from **Corresponding Checklist No. _____,**
4. **Component No.** (e.g., E – Outlet)_____,
5. **Inspection Item No.** (e.g., 2, 3)_____**.**

6. **Required Actions**

Actions	Planned Date	Date Completed

7. **Responsible person(s):**

_____

8. **Special requirements**
   - Time of the season or weather condition:_____
   - Tools/equipment:_____
   - Subcontractor (name or specific type):_____

Approved by _____/_____ Date _____

(name/signature)

Verification of completion by _____/_____ Date _____

(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.

APPENDIX A – LOCATION PLAN

CONVENTIONAL ASPHALT PAVEMENT

PERMEABLE ASPHALT PAVEMENT

PPVMT-10

PPVMT-2

PPVMT-5

PPVMT-8

PPVMT-6

PPVMT-1

PPVMT-9

PPVMT-3

PPVMT-7

PPVMT-4

A
(75,000 SF)
FF=115.5
LD=111.5

B
(75,000 SF)
FF=115.5
LD=111.5

CONSTRUCTED WETLAND (WB-1)

WETLAND LIMIT

WETLAND

EXISTING WATERWAY

50' WETLAND TRANSITION AREA

FHA ELEV. 107.00-101.80

RIPARIAN ZONE LIMIT

WETLAND LIMIT

WETLAND

50' WETLAND TRANSITION AREA

LEGEND
- POROUS PAVEMENT
- REGULAR PAVEMENT
- PROPOSED BUILDING

NJ STATE HIGHWAY ROUTE 27 (66' ROW)

OAKTREE DRIVE

FELA AVE

OMAHA ROAD

SANITARY SEWER EASEMENT

GROUND LEASE AGREEMENT

CROSS ACCESS EASEMENT

FOR NJDEP USE

REV. / ISSUE	DATE	DESCRIPTION
1	6/7/2022	REV. FOR DEP APPLICATION
2	2/8/2023	REV. PER TWP COMMENTS

ORIENTATION / KEY PLAN

NORTH

GRAPHIC SCALE
60 0 30 60 120
(IN FEET)
1 inch = 60 ft.

PAULUS, SOKOLOWSKI AND SARTOR, LLC.

3 MOUNTAINVIEW ROAD
P.O. BOX 4039
WARREN, NJ 07059
PHONE: (732) 560-9700

CERTIFICATE OF AUTHORIZATION NO. 24GA28032700

PROJECT

FRANKLIN WAREHOUSE & OFFICE PLAN

BLOCK 88.02, LOT 13.01

TOWNSHIP OF FRANKLIN, SOMERSET COUNTY, NEW JERSEY

SHEET TITLE

STORMWATER FACILITIES LOCATION PLAN

PROJECT NO.: 04596-0014
SCALE: 1"=60'
DATE: 03-14-2022
SHEET NO.

DRAWN BY: C.Y.
CHECKED BY: C.H.
SHEET OF

STM LP

FILE NAME: P:\04596\0014\Reports\C-Civil\Stormwater\Appendices\Appd_Regs\Buildings A + B\Stormwater Facilities\Location Plan.dwg
LAST EDIT: 03/15/2023 - 12:06:33 PM
LOGIN: rgravens@PSandS.com
XREFS: 04596004C-B024x36 ; 04596004C-B024x36r ; 04596004C-D950_A8 ; 04596004C-D950_A8 ; EXP_20013_FLOI_01 ; EXP_20013_FLOI_02 ; wetland_by_other
IMAGES:

APPENDIX B – AS-BUILT DRAWINGS
(TO BE ATTACHED)

APPENDIX C – GEOTECHNICAL REPORT

CARLIN • SIMPSON & ASSOCIATES, LLC

Consulting Geotechnical and Environmental Engineers

61 Main Street, Sayreville, New Jersey 08872
Tel. (732) 432-5757
Fax. (732) 432-5717

Principal:
Robert B. Simpson, P.E.

Associates:
Meredith R. Anke, P.E.
Stephen Rossi, P.E.
Kurt W. Anke
Eric J. Shaw
Michal Wroblewski, E.I.T.
Catherine Simpson, E.I.T.

25 April 2022

PS&S
67A Mountain Blvd, Ext
Warren, NJ 07059

Attn: Mr. Craig Hermann, P.E., P.P., C.M.E.

Re: Report on Subsurface Soil and Foundation Investigation
Proposed Warehouse and Porous Pavement
Block 88.02, Lot 13.02 and Lot 19
Franklin, NJ (CSA Job 20-127)

Dear Mr. Hermann,

In accordance with our revised proposal dated 8 December 2022 and your subsequent authorization, we have completed a Subsurface Soil and Foundation Investigation for the referenced site. The purpose of this study was to determine the nature and engineering properties of the subsurface soil and the groundwater conditions for the new construction, to recommend a practical foundation scheme, to determine the allowable bearing capacity of the site soils, and to determine the permeability in the proposed porous pavement areas.

We understand the proposed development will consist of 3 new warehouse buildings. Site development will also include new driveway and parking areas, utilities, and a stormwater management system. To guide us in our study, you have provided us with concept plans that indicate the location of the proposed construction.

Our scope of work for this project included the following:

1. Reviewed the proposed layout, the existing site conditions, the expected soil conditions, and planned this study.

2. Retained Environmental Technical Drilling Inc to advance twenty (20) test borings at selected locations on the subject site.

3. Retained Villane Construction to advance forty-nine (49) test pits at selected locations on the subject site.

4. Laid out the boring and test pit locations in the field, visually identified the soil layers encountered, obtained soil samples, and prepared detailed boring logs and a Boring and Test Pit Location Plan.

5. Performed soil identification tests on selected soil samples in our laboratory.

6. Analyzed the field and laboratory test data and prepared this report containing the results of this study.

1.0 SITE DESCRIPTION

The project site is located north of the intersection of Bennetts Lane and Route 27 in Franklin, New Jersey. The site is currently a tilled farm field with some partially wooded areas with underbrush. There is an abandoned house located at the southern end of the site. Existing site grades vary from approximately elevation +102.0 to +124.0 and slope downward from southeast to northwest.

2.0 PROPOSED CONSTRUCTION

We understand the proposed development will consist of 3 new warehouse buildings. Site development will also include new driveways and parking areas, utilities, and a stormwater management system. The three warehouse buildings (labeled A, B and C) will have a finished floor elevation of approximately +118.0 and a loading dock elevation of +114.0. The proposed grades in the adjacent parking lots vary from about elevation +111.0 to +117.0. Based on the proposed finished floor elevations, we anticipate that cuts up to approximately 4 feet and fills up to approximately 12 feet will be required from existing grade. The building loads were unknown at the time of this report.

Once the construction plan has been further developed, a copy of the plans should be forwarded to our office so that we can review them along with the recommendations in this report. At that time, any changes or additional recommendations can be provided, if required.

3.0 SUBSURFACE CONDITIONS

To determine the subsurface soil and groundwater conditions at the site, twenty (20) test borings were advanced by Environmental Technical Drilling Inc. and forty nine (49) test pits were advanced by Villane Construction Inc. at the locations shown on the enclosed Boring and Test Pit Location Plan. Detailed boring logs have been prepared and are included in this report. Our field engineer visually identified all of the soil samples obtained during the boring operations. Several samples were selected and tested in our laboratory.

3.1 Soils

The soil descriptions shown on the boring and test pit logs are based on the Burmister Classification System. In this system, the soil is divided into three components: Sand (S), Silt ($) and Gravel (G). The major component is indicated in all capital letters, the lesser in lower case letters. The following modifiers indicate the quantity of each lesser component:

Modifier	Quantity
trace (t)	0 -10%
little (l)	10% - 20%
some (s)	20% - 35%
and (a)	35% - 50%

When the site soils are plastic, the following indicators are used:

Plasticity	**Plasticity Index**	**Indicator**
None	0 - 1	SILT
Slight	1 - 5	Clayey SILT
Low	5 - 10	SILT & CLAY
Medium	10 - 20	CLAY & SILT
High	20 - 40	Silty CLAY
Very High	40+	CLAY

The subsurface soil conditions observed in the borings and test pits can be summarized as follows:

Stratum 1 Topsoil — At the surface at each boring and test pit location is topsoil or topsoil with tilled subsoil that ranges from 0'8" to 2'3" in thickness.

Stratum 2 Existing Fill — Below the surface layer in 6 test pit locations is existing fill that generally consists of red brown coarse to fine Sand, and (-) Silt, some medium to fine Gravel. At test pit location TP-7, existing fill consisted of dark red brown, black coarse to fine SAND, some Silt, some medium to fine Gravel with a lot of debris including glass and brick. This stratum extends to depths ranging from 1'0" to 4'0" below the existing ground surface. There is also a stockpile of existing fill located in the northern portion of the site that is up to approximately 35 feet in height.

Stratum 3 Clayey Silt or Silt — Underlying the existing fill, sand or silty sand throughout the site is medium stiff to stiff red brown Clayey SILT or SILT little (to and), coarse to fine Sand, trace (to little) medium to fine Gravel. Portions of this stratum contain weathered rock fragments.

Stratum 4 Sand or Silty Sand — Below strata the above strata is sand or silty sand that generally consists of red brown, brown coarse to fine SAND, trace (to some) Silt, little (to some) medium to fine Gravel or red brown coarse to fine Sand, some (to and) Silt, little (to some) medium to fine Gravel.

Stratum 5 Completely Weathered Shale — Beneath the above strata is completely weathered Shale. The completely weathered Shale is in a soil like in state, however, there could be denser pockets that cannot be conventionally excavated. The weathered Shale stratum was encountered at depths ranging from 1'0" to 12'0" below the existing ground surface at the boring and test pit locations and transitions to hard Shale bedrock with depth.

Stratum 6 Shale Bedrock — Beneath the completely weathered Shale is Shale bedrock that is highly to slightly weathered. The highly to slightly weathered shale is generally highly fractured, contains little to no soil, and is very blocky when excavated. Highly to slightly weathered rock was encountered from 2'3" to 6'9" below the surface. Auger and

bucket refusal on probable harder bedrock as encountered in 25 of the 69 locations.

3.2 Groundwater and Seasonal High Groundwater

During this investigation, groundwater was encountered in 14 of the 20 test borings and 31 of the 49 test pit locations at depths ranging from 1'6" to 11'0" below the existing ground surface (approximate elevations +100.0 to +109.3). Test pit TP-1, TP-30, TP-33 and TP-49 noted perched or trapped groundwater at a depths ranging from 2'0" to 4'0" below the existing ground surface (approximate elevations +105.0 to +119.0). Evidence of seasonal high groundwater was encountered in boring B-1 and test pits TP-14, TP-20, TP-22, TP-23, TP-24, TP-36 and TP-4 at depths ranging from 0'8" to 9'6" below existing ground surface (approximate elevations +101.3 to +112.5).

Groundwater on the subject site will be controlled by the topography and the underlying bedrock surface. During construction, we expect that perched or trapped water may be encountered within the existing fill, in the silty site soils, and/or along the soil/rock interface, especially during wet periods. Proper groundwater control measures will be required in the event that water is encountered in the site excavations.

Variations in the location of the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not immediately apparent at the time of this exploration.

3.3 Bedrock

Based on our experience and the boring and test pit observations, the in-situ bedrock at the site will range from completely weathered rock in a soil-like state, to shattered, very blocky and seamy, highly fractured Shale in poor condition. The rock generally transitions into harder bedrock with increasing depth. The completely weathered rock was encountered at depths ranging from 1'0" to 12'0" below existing ground surface (approximate elevations +101.5 to +117.3). Auger refusal on harder bedrock was encountered at depths ranging from 7'0" to 22'0" below the existing ground surface (approximate elevations +95.0 to +106.5). Bucket refusal on harder Shale bedrock was encountered at depths ranging from 3'9" to 7'0" (approximate elevations +98.8 to +110.8). The bedrock observations are summarized in Table 1.

Based on the provided grading plan, cuts up to 4'0" are planned throughout the site. Based on the proposed construction and boring and test pit data, these excavations may extend the completely weathered Shale bedrock particularly in the areas of proposed underground utilities.

Penetration into the bedrock and completely weathered rock with excavation equipment will depend on the degree of weathering and fracturing in the rock. The upper few feet of rock may be "rippable" by using large construction equipment, but we anticipate that the "rippability" of the bedrock will be variable and limited. It should not be assumed that the completely weathered rock (very dense material in a soil-like state) can be excavated with conventional equipment. If harder rock is encountered, the use of hydraulic hammers will be required to excavate the harder bedrock. Additional recommendations related to rock removal are discussed in Section 5.1 of this report.

3.4 Summary of Boring and Test Pit Observations

A summary of the boring observations is provided in Table 1 below.

Table 1 – Summary of Boring and Test Pit Observations

Boring / Test Pit No.	Existing Ground Surface Elevation	Depth to Groundwater (Elevation)	Depth to Bottom of Existing Fill (Elevation)	Depth to Rock (Elevation)
B-1	+113.5	7’0” (+106.5)	NE	CWR @ 3’0” (+110.5) AR @ 11’0” (+102.5)
B-2	+114.5	8’0” (+106.5)	NE	CWR @ 9’6” (+105.0) AR @ 16’6” (+98.0)
B-3	+117.0	10’0” (+107.0) SH @ 9’6” (+107.5)	NE	CWR @ 11’0” (+106.0) AR @ 22’0” (+95.0)
B-4	+114.0	7’6” (+106.5)	NE	CWR @6’6” (+107.5) AR @ 16’6” (+97.5)
B-5	+112.5	6’0” (+106.5)	NE	CWR @ 12’0” (+100.5) AR @ 15’0” (+97.5)
B-6	+112.0	6’0” (+106.0)	NE	CWR @ 3’0” (+109.0) AR @ 14’0” (+98.0)
B-7	+114.0	7’0” (+107.0)	NE	CWR @ 2’6” (+111.5) AR @ 16’0” (+98.0)
B-8	+112.0	NWR	NE	CWR @ 4’6” (+107.5) AR @ 8’9” (+103.3)
B-9	+108.0	4’0” (+104.0)	NE	CWR @ 3’3” (+104.8) AR @ 9’6” (+98.5)
B-10	+106.5	NWR	NE	CWR @ 1’6” (+105.0) SR @ 10’9” (+95.8)
B-11	+108.0	NE	NE	CWR @ 1’6” (+106.5) AR @ 7’0” (+101.0)
B-12	+110.0	NE	NE	CWR @ 2’9” (+107.3) AR @ 7’0” (+103.0)
B-13	+109.0	4’9” (+104.3)	NE	CWR @ 2’3” (+106.8) AR @ 7’6” (+101.5)
B-14	+109.5	5’6” (+104.0)	NE	CWR @ 1’6” (+108.0) AR @ 7’0” (+102.5)
B-15	+112.0	9’0” (+103.0)	NE	CWR @ 2’0” (+110.0) AR @ 10’0” (+102.0)
B-16	+115.0	NE	NE	CWR @ 1’3” (+113.8) AR @ 9’0” (+106.0)
B-17	+119.5	11’0” (+108.5)	NE	CWR @ 5’0” (+114.5) AR @ 13’0” (+106.5) SR @ 14’9” (+104.8)
B-18	+111.0	3’9” (+107.3)	NE	CWR @ 1’6” (+109.5) SR @ 11’8” (+99.3)
B-19	+113.0	7’6” (+105.5)	NE	CWR @ 1’8” (+111.3) AR @ 8’0” (+105.0) SR @ 8’4” (+104.6)
B-20	+114.0	NE	NE	CWR @ 4’6” (+109.5) AR @ 9’0” (+105.0)

