Stormwater Management Measures Maintenance Plan & Field Manuals

7th Avenue and Douglas Street

Block 143 Lot 1 Elk Township, Gloucester County, New Jersey



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Job #23-105 January 2024

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This plan is recorded in

Deed Book # _____ Page # ____ with _____ County Clerk on Date _____

Last Revised on <u>MM / DD / YYYY</u>

NOTE

This Maintenance Plan is intended to be editable and adjustable in accordance with the design of stormwater management measures, the site conditions, and the special needs of responsible party.

Table of Contents

Part I- Maintenance

Prepared by
List of Stormwater Management Measures
Location Map
Description of Stormwater Management Measures
Preventative and Corrective Maintenance Action Plan
Maintenance Personnel, Equipment, Tools, and Supplies
Disposal Plan 10
Cost Estimate 11
Safety Measures and Procedures
Training Plan and Records 14
Annual Evaluation of the Effectiveness of the Plan 15
Documents
Bioretention System Overview
Basic Design Information
Reference Documents (Located at end of this section)
Small-Scale Infiltration Basin Overview
Basic Design Information
Reference Documents
Visual Aid for Dry Type Stormwater Basin Inspection
Inspection Checklist / Maintenance Actions
Preventative Maintenance Record
Corrective Maintenance Record

Part II- Field Manuals and Maintenance Records

Field Manual for <u>Rain Gardens (Bioretention Systems) #1 - #4</u> Field Manual for <u>Infiltration Areas (Small-Scale Infiltration Basins) #5-#6</u>

Maintenance Logs and Inspection Records Reference Documents Part I- Maintenance Plan

List of Stormwater Management Measures

The stormwater management measures incorporated into this development are listed below. The corresponding Field Manuals for the stormwater management measures are located in Part II of the Maintenance Plan.

Type of Stormwater Management Measure	BMP No.	Location Description	State Plane Coordinates / Lat., Long.
Rain Garden	Bioretention System #1	Northerly side of Block 143 Lot 1.03; along Seventh Avenue frontage	39°40'30.6"N -75°06'55.5"W
Rain Garden	Bioretention System #2	Northerly side of Block 143 Lot 1.02; along Seventh Avenue frontage	39°40'31.1"N -75°06'53.9"W
Rain Garden	Bioretention System #3	Northeasterly corner of Block 143 Lot 1.01; along Seventh Avenue frontage	39°40'31.7"N -75°06'31.8"W
Rain Garden	Bioretention System #4	Northeasterly corner of Block 143 Lot 1; along Seventh Avenue frontage	39°40'32.3"N -75°06'49.4"W
Infiltration Area	Small-Scale Infiltration Basin #5	Northerly side of Seventh Avenue, along frontage of Block 142 Lot 1	39°40'32.3"N -75°06'51.8"W
Infiltration Area	Small-Scale Infiltration Basin #6	Northwesterly corner of Seventh Avenue and Douglas Street intersection	39°40'33.3"N -75°06'49.1"W

Location Map



No.	Type of Stormwater Management Measure
Bioretention System #1	Rain Garden #1
Bioretention System #2	Rain Garden #2
Bioretention System #3	Rain Garden #3
Bioretention System #4	Rain Garden #4
Small-Scale Infiltration Basin #5	Infiltration Area #5
Small-Scale Infiltration Basin #6	Infiltration Area #6

Description of Stormwater Management Measures

Bioretention System #1 (Rain Garden #1)

Design storm: 100-year storm

- Design Purposes:
 - Water quality, water quantity, and groundwater recharge
 - \circ 2-year storm (3.29 inches);
 - \circ 10-year storm (5.05 inches);
 - o 100-year storm (8.55 inches)
- Dimensions: 92 ft (Length) x 20 ft (Width) x 2 ft (Depth)

Bioretention System #2 (Rain Garden #2)

Design storm: 100-year storm

- Design Purposes:
 - Water quality, water quantity, and groundwater recharge
 - 2-year storm (3.29 inches);
 - \circ 10-year storm (5.05 inches);
 - 100-year storm (8.55 inches)
 - Dimensions: 87 ft (Length) x 20 ft (Width) x 2 ft (Depth)

Bioretention System #3 (Rain Garden #3)

Design storm: 100-year storm

- Design Purposes:
 - Water quality, water quantity, and groundwater recharge
 - 2-year storm (3.29 inches);
 - \circ 10-year storm (5.05 inches);
 - 100-year storm (8.55 inches)
- Dimensions: 88 ft (Length) x 20 ft (Width) x 2 ft (Depth)

Bioretention System #4 (Rain Garden #4)

Design storm: 100-year storm

- Design Purposes:
 - Water quality, water quantity, and groundwater recharge
 - 2-year storm (3.29 inches);
 - \circ 10-year storm (5.05 inches);
 - 100-year storm (8.55 inches)
- Dimensions: 130 ft (Length) x 43 ft (Width) x 2 ft (Depth)

Small-Scale Infiltration Basin #5 (Infiltration Area #5)

Design storm: 100-year storm

- Design Purposes:
 - Water quality, water quantity, and groundwater recharge
 - \circ 2-year storm (3.29 inches);
 - \circ 10-year storm (5.05 inches);

- 100-year storm (8.55 inches)
- Dimensions: 555 ft (Length) x 12 ft (Width) x 2 ft (Depth)

Small-Scale Infiltration Basin #6 (Infiltration Area #6)

Design storm: 100-year storm

- Design Purposes:

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- Water quality, water quantity, and groundwater recharge
- \circ 2-year storm (3.29 inches);
- \circ 10-year storm (5.05 inches);
- 100-year storm (8.55 inches)
- Dimensions: 115 ft (Length) x 12 ft (Width) x 1 ft (Depth)

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.

As per NJDEP BMP Manual Ch. 8 Feb. 2004), maintenance plans should include specific preventative and corrective maintenance tasks such as removal of sediment, trash, and debris; mowing, pruning, and restoration of vegetation; restoration of eroded areas; elimination of mosquito breeding habitats; control of aquatic vegetation; and repair or replacement of damaged or deteriorated components.

As per NJDEP BMP Manual Ch. 8 (Feb. 2004), maintenance plans should include recommended corrective responses to various emergency conditions that may be encountered at the stormwater management measure. It should be noted that if the stormwater management measure includes a Class I or II dam as defined in the NJDEP Dam Safety Standards at N.J.A.C. 7:20, an emergency action plan for the dam is also required. See N.J.A.C. 7:20-1.7(f) for more information.

As per NJDEP BMP Manual Ch. 8 (Feb. 2004), the maintenance plan should address the maintenance of access points to the stormwater management measures in accordance with the following:

- all components of the stormwater management measures must be readily accessible for inspection and maintenance;
- trees, shrubs, and underbrush must be pruned or trimmed as necessary to maintain access to the stormwater management measure via roadways, paths, and ramps, including paths through perimeter vegetation to permanent pools, aquatic benches, and safety ledges to allow for the inspection and control of mosquito breeding; and
- the exact limits of inspection and maintenance easements and rights-of-way should be specified on stormwater management measure plans and included in the maintenance plan.

Preventative Maintenance Actions

Frequency	Preventative Maintenance Actions	Stormwater Measures/ No.
Monthly	Vegetation mowing and removal in growing	Bioretention Systems #1-4,
	season, Trash removal	Small-Scale Infiltration Basins
		#5-6, Access
Quarterly	Quarterly inspection, Sediment Removal	Bioretention Systems #1-4,
		Small-Scale Infiltration Basins
		#5-6
Annual	Bioretention System Structural Inspection	Bioretention Systems #1-4,
		Small-Scale Infiltration Basins
		#5-6
Unscheduled	Quick inspection after every 1" rain	Bioretention Systems #1-4,
		Small-Scale Infiltration Basins
		#5-6

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.

Potential Corrective Maintenance Actions	Stormwater Management Measures/No.
Revegetation of eroded side slope and basin bottom	Bioretention Systems #1-4, Small-Scale Infiltration Basins #5-6
Filling eroded areas or gullies and seeding to stabilize the area. Stabilize minor erosion by top soiling, seeding and erosion control matting to facilitate grass growth. More severe stabilization may require filter fabric and riprap stone slope protection	Bioretention Systems #1-4, Small-Scale Infiltration Basins #5-6
Clearing of trees, shrubs and underbrush in the basin embankment, berm, near the overflow structure and wingwalls and in the immediate vicinity of the exit channel	Bioretention Systems #1-4, Small-Scale Infiltration Basins #5-6
Removal of burrowing animals and filling the holes.	Bioretention Systems #1-4, Small-Scale Infiltration Basins #5-6

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 Ch. 8 (Feb, 2004), a maintenance plan shall include a schedule of regular inspections and tasks, and detailed logs of all preventative and corrective maintenance performed on the stormwater management measure, including all maintenance-related work orders. 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 Field Manual for the stormwater management measures on this site include:

- Field Manual for Bioretention Systems
- Field Manual for Small-Scale Infiltration Basins

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

Maintenance Personnel, Equipment, Tools, and Supplies

As per NJDEP BMP Manual Ch. 8 (Feb. 2004), maintenance plans should include equipment, tools, and supplies necessary to perform the various preventative and corrective maintenance tasks specified in the plan. Sources of specialized, proprietary, and nonstandard equipment, tools, and supplies should also be provided.

This section applies to both maintenance tasks that are performed by in-house personnel or are outsourced. The design engineer has to list the required amount of maintenance personnel, equipment, tools, and supplies necessary to perform the various preventative and corrective maintenance tasks specified in the plan. In addition, the sources of specialized, proprietary, and nonstandard equipment, tools and supplies for specific measures, such as manufactured treatment devices should also be listed.

Maintenance Personnel/Equipment/Tools/Supplies

The following is a list of required inspection equipment for performing M&R procedures and Inspections.

- 1. A clip board, a pencil and inspection checklist the inspection checklist is included in the following section.
- 2. A standard 6-foot collapsible ruler.
- 3. A camera photographs or observed portions of the basin will provide a measure of performance when comparing past and present maintenance practice.
- 4. A probe any stiff light stick or rod with a blunt tip of sufficient strength to penetrate soil. The probe can provide information on conditions below the surface of the basin such as the depth and softness of a saturated area.
- 5. A weed whacker can be used to clear non-visible areas and to perform routine maintenance on the embankments.
- 6. A flashlight a flashlight can be used to observe areas where there is a low level of light.
- 7. A hammer for sounding concrete to detect deteriorated areas.
- 8. Pump for draining ponds or dry basins that are not drained, according to soil conservation regulations.

Maintenance at the basin may require heavy equipment including the following:

- 1. Chain saw.
- 2. Stump grinder.
- 3. Wheelbarrow.
- 4. Backhoe
- 5. Dump truck.

Sources of the following materials should be identified for immediate use if warranted by the inspection.