Boring / Test Pit No.	Existing Ground Surface Elevation	Depth to Groundwater (Elevation)	Depth to Bottom of Existing Fill (Elevation)	Depth to Rock (Elevation)
TP-1	+113.0	*3’3” (+109.8)	NE	CWR @ 2’6” (+110.5) BR @ 4’0” (+109.0)
TP-2	+115.0	NE	NE	CWR @ 5’6” (+109.5)
TP-3	+114.5	NE	NE	CWR @ 5’6” (+109.0)
TP-4	+112.0	NE	NE	CWR @ 6’0” (+106.0)
TP-5	+111.5	NE	NE	CWR @ 5’6” (+106.0) BR @ 6’3” (+105.3)
TP-6	+109.0	NE	NE	CWR @ 1’4” (+107.7)
TP-7	+119.0	NE	4’0” (+115.0)	CWR @ 7’3” (+111.8)
TP-8	+117.0	NE	1’0” (+116.0)	CWR @ 8’0” (+109.0)
TP-9	+115.0	NE	NE	CWR @ 7’0” (+108.0)
TP-10	+113.0	7’6” (+105.5)	NE	CWR @ 6’9” (+106.3)
TP-11	+112.5	7’9” (+104.8)	NE	CWR @ 6’3” (+106.3)
TP-12	+111.5	6’3” (+105.3)	NE	CWR @ 5’3” (+106.3) BR @ 7’0” (+104.5)
TP-13	+108.0	4’3” (+103.8)	NE	CWR @ 6’0” (+102.0)
TP-14	+107.0	3’9” (+103.3) SH @ 1’6” (+105.5)	NE	CWR @ 2’3” (+104.8)
TP-15	+109.5	5’6” (+104.0)	NE	CWR @ 1’6” (+108.0)
TP-16	+111.5	6’6” (+105.0)	NE	CWR @ 6’6” (+105.0)
TP-17	+109.5	5’0” (+104.5)	NE	CWR @ 6’9” (+102.8)
TP-18	+106.5	3’0” (+103.5)	NE	CWR @ 1’0” (+105.5) BR @ 6’0” (+100.5)
TP-19	+102.5	3’0” (+99.5)	NE	CWR @ 1’0” (+101.5) BR @ 3’9” (+98.8)
TP-20	+102.5	1’6” (+101.0) SH @ 1’3” (+101.3)	NE	CWR @ 3’0” (+99.5)
TP-21	+104.5	3’6” (+101.0)	NE	CWR @ 3’9” (+100.8)
TP-22	+103.0	3’0” (+100.0) SH @ 1’0” (+102.0)	NE	CWR @ 4’9” (+98.3)
TP-23	+104.5	2’9” (+101.8) SH @ 0’10” (+103.6)	NE	CWR @ 1’3” (+103.3)
TP-24	+106.0	2’9” (+103.3) SH @ 0’8” (+105.3)	NE	CWR @ 2’0” (+104.0)
TP-25	+110.0	5’3” (+104.8)	NE	CWR @ 3’3” (+106.8)
TP-26	+111.0	3’9” (+107.3)	NE	CWR @ 1’3” (+109.8)
TP-27	+110.5	3’3” (+107.3)	NE	CWR @ 1’6” (+109.0)
TP-28	+114.0	NE	NE	CWR @ 2’0” (+112.0) BR @ 4’6” (+109.5)
TP-29	+120.5	NE	2’6” (+118.0)	CWR @ 6’0” (+114.5)
TP-30	+122.0	*3’0” (+119.0)	3’0” (+119.0)	CWR @ 3’9” (+118.3)
TP-31	+111.0	4’3” (+106.8)	NE	CWR @ 2’0” (+109.0)
TP-32	+110.0	5’0” (+105.0)	NE	CWR @ 1’8” (+108.3)
TP-33	+107.0	*2’0” (+105.0)	NE	CWR @ 1’0” (+106.0)

Boring / Test Pit No.	Existing Ground Surface Elevation	Depth to Groundwater (Elevation)	Depth to Bottom of Existing Fill (Elevation)	Depth to Rock (Elevation)
TP-34	+105.5	2'0" (+103.5)	NE	CWR @ 4'0" (+101.5)
TP-35	+116.0	NE	NE	CWR @ 5'3" (+110.8)
TP-36	+118.0	SH @ 5'6" (+112.5)	NE	NE to 7'9"
TP-37	+146.0	NE	>9'0" (>+137.0)	NE
TP-38	+135.0	NE	>9'0" (>+126.0)	NE
TP-39	+108.5	3'3" (+105.3)	NE	CWR @ 1'6" (+107.0)
TP-40	+110.0	5'6" (+104.5)	NE	CWR @ 1'4" (+108.7)
TP-41	+106.0	4'6" (+101.5) SH @ 1'0" (+105.0)	NE	CWR @ 1'6" (+104.5)
TP-42	+108.0	4'0" (+104.0)	NE	CWR @ 3'3" (+104.8)
TP-43	+109.5	5'6" (+104.0)	NE	CWR @ 1'3" (+108.3)
TP-44	+112.0	NE	NE	CWR @ 2'0" (+110.0)
TP-45	+113.5	NE	NE	CWR @ 3'3" (+110.3)
TP-46	+113.0	NE	NE	CWR @ 1'0" (+112.0)
TP-47	+119.0	NE	NE	CWR @ 1'8" (+117.3)
TP-48	+114.0	4'9" (+109.3)	NE	CWR @ 1'3" (+112.8)
TP-49	+115.0	*4'0" (+111.0)	NE	CWR @ 1'3" (+113.8) BR @ 4'3" (+110.8)

NE – Not Encountered
NWR – No Water Reading
SH – Seasonal High Groundwater (i.e. Mottling)
(*) – Perched or Trapped Groundwater
CWR – Completely to Moderately Weathered Rock, rippable
AR – Auger Refusal on Harder Bedrock
SR – Spoon Refusal on Weathered Shale
BR – Bucket Refusal on Harder Bedrock

4.0 SUMMARY OF DESIGN RECOMMENDATIONS

Below is a summary of the major design and construction considerations for this project. Additional recommendations are provided in the following sections of this report.

- *Subsurface Conditions (Section 3.0)*
  - Topsoil at the site extends to depths ranging from 0'8" to 2'3" below the existing ground surface.
  - Existing fill at the site extends to depths ranging from 1'0" to 4'0" below the existing ground surface at the boring and test pit locations.
  - An existing stockpile of material is located in the northeast portion of the site that is approximately 30 to 35 feet in height.
  - Groundwater was encountered depths ranging from 1'6" to 11'0" below the existing ground surface.
  - Perched or trapped groundwater was encountered at a depths ranging from 2'0" to 4'0" below the existing ground surface.
  - Evidence of seasonal high groundwater (i.e. mottling) was encountered at depths ranging from 0'8" to 9'6" below existing ground surface.

- A summary of the subsurface observations is provided in Table 1 above.

- *Building Area Preparation (Section 5.1)*
  - Where encountered, the existing fill shall be completely removed from below the building area and replaced with new compacted fill.
  - Existing fill is not suitable for the support of the building foundations and floor slab.
  - The existing stockpile of material in the northeast portion of the site will be moved to reach the planned subgrade elevation. If existing fill remains below the finished floor elevation, it must be completely removed and replaced with new compacted fill.
  - Exposed subgrade soil shall be densified prior to excavating foundations.
  - New backfill shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM D-1557).

- *Building Foundation Recommendations (Section 5.2)*
  - The new foundations may be designed as spread footing type foundations bearing on virgin soil or engineer-approved compacted fill.
  - Net design bearing pressure is 4,000 psf.
  - Minimum depth for frost protection is 36 inches.
  - Seismic Site Class is D or Stiff Soil Profile.

- *Building Floor Slab Recommendations (Section 5.3)*
  - The floor slab may be designed as slab on grade.
  - Modulus of subgrade reaction is 200 pci.

- *Additional Site Recommendations (Section 6.0)*
  - Stormwater Management (Section 6.1): Porous pavement areas are proposed across the site. One detention basin is proposed in the western portion of the site.
  - Pavement (Section 6.2): Densified existing fill, virgin soil, and new compacted fill may be used to support the pavement.
  - Utilities (Section 6.3): New utilities may bear in the densified existing fill, virgin soil, or new compacted fill.

5.0 BUILDING EVALUATION

We understand the proposed development will consist of 3 new warehouse buildings. The three warehouses (labeled A, B and C) will have a finished floor elevation of approximately +118.0 and a loading dock elevation of +114.0. The proposed grades in the adjacent parking lots vary from +111.0 to +117.0. Based on the proposed finished floor elevations of the warehouses and the roadway grading we anticipate cuts up to 4 feet and fills up to 12 feet will be required from existing grade. A summary of the boring and test pit observations performed in the proposed building areas is provided in Table 1 above.

Topsoil was encountered at the site to depths ranging from 0’8” to 2’3” below existing ground surface. Existing fill at the site extends to depths of 1’0” to 4’0” below the existing ground surface at the test locations. An existing stockpile of material is located in the northeast portion of the site that is approximately 30 to 35 feet in height. The depth of the existing fill is expected to be variable and may be deeper in unexplored areas of the site. The existing fill and topsoil are considered unsuitable materials and are not an acceptable bearing material for the new building

foundations or floor slab. The consistency and density of the soil fill are not predictable. Certain areas may contain clean dense soils while other areas may contain loose material, void spaces, and/or debris. The existing soil fill creates the possibility of intolerable differential settlements under loading.

To eliminate the potential for damaging differential settlements, the existing fill and topsoil shall be completely removed and replaced with new compacted fill. The building foundation may be designed as a shallow spread foundation bearing on engineered-approved compacted fill or the virgin soils. Recommendations for preparation of the building area are provided in Section 5.1. Foundation recommendations for the building are provided in Section 5.2 below. In addition, the proposed building floor slab may be designed as slab on grade bearing on new compacted fill or virgin soils. Floor slab recommendations can be found in Section 5.3 below.

5.1 Building Area Preparation

In order to prepare the site for construction, any surface materials such as topsoil, surface vegetation, and trees shall be removed from the planned building areas, extending at least 10 feet beyond the new construction limits, where practical.

Removal of Existing Fill

Existing fill was encountered in four boring and test pit locations. The existing fill was encountered to depths ranging from 1’0” to 4’0” below the existing ground surface. As discussed above, the existing fill is not a suitable bearing material for the new building foundations and floor slabs. Where existing fill is encountered in a building area, it must be completely removed and replaced as described below.

If existing fill remains below the planned subgrade elevation, the excavation shall extend through the existing fill down to the virgin soil. At the bottom of the excavation, the removal of the unsuitable material shall extend horizontally beyond the building limits a minimum distance of 1’0” plus a distance equal to the depth of the excavation below the planned foundation bearing elevation. For example, if the removal of the existing fill extends vertically 3’0” below the planned foundation bearing elevation, the excavation must extend horizontally a minimum of 4’0” (1’0” plus 3’0”) beyond the new building limits at that location.

The removal of the existing fill from the proposed building areas shall be performed under the full time inspection of Carlin-Simpson & Associates. The on-site representative from Carlin-Simpson & Associates shall direct the contractor during this operation to ensure that all of the unsuitable material has been removed from the proposed building areas.

During the removal of the unsuitable material, the contractor should segregate the potentially re-usable existing soil/fill material from the non-reusable fill (i.e. debris and topsoil). The on-site representative from Carlin-Simpson & Associates shall evaluate the suitability of the excavated materials for use as compacted fill during the excavation and prior to its re-use. Potentially usable fill should be stockpiled and covered with tarps or plastic sheeting for protection from excess moisture. Any fill material that is or becomes wet must be dried prior to its re-use.

Densification of Subgrade Soils (Proofrolling)

After the surface materials and existing fill are removed as outlined above; the exposed subgrade shall be proofrolled with at least five (5) passes of a large vibratory drum roller (i.e. Dynapac CA 250 or equivalent). The proofrolling is necessary to densify the underlying soils. The proofrolling must be performed prior to the excavation for new foundations and the placement of new fill in the building areas. In areas where the existing subgrade is to be cut, the proofrolling of the subgrade in those areas should be performed once the proposed subgrade is achieved.

A representative from Carlin-Simpson & Associates shall observe the proofrolling operation. If any excessive movement is noted during the proofrolling, the soft soil shall be removed and replaced with new compacted fill. The Carlin-Simpson & Associates representative shall be responsible for determining what material, if any, is to be removed and will direct the Contractor during this operation.

Handling Wet and Sensitive Subgrades During Foundation Excavations

The foundation bearing material may consist of clayey or silty virgin soil. In the event that the foundation subgrade consists of wet or soft soils, and become destabilized due to the seepage of trapped or perched groundwater into the excavation, stabilization with crushed stone and filter fabric will be required to construct the foundations. It is anticipated that over-excavation below the foundations between be required in some areas where the existing grades are being cut, primarily in warehouses B and C. It is recommended that geotextile fabric, crushed stone, and sump pumps be present on the site when excavating for the foundations, to control groundwater and minimize the destabilization of the foundation subgrade.

To prepare the destabilized foundation subgrade surface for the geotextile fabric and crushed stone, all groundwater, loose soil, and mud must be removed from the area. The vertical overexcavation below the bottom of footing will range between 12 to 18 inches. The horizontal over excavation beyond the edge of the foundations shall be equal to the vertical overexcavation. Where necessary, sump pits and pumps should be used to remove the standing water and to control the groundwater during construction. The sumps shall consist of a perforated pipe at least eight (8) inches in diameter, surrounded by crushed stone and filter fabric. The sump pits must be installed just outside the planned excavation area and should extend a minimum of 2 feet below the bottom of the proposed excavation elevation.

After the subgrade is prepared, the geotextile filter fabric should be laid out on the exposed subgrade. The geotextile filter fabric shall consist of Mirafi 500X or equivalent. Adjacent layers of geotextile filter fabric should be overlapped a minimum of 12 inches. As necessary, approximately 12 to 18 inches of 3/4-inch clean crushed stone will be installed on top of the filter fabric layer to provide a firm working surface, provide protection for the geotextile filter fabric, and minimize pumping of the subgrade soil. The stone should be spread across the geotextile filter fabric.

Installation of New Structural Fill

New fill required to achieve final grades shall consist of either engineer-approved on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% by weight passing a No. 200 sieve. The new fill shall be placed in layers not exceeding one (1) foot in thickness and each layer shall be compacted to at least 95% of its Maximum Modified Dry Density (ASTM

D1557). Each layer must be compacted, tested, and approved by the Carlin-Simpson & Associates field representative prior to placing subsequent layers. The suitability of the excavated soil for reuse as compacted structural fill is discussed in Section 6.5 below.

If imported structural fill is required during construction, the imported structural fill shall meet the following specified gradation:

US Standard Sieve Size	Percent Finer By Weight
3 inch	100
No. 4	30-80
No. 40	10-50
No. 200	0-20

5.2 New Building Foundations

Once the planned building subgrade has been prepared as described Section 5.1 above, the new foundations may be constructed on the virgin site soils or new compacted fill. The new building foundations may be designed as shallow spread footings using a net design bearing pressure as listed in Table 2 below.

All foundations shall bear on the virgin soil or on new engineer-approved compacted fill. All of the exterior footings shall bear at the minimum depth listed below for protection from frost. Interior column footings may bear on the virgin soil or new structural fill just below the floor slab provided the structure is heated during winter. The footings shall have minimum dimensions as listed below.

Table 2 – Building Foundation Design Parameters

Description	Value
Foundation Bearing Material	Virgin Soil or New Compacted Fill
Net Design Bearing Pressure	4,000 psf
Minimum Frost Depth	36 inches
Minimum Column Dimension	30 inches
Minimum Wall Dimension	18 inches

The excavations for the new foundations shall be performed under the full-time inspection of Carlin-Simpson & Associates. The on-site representative shall confirm that the foundation bearing material is capable of supporting the design bearing pressure.

Prior to the installation of the reinforcement steel and concrete, the bottoms of the foundation excavations should be cleaned of all loose material. The foundation subgrade shall be compacted with a small vibratory drum trench compactor (i.e. Wacker Model RT560), a heavy vibratory plate tamper (i.e. Wacker BPU 3545A or equivalent), or a “jumping jack” style tamper (i.e. Wacker Model BS 600). The preparation of the footing bearing subgrade should be performed under the observation of a representative from Carlin-Simpson & Associates. If instability is observed during the compaction of the bearing subgrade, the soft soil shall be removed and replaced with new compacted fill.