- 1. Native, silty sand for filling erosion rills and gullies.
- 2. Topsoil mixture, fertilizer and seed.
- 3. Large stone rip rap for emergency repairs caused by erosion.
- 4. Synthetic geofabric netting and stakes to prevent seed and topsoil from blowing away.
- 5. Specialized, proprietary or nonstandard equipment, tools and supplies, if applicable

Disposal Plan

As per NJDEP BMP Manual Ch. 8 (Feb. 2004), 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 conducted in accordance with the Standards for Soil Erosion & Sediment Control in New Jersey
- Disposal of debris, trash, sediment and other waste material shall be done at suitable disposal/recycling sites and in compliance with all applicable local, state, and federal waste regulations.
- Any new correspondence or contract data must be copied and included in the Documents section of the Maintenance Plan if available.

Cost Estimate

As per N.J.A.C.7:8-5.8(b), cost estimates of maintenance tasks, including, but not limited to, sediment, trash and debris removal must be included in the maintenance plan. Below is an illustration of a cost breakdown and estimation for maintenance of stormwater management measures. The design engineer should estimate the cost based on the expected maintenance required for each stormwater management measure. The actual costs may vary with factors such as local requirements, equipment, personnel, weather, and maintenance methods.

The requirement to obtain State permits depends on specific circumstances, such as, but not limited to, the specific design of the stormwater management measures, the maintenance actions, the access and disturbance, the disposal methods, the location of disposal, the method to empty a basin, the method to dredge the basin, the pollutants in the basin, the damages to the basin, and the method to repair the basin.

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

Basin Maintenance Tasks	<u>Frequency</u>	Manpower	Hourly Rate *(K)	Amount
Grass Cutting & Grass Clipping Disposal - *(A), *(B)	2 per month	2 hours	\$25	\$800
Weed Control - Pesticides - ^{*(C), *(A)}	1 per month	3 hours	\$25	\$600
Sediment Removal - ^{*(D),} *(G), *(A)	1 per year	8 hours	\$25	\$200
Erosion Repair - *(E), *(B)	1 per year	12 hours	\$25	\$300
Trash and Debris Removal ^{*(F), *(G), *(A)}	1 per 3 months	3 hours	\$25	\$300
Inspection - All Structural Components *(I)	1 per 6 months	2 hours	\$25	\$100
			Total Yearly Engineer's Estimate of Probable Maintenance Cost	\$2,300 All BMPs

COST ESTIMATES

Notes:

A) Disposal of debris, trash, sediment and other waste materials should be done at suitable disposal/recycling sites and in compliance with all local, state, & federal waste regulations.

B) Ground Cover consists of fertilizer, lime application, and mulching and shall be placed to assure vegetation health and re-establish stability after filling and compaction.

C) Weeds shall be removed from headwalls, outlet structures, low flow channels and rip-rapped areas.

D) Sediment shall be removed from piping, outlet structures, low flow channels, and rip-rapped areas.

E) Erosion Repair consists of any eroded areas especially low and depressed areas to prevent mosquito breeding habitats.

F) Trash and Debris shall be removed quarterly as well as following any rain events exceeding 1-inch of rainfall.

G) All Structural Components must be inspected for cracking, subsidence, spalling, erosion, and deterioration.

H) Vacuum Truck & 2-man crew to remove sediment once per year, clean and replace/repair filter cartridges typically 4-hour minimum.

I) The hourly rate for manpower is \$25 per hour. This price includes all necessary tools and overhead costs.

Safety Measures and Procedures

As per NJDEP BMP Manual Ch. 8 (Feb. 2004), maintenance plans should include procedures and equipment required to protect the safety of inspection and maintenance personnel.

Safety Regulations and Requirements

The owner or the owner's designated personnel or contractor shall be responsible to identify all applicable safety regulations and requirements associated with required preventative and corrective maintenance activities and inspections.

Safety Procedures

The owner or the owner's designated personnel or contractor shall be responsible to identify all applicable local, state, and federal laws and regulations, and the safety instructions procided by the equipment or device manufacturers associate with required preventative and corrective maintenance activities.

Emergency Procedures

Concact 911 for any immediate medical emergencies

Training Plan and Records

As per NJDEP BMP Manual Ch. 8 (February 2004), maintenance training begins with a basic description of 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.

I. Training Plan

- Stormwater Management Basic Training

- Purposes and Functions of BMPs
 - NJDEP Stormwater BMP Manual, Chapter Nine: Structural Stormwater Management Measures
 - Chapter 9.8 Small-Scale Infiltration Basins
 - More training information is available at NJ Stormwater.org (<u>http://www.nj.gov/dep/stormwater/training.htm</u>)
- Vegetation Care
 - NJDEP Stormwater BMP Manual, Chapter Seven: Landscaping (provides information on vegetation and landscaping for stormwater management measures)
 - https://www.njstormwater.org/bmp_manual/NJ_SWBMP_7.pdf
- Field Manual Usage Training
 - See Field Manuals attached to this Maintenance Plan
- Equipment and Tools Operation Training
 - Owner should attach any Equipment or tool manufacturer's Operation & Maintenance Manual which is used in preventative or corrective maintenance
- The owner or the owner's designated personnel or contractor shall be responsible to identify all applicable local, state, and federal laws and regulations, and the safety instructions provided by the equipment or device manufacturers associated with required preventative and corrective maintenance activities including but not limited to:
 - OSHA Training
 - Equipment or tool manufacturer's Operation & Maintenance Manual

II. 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;
- 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	
		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)	

Documents

Transfer Agreement

As per N.J.A.C. 7:8-5.8(b), if the maintenance plan identifies a person other than the developer as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.

Deed

As per N.J.A.C. 7:8-5.8(d), if the person responsible for maintenance is not a public agency, the maintenance plan and any future revisions shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.

As-Built Drawings with Drainage Plans

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), as-built construction plans of the stormwater management measure and copies of pertinent construction documents, such as laboratory test results, permits, and completion certificates should be included in this Maintenance Plan.

Landscaping Plan for the Stormwater Management Measures

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), if there is a Landscaping Plan for the stormwater management measures, it should be included in this Maintenance Plan.

Permeability Test/Infiltration Test Report

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), if a permeability test or infiltration test is required and available, the reports for pre-construction and post-construction testing should be included in this Maintenance Plan.

Soil Boring Logs

As per NJDEP BMP Manual Ch.8 (Feb., 2004), if any soil borings were taken prior to construction, a copy of the soil boring logs should be included in this Maintenance Plan.

Local, State, Federal Permits

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), local, state, or federal permits related to the stormwater management measures for this development should be included in this Maintenance Plan. See Cost Estimate Section of This Maintenance Plan for more information. The requirement to obtain State permits depends on specific circumstances, such as, but not limited to, the specific design of the stormwater management measures, the maintenance actions,

the access and disturbance, the disposal methods, the location of disposal, the method to empty a basin, the method to dredge the basin, the pollutants in the basin, the damages to the basin, and the method to repair the basin.

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

Safety Regulations and Requirements

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), all local ordinances and state and federal regulations regarding occupational safety should be included in this Maintenance Plan.

Devices/Tools/Equipment Operation and Maintenance Manual and Warranties

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), maintenance, repair, and replacement instructions for specialized, proprietary, and nonstandard equipment, tools, supplies, manufacturers' product instructions, and user manuals should be included in this Maintenance Plan.

Part II- Field Manuals

Attachment of Field Manuals for Stormwater Management Measures on this Site

As per N.J.A.C. 7:8-5.8(b)&(e), preventative and corrective maintenance shall be performed to maintain the function of stormwater management measures, including repair or replacement of the structure; removal of sediment, debris or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; repair or replacement of non-vegetated linings, and removal of rodent/wildlife and repair/restoration to damaged affected areas caused by them.

Each Field Manual attached to this Maintenance Plan is a separate document pertaining to one specific stormwater management measure, and should be used by inspections and maintenance crews in order to carry out the maintenance work required by N.J.A.C. 7:8-5.8(e).

Field Manual for Rain Gardens (Bioretention Systems #1- #4) Field Manual for Infiltration Areas (Small-Scale Infiltration Basins #5-#6)

Maintenance Logs and Inspection Records

As per N.J.A.C. 7:8-5.8(e), preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure(s), including 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.

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.

The responsible party shall maintain a record of all maintenance actions performed, including:

- Inspection checklists from each performed inspection
- Preventative maintenance logs
- Corrective maintenance logs, including work orders
- Other maintenance records

Bioretention System Overview

Functionality

Bioretention systems are used to remove a wide range of pollutants, such as suspended solids, nutrients, metals, hydrocarbons, and bacteria from stormwater runoff. They can also be used to reduce peak runoff rates and increase stormwater infiltration when designed as a multi-stage, multi-function facility.

A bioretention system can be configured as either a bioretention basin or a longer, narrower bioretention swale. In general, a bioretention basin has a flat bottom while a bioretention swale may have sloping bottom. Runoff storage depths above the soil bed surface are typically shallow. The TSS removal rate for bioretention systems is 80 or 90 percent, depending upon the thickness of the soil planting bed and the type of vegetation grown in the bed.

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 Basin / Infiltration

A bioretention system is a type of **dry** basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

A bioretention system with infiltration can also be designed for extended detention, in which case it will attenuate peak flows from storms larger than the Water Quality Design Storm.

Basic Design Information

Hydrology Design Targets

- 1. The bioretention system is designed as an online system.
- 2. The design drain time for each bioretention system is the following:
 - Rain Garden #1: 19.00 hours
 - Rain Garden #2: 32.70 hours
 - Rain Garden #3: 15.42 hours
 - Rain Garden #4: 4.14 hours
- 3. The elevation of the seasonal high water table ranges from elevation 130.16 to 131.42 according to on soil testing dated 10/13/2023. Therefore, the seasonal high water table is at least 2' below the elevation of the bottom of all bioretention systems.
- 4. This system is designed with a subsoil permeability rate of 4.224 inches/hour.

Hydraulic Design Targets

Design parameters for 100-year storm

	Rain Cardon #1	Rain Garden	Rain	Rain
		#2	Garden #3	Garden #4
Rainfall Depth	8.55"	8.55"	8.55"	8.55"
(inches)	In 24 hours	In 24 hours	In 24 hours	In 24 hours
Runoff Volume	0.205	0.305	0.166	0.141
(acre feet)				
Peak Flow Rate	2.72	4.04	2.07	1.84
(cfs)				
Water Surface	137.34	138.45	137.23	135.57
Elevation (feet)				

Basin Configuration Targets

1. Outlet Information:

 Rain Garden # 	#1

Outlet Type	Dimensions	Invert Elevation
Infiltration	Basin Bottom Surface Area	134.50

• Rain Garden #2

Outlet Type	Dimensions	Invert Elevation
Infiltration	Basin Bottom Surface Area	135.00

• Rain Garden #3

Outlet Type	Dimensions	Invert Elevation
Infiltration	Basin Bottom Surface Area	135.00

• Rain Garden #4		
Outlet Type	Dimensions	Invert Elevation
Infiltration	Basin Bottom Surface Area	135.00
Emergency Overflow Spillway	3' Wide	136.90

2. The vegetation type to be used in this bioretention system is (site-tolerant grasses, terrestrial forested community). A Landscaping Plan is included in the Reference Documents section of this field manual.