5.3 Building Floor Slabs on Grade

We anticipate that fills up to 12 feet will be required in the proposed building areas to achieve the desired finished floor elevations. New fill for the floor slabs shall consist of either suitable on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% material by weight passing a No. 200 sieve. The new fill shall be placed in layers not exceeding one (1) foot in loose thickness and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D1557). Fill layers shall be compacted, tested, and approved before placing subsequent layers.

The floor slabs may be designed as slabs on grade bearing on densified virgin soil or on new engineer-approved structural fill. Floor slab design parameters are provided in Table 3 below. A layer of 3/4-inch crushed stone is recommended beneath the concrete slab, for additional support and drainage.

The floor slab design parameters are based on the anticipated loading of the floor slab. It is assumed that only light loads, no heavy machinery or equipment will be placed on the floor slab. At the time of writing this report, the loads that will be placed on the floor slab were unknown. If the actual loading is different from what is assumed in this report, the information must be forwarded to our office for review and make additional recommendations, if necessary.

Table 3 – Warehouse Floor Slab Design Parameters

Description	Value
Slab Subgrade Material	New Compacted Fill or Virgin Soil
Modulus of Subgrade Reaction (k)	200 pci
Crushed Stone Cushion Thickness	6 inches

5.4 Building Settlement

Settlement of individual footings, designed in accordance with recommendations presented in this report, is expected to be within tolerable limits for the proposed structure. For footings placed on natural soils or new compacted fill approved by Carlin-Simpson & Associates and constructed in accordance with the requirements outlined in this report, maximum total settlement is expected to be on the order of 1-inch or less. Maximum differential settlement between adjacent columns or load bearing walls is expected to be ½-inch or less.

The above settlement values are based on our engineering experience with similar soil conditions and the anticipated structural loading. These estimated settlements are intended to guide the structural engineer with their design. It is critical that Carlin-Simpson & Associates be retained to observe the foundation bearing surfaces and to confirm the recommended bearing pressures during construction.

5.5 Seismic Design Considerations

From the site-specific test boring data, the Seismic Site Class was determined using the International Building Code – New Jersey Edition and Table 20.3-1 of ASCE 7-16. The site-specific data used to determine the Site Class typically includes soil test borings to determine Standard

Penetration resistances (N-values). Based on estimated average N-values in the upper 100 feet of soil profile, the site can be classified as Site Class D or Stiff Soil Profile.

The new structure should be designed to resist stress produced by lateral forces computed in accordance with Section 1613 of International Building Code – New Jersey Edition (2018). The values in Table 4 can be used for this project.

Table 4 – Seismic Design Values

Description	Value
Mapped Spectral Response Acceleration for Short Periods, [Fig 1613.2 (1)]	S_S=0.253g
Mapped Spectral Response Acceleration at 1-Second Period, [Fig 1613.2 (2)]	S_1=0.055g
Site Coefficient [Table 1613.2.3 (1)]	F_a= 1.597
Site Coefficient [Table 1613.2.3 (2)]	F_v= 2.40
Max Considered Earthquake Spectral Response for Short Periods [Eq 16-36]	S_{MS}=0.404g
Max Considered Earthquake Spectral Response at 1-Second Period [Eq 16-37]	S_{M1}=0.133g
Design Spectral Response Acceleration for Short Periods [Eq 16-38]	S_{DS}=0.27g
Design Spectral Response Acceleration for 1-Second Period [Eq 16-39]	S_{D1}=0.089g

We expect that the proposed building will be a standard occupancy with a Risk Category of II. Based on this assumption, the Seismic Design Category (SDC) B. The Risk Category and SDC should be verified by the project structural engineer. In the event that the structure has a different Risk Category, the SDC should be updated in accordance with Section 1613 of the International Building Code – New Jersey Edition.

6.0 SITE EVALUATION

Our recommendations for the proposed site development including the new utilities, pavement, temporary excavation and bracing, and suitability of the existing site soils for reuse are provided below. A summary of the boring and test pit observations is provided in Table 1 above.

6.1 Stormwater Management System

It is our understanding that new stormwater management systems will be constructed at the site. The stormwater management system will consist of porous pavement areas and a detention basin. The porous pavement invert elevations will vary with the proposed pavement grades, and the detention basin will have a proposed bottom elevation of +102.0.

Based on our field observations, a large portion of the site that is currently classified as HSG "C" and may be reclassified. The site contains soil and rock that have low enough permeability, shallow depth to weathered rock and seasonal high groundwater to reclassify portions of the site to HSG "D".

According to Chapter 12: Soil Testing Criteria of the NJ Stormwater Best Management Practices Manual (March 2021), when the HSG designation of a soil mapping unit is undetermined or inaccurate, field observations and soil testing must be performed and classification of HSG must be in accordance with the NRCS National Engineering Handbook, part 630 – Hydrology (NEH), Chapter 7 Hydrologic Soil Groups, January 2009.

To determine the number of test locations required to reclassify a soil mapping unit are found in Chapter 12 of the NJ Stormwater Best Management Practices Manual and is dependent on the acreage of the soil mapping unit. The summary of existing HSG classification, acreage, and quantity of the required tests to reclassify is summarized in the Table 5 below.

Table 5: Summary of Existing HSG, Acreage, Required Number of Test Locations

Soil Mapping Unit	Existing Hydrologic Soil Group (HSG)	Area of Soil Mapping Unit (acres)	Number of Test Locations Required to Reclassify
BhnB	B	2.13	8
RehA (upper)	C	7.0	14
RehA (lower)	C	2.19	8
RoyB (upper)	C	3.19	8
RoyB (lower)	C	3.53	8

The following is a summary of the regulations that were used to reclassify the site.

1) If Seasonal High Water Table (i.e. mottling or groundwater observations within January to April inclusive) is within 24 inches of the ground surface, the soil must be classified as HSG "D".
2) Depth to water impermeable layer is less than 50 cm or 20 inches, the soil must be classified as HSG "D". A water impermeable layer is defined by having a K_{sat} less than 0.0014 in/h or a component of cemented horizons, bedrock (parathilic or lithic), etc.
3) Lastly, if the K_{sat} is determined to be lower than that indicated on Table 7-1 of the NRCS National Engineering Handbook part 630 – Hydrology (NEH), Chapter 7 Hydrologic Soil Groups, January 2009, the soil may be classified as HSG "D".

The boring, test pit and percolation data shows that the entire RoyB (upper) and RoyA (upper) and portions of RoyB (lower) and RehA (lower) can be reclassified as Hydrologic Soil Group "D". The attached Figure 2 indicates the locations of the boring, test pit and percolation tests with the reclassified Hydrologic Soil Group for the soil mapping units.

The following tables are a summary of boring and test pits with the corresponding regulation that was used to reclassify the soil mapping unit.

Table 6: Test Locations and Regulation used to Reclassify Portions of Site to HSG "D"

Test Pit or Boring Location	Existing Hydrologic Soil Group (HSG)	Regulation used to Reclassify	New Hydrologic Soil Group
B-10	C	2	**D**
B-11	C	2	**D**
B-12	C	2	**D**
B-13	C	2	**D**
B-14	C	2	**D**
B-16	C	2	**D**
B-18	C	2	**D**
B-19	C	2	**D**
TP-2	C	3	**D**

Test Pit or Boring Location	Existing Hydrologic Soil Group (HSG)	Regulation used to Reclassify	New Hydrologic Soil Group
TP-3	C	3	**D**
TP-4	C	3	**D**
TP-5	C	3	**D**
TP-6	C	3	**D**
TP-13	C	3	**D**
TP-14	C	1	**D**
TP-15	C	2	**D**
TP-18	C	2	**D**
TP-19	C	2	**D**
TP-20	C	1	**D**
TP-21	C	3	**D**
TP-22	C	1	**D**
TP-23	C	1, 2	**D**
TP-24	C	1	**D**
TP-25	C	3	**C**
TP-26	C	2	**D**
TP-27	C	2	**D**
TP-29	C	3	**D**
TP-30	C	2	**D**
TP-32	C	2	**D**
TP-33	C	2	**D**
TP-39	C	2	**D**
TP-40	C	2	**D**
TP-41	C	1, 2	**D**
TP-42	C	3	**C**
TP-43	C	2	**D**
TP-46	C	2	**D**
TP-47	C	2	**D**
TP-48	C	2	**D**
TP-49	C	2	**D**

(1) – Depth to Seasonal High Groundwater Table
(2) – Depth to water impermeable layer
(3) – K_{sat} is determined to be lower than that indicated on Table 7-1 of NRCS National Engineering Handbook

Table 7: Test Location and Regulation used to Classify Remainder of Site

Test Pit or Boring Location	Existing Hydrologic Soil Group (HSG)	Regulation used to Reclassify	New Hydrologic Soil Group
TP-8	B	3	**B**
TP-9	B	3	**A**
TP-10	B	3	**B**
TP-11	B	3	**B**
TP-12	C	3	**B**

Test Pit or Boring Location	Existing Hydrologic Soil Group (HSG)	Regulation used to Reclassify	New Hydrologic Soil Group
TP-16	C	3	**B**
TP-17	C	3	**C**
TP-36	B	3	**B**

(1) – Depth to Seasonal High Groundwater Table
(2) – Depth to water impermeable layer
(3) – K_{sat} is determined to be lower than that indicated on Table 7-1 of NRCS National Engineering Handbook

Field percolation tests were performed at select test pit locations in accordance with NJ Stormwater Best Management Practices Manual, Chapter 12 "Soil Testing Criteria" for the proposed systems and reclassification of the Hydrologic Soil Group (HSG). The results of the percolation test results are presented below.

Table 8: Summary of Percolation Test Results

Test Pit No.	Approximate Ground Surface Elevation	Bottom of Test Depth (Elevation)	Percolation Rate (min/in)	Infiltration Rate (in/hr)	HSG
TP-2	+115.0	2'6"	960	0.021	D
TP-3	+114.5	2'6"	960	0.021	D
TP-4	+112.0	2'3"	720	0.027	D
TP-5	+111.5	2'3"	480	0.0416	D
TP-8	+117.0	2'0"	16.7	1.19	B
TP-9	+115.0	3'3"	6	3.3	A
TP-10	+113.0	3'6"	25.5	0.78	B
TP-11	+112.5	2'0"	143	0.84	B
TP-12	+111.5	2'6"	25.0	0.80	B
TP-13	+108.0	2'6"	350	0.057	D
TP-16	+111.5	1'9"	25.2	0.79	B
TP-17	+109.5	2'0"	46.3	0.43	C
TP-21	+104.5	2'0"	420	0.047	D
TP-25	+110.0	1'6"	142	0.141	C
TP-29	+120.5	3'6"	960	0.02	D
TP-36	+118.0	1'6"	30.5	0.66	B
TP-42	+108.0	2'0"	50.1	0.39	C

Should stormwater management areas be planned in other portions of the property, they should be evaluated on a case-by-case basis. The subsurface stormwater management systems must be designed in accordance with the applicable State of New Jersey Department of Environmental Protection (NJDEP) regulations and the NJ Stormwater Best Management Practices (BMP) Manual. Testing requirements are outlined in Chapter 12 of the manual.

6.2 Pavement

We understand that the proposed construction will also include new asphalt paved parking areas and driveways. We expect that cuts up to 4 feet and fills up to 12 feet will be required to achieve the planned subgrade elevations in the new pavement areas.

Test pit TP-7 is located within a proposed pavement area and indicated a high percentage of debris. Material that contains a high percentage of debris is not suitable for support of the pavement and must be completely removed. Densified existing fill, virgin site soils, and new compacted fill may be used to support the pavement.

In the proposed pavement areas, the existing building in the southern most parking lot must be completely demolished and the debris removed from the site. The foundations, walls, and footings may remain in place provided that they are at least thirty (30) inches below final grade and do not interfere with the new utilities. The existing foundations, walls, and footings must also be thirty (30) inches below any utility invert. The existing basement slab may be broken up and left in place or removed. The excavation resulting from the removal of the existing structures shall be backfilled using controlled compacted fill. New fill shall consist of either suitable on-site soil or imported sand and gravel placed in layers not exceeding one (1) foot in loose thickness and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557).

To prepare the new pavement areas, the existing surface materials (i.e. topsoil) must be removed from the planned pavement areas. In the proposed pavement areas, the existing structures and debris resulting from the demolition of these structures must be completely removed from the new pavement area, extending at least five (5) feet beyond the new paving limits, where practical. The excavations resulting from the removal of existing structures shall be backfilled using controlled compacted fill. New fill shall consist of either suitable on-site soil or imported sand and gravel placed in one (1) foot loose layers and compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557).

Areas where existing fill (outside the area surrounding test pit TP-7) is encountered shall be compacted in place. Carlin-Simpson & Associates or a qualified geotechnical engineer must evaluate these areas for the presence of soft or unsuitable material within the existing fill matrix. Portions of this fill may have to be removed and replaced with new compacted fill. Carlin-Simpson & Associates or the qualified geotechnical engineer will determine this during construction.

After all surface materials have been removed, the area can be excavated to the planned subgrade elevation. Where soil is encountered at the subgrade elevation, the subgrade shall be proofrolled with a large vibratory drum roller (i.e. Dynapac 250 or equivalent) to densify the underlying soils. The on-site representative from Carlin-Simpson & Associates or the qualified geotechnical engineer shall witness the proofrolling operation. If any excessive movement is noted during the proofrolling, the soft or unsuitable soil shall be removed and replaced with new compacted fill.

Where new fill is required to achieve final grades, it shall consist of either suitable on-site soil or imported sand and gravel. Imported sand and gravel shall contain less than 20% by weight passing a No. 200 sieve. New fill shall be placed in layers not exceeding one (1) foot in loose thickness and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557). After the planned subgrade has been proofrolled and new compacted fill has been

placed as required, the new pavement subbase may be placed on the existing site soils and new compacted fill.

Asphalt Pavement Section

The new pavement subbase may be placed on engineer-approved densified existing fill, virgin soil, or new compacted fill. A minimum of eight (8) inches of dense graded aggregate (DGA) is recommended for the subbase layer for drainage and additional pavement support. We recommend that the following pavement section be used for the parking lots and driveways. This pavement section is subject to local government approval.

2”	Asphalt Wearing Surface Course	(NJDOT Item I-5)
3”	Asphalt Base Course	(NJDOT Item I-2)
8”	Stone Subbase Course-Dense-Graded Aggregate (DGA)	
	Approved Compacted Subgrade (Minimum CBR = 10)	

6.3 Utilities

New utilities may bear in the densified existing fill, virgin soils, or new compacted fill. The bottom of all trenches shall be excavated clean so a hard bottom is provided for pipe support. If any soft areas or unsuitable existing fill conditions are encountered during the construction operation, these materials must be removed and replaced with new compacted fill. For areas where the existing building foundations, walls, and footings are remaining in place they must be at least thirty (30) inches below the invert of the new utilities.

Trench hammering may be required to install the new utilities in portions of the site where rock is encountered above the planned utility invert elevation. Where rock is encountered in the utility excavations, it must be removed to at least six (6) inches below planned pipe invert. The over-excavated six (6) inches shall then be filled with new sandy fill and compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557) to act as a cushion on the rock.

In the event that the trench bottom becomes soft due to the inflow of surface or trapped water, the soft soil shall be removed and the excavation filled with a minimum of six (6) inches of 3/4-inch clean crushed stone to provide a firm base for support of the pipe. Sump pits and pumps should be adequate to keep the excavations dry.

After the utility is installed, the trench must be backfilled with compacted fill. The fill shall consist of suitable on-site soil or imported sand and gravel. Imported fill shall contain less than 20% by weight passing a No. 200 sieve. Large rock fragments and boulders must not be placed directly against the pipe. Controlled compacted fill shall be placed in one (1) foot loose layers and each layer shall be compacted to at least 92% of its Maximum Modified Dry Density (ASTM D-1557). The backfill must be free of topsoil, debris, and large boulders or rock fragments.

6.4 Temporary Construction Excavations and Excavation Protection

Temporary construction excavations should be conducted in accordance with the most recent OSHA guidelines or applicable federal, state or local codes. A qualified person should evaluate the excavations at the time of construction to determine the appropriate soil type and allowable slope

configuration. Based on the boring and test pit data, we believe the site soils and rock would have the following classifications as defined by the OSHA guidelines.