Critical Maintenance Features

- 1. No heavy equipment on the basin surface.
- 2. Remove vegetation strictly in accordance with the landscaping plan.
- 3. Grass clippings shall be collected from the basin and properly disposed.
- 4. keep the appearance of the basin aesthetic

Reference Documents (Located at end of this section)

Documents to be placed in this field manual should include the following:

- As-built Drawings with Drainage Plans
- Soil Boring Logs
- Permeability Test (Pre-construction)
- Permeability Test (Post-construction)
- Landscaping Plan

Small-Scale Infiltration Basin Overview

Functionality

Small-scale infiltration basins are stormwater management systems constructed with highly permeable components designed to both maximize the removal of pollutants from stormwater and to promote groundwater recharge. Pollutants are treated through settling, filtration of the runoff through and biological and chemical activity within, the components. The total suspended solids (TSS) removal rate is 80%.Small-scale infiltration basins are constructed in areas of highly permeable soil that provide temporary storage of stormwater runoff and can help to reduce increases in both the peak rate and total volume of runoff caused by land development. Pollutants in runoff are treated through the processes of filtration through and biological and chemical activity within the soil.

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 / Infiltration Only

A small-scale infiltration basin is a type of **dry** stormwater management measure. Dry stormwater management measures must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

Basic Design Information

Hydrology Design Targets

- 5. The bioretention system is designed as an online system.
- 6. The design drain time for each bioretention system is the following:
 - Infiltration Area #5: 14.86 hours
 - Infiltration Area #6: 19.07 hours

The elevation of the seasonal high water table ranges from elevation 130.16 to 131.42 according to on soil testing dated 10/13/2023. Therefore, the seasonal high water table is at least 2' below the elevation of the bottom of all small-scale infiltration basin systems.

7. This system is designed with a subsoil permeability rate of 4.224 inches/hour.

Hydraulic Design Targets

Design parameters for 100-year storm

Ĭ	Infiltration	Infiltration
	Area #5	Area #6
Rainfall Depth	8.55"	8.55"
(inches)	In 24 hours	In 24 hours
Runoff Volume	0.153	0.032
(acre feet)		
Peak Flow Rate	2.03	0.42
(cfs)		
Water Surface	137.58	135.75
Elevation (feet)		

Basin Configuration Targets

- 1. Outlet Information:
 - Infiltration Area #5

Outlet Type	Dimensions	Invert Elevation
Infiltration	Basin Bottom Surface Area	136.00
Emergency Overflow Spillway	20' Wide	137.80

• Infiltration Area #6

Outlet Type	Dimensions	Invert Elevation
Infiltration	Basin Bottom Surface Area	135.00

2. The vegetation type to be used in this bioretention system is (site-tolerant grasses, terrestrial forested community). A Landscaping Plan is included in the Reference Documents section of this field manual.

Critical Maintenance Features

- 1. No heavy equipment on the basin surface.
- 2. Remove vegetation strictly in accordance with the landscaping plan.
- 3. Grass clippings shall be collected from the basin and properly disposed.
- 4. keep the appearance of the basin aesthetic

Reference Documents

Documents to be placed in this field manual should include the following:

- As-built Drawings (or specifications if a manufactured dry well is used) with Drainage Plans
- Operation and Maintenance Manual
- Permeability Test (Pre-construction)
- Permeability Test (Post-construction)
- Fabric Specifications and Maintenance Information

Visual Aid for Dry Type Stormwater Basin Inspection

(Note: Basins shown here include various types of dry basins, not limited to the category of basin in this field manual.)



Issue:

The inlet is not properly drained, assuming it has not rained within 72 hours.

Corrective Action:	Clear and remove sediment. Check whether the water table is at or
	above the bottom of the forebay. Also check the permeability of the
	underlying soil, if necessary.

Preventative Action: Routine inspections and removal of sediment from the forebay.



Issue:

The vegetation loss and the blackish soil may indicate frequent inundation.

Corrective Action:

Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.

Routine inspection and tilling/aeration, if necessary.

Preventative Action:



Issue:	outflow orifice is clogged by a trash bag and debris. Note that there is no trash rack installed.		
Corrective Action:	Check the permeability rate of the soil and the water table elevation. Replace the soil if necessary.		
Preventative Action:	Routine inspection and cleaning.		

Inspection Checklist / Maintenance Actions Bioretention System / Small-Scale Infiltration 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 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	
				Recheck to determine if there is standing water after 72 hours
				If standing water is present longer than 5 days, report to mosquito commission.
		Standing water is present after the design drain time	Y	Remove any sediment buildup
	1	The observed drain time is	N	Check the soil permeability
approximately hours.		Till the soil bed with rotary tiller or disc harrow		
В				Replace the planting soil, if necessary
Basin Bed				Work Order #
	2	Excessive sediment, silt, or trash	Y	Clean pretreatment system
		accumulation on basin bed	N	Remove silt, sediment, and trash
			Y	Check whether the flow bypass or diversion device is clogged
	3	Erosion or channelization is present	N	Re-grade the infiltration bed
				Work Order #
	Λ	Animal humanya/radanta ara present	Y	Pest control
	+ Amilia	Annual burrows/rodents are present	N	Work Order #
Note:				

		For Inspector		For Maintenance Crew
	5	Uneven bed	Y	Use light equipment to resurface the bed
В			N	Work Order #
Basin Bed	6	Evidence of sinkholes or subsidence	Y N	Monitor for sinkhole development
	1	Large spot(s) showing bare soil	Y N	 Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost. Check Landscaping plan for guidance (if available) Work Order #
C Vegetation	2	Invasive plants are present	Y N	Remove the invasive plants and restore the vegetation in accordance with the landscaping plan Work Order #
	3	The vegetation in the basin has been mowed or removed	Y N	Revegetate the system in accordance with the vegetation plan Work Order # Note: The vegetation in a bioretention system should not be mowed or removed
Note:				

		For Inspector		For Maintenance Crew
D Bioretention System	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
Embankment and Side Slopes	2	Overgrown perimeter vegetation	Y N	Work Order # Mow the vegetation on the perimeter of the embankment Work Order # Note: Mowing of vegetation should only take place in the area outside the basin. Dense vegetation must be maintained in the basin.
Note:				

		For Inspector	-	For Maintenance Crew
F	1	Trees or excessive vegetation present	Y N	Remove trees and roots, and restore berms if necessary Work Order #
Emergency Spillway	2	Damaged structure	Y N	Repair Work Order #
	1	Fence: broken or eroded parts	Y N	Repair or replace Work Order #
G Miscellaneous	2	Gate: missing gate or lock	Y N	Repair or replace 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 #
Note:			1	

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

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	A1/A2/A3 – Pretreatment	
Sediment removal should	B – Basin Bed	
be taken place when the	D – Bioretention System Embankment and	
basin is thoroughly dry.	Side Slopes	
	E – Outlet	
	A1/A2/A3 – Pretreatment	
	B – Basin Bed	
Vegetation removal	D – Basin Embankment and Side Slopes	
	E – Outlet	
	F – Emergency Spillway	
(List additional tasks, if applicable)		

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:	
	(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:
- 3. The issue was from Corresponding Checklist _____, Component No. _____, Inspection Item No. _____.

4. Required Actions

Actions	Planned Date	Date Completed
Restabilize side slope (indicate		
location)		
Remove Sediment		
Revegetate		
Additional Items:		

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 _____

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

	GLO APPLICATION FOR PERMIT TO	UCESTER COUNTY	DEPARTMENT OF HEAL	TH .	*
•	APPLICATION SHALL BE SUBI	DISPOS	AL SYSTEM	AL SUBSURFACE SEW	AGE
	Septic PAYMENT SHALL	Reviews@cmeusa1.co	m and jalexander@cmeusa1.	VIEW BY DESIGN ENGI	NEER
	ONSITE INSPECTION MUNICIPAL	NS MUST BE SCHE	JCHD (CHECK OR MONE DULED VIA EMAIL: <u>GCHE</u> Twp	Y ORDER ONLY)	
Form 2b - Sc	il Log and Interpretation: Lot	Block	143		
1_Log Numb	erTP1 Method (Check One):	XProfile	Pit Boring		
Existing Grad 2. Soil Log	le Elevation:				
Depth	Münsel Color Name and Sy	mbol; Estimated Tex	ctural Class; (inches) Estim	ated Volume % Correct	enternancia de Pro-
Top-Bottom	Moist or Dry Consistence; M	Aottling-Abundance	e, Size and Contrast. If Pres		regiment, it Present;
0"-12"]	0YR 4/3 Sandy loam, Sub-angul	ar blocky, Friat	le		
12" - 31"	7.5YR 6/4 fine Loamy sand, Sub	-angular block	, Friable		
31" – 44"	7.5YR 6/6 Sandy clay loam, Sub-	angular blocky	, slightly Firm		
44" – 81"	7.5YR 6/6 Sandy clay Ioam, Ang	ular blocky, Fi	m (HR) with 35% o	Tavel	
81"-95"	7.5YR 5/4 Sandy clay loam, Ang with Common, Medium, Distinc	ular blocky, Fi t SYR 5/6 moti	m (HR) les @ 86"		÷
95" – 107	7.5YR 5/4 Sandy clay loam, An	gular blocky, sl	ightly Firm with 10	% mairel	
107" - 12	1" 7.5YR 5/4 Sandy loam, Sub-an	gular blocky. F	riable, with 15% or	avel	
121"-150)" 7.5YR 7/2 fine Loamy sand, Si	ngle grain, Loc	se	• • • • .	
	uin yn de fan skin yn nigenifie genyf frys de an an de fan yn ar yn a	injenikanus entitikitin simeenettettiitii		efti égi kur ki kan jégangangan kangangan kangangangan kang kang	nya na mana mana mana mana mana mana man
				* .	
3. Ground Wa	ter Observations:		н 		
Seepage-Indic Pit /Boring Pic	até Dépth N/E Rided-Denthafter	* Europe and			
a rindi transara	· · · · · · · · · · · · · · · · · · ·	mours	• • •		
4. Soil Limiting	(Zones (Check Appropriate Categories): k Substratum - Depth to Top	:			
Excessively Co	Substratum - Depth to Top arse Horizon - Depth Top to Bottom				
Excessively Co	arse Substratum - Depth to Top				
Hydraulically I Hydraulically I	Restrictive Horizon - Depth Top to Bottom	44" - 95"			
Perched Zone	of Saturation - Depth Top to Bottom				
Regional Zone	of Saturation - Depth to Top	86"			
5. Soll Suitabili	ity Classification: IIIHR		•	,	
6. I hereby cer the Water Poll	tify that the information furnished on Form ution Control Act (N.J.S.A. S8: IOA-I et seq.) a	2b of this application and is subject to pen	n is true and accurate. I an alties as prescribed in N.L.	aware that faisification A.C. 7: 14-8.	of data is a violation of
Signature of Si Date	te Evaluator				
ene ene energia de la companya de la					
Signature of Pr	ofessional Engineer	the second s	License # <u>6</u> E2	8106	, .

AP	GLOUCESTER CO PLICATION FOR PERMIT TO CONSTRUC DI PLICATION SHALL BE SUBMITTED ELEC SepticReviews@orner PAYMENT SHALL BE SUBMITE ONSITE INSPECTIONS MUST BE MUNICIPALITY	UNTY DEPARTMEN T/ALTER/REPAIR A SPOSAL SYSTEM TRONICALLY TO C ISS1.com and jalexande D TO SCHD (CHECH SCHEDULED VIA EI EIR Twp	T OF HEALTH N INDIVIDUAL SUBSURFACE SEWAGE ME FOR REVIEW BY DESIGN ENGINEER <u>r@cmeusal.com</u> (OR MONEY ORDER ONLY) MAIL: <u>GCHD@CMEUSA1.COM</u>
Form 2b - Soil Log and Inte	pretation Lot B	llock143	
1. Log NumberTP2	Method (Check One): xx P	rofile Pit	Boring
Existing Grade Elevation:	<u></u>		
2. Soil Log Depth Structure: Top-Bottom	Munsel Color Name and Symbol; Estimat Moist or Dry Consistence; Mottling-Abu	ted Textural Class; (ii ndance, Size and Co	iches) Estimated Volume % Coarse Fragment, If Present; htrast, if Present
0" – 11" 10YR 4/3 S	andy loam, Sub-angular blocky,	Friable	
11" - 50" 7.5YR 6/4	Sandy clay loam, Sub-angular b	locky, Friable,	with 10% gravel
50" – 71" 7.5YR 6/6	Sandy clay loam, Angular block	y, Firm (HR) w	ith 30% gravel
71" – 93" 7.5YR 6/6 with Con	Sandy loam, Sub-angular blocky mon, Medium, Distinct 5YR 5/6	v, Friable, with mottles @ 87"	40% gravel
93" – 144" 7.5¥R 7/	3 fine Loamy sand, Angular bloc	ky, Friable	un and and a start of the start of t
 Ground Water Observati Seepage-Indicate Dep Pit /Boring Flooded-Depth 	ons: th N/E afterHours	:	
4. Soil Limiting Zones (Chec Fractured Rock Substratum Massive Rock Substratum - Excessively Coarse Horizon Excessively Coarse Substrat Hydraulically Restrictive Ho Hydraulically Restrictive Sul Perched Zone of Saturation	c Appropriate Categories): - Depth to Top Depth to Top - Depth Top to Bottom um - Depth to Top rizon - Depth Top to Bottom 50" - 7 istratum - Depth to Top - Depth Top to Bottom	1 ¹⁴	
Regional Zone of Saturation	- Depth to Top 87"		
6. I hereby certify that the I the Water Pollution Contro	nformation furnished on Form 2b of this ap Act (N.J.S.A. 58: IOA-I et seq.) and is subjec	plication is true and t to penalties as pre	accurate. I am aware that faisification of data is a violation of scribed in N.I.A.C. 7: 14-8.
Signature of Site Evaluator Date10/13/20		1 - - -	
Signature of Professional Fr		F Terr	ma # 6F28106

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	GLOU APPLICATION FOR PERMIT TO APPLICATION SHALL BE SUBM Septick PAYMENT SHALL BI ONSITE INSPECTION: MUNICIPALIT	CESTER COUNTY DEPAR CONSTRUCT/ALTER/REF DISPOSAL SYS ITTED ELECTRONICALLY eviews@cmeusal.com and <u>ia</u> E SUBMITED TO GCHD (S MUST BE SCHEDULED YElk Twp	TMENT OF HEALTH PAIR AN INDIVIDUAL SUBSU TEM TO CME FOR REVIEW BY D Exander@cmeusal.com CHECK OR MONEY ORDER VIA EMAIL: <u>GCHD@CMEUS</u>	RFACE SEWAGE DESIGN ENGINEER ONLY) <u>A1.COM</u>
Form 2b - Soil Log and	Interpretation: Lot	Block143	ala angene eta ele a	
1. Log NumberTP3	Method (Check One):	Profile Pit	Boring	
Existing Grade Elevatio	Ф¢			
2. Soil Log Depth Structure: Top-Bottom	Munsel Color Name and Syr Moist or Dry Consistence; N	nbol; Estimated Textural C lottling-Abundance, Size a	lass; (inches) Estimated Volur and Contrast, If Present	ne % Coarse Fragment, If Present;
0" – 14" 10YR 4/	3 Sandy loam, Sub-angula	r blocky, Friable		
14" - 59" 7.5YR	6/4 Sandy clay loam, Sub-	angular blocky, Friz	able, with 10% gravel	
59" – 68" 7.5YR	7/2 fine Loamy sand, Sing	le grain, Loose, wit	h 15% gravel	
68" - 84" 7 5VR	5/4 Sandy Joam Sub-apor	lar blocky. Friable	with 35% gravel	
with C 102" - 144" 7.5Y	Common, Medium, Distinc R 5/8 Sandy loam, Sub-ar	argular blocky, Fr at 5YR 5/6 mottles @	lable, with 25% grave. § 85" le, with 25% gravel	t
3. Ground Water Obse Seepage-indicate Pit /Boring FloodedD	rvations: Depth N/E epth after		i na shi na mar shi na shi T	annanging gan annya gan dan dan dan dan dan dan dan dan dan d
4. Soil Limiting Zones (Fractured Rock Substrat Excessively Coarse Hou Excessively Coarse Sub Hydraulically Restrictiv Hydraulically Restrictiv Perched Zone of Satur Regional Zone of Satur	Check Appropriate Categories}: atum - Depth to Top um - Depth to Top Izon - Depth Top to Bottom Istratum - Depth to Top We Horizon - Depth Top to Bottom Ve Substratum - Depth to Top ation - Depth Top to Bottom Tation - Depth to Top	85"		
S. Soll Sultability Class	fication:			
6. I hereby certify that the Water Pollution C Signature of Site Evalu Date 10/	the information furnished on Forr ontrol Act (N.J.S.A. 58: 10A-1 et seq. ator 13/2023	n 2b of this application is t) and is subject to penaltie 	rue and accurate. I am aware s as prescribed in NJ.A.C. 7: I	that faisification of data is a violation of 4-8.
				1

Signature of Professional Engineer____

License # 6E28106

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GLOUCESTER COUNTY DEPAR APPLICATION FOR PERMIT TO CONSTRUCTAL TER/REI	TMENT OF HEALTH PAIR AN INDIVIDUAL SUBSURFACE SEWAGE
APPLICATION SHALL BE SUBMITTED ELECTRONICALLY	TEM TO CME FOR REVIEW BY DESIGN ENGINEER
PAYMENT SHALL BE SUBMITED TO GOLD (ONSITE INSPECTIONS MUST PE SCHEDU	lexander@cineusa1.com CHECK OR MONEY ORDER ONLY)
MUNICIPALITYEik Twp	VIA EMAIL: GCHD@CMEUSA1.COM
Form 2b - Soil Log and Interpretation: Lot Block143	www.iffition.gag
1. Log NumberTP4 Method (Check One):xx Profile Pit	Boring
Existing Grade Elevation:	
2. Soil Log Depth Munsel Color Name and Symbol: Estimated Textural C	assi finches) Fetimated Volume & Corres Engrand 14 march
Structure: Top-Bottom Moist or Dry Consistence; Mottling-Abundance, Size a	nd Contrast. If Present
0"-7" 10YR 4/3 Sandy Joam Sub-anoniar blocky Prichle	
To a reason of the second	
7" – 29" 7.5YR 6/4 Sandy loam, Sub-angular blocky, Friable	
29"-42" 7.5YR 6/4 Sandy clay loam, Sub-angular blocky, Fria	ble
42"-60" 7.5YR 6/6 Loamy sand, Sub-angular blocky, Friable,	with 10% gravel
60" - 87" 7.5YR 5/4 Sandy loam, Sub-angular blocky, Friable, with Common, Medium, Distinct 5YR 5/6 mottles @	with 25% gravel) 84"
87" - 105" 7.5YR 7/3 fine Loamy sand, Angular blocky, Friable	e, with 25% gravel
105" - 125" 7.5YR 7/3 fine Loamy sand. Single grain, Loose	
125" – 150" 7.5 YR 7/1 fine Sand, Single grain, Loose	
ana itan pada pada ini mutaka kang kang kang kang kang kang kang k	n na
3. Ground Water Observations:	
Pit /Boring FloodedDepth afterHours	
4. Soil Limiting Zones (Check Appropriate Categories):	
Fractured Rock Substratum - Depth to Top Massive Rock Substratum - Depth to Top	
Excessively Coarse Horizon - Depth Top to Bottom Excessively Coarse Substratum - Depth to Top	
Hydraulically Restrictive Horizon - Depth Top to Bottom	
Hydraulically Restrictive Substratum - Depth to Top Perched Zone of Saturation - Depth Top to Bottom	
Regional Zone of Saturation - Depth to Top 84"	
5. Soil Suitability Classification:	•
6. I hereby certify that the information furnished on Form 2b of this application is tri the Water Pollution Control Act (NJ.S.A. 58: IOA-I et seq.) and is subject to penalties	ue and accurate. I am aware that falsification of data is a violation of as prescribed in N.J.A.C. 7: I4-8.
Signature of Site Evaluator	
Date10/13/2023	t Ca Diala
Signature of Professional Engineer	License # 0128100