Soil/Rock Type	Possible Classification	Maximum Slope or Bench
Existing Fill	Type "C"	1½H:1V
Virgin Soil	Type "B" or "C"	1H:1V to 1½H:1V

Temporary support (i.e. trench boxes, sheeting and shoring, etc.) should be used for any excavation that cannot be sloped or benched in accordance with the applicable regulations, where necessary to protect adjacent utilities and structures, or where saturated soils or water seepage is encountered within the excavation.

A New Jersey State licensed professional engineer must design all temporary and permanent support systems. The contractor will select the shoring type and submit design calculations for the proposed shoring method to Carlin-Simpson & Associates for review. The soil adjacent to the temporary support system will exert a horizontal pressure against the system. This pressure is based on the soil unit weight, coefficient of active earth pressure, and depth of the excavation. Support of Excavation design parameters are listed in Table 9 below.

Table 9 – Temporary Sheeting and Shoring Design Parameters

Description	Value
Moist Unit Weight (pcf)	130
Friction Angle (ϕ, deg)	30
Cohesion (c, psf)	0
Active Earth Pressure Coefficient (k_a)	0.33
Equivalent Fluid Pressure (pcf)	42.9
Passive Earth Pressure Coefficient (k_p)	3.0

6.5 Suitability of the In-Situ Soils for Use as Compacted Fill

The suitability of each soil stratum for use as compacted fill is discussed below.

Stratum 1 Topsoil
Topsoil is not suitable for use as compacted fill. During the stripping operation, it may be stockpiled on site for later use in the landscaped areas or removed from the site.

Stratum 2 Existing Fill
The existing fill generally consists of red brown coarse to fine Sand, and (-) Silt, some medium to fine Gravel. At test pit location TP-7 existing fill consisted of dark red brown, black coarse to fine SAND, some Silt, some medium to fine Gravel with a lot of debris including glass and brick. The existing fill that was encountered in TP-7 is not suitable for reuse as compacted fill. The remaining existing fill is suitable for reuse as long as it remains relatively dry for optimum compaction and all debris (if encountered) has been removed prior to its reuse.

Stratum 3 Clayey Silt or Silt

The clayey silt or silt generally consists of Clayey SILT or SILT little (to and), coarse to fine Sand, trace (to little) medium to fine Gravel. Portions of this stratum contain weathered rock fragments. This stratum contains a high clay and silt content. The stratum will be very moisture sensitive and difficult to reuse as compacted fill. Some of the material maybe suitable for use as compacted fill in the building and pavement areas, provided that it remains relatively dry for optimum compaction prior to its use.

Stratum 4 Sand or Silty Sand

The virgin Sandy Clay and Silt consists red brown, brown coarse to fine SAND, trace (to some) Silt, little (to some) medium to fine Gravel or red brown coarse to fine Sand, some (to and) Silt, little (to some) medium to fine Gravel.. This material contains a low to moderate percentage of silt. The moderate silt content material will be moisture sensitive and difficult to reuse as compacted fill. This material is generally suitable for use as compacted fill provided that it does not become too wet prior to being placed.

Stratum 5 and 6 Weathered Shale Bedrock

Excavated rock may be used as fill material provided that the material conforms to the required gradation, is well graded, and has been approved prior to use by Carlin-Simpson & Associates.

All rock fill (including large cobbles and boulders) must be well blended with smaller rock fragments and/or soil. Any excavated rock (and boulders) that are too large for use as structural fill should be processed through a crusher to provide suitable fill material.

The boring and test pit observations indicate that the on-site soils contain a varying percentage of silt (5% to 70.0%). The moderate to high silt content soils, particularly some of the existing fill and virgin clayey silt and silt, will be moisture sensitive. If the soil becomes too wet, it will be difficult to achieve adequate compaction. In addition, the site soils that extend below the groundwater table are completely saturated and therefore, unsuitable for reuse.

Carlin-Simpson & Associates shall evaluate the suitability of the excavated materials for use as compacted fill during the excavation and prior to its reuse. Potentially usable fill should be stockpiled and covered with tarps or plastic sheeting for protection from excess moisture. Any fill material that is wet must be dried prior to its reuse.

Proper moisture conditioning of the soil will be required. New compacted fill should be within 2% (+/-) of its optimum moisture content at the time of placement. In the event that the on-site material is too wet at the time of placement and cannot be adequately compacted, the soil should be aerated and allowed to dry or the material removed and a drier cleaner fill material used. In the event that the on-site material is too dry at the time of placement and cannot be adequately compacted, water may be needed to increase the soil moisture content for proper compaction.

The in-situ soils which exist throughout the site may become soft and weave if exposed to excessive moisture and construction traffic. The instability will occur quickly when exposed to these elements and it will be difficult to stabilize the subgrade. We recommend that adequate site drainage be implemented early in the construction schedule and if the subgrade becomes wet, the contractor should limit construction activity until the soil has dried.

The minimum compaction requirements for the various areas of the site are summarized in Table 10 below.

Table 10 - Minimum Compaction Requirements

Area	Maximum Modified Dry Density (ASTM D-1557)
Building (below foundations)	95%
Building Slab (above foundations)	92%
Pavement Areas	92%
Exterior Slabs and Sidewalks	92%
Utility Trenches	92%
Landscape Areas	90%

7.0 GENERAL

The findings, conclusions and recommendations presented in this report represent our professional opinions concerning subsurface conditions at the site. The opinions presented are relative to the dates of our site work and should not be relied on to represent conditions at later dates or at locations not explored. The opinions included herein are based on information provided to us, the data obtained at specific locations during the study and our past experience. If additional information becomes available that might impact our geotechnical opinions, it will be necessary for Carlin-Simpson & Associates to review the information, reassess the potential concerns, and re-evaluate our conclusions and recommendations.

Regardless of the thoroughness of a geotechnical exploration, there is the possibility that conditions between borings and test pits will differ from those encountered at specific boring or test pit locations, that conditions are not as anticipated by the designers and/or the contractors, or that either natural events or the construction process have altered the subsurface conditions. These variations are an inherent risk associated with subsurface conditions in this region and the approximate methods used to obtain the data. These variations may not be apparent until construction.

The professional opinions presented in this geotechnical report are not final. Field observations and foundation installation monitoring by the geotechnical engineer, as well as soil density testing and other quality assurance functions associated with site earthwork and foundation construction, are an extension of this report. Therefore, Carlin-Simpson & Associates should be retained by the Owner to observe all earthwork and foundation construction, to document that the conditions anticipated in this study actually exist, and to finalize or amend our conclusions and recommendations Carlin-Simpson & Associates is not responsible or liable for the conclusions and recommendations presented in this report if Carlin-Simpson & Associates does not perform the observation and testing services.

Therefore, in order to preserve continuity in this project, the Owner must retain the services of Carlin-Simpson & Associates to provide full time geotechnical related monitoring and testing during construction. At a minimum, this shall include the observation and testing of the following: 1) the removal of existing fill and unsuitable soil, where required; 2) the proofrolling of the subgrade soil prior to the placement of new compacted fill; 3) the placement and compaction of controlled fill;

4) the excavation for the building foundations; and 5) the preparation of the subgrade for the floor slabs and pavement areas.

This report has been prepared in accordance with generally accepted geotechnical engineering practice. No other warranty is expressed or implied. The evaluations and recommendations presented in this report are based on the available project information, as well as on the results of the exploration. Carlin-Simpson & Associates should be given the opportunity to review the final drawings and site plans for this project to determine if changes to the recommendations outlined in this report are needed. Should the nature of the project change, these recommendations should be re-evaluated.

This report is provided for the exclusive use of PS&S and the project specific design team and may not be used or relied upon in connection with other projects or by other third parties. Carlin-Simpson & Associates disclaims liability for any such third party use or reliance without express written permission. Use of this report or the findings, conclusions or recommendations by others will be at the sole risk of the user. Carlin-Simpson & Associates is not responsible or liable for the interpretation by others of the data in this report, nor their conclusions, recommendations or opinions.

If the conditions encountered during construction vary significantly from those stated in this report, this office should be notified immediately so that additional recommendations can be made.

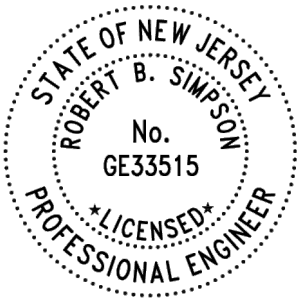
Thank you for allowing us to assist you with this project. Should you have any questions or comments, please contact this office.

Very truly yours,

CARLIN-SIMPSON & ASSOCIATES

MICHAL WROBLEWSKI E.I.T.
Project Manager

ROBERT B. SIMPSON P.E.



File No. 20-127

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-1
Project: Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ		**SHEET NO.:** 1 of 1
Client: PS&S		**JOB NUMBER:** 20-127
Drilling Contractor: Environmental Technical Drilling, Inc.		**ELEVATION:** +113.5

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			**DATUM:** Topo
24/Jan/22	1040	7'0"	HSA	DIA.	3 1/4"	1 3/8"			**START DATE:** 24/Jan/22
				WGHT		140#			**FINISH DATE:** 24/Jan/22
				FALL		30"			**DRILLER:** Mike Kane
									INSPECTOR: MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	3 2			Rec = 12"
			2		**Red Brown topsoil with tilled subsoil**	moist to wet
2			2		2'0"	
			4		Gr, rd br $ s, cf S, l (+) mf G w/weathered shale frag	
3		S-2	8		**Gray, red brown SILT some, coarse to fin** 3'0"	Rec = 12"
			18		**Sand, little (+) medium to fine Gravel,**	moist to wet
4			28		**with weathered shale fragments**	
5						
			6			
6		S-3	29		Gr cf S, s (-) $, a (-) mf G, completely weathered shale	Rec = 8"
			50/5"			moist
7					**Gray coarse to fine Sand, some (-) Silt,**	Very dense slow augering
8					**and (-) medium to fine Gravel, completely weathered shale**	
			7			
9		S-4	12		same, rd br	Rec = 20"
			14			wet
10			15			
			27			
11		S-5	50/4"		same, rd br 11'0"	Rec = 6"
					End of Boring @ 11'0"	wet
12						Auger refusal on completely weathered rock @ 11'0"
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-2
Project: Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ		**SHEET NO.:** 1 of 1
Client: PS&S		**JOB NUMBER:** 20-127
Drilling Contractor: Environmental Technical Drilling, Inc.		**ELEVATION:** +114.5

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			START DATE: 24/Jan/22
24/Jan/22	1215	8'6"	HSA	DIA.	3 1/4"	1 3/8"			FINISH DATE: 24/Jan/22
24/Jan/22	100	8'0"	HSA	WGHT		140#			DRILLER: M Kane
				FALL		30"			INSPECTOR: MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	4 2			Rec = 20"
2			2 4		**Brown topsoil with tilled subsoil** 2'0"	wet
3		S-2	4 7		Rd br $ l (+), cf S, t (+) mf G	Rec = 18"
4			9 15			moist
5					**Red brown SILT little (+), coarse to fine Sand, trace (+) medium to fine Gravel**	
6		S-3	4 7		same, s (+), cf S, l mf G	Rec = 18"
7			11 12			moist
8		S-4	12 13		same	Rec = 18"
9			13 17			moist
10					9'6"	
11		S-5	11 24		Gr cf S, s $, a (-) mf G, completely weathered shale	Rec = 18"
12			32 44			wet
13						
14					**Gray coarse to fine Sand, some Silt, and (-) medium to fine Gravel, completely weathered shale**	
15						
16		S-6	9 26		same, a mf G	Rec = 8"
17			35 41		17'0"	wet Auger refusal on dense weathered shale @ 16'6"
18					**End of Boring @ 17'0"**	
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-3
Project: Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ		**SHEET NO.:** 1 of 1
Client: PS&S		**JOB NUMBER:** 20-127
Drilling Contractor: Environmental Technical Drilling, Inc.		**ELEVATION:** +117.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			START DATE: 24/Jan/22
24/Jan/22	1400	10'6"	HSA	DIA.	3 1/4"	1 3/8"			FINISH DATE: 24/Jan/22
24/Jan/22	1545	10'0"	HSA	WGHT		140#			DRILLER: M Kane
25/Jan/22	800	10'0"	HSA	FALL		30"			INSPECTOR: MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	2 1		**Brown topsoil with tilled subsoil**	Rec = 18" moist to wet
2			2 2			
3		S-2	2 5		2'6" Rd br Cy $ l (+), cf S, t mf G	Rec = 18"
4			6 9			moist
5						
6		S-3	3 4		same, s (+), cf S, t (+) mf G	Rec = 12"
7			6 8		**Red brown Clayey SILT little (+), coarse to fine Sand, trace medium to fine Gravel**	moist
8		S-4	7 10		same	Rec = 0
9			14 16			moist pushing gravel
10					9'6" **Mottled light gray, light brown, red brown coarse to fine SAND, and (+) Silt**	
11		S-5	5 9		Mttld lt gr, lt br, rd br cf S, a (+) $ 11'0"	Rec = 22"
12			15 26		Rd br cf S, s (+) $, s (-) mf G, w/seams of completely weathered shale	moist to wet
13						
14						
15						
16		S-6	6 13		**Red brown coarse to fine Sand, some (+) coarse to fine Silt, some (-) medium to fine Gravel, completely weathered shale**	Rec = 18"
17			15 19		same	wet
18						
19						very dense, slow augering
20						
21		S-7	9 21		same, t (+) mf G	Rec = 14"
22			38 50/3"		**End of Boring @ 22'0"** 22'0"	wet Auger refusal, weathered shale

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-4
Project: Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ		**SHEET NO.:** 1 of 1
Client: PS&S		**JOB NUMBER:** 20-127
Drilling Contractor: Environmental Technical Drilling, Inc.		**ELEVATION:** +114.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			**DATUM:** Topo
25/Jan/22	800	7'6"	HSA	DIA.	3 1/4"	1 3/8"			**START DATE:** 24/Jan/22
				WGHT		140#			**FINISH DATE:** 25/Jan/22
				FALL		30"			**DRILLER:** M Kane
									INSPECTOR: MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	2 1			Rec = 22"
			2		**Brown topsoil with tilled subsoil**	moist to wet
2			4		2'0"	
			5			
3		S-2	7		Rd br Cy $ s, cf S, l (-) mf G	Rec = 22"
			8			moist
4			8		**Red brown Clayey SILT some, coarse to fine Sand, little (-) medium to fine Gravel**	
5						
		S-3A	4		same	Rec = 22"
6			8			moist
			14		6'6"	
7		S-3B	16		Rd br cf S, s (+) $, s (-) mf G, w/weathered rk frg	
			15			
8		S-4	21		same, completely weathered shale	Rec = 8"
			18			moist to wet
9			20			
10						very dense, slow augering to 10'
			15			
11		S-5	29		same, completely weathered shale	Rec = 20"
			34		**Red brown coarse to fine Sand, some (+) Silt, some (-) medium to fine Gravel, completely weathered Shale**	wet
12			50/5"			
13						
14						
15						
			12			
16		S-6	29		same, gr, l mf G	Rec = 12"
			50/5"		16'6"	wet
17					**End of Boring @ 16'6"**	Auger refusal @ 16'6" on completely weathered shale
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-5
Project: Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ		**SHEET NO.:** 1 of 1
Client: PS&S		**JOB NUMBER:** 20-127
Drilling Contractor: Environmental Technical Drilling, Inc.		**ELEVATION:** +112.5

GROUNDWATER					CASING	SAMPLE	CORE	TUBE
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS		
25/Jan/22	950	6'6"	Open	DIA.	3 1/4"	1 3/8"		
25/Jan/22	1550	6'0"	Open	WGHT		140#		
				FALL		30"		