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Form 2b - Soil Log and Interpretation: Log NumberTP5Method (Check One):xo Profile PitBoring Lisg NumberTP5Method (Check One):xo Profile PitBoring Existing Grade Elevation:		PAYMENT SI ONSITE INSPE MUNI	HALL BE S	SUBMT AUST I	TED TO GC BE SCHEDU Elk Tw	HD (CHE ILED VIA	ECK OR MONEY ORDER ONLY) EMAIL: <u>GCHD@CMEUSA1.COM</u>
Li log NumberTPSMethod (Check One):	orm 2b - Soil Log and Interp	retation:	Lot	\$	Block	_143	
Existing Grade Elevation:	1. Log NumberTPS	Method (Check Or	ie):	XX.	Profile Pit		Boring
	xisting Grade Elevation:		÷				
Windows: top-Bottom Moist or Dhy Consistence: Motifing-Abundance, Size and Contrast, if Present " - 8" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable 3" - 21" 7.5YR 6/4 Sandy loam, Sub-angular blocky, Friable 21" - 37" 7.5YR 7/2 Loamy sand, Sub-angular blocky, Friable 21" - 37" 7.5YR 5/8 Sandy clay loam, Angular blocky, Slightly Firm, with 15% gravel 77" - 97" 7.5YR 5/4 Sandy clay loam, Sub-angular blocky, slightly Firm, with 15% gravel 77" - 97" 7.5YR 5/4 Sandy clay loam, Sub-angular blocky, slightly Firm, with 25% gravel 77" - 97" 7.5YR 5/4 Sandy clay loam, Sub-angular blocky, Slightly Firm, with 25% gravel 77" - 117" 7.5YR 6/4 fine Loamy sand, Sub-angular blocky, Friable 217" - 114" 7.5YR 7/1 fine Sand, Single grain, Loose 3. Ground Water Observations: Segrage-indicate Depth N/E Tractured hock Substratum - Depth to Top 22. Sold Suttability Classification: I Segrature of Startation - Depth Top to Bottom Paceastryc Coarse Horizon - Depth Top to Bottom Paceastryc Coarse Horizon - Depth Top to Bottom Paceastryc Coarse Horizon - Depth Top to Bottom Paceastrictive Substratum - Depth to Top Paceastrictive Substratum - Depth	l, Soil Log Depth	Munsel Color Name	and Symb	ol: Esti	mated Texts	urai Class	: linchest Estimated Volume % Coarse Fragment, if Present
Notes of UV Consistence, Notifing - Aduntance, size and Contrast, if Present V" - 8" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable Step 21" 7.5YR 6/4 Sandy loam, Sub-angular blocky, Friable 21" - 37" 7.5YR 7/2 Loainy sand, Sub-angular blocky, Friable 21" - 77" 7.5YR 5/8 Sandy clay loam, Angular blocky, Slightly Firm, with 15% gravel 77" - 77" 7.5YR 5/8 Sandy clay loam, Sub-angular blocky, slightly Firm, with 15% gravel 77" - 97" 7.5YR 5/4 Sandy clay loam, Sub-angular blocky, slightly Firm, with 25% gravel with Common, Medium, Distinct 5YR 5/6 mottles @ 82" 77" - 117" 7.5YR 6/4 fine Loamy sand, Sub-angular blocky, Friable 117" - 144" 7.5YR 7/1 fine Sand, Single grain, Loose 14. Ground Water Observations: Stepage-indicate Depth N/E Mours 4. Soll Uniting Zones (Check Appropriate Categories): Fractured Rock Substratum - Depth to Top Wassite Rock Substratum - Depth to Top Wassite Rock Substratum - Depth to Top Mours 5. Soll Suitability Classification: 1 6. Investing Control Act (NJ S.A. 38: 10A-1 er seq.) and is subject to penalties as prescribed in NJAC. 7: 14-8. Signature of Structor Signature of Structor 10/13/2023 10/13/2023 10/13/2023 10/13/2023	tructure:		1711 7 7 1170 11212 - NHOR		8 i		an marana a agas a com
³⁷ - 8° 10YR 4/3 Sandy loam, Sub-angular blocky, Friable ³⁷ - 21° 7.5YR 6/4 Sandy loam, Sub-angular blocky, Friable ³⁷ - 77° 7.5YR 7/2 Loainy sand, Sub-angular blocky, Friable ³⁷ - 77° 7.5YR 5/8 Sandy clay loam, Angular blocky, slightly Firm, with 15% gravel ³⁷ - 97° 7.5YR 5/8 Sandy clay loam, Sub-angular blocky, slightly Firm, with 15% gravel ³⁷ - 97° 7.5YR 5/4 Sandy clay loam, Sub-angular blocky, slightly Firm, with 25% gravel ³⁷ - 97° 7.5YR 5/4 Sandy clay loam, Sub-angular blocky, slightly Firm, with 25% gravel ^{37°} - 117° 7.5YR 6/4 fine Loamy sand, Sub-angular blocky, Friable ^{37°} - 117° 7.5YR 6/4 fine Loamy sand, Sub-angular blocky, Friable ³¹ - 144° 7.5YR 7/1 fine Sand, Single grain, Loose ³⁸ 6round Water Observations: ³⁸ sepage-indicate Depth N/E ⁴⁰ (bering floaded-Depth after	op-bottom	Wolst or Dry Consist	tence; Mot	tiing/	Abundance,	Size and	Contrast, if Present
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Form 2b - Soil Log and	Interpretation:	Lot1	8lock143_			
1. Log NumberTP7	/Method (Check	One):xx	Profile Pit	Boring		
Existing Grade Elevatio	n:				,	
2. Soll Log					٠	
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Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring FloodedDe 4. Soil Limiting Zones (C Fractured Rock Substratu Massive Rock Substratu	collapse / cave-in vations: Depth N/E opth after heck Appropriate Categ tum - Depth to Top am - Depth to Top	an de la constantia de la consta Constantia de la constantia de la constantia de la constantia de la constantia de la constantia de la constanti	łours	- - - 	an an an an an an an an an an an an an a	ne ne za na na na na na na na na na na na na na
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring Flooded-De 4. Soil Limiting Zones (C Fractured Rock Substratu Massive Rock Substratu Excessively Coarse Hori	collapse / cave-in vations: Depth N/E opth after heck Appropriate Categ turn - Depth to Top im - Depth to Top im - Depth to Top zon - Depth Top to Botto		łours	- - - - - - - - - - - - - - - - - - -	<u>terina a fasta a su a su a su a su a su a su a su </u>	ne kalakan ni nyangi kalakan na ka
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring FloodedDe 4. Soil Limiting Zones (C Fractured Rock Substratu Excessively Coarse Hori Excessively Coarse Subs	collapse / cave-in vations: Depth N/E opth after heck Appropriate Categ tum - Depth to Top im - Depth to Top zon - Depth to Top zon - Depth to Top	ories): 2m	łours		an an an an an an an an an an an an an a	n te talatan sakit ni nyangi kati ating
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring FloodedDe 4. Soil Limiting Zones (C Fractured Rock Substratu Excessively Coarse Hori, Excessively Coarse Hori, Excessively Coarse Subs Hydraulically Restrictive Hydraulically Restrictive	collapse / cave-in vations: Depth N/E opth after heck Appropriate Categ tum - Depth to Top zon - Depth to Top zon - Depth to Top zon - Depth to Top s Horizon - Depth to Top e Horizon - Depth Top to s Substratum - Depth to	ories): Pm Bottom Too			na na na na na na na na na na na na na n	ne triban - dila si n quanți în triba în dina
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring Flooded—De 4. Soil Limiting Zones (C Fractured Rock Substratu Excessively Coarse Hori Excessively Coarse Hori Excessively Coarse Subs Hydraulically Restrictive Perched Zone of Satura	collapse / cave-in vations: Depth N/E spth after heck Appropriate Categ tum - Depth to Top im - Depth to Top zon - Depth Top to Botto stratum - Depth to Top e Honzon - Depth Top to sobstratum - Depth to Top tion - Depth Top to Bott	ories): m Bottom Top	łours	Mayran Talifa (1990) 	terne et anter anter a fara en en en en en en en en en en en en en	ne dele descrittario no descrittaria de la dele de
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring FloodedDe 4. Soil Limiting Zones (C Fractured Rock Substratu Excessively Coarse Hori Excessively Coarse Hori Excessively Coarse Subs Hydraulically Restrictive Perched Zone of Satura Regional Zone of Satura	collapse / cave-in vations: Depth N/E opth after heck Appropriate Categ tum - Depth to Top im - Depth to Top im - Depth Top to Botto itratum - Depth Top to Botto itratum - Depth Top to Substratum - Depth Top to Substratum - Depth Top to Substratum - Depth Top to Bott ition - Depth Top to Bott		lours	- - 	<u>tenen al para se da se da se da se da se da se da se da se da se da se da se da se da se da se da se da se da s</u>	ne tell da maniferativa e se se se se se se se se se se se se s
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring FloodedDe 4. Soil Limiting Zones (C Fractured Rock Substratu Excessively Coarse Hori Excessively Coarse Hori Excessively Coarse Subs Hydraulically Restrictive Hydraulically Restrictive Perched Zone of Satura Regional Zone of Satura 5. Soil Suitability Classif	collapse / cave-in vations: Depth N/E opth after heck Appropriate Categ tum - Depth to Top im - Depth to Top zon - Depth Top to Botto itratum - Depth to Top e Horizon - Depth Top to Botto itratum - Depth Top to Botto itroi - Depth Top to Botto ition - Depth to Top ication:	ories): Pm Bottom Top gm 82*	łours		<u>tenen al pou a se la se se se se se se se se se se se se se </u>	ne talata ang kang talat talat ta
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring Flooded-De 4. Soil Limiting Zones (C Fractured Rock Substratu Excessively Coarse Hori Excessively Coarse Hori Excessively Coarse Subs Hydraulically Restrictive Hydraulically Restrictive Perched Zone of Satura Regional Zone of Satura S. Soil Suitability Classif 6. I hereby certify that t the Water Pollution Cor	collapse / cave-in vations: Depth N/E opth after heck Appropriate Categ tum - Depth to Top im - Depth to Top zon - Depth Top to Botto itratum - Depth Top to Botto itratum - Depth Top to Botto itratum - Depth Top to Botto itron - Depth Top to Botto ition - Depth Top to Botto ition - Depth to Top leation: I the information furnishe ntrol Act (N.J.S.A. 58: 104	ories): om Bottom Top om 82* d on Form 2b of th of et seq.) and is su	is application is true	s and accurate. I	am aware that faisification) of data is a viola
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring FloodedDe 4. Soil Limiting Zones (C Fractured Rock Substratu Brassive Rock Substratu Excessively Coarse Honi Excessively Coarse Honi Excessively Coarse Subs Hydraulically Restrictive Hydraulically Restrictive Hydraulically Restrictive Perched Zone of Satura Regional Zone of Satura 5. Soil Suitability Classif 6. I hereby certify that to the Water Pollution Cor Signature of Site Evalua	collapse / cave-in vations: Depth N/E pth after heck Appropriate Categ tum - Depth to Top zon - Depth Top to Botto stratum - Depth Top to Botto stratum - Depth Top to Botto stratum - Depth Top to Botto stratum - Depth Top to Botto iton - Depth Top to Botto tion - Depth Top to Botto tion - Depth to Top lication: I the information furnished http://www.com/actor/lication/licati	ories): Dm Bottom Top om 82 [#] d on Form 2b of th of et seq.) and is su	lours	s and accurate. I is prescribed in N	am awaire that faisification J. A. C. 7: 14-8.) of data is a viola
Pit discontinued due to 3. Ground Water Obser Seepage-Indicate Pit /Boring Flooded—De 4. Soil Limiting Zones (C Fractured Rock Substratu Excessively Coarse Subs Massive Rock Substratu Excessively Coarse Subs Hydraulically Restrictive Perched Zone of Satura Regional Zone of Satura 5. Soil Suitability Classif 6. I hereby certify that t the Water Pollution Cor Signature of Site Evalua Date10/1	collapse / cave-in vations: Depth N/E pth after heck Appropriate Categ tum - Depth to Top im - Depth to Top zon - Depth Top to Botto stratum - Depth Top to Botto stratum - Depth Top to Botto iton - Depth Top to Botto iton - Depth Top to Botto cation - Depth to Top ication: I the information furnishe ntrol Act (N.I.S.A. 58: 104 itor 3/2023	ories): om Bottom Top om 82 [#] d on Form 2b of th of the seq.) and is su	lours	e and accurate. I Is prescribed in N	am aware that faisification J.A.C. 7: 14-8.) of data is a viola

GLOUCESTER COUNTY DEPARTMEN APPLICATION FOR PERMIT TO CONSTRUCT/ALTER/REPAIR A DISPOSAL SYSTEM APPLICATION SHALL BE SUBMITTED ELECTRONICALLY TO C SepticReviews@cmeusal.com and jalexande PAYMENT SHALL BE SUBMITTED TO GCHD (CHEC) ONSITE INSPECTIONS MUST BE SCHEDULED VIA EI MUNICIPALITYEIK Twp	T OF HEALTH N INDIVIDUAL SUBSURFACE SEWAGE ME FOR REVIEW BY DESIGN ENGINEER r@cmeusal.com (OR MONEY ORDER ONLY) MAIL: <u>GCHD@CMEUSA1.COM</u>
Form 2b - Soil Log and Interpretation: Lot Block143	
1. Log NumberTP8 Method (Check One):xx Profile Pit	Boring
Existing Grade Elevation:	
2. Soil Log Depth Munsel Color Name and Symbol; Estimated Textural Class; (i Structure: Top-Bottom Moist or Dry Consistence; MottlingAbundance, Size and Co	nches) Estimated Volume % Coarse Pragment, If Present; ntrast, If Present
0" – 8" 10YR 4/3 Sandy loam, Sub-angular blocky, Friable	
8" - 34" 7.5YR 6/6 Sandy clay loam, Angular blocky, Friable, with	15% gravel
34" - 76" 7.5YR 6/6 Sandy loam, Sub-angular blocky, Friable	1
76" - 91" 7.5YR 7/3 fine Loamy sand, Single grain, Loose with Common, Medium, Distinct 5YR 5/6 mottles @ 79"	и и у Эр 1 1 1
91"-135" 7.5YR 7/1 fine Sand, Single grain, Loose	
Pit discontinued due to collapse / cave-in	ning sing same tang tang tang tang tang tang tang tang
3. Ground Water Observations:	
Seepage-Indicate Depth N/E Pit /Boring FloodedDepth afterHours	
4. Soil Limiting Zones (Check Appropriate Categories): Fractured Rock Substratum - Depth to Top Massive Rock Substratum - Depth to Top Excessively Coarse Horizon - Depth Top to Bottom Excessively Coarse Substratum - Depth to Top Hydraulically Restrictive Horizon - Depth Top to Bottom Hydraulically Restrictive Substratum - Depth to Top Perched Zone of Saturation - Depth Top to Bottom Regional Zone of Saturation - Depth to Top 79°	• • • • • • • • • • • • • • • • • • •
5. Soil Suitability Classification:	
6. I hereby certify that the information furnished on Form 2b of this application is true ar the Water Pollution Control Act (N.J.S.A. 58: IOA-I et seq.) and is subject to penalties as p	d accurate. I am aware that falsification of data is a violation of rescribed in N.I.A.C. 7: 14-8.
Signature of Site Evaluator Date10/13/2023	
Signature of Professional Engineer	icense # <u>GE2810b</u>

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P.O. Box 1406 Do Voorhees, NJ 08043 Elk MUNICIPALITY Elk Township Form 3b. Tube Permeameter Test Data 1. 1. Test Number 1 2. Material Tested Fill 3. Type of Sample Undisturbed 4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	buglass Street Stormwater - TP1 k Township Horizon 95"-107" A Date Collected 10/13/2023 X Test in Native Soil - Indicate Depth 1.905 3
Voorhees, NJ 08043 Elk MUNICIPALITY Elk Township Form 3b. Tube Permeameter Test Data 1. 1. Test Number 1 Replicate Letter 2. Material Tested Fill Image: Stample 3. Type of Sample Undisturbed 4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	k Township Horizon 95"-107" A Date Collected 10/13/2023 X Test in Native Soil - Indicate Depth 102" X Test in Native Soil - Indicate Depth 102" 1.905 3 145 59
MUNICIPALITY Elk Township Form 3b. Tube Permeameter Test Data 1. Test Number 1 2. Material Tested Fill 3. Type of Sample Undisturbed 4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches In cm	A Date Collected 10/13/2023 X Test in Native Soil - Indicate Depth 102" X Disturbed 1.905 3 145.59 145.59
MUNICIPALITY Elk Township Form 3b. Tube Permeameter Test Data 1. Test Number 1 2. Material Tested Fill 3. Type of Sample Undisturbed 4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches In cm	A Date Collected 10/13/2023 X Test in Native Soil - Indicate Depth 102" X Disturbed 1.905 3 145.59 145.59
Form 3b. Tube Permeameter Test Data 1. Test Number 1 2. Material Tested Fill 3. Type of Sample Undisturbed 4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches Inches	A Date Collected 10/13/2023 X Test in Native Soil - Indicate Depth 102" X Disturbed 1.905 3 145.59 Disturbed
1. Test Number 1 Replicate Letter 2. Material Tested Fill 3. Type of Sample Undisturbed 4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	A Date Collected 10/13/2023 X Test in Native Soil - Indicate Depth 102" X Disturbed 102" 1.905 3 145.59
2. Material Tested Fill Grample Grample Grample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	X Test in Native Soil - Indicate Depth 102" X Disturbed
3. Type of Sample Undisturbed 4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	X Disturbed
4. Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905
	145 50
5. Bulk Density Determination (Disturbed Samples Only): Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube Sample Volume (L x 2.54 cm/inch x 3.14R ²), cc Bulk Density (Sample Wt./Sample Volume), grams/cc	86.83 1.68
6. Standpipe Used:x No Yes Indicate internal Radius, cm	
7. Height of water Level above Rim of Test Basin in inches: At the Beginning of Each Test Interval, H1 At the End of Each Test Interval, H2	<u>3.0</u> 2.0
8. Rate of Water Level Drop (Add additional lines if needed):	
Time, Start of Test Time, End of Test Length of Test Interval, Interval, T1 Interval, T2 T, (min) (min.sec) (min.sec)	
0.00 43.05 43.08	
0.00 <u>40.42</u> 40.70	
9. Calculation of Permeability:	
K, (in/hr) = 60 min/hr x r^2/R^2 x L(in)/T(min) x ln (H1/H2)	
k= 60 min/hr x x 3/ 43.70 x l	In(3/2)
k= 1.67	
10. Defects in the Sample (Check appropriate items):	

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_____ None ____Cracks ____Worm Channels _____Root Channels ______Root Channels _____Large Gravel _____Large Roots

_____ Dry Soil _____Smeering ____Compactation

_____ Other---Specify______

South Jersey En	gineers LLC		Tristate Er	ngineering	Sample Date	: 10/13/23
P.O. Box 1406	3043		Douglass Str	reet	Stormwater - TI	P1
v 00111003, 140 00		·····	EIK TOWNSHI	0	Honzon 95 - 10	/
MUNICIPALITY	Elk Township					
Form 3b. Tube Permea	ameter Test Data					
1. Test Number	1	Replicate Letter	В	Date Collecte	ed 10/13/2023	
2. Material Tested		Fill	X]Test in Native Soil -	Indicate Depth	102"
3. Type of Sample		Undisturbed		X	Disturbed	
4. Sample Dimensions	Inside Radius of Sampl Length of Sample, in in	e Tube, R, in cm ches	1.905 3			
5. Bulk Density Determ Sample Weight (Wt. Sample Volume (L x 2 Bulk Density (Sample	ination (Disturbed Samp Tube Containing Sample 2.54 cm/inch x 3.14R²), (Wt./Sample Volume), g	oles Only): e - Wt. Empty Tube cc rams/cc	147.61 86.83 1.70			
6. Standpipe Used: Indicate internal Rac	No dius, cm	Yes		_		
7. Height of water Leve At the Beginning of E At the End of Each T	el above Rim of Test Bas Each Test Interval, H1 Fest Interval, H2	sin in inches:	3.0 2.0			
8. Rate of Water Level	Drop (Add additional lin	ies if needed):				
Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interva T, (min)	1,			
0.00	45.39	45.65				
0.00	45.56	45.94	1			
0.00	46.03	46.04	-			
9. Calculation of Perm	eability:					
K, (in/hr) = 60 min/hr	$x r^2/R^2 x L(in)/T(min) x$	in (H1/H2)		-		
k= 60 min/hr	x x 3/	46.04	x ln(3/2)			
k=	1.59					
10. Defects in the Sam	ple (Check appropriate	items):				
	Gracks Worm Ch	anneisRoot Cha	arineis			
Soil/Tube Co	ontactLarge Grave	eiLarge Roots				
Dry Soil	SmeeringCom	pactation				

_____ Other--Specify____

South Jersey Engineers LLC		i ristate Engineering	Sample Date: 10/13/23	
P.O. Box 1406 Voorbees, NJ 08043		Douglass Street	Stormwater - TP2	
		Elk Township	Horizon 71"-93"	
100111000, 110 00				
MUNICIPALITY [Elk Township			
Form 3b. Tube Permea	meter Test Data			
1. Test Number	1 Replicate Lette	er A Date Co	llected 10/13/2023	
2. Material Tested	Fill	X Test in Native S	Soil - Indicate Depth 86"	
3. Type of Sample	Undisturbed	X	Disturbed	
4. Sample Dimensions	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905 3		
5. Bulk Density Determ Sample Weight (Wt. 1 Sample Volume (L x 2	ination (Disturbed Samples Only): Fube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R²), cc	146.59 86.83		
Bulk Density (Sample	Wt./Sample Volume), grams/cc	1.69		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac	Wt./Sample Volume), grams/cc x No Yes lius, cm	1.69		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T	Wt./Sample Volume), grams/cc No Yes lius, cm el above Rim of Test Basin in inches: fach Test Interval, H1 est Interval, H2	<u> </u>		
 Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level 	Wt./Sample Volume), grams/cc <u>x</u> No Yes lius, cm al above Rim of Test Basin in inches: ach Test Interval, H1 est Interval, H2 Drop (Add additional lines if needed):	1.69 3.0 2.0		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level Time, Start of Test Interval, T1 (min sec)	Wt./Sample Volume), grams/cc <u>x</u> No Yes lius, cm Yes al above Rim of Test Basin in inches: ach Test Interval, H1 est Interval, H2 Drop (Add additional lines if needed): Time, End of Test Length of Test Interv Interval, T2 T, (min) (min sec)	<u>1.69</u> <u>3.0</u> <u>2.0</u>		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00	wt./Sample Volume), grams/cc	<u>1.69</u> <u>3.0</u> 2.0		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00	wt./Sample Volume), grams/cc	1.69 3.0 2.0		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00 0.00	Wt./Sample Volume), grams/cc	1.69 3.0 2.0		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00	wt./Sample Volume), grams/cc	1.69 3.0 2.0 al,		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00	Wt./Sample Volume), grams/cc	1.69 3.0 2.0		
Bulk Density (Sample 6. Standpipe Used: Indicate internal Rac 7. Height of water Leve At the Beginning of E At the End of Each T 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00	Wt./Sample Volume), grams/cc	1.69 3.0 2.0 al, x ln(3/2)		

x None Cracks Worm Channels Root Channels Soil/Tube Contact Large Gravel Large Roots