DATUM:	Topo
START DATE:	25/Jan/22
FINISH DATE:	25/Jan/22
DRILLER:	M Kane
INSPECTOR:	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	4 3		**Brown topsoil with tilled subsoil**	Rec = 22"
			4		1'6"	moist
2			5		Rd br cf S, a (+) $, l (-) mf G, w/seams of Cy $	
			5			
3		S-2	9			Rec = 20"
			10			moist
4			12			
5					**Red brown coarse to fine Sand,**	
			3		**and (+) Silt, little (-) medium to fine**	
6		S-3	5		same **Gravel, with seams of Clayey Silt**	Rec = 20"
			6			moist to wet
7			6			
			6			
8		S-4	7		same, $ a (-), cf S, t (-) f G	Rec = 22"
			6			wet
9			7			
10						
			10			
11		S-5	19		same, cf S, a(+) $	Rec = 8"
			16			wet
12			11		12'0"	very dense, slow augering
13						
14					**Red brown completely weathered shale**	
						Auger refusal @ 15'0"
15						
			16			
16		S-6	50/3"		Rd br completely weathered shale 15'9"	Rec = 6"
					End of Boring @ 15'9"	wet
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-6

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**	**SHEET NO.:**	1 of 1
Client:	**PS&S**	**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**	**ELEVATION:**	+112.0
GROUNDWATER		**DATUM:**	Topo
START DATE:	25/Jan/22		
FINISH DATE:	25/Jan/22		
DRILLER:	M Kane		
INSPECTOR:	MW		

DATE	TIME	DEPTH	CASING
25/Jan/22	1130	6'0"	Open
25/Jan/22	1550	6'0"	Open

	CASING	SAMPLE	CORE	TUBE
TYPE	HSA	SS		
DIA.	3 1/4"	1 3/8"		
WGHT		140#		
FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1A	2 1		**Brown topsoil with tilled subsoil**	Rec = 18" moist
			2		1'6"	
2		S-1B	10		Rd br Cy $ s, cf S, t (+) f G	
			5		**Red brown Clayey SILT some, coarse to**	
3			13		**fine Sand, trace (+) fine Gravel** 3'0"	
			19			
4		S-2	29		Rd br cf S, s $, l (+) mf G, completely weathered shale	Rec = 18" moist
5						
			8			
6		S-3	14		same	Rec = 12"
			18			moist
7			22			
			23			
8		S-4	29		same, l (+) $	Rec = 22"
			29		**Red brown coarse to fine Sand,**	moist to wet
9			36		**some Silt, little (+) medium to fine**	very dense, slow augering
10					**Gravel, completely weathered shale**	
			19			
11		S-5	15		same, l $	Rec = 20"
			16			wet
12			20			
13						
14						Auger refusal @ 14'0"
		S-6	50/2"		same 14'2"	Rec = 1"
15					**End of Boring @ 14'2"**	wet
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-7

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**								**SHEET NO.:**	1 of 1
Client:	**PS&S**								**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**								**ELEVATION:**	+114.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	25/Jan/22
25/Jan/22	**1330**	**11'3"**	**Open**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	25/Jan/22
25/Jan/22	**1530**	**8'0"**	**Open**	**WGHT**		**140#**			**DRILLER:**	M Kane
26/Jan/22	**1300**	**7'0"**	**Open**	**FALL**		**30"**			**INSPECTOR:**	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	2 1		**Topsoil with tilled subsoil** 0'10"	Rec = 12"
2			8 14		**Red brown coarse to fine Sand, some (+) Silt, little (-) medium to fine Gravel** 2'6"	moist
3		S-2	9 19		Rd br cf S, s $, l (+) mf G, completely weathered shale	Rec = 20"
4			22 28			moist very dense, slow augering
5						
6		S-3	5 9		same, w/seam of soil	Rec = 22"
7			16 19			moist to wet
8		S-4	13 19		same, rd br, lt gr a (-) $	Rec = 12"
9			21 39		**Red brown coarse to fine Sand, some Silt, little (+) medium to fine Gravel, completely weathered shale**	wet
10						
11		S-5	7 12		same, l (+) $, s (+) mf G	Rec = 12"
12			18 35			wet
13						
14						
15						
16		S-6	17 50/3"		same 16'0"	Rec = 6"
17					**End of Boring @ 16'0"**	wet Auger refusal @ 16'0" on completely weathered rock
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-8

Project:	Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ	**SHEET NO.:**	1 of 1
Client:	PS&S	**JOB NUMBER:**	20-127
Drilling Contractor:	Environmental Technical Drilling, Inc.	**ELEVATION:**	+112.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			DATUM:	Topo
No Groundwater Reading				DIA.	3 1/4"	1 3/8"			START DATE:	25/Jan/22
				WGHT		140#			FINISH DATE:	25/Jan/22
				FALL		30"			DRILLER:	M Kane
									INSPECTOR:	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			1			
1		S-1	1		**Brown topsoil with tilled subsoil**	Rec = 18"
			2			moist
2			3		2'0"	
			5		Rd br cf S, s (+) $, l (+) mf G	
3		S-2	10		**Red brown coarse to fine Sand,**	Rec = 18"
			14		**some (+) Silt, little (+) medium to fine**	moist
4			15		**Gravel**	
					4'6"	
5						
			8			
6		S-3	20		Rd br cf S, s (-) $, s (-) mf G, completely weathered	Rec = 20"
			29		shale	moist to wet
7			47		**Red brown coarse to fine Sand,**	very dense, slow augering
					some (-) Silt, some (-) medium to fine	Auger refusal @ 8'0"
8					**Gravel, completely weathered shale**	
			25			
9		S-4	50/1"		same 8'9"	Rec = 4"
					End of Boring @ 8'9"	moist
10						Auger refusal 8'9" on harder
						weathered shale
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-9

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**	**SHEET NO.:**	1 of 1
Client:	**PS&S**	**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**	**ELEVATION:**	+108.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			DATUM:	Topo
26/Jan/22	800	8'3"	Open	DIA.	3 1/4"	1 3/8"			START DATE:	25/Jan/22
31/Mar/22		4'0"	Test Pit	WGHT		140#			FINISH DATE:	26/Jan/22
				FALL		30"			DRILLER:	M Kane
									INSPECTOR:	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	2 1 3		**Brown topsoil with tilled subsoil** 1'6"	Rec = 27" moist
2			4		Rd br cf S, a (-) $, s (+) mf G, with many weath Sh frag	
3		S-2	5 8 7		**Red brown coarse to fine Sand, and (-) Silt some (+) coarse to fine Gravel with many weathered Shale fragments** 3'3"	Rec = 18" moist
4			16			
5					**Red brown completely weathered Shale** 4'3"	
6		S-3	8 16		Rd br, high weath Sh, high fracture	Rec = 20"
7			27 44		**Red brown highly weathered Shale, highly fractured**	wet very slow augering
8						auger refusal 8'0"
9		S-4	35 50/2"		same 9'6"	Rec = 4" wet
10					**End of Boring @ 9'6"**	Auger refusal 9'6" on harder shale
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-10

Project:	Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ	**SHEET NO.:**	1 of 1
Client:	PS&S	**JOB NUMBER:**	20-127
Drilling Contractor:	Environmental Technical Drilling, Inc.	**ELEVATION:**	+106.5
		DATUM:	Topo
		START DATE:	26/Jan/22
		FINISH DATE:	26/Jan/22
		DRILLER:	M Kane
		INSPECTOR:	MW

GROUNDWATER								
DATE	TIME	DEPTH	CASING	TYPE	CASING	SAMPLE	CORE	TUBE
No Groundwater Reading				DIA.	3 1/4"	1 3/8"		
				WGHT		140#		
				FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION		REMARKS
			4				
1		S-1	4		**Brown topsoil with tilled subsoil**	1'3"	Rec = 16"
			2		**Gray SILT some, coarse to fine Sand**		moist
2			12		**trace (+) medium to fine Gravel**	1'6"	
			6		Rd br, comp weathered Sh		
3		S-2	14		**Red brown completely weathered Shale**	2'9"	Rec = 20"
			17		Rd br, mod weathered Sh, high frac		moist
4			22				
5							
			7		Rd, br, same		
6		S-3	11				Rec = 20"
			16		**Red brown moderately weathered Shale,**		moist
7			17		**highly fractured**		
			13				
8		S-4	22				Rec = 18"
			32		Rd br, same		wet
9			50/3"				very dense, slow augering
10							
			36				
11		S-5	50/3"		Rd br, same	10'9"	Rec = 4"
					End of Boring @ 10'9"		wet
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-11

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**								**SHEET NO.:**	1 of 1
Client:	**PS&S**								**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**								**ELEVATION:**	+108.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	26/Jan/22
No Groundwater Encountered				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	26/Jan/22
				WGHT		**140#**			**DRILLER:**	M Kane
				FALL		**30"**			**INSPECTOR:**	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION		REMARKS
			2				
1		S-1	2		**Brown topsoil with tilled subsoil**	1'0"	Rec = 20"
			3		**Red brown SILT some (+), coarse to**	1'6"	moist
2			15		**fine Sand, little medium to fine Gravel**		
			8		Rd br, comp weathered Sh		
3		S-2	25		**Red brown completely weathered Shale**	3'3"	Rec = 22"
			36		Rd br, high to mod weathered Sh, high fracture		moist
4			50/5"				
					Red brown highly to moderately weathered		
5					**Shale, highly fractured**		
			23				
6		S-3	50/3"		same		Rec = 8"
							moist
7						7'0"	Auger refusal @ 7'0" on
					End of Boring @ 7'0"		harder weathered shale
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-12
Project: Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ		**SHEET NO.:** 1 of 1
Client: PS&S		**JOB NUMBER:** 20-127
Drilling Contractor: Environmental Technical Drilling, Inc.		**ELEVATION:** +110.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			**DATUM:** Topo
No Groundwater Encountered				DIA.	3 1/4"	1 3/8"			**START DATE:** 26/Jan/22
				WGHT		140#			**FINISH DATE:** 26/Jan/22
				FALL		30"			**DRILLER:** M Kane
									INSPECTOR: MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	2 1 2		**Brown topsoil with tilled subsoil** 1'3"	Rec = 20" moist
2			4		**Red brown coarse to fine Sand, and Silt little medium to fine Gravel with weathered**	
3		S-2	4 11		**Shale fragments** 2'9"	Rec = 18"
4			33 50/5"		**Red brown completely weathered Shale** 4'0"	moist
5					Rd br, highly to moderately weathered Sh, highly fractured	
6		S-3	19 42		same **Red brown highly to moderately weathered Shale, highly fractured**	Rec - 12" moist
7			50/2"		7'0"	Auger refusal @ 7'0" on harder weathered shale
8					**End of Boring @ 7'0"**	
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-13

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**								**SHEET NO.:**	1 of 1
Client:	**PS&S**								**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**								**ELEVATION:**	+109.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	26/Jan/22
No Groundwater Encountered in boring				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	26/Jan/22
31/Mar/22		**4'9"**	**Test Pit**	**WGHT**		**140#**			**DRILLER:**	M Kane
				FALL		**30"**			**INSPECTOR:**	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	2 2		**Brown topsoil with tilled subsoil**	Rec = 18" moist
2			2 2			
3		S-2	WOH 4		2'3" Rd br, comp weathered Shale, w/ prt of soil	Rec = 18" moist
4			8 11		**Red brown completely to highly weathered Shale with partings of soil**	
5						
6		S-3	7 20		Rd br, same, no prt	Rec = 18" moist
7			35 35			
8		S-4	50 25/1"		7'6" same, highly weathered **End of Boring @ 7'6"**	Rec = 4" moist Auger refusal @ 7'6" on harder weathered shale
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-14

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**								**SHEET NO.:**	1 of 1	
Client:	**PS&S**								**JOB NUMBER:**	20-127	
Drilling Contractor:	**Environmental Technical Drilling, Inc.**								**ELEVATION:**	+109.5	
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo	
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	26/Jan/22	
No Groundwater Encountered in boring				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	26/Jan/22	
31/Mar/22		**5'6"**	**Test Pit**	**WGHT**		**140#**			**DRILLER:**	M Kane	
				FALL		**30"**			**INSPECTOR:**	MW	

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			2			
1		S-1	2		**Brown topsoil with tilled subsoil**	Rec = 18"
			4		1'6"	moist
2			4		Rd br, comp weath Sh, w/ prt of soil	
			4			
3		S-2	18		**Red brown completely weathered Shale**	Rec = 18"
			20		**with partings of soil**	moist
4			20			
5					4'9"	
			9		Rd br, mod weathered Sh, high fracture	
6		S-3	26		**Red brown moderately weathered Shale**	Rec = 18"
			37		**highly fractured**	moist-wet
7			50/4"		7'0"	Auger refusal @ 7'0"
					End of Boring @ 7'0"	on weathered shale
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-15

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**	**SHEET NO.:**	1 of 1
Client:	**PS&S**	**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**	**ELEVATION:**	+112.0
		DATUM:	Topo
		START DATE:	26/Jan/22
		FINISH DATE:	26/Jan/22
		DRILLER:	M Kane
		INSPECTOR:	MW

GROUNDWATER					CASING	SAMPLE	CORE	TUBE
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS		
26/Jan/22	1445	9'0"	HSA	DIA.	3 1/4"	1 3/8"		
				WGHT		140#		
				FALL		30"		

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	3 2		**Brown topsoil with tilled subsoil**	Rec = 20"
			3		1'6"	moist
2			2		**Red brown coarse to fine Sand, and Silt** 2'0"	
			7		**some medium to fine Gravel**	
3		S-2	17		Rd br, comp weathered Sh, w/ prt of soil	Rec = 18"
			26			moist
4			36			
5						
			9		Rd br, same	
6		S-3	21		**Red brown completely to highly weathered**	Rec = 20"
			18		**Shale with parting of soil**	moist to wet
7			24			
			8		Rd br, same, highly weathed	
8		S-4	19			Rec = 20"
			32			wet
9			50/4"			
10						
		S-5	50/5"		Rd br, same 10'5"	
11					**End of Boring @ 10'5"**	Auger refusal @ 10'0"
						on weathered shale
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-16

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**	**SHEET NO.:**	1 of 1
Client:	**PS&S**	**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**	**ELEVATION:**	+115.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			DATUM:	Topo
No Groundwater Encountered				DIA.	3 1/4"	1 3/8"			START DATE:	27/Jan/22
				WGHT		140#			FINISH DATE:	27/Jan/22
				FALL		30"			DRILLER:	M Kane
									INSPECTOR:	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			4			
1		S-1	5		**Brown topsoil with tilled subsoil**	Rec = 3"
			10		1'3"	moist
2			18		Rd br, comp weathered Shale	gravel in tip
			13		**Red brown completely weathered Shale**	
3		S-2	21		same 3'0"	Rec = 18"
			24		Rd br, mod weath Sh, high fracture	moist
4			31			
					Red brown moderately weathered Shale,	
5					**highly fractured**	
			15			
6		S-3	27		Rd br, same	Rec = 22"
			23			moist
7			26			
			18			
8		S-4	38		same	Rec = 18"
			49			moist
9			50/5"		9'0"	Auger refusal @ 9'0"
					End of Boring @ 9'0"	on completely weathered
10						shale
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-17

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**								**SHEET NO.:**	1 of 1
Client:	**PS&S**								**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**								**ELEVATION:**	+119.5
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	27/Jan/22
27/Jan/22	**1045**	**11'0"**	**HSA**	**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	27/Jan/22
				WGHT		**140#**			**DRILLER:**	M Kane
				FALL		**30"**			**INSPECTOR:**	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			5			
1			4		**Brown topsoil with tilled subsoil** 1'0"	
		S-1	5		Gr $ s (+), cf S, l (+) mf G	Rec = 18"
2			6			moist
			4			
3		**S-2**	6		same, Gr, dk br	Rec = 18"
			10		**Gray SILT some (+), coarse to fine Sand,**	moist
4			14		**little (+) medium to fine Gravel**	
5					5'0"	
			7			
6		**S-3**	10		Dk gr cf S, s (+) $, a (-) mf G, weathered shale	Rec = 18"
			13			moist
7			23			
			14			
8		**S-4**	20		same, s mf G	Rec = 20"
			25			moist
9			27		**Dark gray coarse to fine Sand,**	
					some (+) Silt, and (-) medium to fine	
10					**Gravel, weathered Shale**	
			10			
11		**S-5**	11		same, rd br weathered shale, w/seams of soil	Rec = 20"
			14			moist to wet
12			20			
13						Auger refusal @ 13'0"
			38			
14		**S-6**	44		same, rd br, completely to highly weathered shale	Rec = 18"
			47			wet
15			50/3"		14'9"	
					End of Boring @ 14'9"	
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-18

Project:	**Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ**								**SHEET NO.:**	1 of 1
Client:	**PS&S**								**JOB NUMBER:**	20-127
Drilling Contractor:	**Environmental Technical Drilling, Inc.**								**ELEVATION:**	+111.0
GROUNDWATER					**CASING**	**SAMPLE**	**CORE**	**TUBE**	**DATUM:**	Topo
DATE	**TIME**	**DEPTH**	**CASING**	**TYPE**	**HSA**	**SS**			**START DATE:**	27/Jan/22
No Groundwater Encountered in Boring				**DIA.**	**3 1/4"**	**1 3/8"**			**FINISH DATE:**	27/Jan/22
31/Mar/22		**3'9"**	**Test Pit**	**WGHT**		**140#**			**DRILLER:**	M Kane
				FALL		**30"**			**INSPECTOR:**	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION		REMARKS
			4				
1		S-1	2		**Brown topsoil with tilled subsoil**	1'0"	Rec = 12"
			9		**Red brown coarse to fine Sand, and (-)**	1'6"	moist
2			19		**Silt, little medium to fine Gravel**		
			10		**with weathered Shale fragments**		
3		S-2	19		**Red brown completely weathered Shale**	3'0"	Rec = 22"
			29		Rd br, highly to moderately weathered Shale, highly		moist-wet
4			40		fractured		spoon walking
5							
			7				
6		S-3	20		same, dk gr		Rec = 22"
			20		**Red brown, dark gray highly to moderately**		moist
7			27		**weathered Shale, highly fractured**		
			32				
8		S-4	36		same, dk gr, weathered shale		Rec = 20"
			38				moist
9			42				very dense, very slow
							augering
10							
			9				
11		S-5	18		same, dk gr weathered shale		Rec = 18"
			25				moist
12			50/2"			11'8"	spoon refusal @ 11'8"
					End of Boring @ 11'8"		
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-19

Project:	Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ	**SHEET NO.:**	1 of 1
Client:	PS&S	**JOB NUMBER:**	20-127
Drilling Contractor:	Environmental Technical Drilling, Inc.	**ELEVATION:**	+113.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			DATUM:	Topo
27/Jan/22	1330	7'6"	HSA	DIA.	3 1/4"	1 3/8"			START DATE:	27/Jan/22
				WGHT		140#			FINISH DATE:	27/Jan/22
				FALL		30"			DRILLER:	M Kane
									INSPECTOR:	MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
			2			
1		S-1	1		**Brown topsoil with tilled subsoil**	Rec = 18"
			1		1'3"	moist
2			7		**Brown Clayey SILT some (-), coarse** 1'8"	
			7		**to fine Sand, little medium to fine Gravel**	
3		S-2	10		2'9"	Rec = 18"
			11		**Red Brown completely weathered Shale**	moist
4			15		**with many soil partings**	Trapped/Perched water at 4'0"
5					Rd br cf S, s (-) $, s mf G, completely weathered shale	
			7			
6		S-3	18		**Red brown completely to highly weathered**	Rec = 22"
			22		**Shale, highly fractured.**	moist
7			50/3"		same	
						Auger refusal @ 8'0" on harder weathered shale
8						
		S-4	50/4"		same 8'4"	Rec = 3"
9					**End of Boring @ 8'4"**	spoon wet
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

CARLIN-SIMPSON & ASSOCIATES Sayreville, NJ	TEST BORING LOG	BORING NUMBER B-20
Project: Proposed Stormwater Study, Block 88.02 Lot 13.02, Lot 19 Franklin, NJ		**SHEET NO.:** 1 of 1
Client: PS&S		**JOB NUMBER:** 20-127
Drilling Contractor: Environmental Technical Drilling, Inc.		**ELEVATION:** +114.0

GROUNDWATER					CASING	SAMPLE	CORE	TUBE	DATUM: Topo
DATE	TIME	DEPTH	CASING	TYPE	HSA	SS			START DATE: 27/Jan/22
No Groundwater Encountered				DIA.	3 1/4"	1 3/8"			FINISH DATE: 27/Jan/22
				WGHT		140#			DRILLER: M Kane
				FALL		30"			INSPECTOR: MW

Depth (ft.)	Casing Blows per Foot	Sample Number	Blows on Sample Spoon per 6"	Sym	IDENTIFICATION	REMARKS
1		S-1	2 1		**Brown topsoil with tilled subsoil**	Rec = 20"
2			2 5		1'9"	moist
3		S-2	4 7		Rd br $ l (-), cf S, t (-) f G	Rec = 18"
4			13 18		**Red brown SILT little (-), coarse to fine Sand, trace (-) fine Gravel**	moist
5					4'6"	
6		S-3	7 14		Rd br cf S, s (+) $, s (-) mf G	Rec = 18"
7			17 20		**Red brown coarse to fine Sand, some (+) Silt, some (-) medium to fine Gravel, completely weathered Shale**	moist to wet
8		S-4	15 29		same, completely weathered shale	Rec = 12"
9			50/3"		9'0"	moist to wet Auger refusal @ 9'0" on completely weathered shale
10					**End of Boring @ 9'0"**	
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

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TP-1 (Elev. +113.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 2'6"	Red brown coarse to fine Sand, and (+) Silt, some (-) medium to fine Gravel, with weathered Shale fragments	medium dense, moist
2'6" - 4'0"	Red brown completely to highly weathered Shale	rippable
	Groundwater Encountered @ 3'3" (very slow inflow) Bucket refusal @ 4'0" on highly weathered Shale	

TP-2 (Elev. +115.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 4'6"	Red brown SILT some, coarse to fine Sand, trace (+) fine Gravel	medium stiff, moist
4'6" - 5'6"	Red brown coarse to fine Sand, some (+) Silt, some (+) medium to fine Gravel, with weathered Shale fragments	very dense, moist
5'6' - 6'0"	Red brown completely to highly weathered Shale	rippable, moist
	No Groundwater Encountered	

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TP-3 (Elev. +114.5)

0'0" - 1'6"	Topsoil with tilled subsoil	
1'6" - 5'6'	Red brown SILT some (+), coarse to fine Sand, trace medium to fine Gravel	medium stiff, moist
5'6" - 6'6"	Red brown completely weathered Shale, with partings of soil	rippable, moist
	No Groundwater Encountered	

TP-4 (Elev. +112.0)

0'0" - 1'6"	Topsoil with tilled subsoil	
1'6" - 6'0"	Red brown SILT and (+), coarse to fine Sand, little (-) medium to fine Gravel	medium stiff, moist
6'0" - 6'9"	Red brown completely weathered Shale	rippable, moist
	No Groundwater Encountered	

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TP-5 (Elev. 111.5)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 5'6"	Red brown coarse to fine Sand, some (+) Silt, some (+) coarse to fine Gravel, with many weathered Shale fragments	medium dense, moist
5'6" - 6'3"	Red brown completely weathered Shale	rippable, moist
	Bucket refusal @ 6'3" on weathered Shale No Groundwater Encountered	

TP-6 (Elev. +109.0)

0'0" - 1'4"	Topsoil with tilled subsoil	
1'4" - 3'0"	Red brown completely weathered Shale, with many soil seams	very dense, moist
3'0" - 5'6"	Red brown highly weathered Shale	rippable, moist
	No Groundwater Encountered	

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TP-7 (Elev. +119.0)

0’0” - 0’8”	Topsoil	
0’8” - 4’0”	FILL (Dark red brown, black coarse to fine SAND, some (-) Silt, some (-) medium to fine Gravel, with a lot of debris, glass, brick)	loose, moist
4’0” - 5’0”	Red brown coarse to fine SAND, trace Silt, little medium to fine Gravel	medium dense, moist
5’0” - 7’3”	Red brown coarse to fine Sand, and Silt, and coarse to fine Gravel, with weathered rock fragments	dense, moist
7’3” - 9’0”	Red brown completely weathered Shale with seams of Silt	rippable, moist
	No Groundwater Encountered	

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TP-8 (Elev. +117.0)

0’0” - 0’4”	Topsoil	
0’4” - 1’0”	FILL (Dark brown, gray coarse to fine SAND, little (+) Silt, some (-) medium to fine Gravel)	loose, moist
1’0” - 4’0”	Red brown coarse to fine SAND, some Silt, some (-) medium to fine Gravel	medium dense, moist
4’0” - 6’6”	Red brown coarse to fine SAND, trace Silt, little medium to fine Gravel	medium dense, moist to wet
6’6” - 8’0”	Red brown SILT and (-), coarse to fine Sand, little coarse to fine Gravel, with weathered Shale fragments	medium stiff
8’0” - 8’9”	Red brown completely weathered Shale	dense, moist
	No Groundwater Encountered	

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TP-9 (Elev. +115.0)

0'0" - 1'0"	Topsoil	
1'0" - 2'6"	Red brown, brown coarse to fine SAND, trace Silt, little medium to fine Gravel	loose, moist
2'6" - 5'0"	Brown SILT some (+), coarse to fine Sand, trace (+) medium to fine Gravel, with seams of coarse to fine Sand, some Silt	medium stiff, moist
5'0" - 7'0"	Red brown Clayey SILT some (-), coarse to fine Sand, trace (-) fine Gravel	medium stiff, moist
7'0" - 8'9"	Red brown completely weathered Shale	rippable, moist
	No Groundwater Encountered	

TP-10 (Elev. +113.0)

0'0" - 2'6"	Topsoil	
2'6" - 6'9"	Red brown, brown coarse to fine Sand, and Silt, little (-) medium to fine Gravel	medium dense, moist
6'9" - 8'9"	Red brown completely weathered Shale with seams of Silt	rippable, moist to wet
	Groundwater Encountered @ 7'6"	

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TP-11 (Elev. +112.5)

0'0" - 0'3"	Topsoil	
0'3" - 3'9"	Red brown Clayey SILT some (-), coarse to fine Sand, trace (-) fine Gravel	stiff, moist
3'9" - 6'3"	Red brown coarse to fine SAND, and (+) Silt, some (-) coarse to fine Gravel, with weathered Shale fragments	dense, moist
6'3" - 9'0"	Red brown completely weathered Shale	rippable, moist
	Groundwater Encountered @ 7'9"	

TP-12 (Elev. +111.5)

0'0" - 1'6"	Topsoil with tilled subsoil	
1'6" - 4'6"	Red brown Clayey SILT little, coarse to fine Sand, trace (-) fine Gravel	medium stiff, moist
4'6" - 5'3"	Red brown SILT and (+), coarse to fine Sand, little (+) coarse to fine Gravel	medium stiff, moist
5'3" - 7'0"	Red brown Shale highly to completely weathered	rippable, moist
7'0"	Red brown Shale	unrippable
	Groundwater Encountered @ 6'3" Bucket Refusal @ 7'0" on Harder Shale	

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TP-13 (Elev. +108.0)

0'0" - 1'3"	Topsoil	
1'3" - 6'0"	Red brown SILT and (+), coarse to fine Sand, trace (+) medium to fine Gravel	stiff, moist-wet
6'0" - 8'0"	Red brown completely weathered Shale, with partings of soil	rippable, wet
	Groundwater Encountered @ 4'3"	

TP-14 (Elev. +107.0)

0'0" - 1'6"	Topsoil with tilled subsoil	
1'6" - 2'3"	Mottled light gray, red brown, orange brown coarse to fine Sand, and Silt, little medium to fine Gravel	dense, moist
2'3" - 6'0"	Red brown highly weathered Shale, highly fractured	rippable, moist to wet
	Groundwater Encountered @ 3'9" Seasonal High Groundwater @ 1'6"	

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TP-15 (Elev. +109.5)

0'0" - 1'6"	Topsoil with tilled subsoil	
1'6" - 6'3"	Gray completely weathered Shale with seams of soil	rippable, moist to wet
6'3" - 8'9"	Red brown highly weathered Shale, highly fractured	rippable, wet
	Groundwater Encountered @ 5'6"	

TP-16 (Elev. +111.5)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 2'3"	Red brown SILT some (+), coarse to fine Sand, trace medium to fine Gravel	medium stiff, moist
2'3" - 3'9"	Red brown coarse to fine SAND, little (+) Silt, some medium to fine Gravel	medium dense, moist
3'9" - 6'6"	Red brown coarse to fine Sand, and Silt, some coarse to fine Gravel, with weathered rock fragments	dense, moist
6'6" - 7'6"	Red brown completely weathered Shale	rippable
	Groundwater Encountered @ 6'6"	

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TP-17 (Elev. +109.5)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 2'9"	Red brown coarse to fine Sand, some (-) Silt, some (+) medium to fine Gravel	medium dense, moist
2'9" - 6'9"	Red brown coarse to fine Sand, and Silt, and (-) medium to fine Gravel, with weathered Shale fragments	dense, moist
6'9" - 8'0"	Red brown completely to highly weathered Shale, highly Fractured	rippable, wet
	Groundwater Encountered @ 5'0"	

TP-18 (Elev. +106.5)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 3'6"	Red brown completely weathered Shale with seams of soil	rippable, moist
3'6" - 6'0"	Red brown highly weathered Shale, highly fractured	rippable, moist to wet
6'0"	Red brown Shale	unrippable, wet
	Groundwater Encountered @ 3'0" Bucket refusal @ 6'0" on Harder Shale	

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TP-19 (Elev. +102.5)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 3'9"	Red brown highly weathered Shale, highly fractured	rippable, moist
3'9"	Red brown Shale	unrippable, moist
	Bucket Refusal @ 3'9" on Harder Shale Groundwater Encountered @ 3'0" (very slow inflow)	

TP-20 (Elev. +102.5)

0'0" - 0'10"	Topsoil with tilled subsoil	
0'10" - 1'3"	Mottled light gray, orange brown, red brown SILT some (-), medium to fine Sand	medium stiff, moist
1'3" - 3'0"	Red brown coarse to fine Sand, and (+) Silt, and coarse to fine Gravel, with many weathered Shale fragments	dense, moist to wet
3'0" - 5'6"	Red brown highly to completely weathered Shale	rippable, wet
	Groundwater Encountered @ 1'6" (slow inflow) Seasonal High Groundwater @ 1'3"	

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TP-21 (Elev. +104.5)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 3'9"	Red brown coarse to fine Sand, and (+) Silt, little (+) medium to fine Gravel, with weathered Shale fragments	medium dense, moist to wet
3'9" - 5'6"	Red brown highly weathered Shale, highly fractured	rippable, moist to wet
	Groundwater Encountered @ 3'6"	

TP-22 (Elev. +103.0)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 3'3"	Mottled light gray, orange brown, red brown, Clayey SILT some (-), coarse to fine Sand	medium stiff, moist
3'3" - 4'9"	Red brown SILT and, coarse to fine Sand, trace fine Gravel	stiff, moist
4'9" - 5'9"	Red brown completely to highly weathered Shale	rippable, moist
	Groundwater Encountered @ 3'0" (very slow inflow) Seasonal High Groundwater @ 1'0"	

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TP-23 (Elev. +104.5)

0'0" - 0'10"	Topsoil with tilled subsoil	
0'10" - 1'3"	Mottled light gray, orange brown, red brown Clayey SILT some, coarse to fine Sand, trace (-) fine Gravel	medium stiff, moist
1'3" - 4'3"	Red brown slightly weathered Shale, highly fractured	rippable, moist to wet
	Groundwater Encountered @ 2'9" (very slow inflow) Seasonal High Groundwater @ 1'3"	

TP-24 (Elev. +106.0)

0'0" - 0'8"	Topsoil	
0'8" - 1'3"	Mottled light gray, orange brown SILT some (+), coarse to fine Sand	medium stiff, moist
1'3" - 2'0"	Red brown SILT some, coarse to fine Sand, little medium to fine Gravel	medium stiff, moist
2'0" - 4'9"	Red brown Shale, moderately weathered, fractured	rippable
	Groundwater Encountered @ 2'9" (slow inflow) Seasonal High Groundwater @ 0'8"	