_____Dry Soil _____Smeering _____Compactation

_____Other---Specify_____C

South Jersey Er	gineers LLC	Tristate Er	ngineering	Sample Date:	10/13/23
P.O. Box 1406		Douglass St	reet	Stormwater - TP2	
Voorhees NJ 08	3043	Elk Townshi	n	Horizon 71"-93"	
		2			
MUNICIPALITY	Elk Township				
Form 3b. Tube Permea	ameter Test Data				
1. Test Number	1 Replicate Lette	r B] Date Collected	10/13/2023	
2. Material Tested	Fill	X	Test in Native Soil - I	ndicate Depth	86"
3. Type of Sample			X	Disturbed	
4. Sample Dimensions	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905 3].		
5. Bulk Density Determ Sample Weight (Wt. Sample Volume (L x Bulk Density (Sample	nination (Disturbed Samples Only): Tube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R²), cc 9 Wt./Sample Volume), grams/cc	145.48 86.83 1.68			
6. Standpipe Used: Indicate internal Rad	X No Yes dius, cm		_		
7. Height of water Leve At the Beginning of I At the End of Each 1	el above Rim of Test Basin in inches: Each Test Interval, H1 Fest Interval, H2	3.0 2.0			
8. Rate of Water Leve	I Drop (Add additional lines if needed):				
Time, Start of Test Interval, T1 (min sec)	Time, End of Test Length of Test Interva Interval, T2 T, (min)	al,			
0.00	12.48 12.80				
0.00	13.15 13.25				
0.00	13.42 13.69	_			
		\neg			
9. Calculation of Perm	eability:	<u> </u>			
$V_{\rm c}$ (in/hr) = 60 min/hr	v r²/D² v [/in)/T/min) v In /U1/iJ0)				
k = 60 min/hr	x x 3/ 13.69	x In(3/2)	٦		
k=	5.33				
4- <u></u>					
10. Defects in the Sar None Soil/Tube Co Dry Soii	nple (Check appropriate items): _CracksWorm ChannelsRoot Ch ontactLarge GravelLarge Roots SmeeringCompactation	annels			

____Other---Specify_____

outh Jersey Engineers LLC		Tristate Engineering		Sample Date: 10/13/23		
2.O. Box 1406		Douglass Street		Stormwater - TP3		
Voorhees. NJ 08	043		Elk Township) 	Horizon 102"-1	44"
MUNICIPALITY [Elk Township					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Lette	r A] Date Collect	ed 10/13/2023	
2. Material Tested	Fill		X	Test in Native Soil	- Indicate Depth	114"
3. Type of Sample	Un	disturbed		X	Disturbed	
4. Sample Dimensions	Inside Radius of Sample T Length of Sample, in inche	īube, R, in cm es	1.905 3			
5. Bulk Density Determ Sample Weight (Wt. Sample Volume (L x 2 Bulk Density (Sample	ination (Disturbed Sample Tube Containing Sample - 2.54 cm/inch x 3.14R ²), cc Wt./Sample Volume), gran	s Only): Wt. Empty Tube ms/cc	145.37 86.83 1.67			
 6. Standpipe Used: Indicate internal Rad 7. Height of water Leve At the Beginning of E At the End of Each T 	No dius, cm el above Rim of Test Basin Each Test Interval, H1 Fest Interval, H2	Yes in inches:	3.0 2.0			
8. Rate of Water Leve	I Drop (Add additional lines	s if needed):				
Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Le Interval, T2 (min.sec)	ength of Test Intervi T, (min)	ai,			
0.00	12.53	12.88				
0.00	13.08	13.14				
9. Calculation of Perm K, (in/hr) = 60 min/hr k= 60 min/hr	neability: <u>x r²/R² x L(in)/T(min) x ln</u> <u>x x 3/</u>	(H1/H2) 13.14	x ln(3/2)	• _		,
k=	5.56					
10. Defects in the Sar None Soil/Tube C Dry Soil	nple (Check appropriate ite _CracksWorm Char ontactLarge Gravel SmeeringCompa	ems): InelsRoot Cl Large Roots Inctation	nannels			

_____ Other---Specify_

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South Jersey En	gineers LLC	Tristate Engineering	Sample Date: 10/13/23
P.O. Box 1406	х.	Douglass Street	Stormwater - TP3
Voorhees, NJ 08	3043	Elk Township	Horizon 102"-144"
, , , , , , , , , , , , , , , , , , , ,			
MUNICIPALITY	Elk Township		
Form 3b. Tube Permea	ameter Test Data		
1. Test Number	1 Replicate Lette	er B Date Collecte	d 10/13/2023
2. Material Tested	Fill	X Test in Native Soil -	Indicate Depth 114"
3. Type of Sample	Undisturbed	X	Disturbed
4. Sample Dimensions	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	<u>1.905</u> 3	
5. Bulk Density Detern Sample Weight (Wt. Sample Volume (L x Bulk Density (Sample	nination (Disturbed Samples Only): Tube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R²), cc Wt./Sample Volume), grams/cc	147.06 86.83 1.69	
6. Standpipe Used: Indicate internal Rad	X No Yes dius, cm		
 Height of water Leve At the Beginning of E At the End of Each 1 	el above Rim of Test Basin in inches: Each Test Interval, H1 Fest Interval, H2	3.0 2.0	
8. Rate of Water Leve	I Drop (Add additional lines if needed):		
Time Start of Test	Time End of Test i ength of Test Interv	al	
Interval, T1	Interval, T2 T, (min)	o,	
(min.sec)	(min.sec)		
0.00	12.12 12.20		
0.00	12.14 12.23		
0.00	12.32 12.53		
,		_	
9. Calculation of Perm	eability:		
K, (in/hr) = 60 min/hr	x r²/R² x L(in)/T(min) x ln (H1/H2)		
k= 60 min/hr	x/ x 3/ 12.53	x ln(3/2)	
k=	5.82		
10. Defects in the Sar None	nple (Check appropriate items): _CracksWorm ChannelsRoot Ch	nannels	
Soil/Tube Co	ontactLarge GravelLarge Roots		
Dry Soil	SmeeringCompactation		
OtherSpe	cify		

South Jersey En	gineers LLC		Tristate En	gineering	Sample Date: 10/13/23
P.O. Box 1406			Douglass Str	eet	Stormwater - TP4
Voorhees N.L.08	8043		Elk Townshin	 \	Horizon 42"-60"
			ERTOWNSIN	, 	
MUNICIPALITY	Elk Township]			
Form 3b. Tube Permea	imeter Test Data				
1. Test Number	1] Replicate Lette	r A	Date Collected	10/13/2023
2. Material Tested		Fill	X	Test in Native Soil - I	ndicate Depth 51"
3. Type of Sample		Undisturbed		X	Disturbed
4. Sample Dimensions	Inside Radius of Sam Length of Sample, in i	ple Tube, R, in cm inches	1.905 3]	
5. Bulk Density Determ Sample Weight (Wt. ⁻ Sample Volume (L x 2 Bulk Density (Sample	ination (Disturbed Sar Fube Containing Samp 2.54 cm/inch x 3.14R²) Wt./Sample Volume),	nples Only): ble - Wt. Empty Tube , cc grams/cc	150.01 86.83 1.73		
6. Standpipe Used: Indicate internal Rad	No dius, cm	Yes		-	
 Height of water Leve At the Beginning of E At the End of Each T 	el above Rim of Test B Each Test Interval, H1 Fest Interval, H2	asin in inches:	3.0 2.0		
8. Rate of Water Level	Drop (Add additional	lines if needed):			
Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interva T, (min)	al,		
0.00	5.59	5.99			
0.00	6.01	6.01	_		
0.00	6.01	6.01			
9. Calculation of Perm	eability:				
K. $(in/hr) = 60 min/hr$	$x r^2/R^2 x L(in)/T(min)$	x In (H1/H2)			
k= 60 min/hr	x x	3/ 6.01	x ln(3/2)]	
k=	12.14				

10. Defects in the Sample (Check appropriate items):

x None Cracks Worm Channels Root Channels Soil/Tube Contact Large Gravel Large Roots

Dry Soil ____Smeering ___Compactation

_____ Other---Specify_____

South Jersey Engineers LLC	Tristate Engineering	Sample Date: 10/13/23	
P.O. Box 1406	Douglass Street	Stormwater - TP4	
Voorhees, NJ 08043	Elk Township	Horizon 42"-60"	
en en la companya de la companya de la companya de la companya de la companya de la companya de la companya de			
MUNICIPALITY Elk Township			
Form 3b. Tube Permeameter Test Data			
1. Test Number 1 Replicate Lette	Date Collected	10/13/2023	
2. Material Tested	X Test in Native Soil - I	ndicate Depth 51"	
3. Type of Sample Undisturbed	X	Disturbed	
 Sample Dimensions Inside Radius of Sample Tube, R, in cm Length of Sample, in inches 	1.905		
 Bulk Density Determination (Disturbed Samples Only): Sample Weight (Wt. Tube Containing Sample - Wt. Empty Tube Sample Volume (L x 2.54 cm/inch x 3.14R²), cc Bulk Density (Sample Wt./Sample Volume), grams/cc 	152.15 86.83 1.75		
6. Standpipe Used: <u>x</u> No <u>Yes</u> Indicate internal Radius, cm			
 Height of water Level above Rim of Test Basin in inches: At the Beginning of Each Test Interval, H1 At the End of Each Test Interval, H2 	3.0 2.0		
8. Rate of Water Level Drop (Add additional lines if needed):			
Time, Start of Test Time, End of Test Length of Test Interva Interval, T1 Interval, T2 T, (min) (min sec) (min sec)	il,		
0.00 5.40 5.67			
0.00 5.52 5.87	/		
0.00 5.57 5.96	_		
9. Calculation of Permeability:	_		
K, (in/hr) = 60 min/hr x r^2/R^2 x L(in)/T(min) x ln (H1/H2)	x lp(3/2)		
k= 12.25	<u> </u>		
10. Defects in the Sample (Check appropriate items): <u>x</u> None Cracks Worm Channels Root Ch Soil/Tube Contact Large Gravel Large Roots Dry Soil Smeering Compactation Other—Specify	annels		