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TP-25 (Elev. +110.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 2'3"	Red brown coarse to fine Sand and (+) Silt, trace (+) medium to fine Gravel	medium dense, moist
2'3" - 3'3"	Red brown coarse to fine Sand, some Silt, and coarse to fine Gravel, with many weathered rock fragments	dense, moist
3'3" - 7'0"	Red brown highly weathered Shale, highly fractured	rippable, moist-wet
	Groundwater Encountered @ 5'3" slow inflow	

TP-26 (Elev. 111.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 5'0"	Red brown moderately weathered Shale, highly fractured	rippable, moist
	Groundwater Encountered @ 3'9"	

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TP-27 (Elev. +110.5)

0'0" - 1'6"	Topsoil with tilled subsoil	
1'6" - 2'3"	Red brown completely weathered Shale	rippable, moist
2'3" - 5'0"	Red brown moderately weathered Shale, highly fractured	rippable, moist-wet
	Groundwater Encountered @ 3'3" (slow inflow)	

TP-28 (Elev. +114.0)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 2'0"	Red brown SILT some (+), coarse to fine Sand, trace (+) fine Gravel	medium stiff, moist
2'0" - 4'6"	Red brown moderately weathered, highly fractured	rippable, moist
	Bucket Refusal @ 4'6" on Harder Shale No Groundwater Encountered	

TP-29 (Elev. +120.5)

0'0" - 0'8"	Topsoil	
0'8" - 2'6"	FILL (Dark gray, coarse to fine SAND, some Silt, little medium to fine Gravel, with trace debris)	loose, moist
2'6" - 6'0"	Light gray SILT little (+), coarse to fine Sand	medium stiff, moist
6'0" - 8'6"	Red brown moderately weathered Shale, highly fractured	rippable, moist
	No Groundwater Encountered	

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TP-30 (Elev. +122.0)

0'0" - 0'4"	Topsoil	
0'4" - 3'0"	FILL (Red brown Clayey SILT some (+), coarse to fine Sand, little (-) medium to fine Gravel)	loose, moist
3'0" - 3'9"	Red brown Clayey SILT some (+), coarse to fine Sand	medium stiff, moist
3'9" - 8'0"	Red brown completely weathered Shale	rippable, moist
	Perched/trapped water @ 3'0" No Groundwater Encountered	

TP-31 (Elev. +111.0)

0'0" - 1'0"	Topsoil	
1'0" - 2'0"	Red brown SILT some (+), coarse to fine Sand, little (-) medium to fine Gravel	medium stiff, moist
2'0" - 5'6"	Red brown moderately weathered Shale, highly fractured	rippable, moist
	Groundwater Encountered @ 4'3" (slow inflow)	

TP-32 (Elev. +110.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 1'8"	Light gray coarse to fine Sand, and (+) Silt, little (+) medium to fine Gravel	medium dense, moist
1'8" - 6'0"	Red brown completely weathered Shale	rippable, moist

Groundwater Encountered @ 5'0" (slow inflow)

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TP-33 (Elev. +107.0)

0'0" - 1'0"	Topsoil	
1'0" - 2'3"	Red brown completely weathered Shale	rippable, moist
2'3" - 4'0"	Red brown slightly weathered Shale, highly fractured	rippable, moist
	Perched groundwater encountered @ 2'0" No Groundwater Encountered	

TP-34 (Elev. +105.5)

0'0" - 0'10"	Topsoil	
0'10" - 1'9"	Brown Clayey SILT some (-), coarse to fine Sand	medium stiff, moist
1'9" - 4'0"	Red brown coarse to fine SAND, little (+) Silt, little (+) medium to fine Gravel	medium dense, moist to wet
4'0" - 5'0"	Red brown completely weathered Shale	rippable, wet
	Groundwater Encountered @ 2'0"	

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Geotechnical & Environmental

Proposed Warehouses
Block 88.02, Lot 13.02 & 19
Franklin, NJ
20-127

25 March 2022

TP-35 (Elev. +116.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 4'3"	Brown coarse to fine SAND, little (+) Silt, little (+) medium to fine Gravel	medium dense, moist
4'3" - 5'3"	Yellow brown coarse to fine Sand, and Silt, some (-) medium to fine Gravel, with weathered rock fragments	medium dense, moist
5'3" - 9'0"	Red brown coarse to fine Sand, some Silt, some (+) coarse to fine Gravel, with layers of weathered Shale	dense, moist
	No Groundwater Encountered	

TP-36 (Elev. +118.0)

0'0" - 0'8"	Topsoil	
0'8" - 2'0"	Red brown Clayey SILT some (+), coarse to fine Sand	medium stiff, moist
2'0" - 2'9"	Red brown coarse to fine Sand, and (+) Silt, little (-) medium to fine Gravel	medium dense, moist
2'9" - 5'6"	Red brown coarse to fine SAND, some Silt, little medium to fine Gravel	medium dense, moist
5'6" - 7'9"	Mottled light gray, yellow brown, orange brown SILT some, coarse to fine Sand, trace (-) fine Gravel	medium stiff, moist
	No Groundwater Encountered	

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TP-37 (Elev. +146.0)

0'0" - 0'1"	Surface vegetation	
0'1" - 9'0"	FILL (Red brown SILT some, coarse to fine Sand, little (+) medium to fine Gravel, with concrete, boulder)	loose, moist-wet very wet 5'-9'
	Test Pit for existing onsite stockpile	

TP-38 (Elev. +135.0)

0'0" - 0'1"	Surface vegetation	
0'1" - 9'0"	FILL (Red brown coarse to fine Sand, and (-) Silt, some medium to fine Gravel, with one concrete boulder and couple pieces of plastic)	loose, moist-wet
	Test Pit for existing onsite stockpile	

TP-39 (Elev. +108.5)

0'0" - 1'6"	Topsoil with tilled subsoil	
1'6" - 2'0"	Red brown completely weathered Shale, with seams of soil	rippable, moist
2'0" - 4'6"	Red Brown highly weathered Shale, highly fractured	rippable, moist
	Groundwater Encountered @ 3'3" (slow inflow)	

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TP-40 (Elev. +110.0)

0'0" - 1'4"	Topsoil with tilled subsoil	
1'4" - 3'0"	Red brown completely weathered Shale	rippable, moist
3'0" - 5'6"	Red brown highly weathered Shale, highly fractured	rippable, moist-wet
	Groundwater Encountered @ 5'6"	

TP-41 (Elev. +106.0)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 1'6"	Mottled light gray, red brown SILT and (-), coarse to fine Sand	medium stiff, moist
1'6" - 3'0"	Red brown completely weathered Shale	rippable, moist to wet
3'0" - 5'9"	Red brown highly weathered Shale, highly fractured, with layer of soil	rippable, wet
	Groundwater Encountered @ 4'6" (slow inflow) Seasonal High Groundwater @ 1'0"	

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29 March 2022

TP-42 (Elev. +108.0)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 3'3"	Red brown coarse to fine Sand, and (-) Silt, some (+) coarse to fine Gravel, with weathered Shale fragments	medium dense, moist
3'3" - 4'3"	Red brown completely weathered Shale	rippable, moist
4'3" - 5'6"	Red brown highly weathered, highly fractured Shale	rippable, moist-wet
	Groundwater Encountered @ 4'0" (slow inflow)	

TP-43 (Elev. +109.5)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 4'9"	Red brown completely weathered Shale with partings of soil	rippable, moist
4'9" - 6'0"	Red brown moderately weathered Shale, highly fractured	rippable, moist-wet
	Groundwater Encountered @ 5'6" (slow inflow)	

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29 March 2022

TP-44 (Elev. +112.0)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 2'0"	Red brown coarse to fine Sand, and Silt, some (-) medium to fine Gravel, with weathered Shale fragments	medium dense, moist
2'0" - 7'6"	Red brown completely weathered Shale with partings of soil	rippable, moist
	No Groundwater Encountered	

TP-45 (Elev. +113.5)

0'0" - 1'0"	Topsoil with tilled subsoil	
1'0" - 2'0"	Red brown SILT some (+), coarse to fine Sand	medium stiff, moist
2'0" - 3'3"	Red brown coarse to fine Sand and (+) Silt, little (+) medium to fine Gravel, with weathered rock fragments	medium dense, moist
3'3" - 4'3"	Red brown completely weathered Shale	rippable, moist
4'3" - 6'0"	Red brown highly weathered Shale, highly fractured	rippable, moist
	No Groundwater Encountered	

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31 March 2022

TP-46 (Elev. +113.0)

0'0" - 1'0"	Topsoil	
1'0" - 4'0"	Red brown completely weathered Shale	rippable, moist
	No Groundwater Encountered	

TP-47 (Elev. +119.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 1'8"	Red brown coarse to fine Sand, and Silt, little medium to fine Gravel with weathered Shale fragments	medium dense, moist
1'8" - 3'9"	Red brown completely weathered Shale	rippable, moist
3'9" - 5'9"	Dark gray Clayey SILT some (-), coarse to fine Sand, little (-) fine Gravel	medium stiff, moist
5'9" - 6'3"	Dark gray completely weathered Shale	rippable, moist
	No Groundwater Encountered	

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Proposed Warehouses
Block 88.02, Lot 13.02 & 19
Franklin, NJ
20-127

31 March 2022

TP-48 (Elev. +114.0)

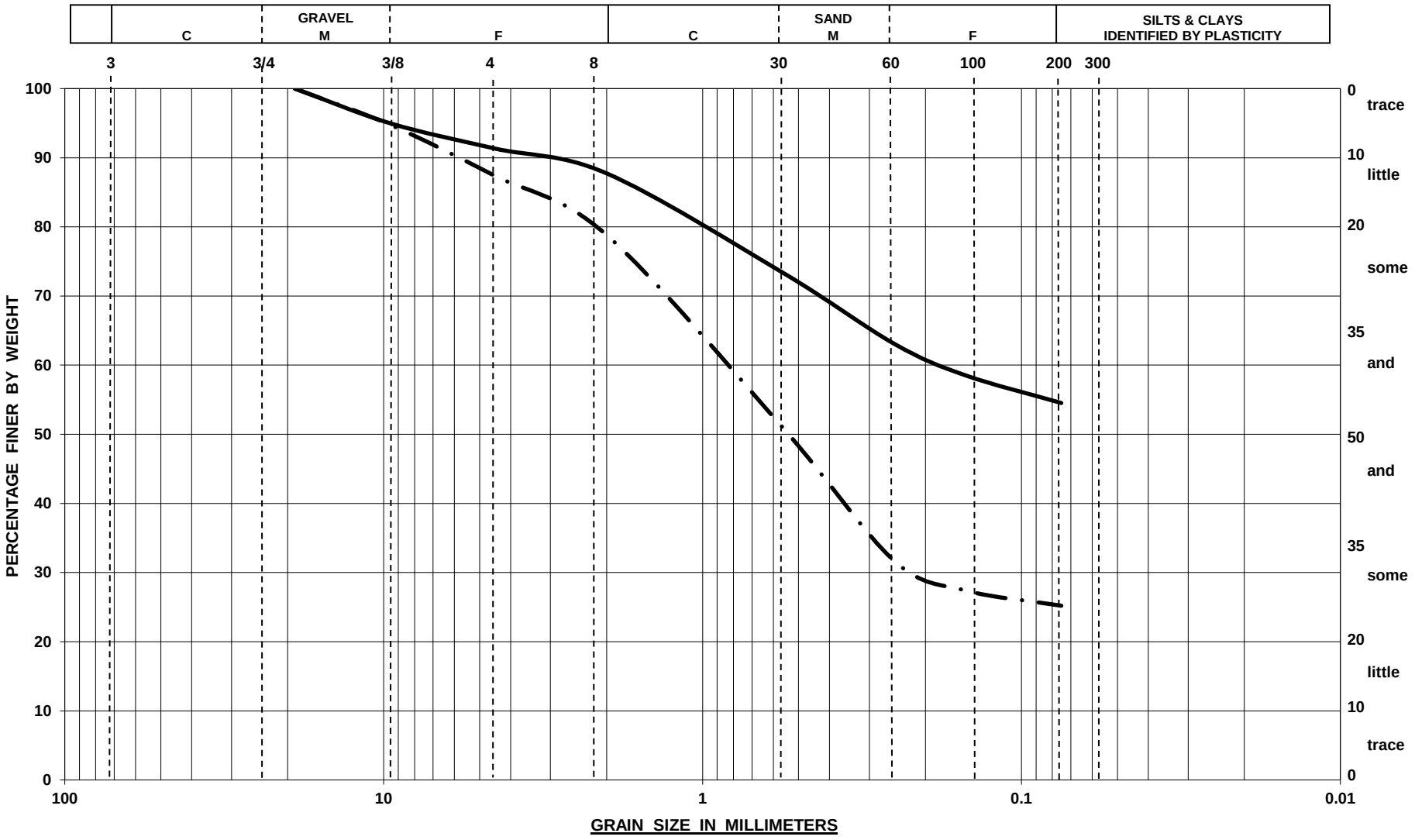
0'0" - 0'10"	Topsoil with tilled subsoil	
0'10" - 1'3"	Red brown coarse to fine Sand, and (-) Silt, some (-) medium to fine Gravel with many weathered Shale fragments	medium dense, moist
1'3" - 3'6"	Red brown completely weathered Shale, with partings of soil	rippable, moist
3'6" - 5'0"	Red brown Clayey SILT and, coarse to fine Sand, some (-) medium to fine Gravel with many weathered Shale fragments	medium stiff, moist
5'0" - 5'6"	Red brown completely weathered Shale	rippable, moist
	Groundwater encountered @ 4'9"	

TP-49 (Elev. +115.0)

0'0" - 1'3"	Topsoil with tilled subsoil	
1'3" - 2'3"	Red brown completely weathered Shale	rippable, moist
2'3" - 4'3"	Red brown highly to moderately weathered Shale, highly fractured	rippable, moist
4'3"	Red brown Shale	unrippable, moist
	Perched Groundwater Encountered @ 4'0" Bucket Refusal @ 4'3" on Harder Shale Bedrock	

CARLIN-SIMPSON & ASSOCIATES
SAYREVILLE, NJ 08872

SIEVE ANALYSIS

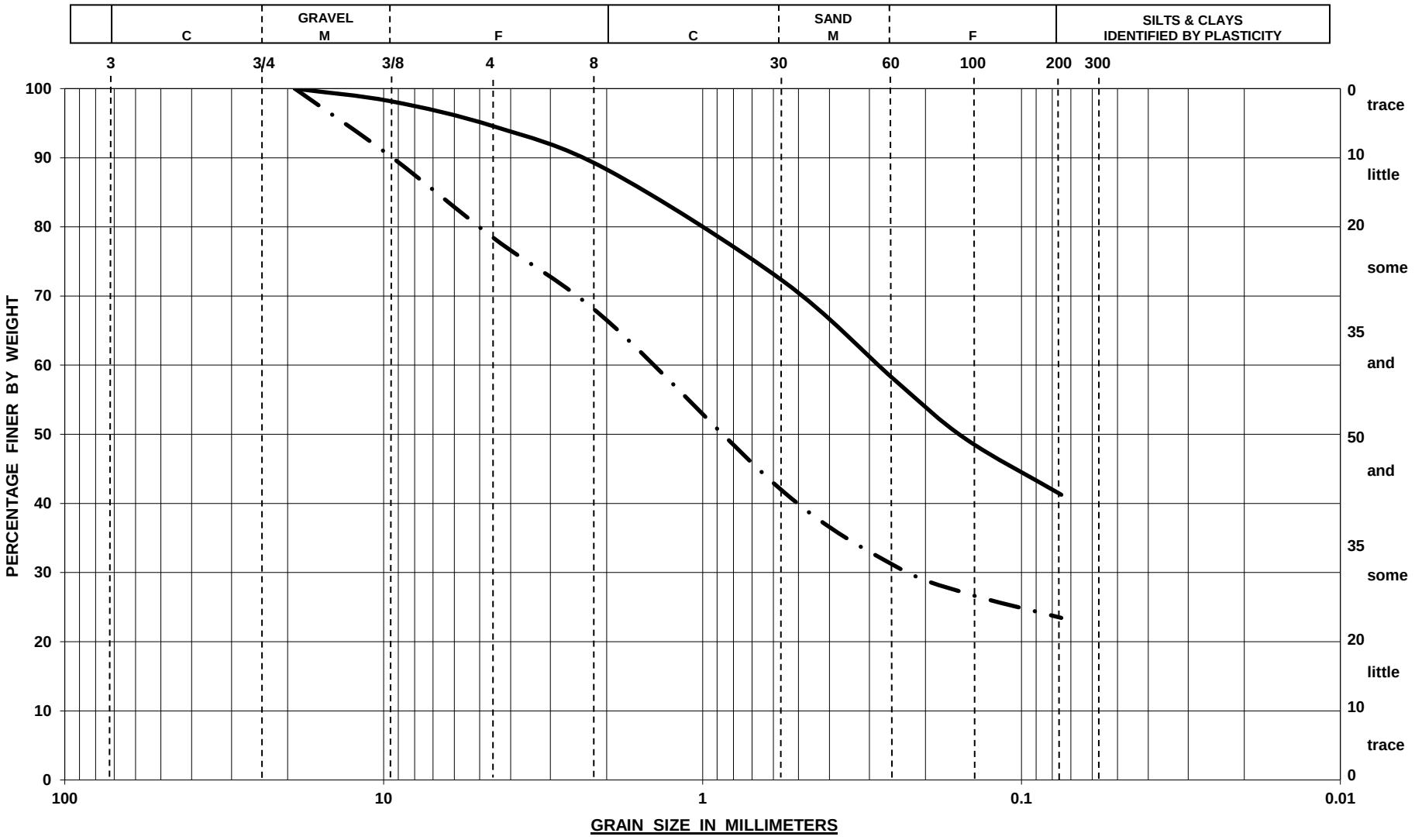


SYMBOL	BORING	SAMPLE	DEPTH	DESCRIPTION	NAT MC
———	TP-4	Perc Depth	2'3"	Red brown SILTand (+), coarse to fine Sand, little (-) medium to fine Gravel	23.0%
— ·	TP-8	Perc Depth	2'0"	Red brown coarse to fine SAND, some Silt, some (-) medium to fine Gravel	12.6%

PROJECT Proposed Warehouses, Block 88.02, Lot 13.02 & 19- Franklin, NJ **BY** M.W. **DATE** 6-Apr-22 **JOB NO** 20-127

CARLIN-SIMPSON & ASSOCIATES
SAYREVILLE, NJ 08872

SIEVE ANALYSIS

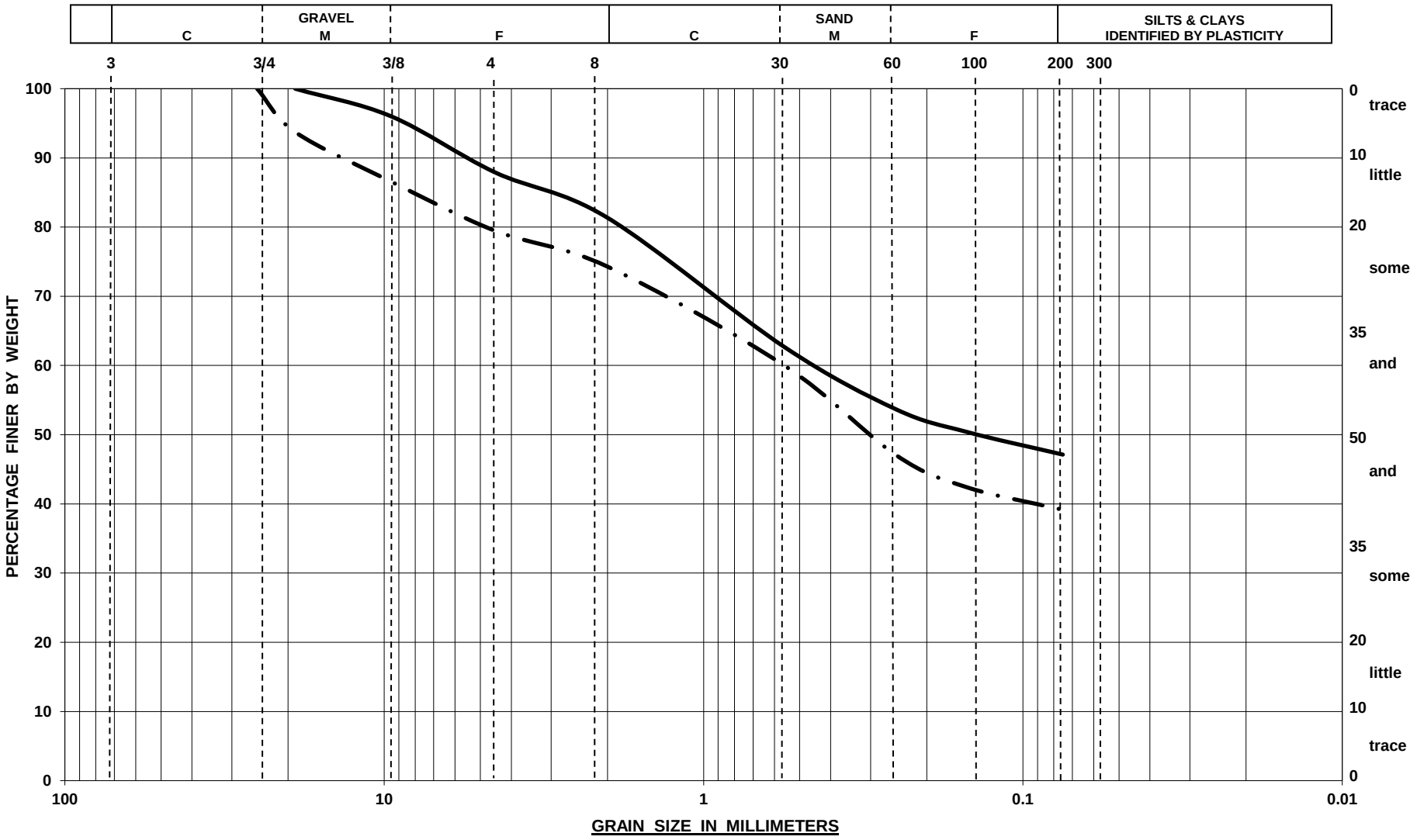


SYMBOL	BORING	SAMPLE	DEPTH	DESCRIPTION	NAT MC
———	TP-10	S-1	2'6" - 6'9"	Red brown coarse to fine Sand, and Silt, little (-) medium to fine Gravel	30.0%
— · —	TP-17	Perc Depth	2'0"	Red brown coarse to fine Sand, some (-) Silt, some (+) medium to fine Gravel	26.2%

PROJECT Proposed Warehouses, Block 88.02, Lot 13.02 & 19- Franklin, NJ **BY** M.W. **DATE** 6-Apr-22 **JOB NO** 20-127

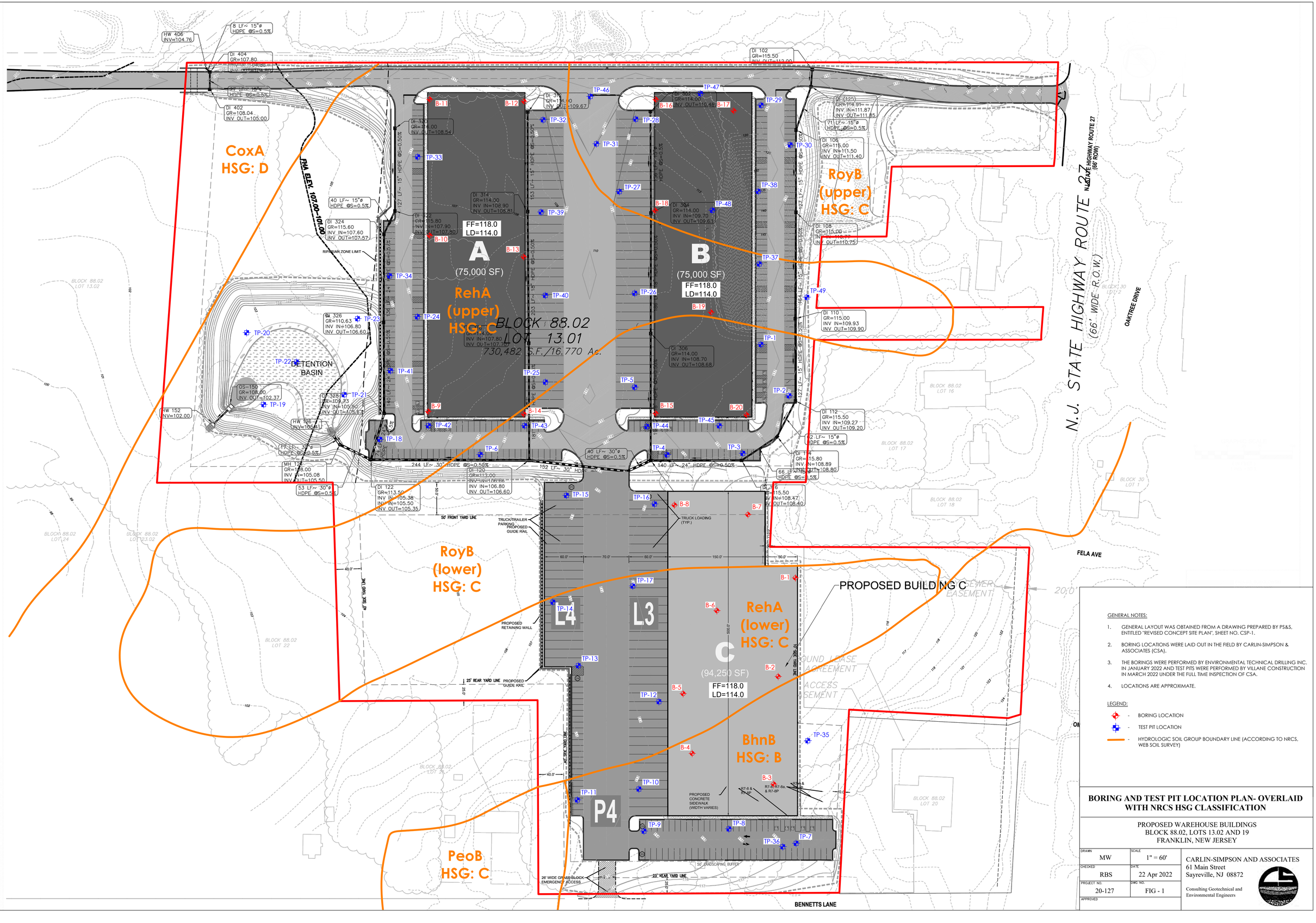
CARLIN-SIMPSON & ASSOCIATES
SAYREVILLE, NJ 08872

SIEVE ANALYSIS



SYMBOL	BORING	SAMPLE	DEPTH	DESCRIPTION	NAT MC
———	TP-21	Perc Depth	2'0"	Red brown coarse to fine Sand, and (+) Silt, little (+) medium to fine Gravel	22.8%
— ·	TP-38	S-1	0'0" - 9'0"	FILL (Red brown coarse to fine Sand, and (-) Silt, some medium to fine Gravel)	16.1%

PROJECT Proposed Warehouses, Block 88.02, Lot 13.02 & 19- Franklin, NJ **BY** M.W. **DATE** 6-Apr-22 **JOB NO** 20-127



GENERAL NOTES:

1. GENERAL LAYOUT WAS OBTAINED FROM A DRAWING PREPARED BY PS&S, ENTITLED 'REVISED CONCEPT SITE PLAN', SHEET NO. CSP-1.
2. BORING LOCATIONS WERE LAID OUT IN THE FIELD BY CARLIN-SIMPSON & ASSOCIATES (CSA).
3. THE BORINGS WERE PERFORMED BY ENVIRONMENTAL TECHNICAL DRILLING INC. IN JANUARY 2022 AND TEST PITS WERE PERFORMED BY VILLANE CONSTRUCTION IN MARCH 2022 UNDER THE FULL TIME INSPECTION OF CSA.
4. LOCATIONS ARE APPROXIMATE.

LEGEND:

- BORING LOCATION
- TEST PIT LOCATION
- HYDROLOGIC SOIL GROUP BOUNDARY LINE (ACCORDING TO NRCS, WEB SOIL SURVEY)

BORING AND TEST PIT LOCATION PLAN- OVERLAID WITH NRCS HSG CLASSIFICATION

PROPOSED WAREHOUSE BUILDINGS
BLOCK 88.02, LOTS 13.02 AND 19
FRANKLIN, NEW JERSEY

DRAWN: MW	SCALE: 1" = 60'
CHECKED: RBS	DATE: 22 Apr 2022
PROJECT NO.: 20-127	DWG NO.: FIG - 1
APPROVED:	

CARLIN-SIMPSON AND ASSOCIATES
61 Main Street
Sayreville, NJ 08872
Consulting Geotechnical and Environmental Engineers

HSG: D

A
(75,000 SF)
FF=118.0
LD=114.0

B
(75,000 SF)
FF=118.0
LD=114.0

C
(94,250 SF)
FF=118.0
LD=114.0

BLOCK 88.02
LOT 13.01
730,482 S.F./16.770 Ac.

L1

L3

P4

HSG: D HSG: C

HSG: B

HSG REMAINS THE SAME AS PER NRCS (2 AREAS)

PROPOSED BUILDING C

N.J. STATE HIGHWAY ROUTE 27
(66' WIDE R.O.W.)

NJ STATE HIGHWAY ROUTE 27
(66' ROW)

OAKTREE DRIVE

FELA AVE

OMAHA ROAD

BENNETTS LANE

RETENTION BASIN

RIPARIAN ZONE LIMIT

FMA ELEV. 107.00-101.00

PROPOSED RETAINING WALL

PROPOSED GUIDE RAIL

TRUCK/TRAILER PARKING

TRUCK LOADING (TYP.)

PROPOSED CONCRETE SIDEWALK (WIDTH VARIES)

50' LANDSCAPING BUFFER

50' FRONT YARD LINE

40' SIDE YARD LINE

25' REAR YARD LINE

26' WIDE GRASS BLOCK EMERGENCY ACCESS

SEWER EASEMENT

20'0"

GROUND LEASE AGREEMENT ACCESS EASEMENT

R7-8 & R7-8P

R7-8 & R7-8a & R7-8P

GENERAL NOTES:

1. GENERAL LAYOUT WAS OBTAINED FROM A DRAWING PREPARED BY PS&S, ENTITLED "REVISED CONCEPT SITE PLAN", SHEET NO. CSP-1.
2. BORING LOCATIONS WERE LAID OUT IN THE FIELD BY CARLIN-SIMPSON & ASSOCIATES (CSA).
3. THE BORINGS WERE PERFORMED BY ENVIRONMENTAL TECHNICAL DRILLING INC. IN JANUARY 2022 AND TEST PITS WERE PERFORMED BY VILLANE CONSTRUCTION IN MARCH 2022 UNDER THE FULL TIME INSPECTION OF CSA.
4. LOCATIONS ARE APPROXIMATE.

LEGEND:

- BORING LOCATION
- TEST PIT LOCATION
- NEW HYDROLOGIC SOIL GROUP BOUNDARY LINE (ACCORDING TO CARLIN SIMPSON AND ASSOCIATES)

BORING AND TEST PIT LOCATION PLAN- OVERLAID WITH RECLASSIFIED HSG

PROPOSED WAREHOUSE BUILDINGS
BLOCK 88.02, LOTS 13.02 AND 19
FRANKLIN, NEW JERSEY

DRAWN: MW	SCALE: 1" = 60'
CHECKED: RBS	DATE: 22 Apr 2022
PROJECT NO.: 20-127	DWG NO.: FIG - 2
APPROVED:	

CARLIN-SIMPSON AND ASSOCIATES
61 Main Street
Sayreville, NJ 08872
Consulting Geotechnical and Environmental Engineers

APPENDIX D – STORMWATER MANAGEMENT REPORT (TO BE ATTACHED)