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South Jersey Engineers L	LC	Tristate Engineering	Sample Date: 10/13/23
P.O. Box 1406		Douglass Street	Stormwater - TP5
Voorhees, NJ 08043		Elk Township	Horizon 97"-117"
MUNICIPALITY Elk Tow	nship		
Form 3b. Tube Permeameter Test D	Pata		
1. Test Number 1	Replicate Let	ter A Date Coll	ected 10/13/2023
2. Material Tested	Fill	X Test in Native S	oil - Indicate Depth 108"
3. Type of Sample	Undisturbed	X	Disturbed
4. Sample Dimensions Inside Radiu Length of Sa	s of Sample Tube, R, in cm mple, in inches	1.905 3	
5. Bulk Density Determination (Distu Sample Weight (Wt. Tube Contain Sample Volume (L x 2.54 cm/inch x Bulk Density (Sample Wt./Sample Y	rbed Samples Only): ing Sample - Wt. Empty Tube < 3.14R²), cc Volume), grams/cc	146.26 86.83 1.68	
6. Standpipe Used:x Indicate internal Radius, cm	_ No Yes		
 Height of water Level above Rim At the Beginning of Each Test Inte At the End of Each Test Interval, H 	of Test Basin in inches: rval, H1 ł2	3.0 2.0	
8. Rate of Water Level Drop (Add a	dditional lines if needed):		
Time, Start of Test Time, End o Interval, T1 Interva	f Test Length of Test Inter II, T2 T, (min)	val,	
0.00 5.2	0 5.33		
0.00 5.3	6 5.59		
0.00 5.5	2 5.87		
		_	
9. Calculation of Permeability:			
9. Calculation of Permeability: K (in/hr) = 60 min/hr x r^2/R^2 x L (in)/T(min) x ln (H1/H2)		
 Galculation of Permeability: K, (in/hr) = 60 min/hr x r²/R² x L(in k= 60 min/hr x/-)/T(min) x ln (H1/H2) x 3/ 5.87	x ln(3/2)	

.

______Soil/Tube Contact _____Large Gravel _____Large Roots

_____ Dry Soil _____Smeering ____Compactation

_____Other---Specify______

•	gineers LLC		Tristate Engine	eering	Sample Dat	e: 10/13/23
P.O. Box 1406			Douglass Street		Stormwater - T	TP5
Voorhees, NJ 08	043		- Elk Township		Horizon 97"-11	17"
······································	· · · · · · · · · · · · · · · · · · ·					
MUNICIPALITY [Elk Township					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1]	Replicate Lette	r B	Date Collecte	ed 10/13/2023	
2. Material Tested	F		X Tes	t in Native Soil -	Indicate Depth	108"
3. Type of Sample [Indisturbed		Х	Disturbed	
4. Sample Dimensions	Inside Radius of Sample Length of Sample, in inc	Tube, R, in cm hes	1.905 3			
5. Bulk Density Determi Sample Weight (Wt. T Sample Volume (L x 2 Bulk Density (Sample	ination (Disturbed Sampl Fube Containing Sample 2.54 cm/inch x 3.14R ²), co Wt./Sample Volume), gr	les Only): - Wt. Empty Tube c ams/cc	145.53 86.83 1.68			
6. Standpipe Used: Indicate internal Rad	No lius, cm	Yes				
 6. Standpipe Used: Indicate internal Rad 7. Height of water Leve At the Beginning of E At the End of Each To 	No lius, cm el above Rim of Test Basi cach Test Interval, H1 est Interval, H2	Yes in in inches:	3.0 2.0			
 6. Standpipe Used: Indicate internal Rad 7. Height of water Leve At the Beginning of E At the End of Each To 8. Rate of Water Level 	x No lius, cm al above Rim of Test Basi cach Test Interval, H1 est Interval, H2 Drop (Add additional line	Yes in in inches: es if needed):	3.0 2.0			
 6. Standpipe Used: Indicate internal Rad 7. Height of water Leve At the Beginning of E At the End of Each Tu 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 	x No lius, cm el above Rim of Test Basi cach Test Interval, H1 est Interval, H2 Drop (Add additional line Time, End of Test L Interval, T2 (min.sec)	Yes in in inches: es if needed): .ength of Test Interva T, (min)	3.0 2.0			
 Standpipe Used: Indicate internal Rad Height of water Leve At the Beginning of E At the End of Each Ti Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00 	No lius, cm al above Rim of Test Basi iach Test Interval, H1 est Interval, H2 Drop (Add additional line Time, End of Test L Interval, T2 (min.sec) 5.15 5.45	Yes in in inches: es if needed): ength of Test Interva T, (min) 5.26 5.74	3.0 2.0			
 Standpipe Used: Indicate internal Rad Height of water Leve At the Beginning of E At the End of Each Ti Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00 0.00 	x No lius, cm el above Rim of Test Basi cach Test Interval, H1 est Interval, H2 Drop (Add additional line Time, End of Test L Interval, T2 (min.sec) 5.15 5.45 5.56	Yes in in inches: es if needed): .ength of Test Interva T, (min) 5.26 5.74 5.93	3.0 2.0			
 Standpipe Used: Indicate internal Rad Height of water Leve At the Beginning of E At the End of Each Ti Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00 0.00 		Yes in in inches: es if needed): .ength of Test Interva T, (min) 5.26 5.74 5.93	3.0 2.0			
 Standpipe Used: Indicate internal Rad Height of water Leve At the Beginning of E At the End of Each Trist Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 <		Yes in in inches: es if needed): .ength of Test Interva T, (min) 5.26 5.74 5.93	3.0 2.0			
 6. Standpipe Used: Indicate internal Rad 7. Height of water Leve At the Beginning of E At the End of Each Ti 8. Rate of Water Level Time, Start of Test Interval, T1 (min.sec) 0.00 0.00 9. Calculation of Perme K, (in/hr) = 60 min/hr 		Yes in in inches: es if needed): .ength of Test Interva T, (min) 5.26 5.74 5.93	3.0 2.0			

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X None ____Cracks ____Worm Channels ____Root Channels
 Soil/Tube Contact ____Large Gravel ____Large Roots
 Dry Soil ____Smeering ___Compactation
 Other---Specify_____

South Jersey Er	igineers LLC		Tristate Er	igineering	Sample Date: 10/13/23
2.O. Box 1406 /oorhees, NJ 08043			Douglass Str Elk Townshir	reet	Stormwater - TP6 Horizon 42"-83"
MUNICIPALITY	Elk Township				
Form 3b. Tube Perme	ameter Test Data				
1. Test Number	1	Replicate Lette	r A] Date Collecte	d 10/13/2023
2. Material Tested	F F	-11	X	Test in Native Soil -	Indicate Depth 63"
3. Type of Sample	[]u	Jndisturbed		X	Disturbed
4. Sample Dimensions	Inside Radius of Sample Length of Sample, in inc	e Tube, R, in cm ches	1.905 3		
5. Bulk Density Detern Sample Weight (Wt. Sample Volume (L x Bulk Density (Sample	nination (Disturbed Samp Tube Containing Sample 2.54 cm/inch x 3.14R²), c wtt/Sample Volume), gr	les Only): - Wt. Empty Tube c rams/cc	151.53 86.83 1.75		
6. Standpipe Used: Indicate internal Ra	x No dius, cm	Yes		_	
7. Height of water Leve At the Beginning of B At the End of Each 7	el above Rim of Test Bas Each Test Interval, H1 Fest Interval, H2	in in inches:	3.0 2.0		
8. Rate of Water Leve	I Drop (Add additional line	es if needed):			
Time, Start of Test Interval, T1 (min.sec)	Time, End of Test I Interval, T2 (min.sec)	Length of Test Interva T, (min)	l i ,		
0.00	5.24	5.39	-		
0.00	5.48 6.02	5.81 6.04	_		
		anna – an ann ann ann an Anna ha fhachadh bha ha Albhan da an Anna an Anna			
9. Calculation of Perm	eability:		_		
K, (in/hr) = 60 min/hr	x r²/R² x L(in)/T(min) x li	n (H1/H2)		-	
k= 60 min/hr	x x 3/	6.04	x ln(3/2)		
k=	12.09				
10. Defects in the Sar None Soil/Tube Co	nple (Check appropriate i _CracksWorm Cha ontactLarge Grave	items): annelsRoot Ch elLarge Roots	annels		

:

Dry Soil _____Smeering _____Compactation

_____Other---Specify______

.

South Jersey Er	ngineers LLC	Tristate Engineering	Sample Date: 10/13/23
P.O. Box 1406	-	Douglass Street	Stormwater - TP6
voornees, NJ Ud	5043	Elk Township	Horizon 42"-83"
MUNICIPALITY	Elk Township		
Form 3b. Tube Perme	ameter Test Data		
1. Test Number	1 Replicate Lett	er B Date Collecte	ed 10/13/2023
2. Material Tested	F H	X Test in Native Soil -	Indicate Depth 63"
3. Type of Sample	Undisturbed	X	Disturbed
4. Sample Dimensions	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905	
5. Bulk Density Detern Sample Weight (Wt. Sample Volume (L x Bulk Density (Sample	nination (Disturbed Samples Only): Tube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R²), cc e Wt./Sample Volume), grams/cc	145.35 86.83 1.67	
6. Standpipe Used: Indicate internal Ra	x NoYes dius, cm		
7. Height of water Lev At the Beginning of At the End of Each	el above Rim of Test Basin in inches: Each Test Interval, H1 Test Interval, H2	3.0 2.0	
8. Rate of Water Leve	I Drop (Add additional lines if needed):		
Time, Start of Test Interval, T1	Time, End of Test Length of Test Interv Interval, T2 T, (min)	/al,	
0.00	5.19 5.31		
0.00	5.42 5.69		
0.00	5.58 5.97		
9. Calculation of Pern	neability:		
K, (in/hr) = 60 min/h	r x r²/R² x L(in)/T(min) x ln (H1/H2)		
k= 60 min/hr	x x 3/ 5.97	x in(3/2)	
k=	12.23		
10. Defects in the Sar None Soil/Tube C Dry Soil	mple (Check appropriate items): _CracksWorm ChannelsRoot C ontactLarge GravelLarge Roots SmeeringCompactation	hannels	

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Other---Specify____

South Jersey Er	ngineers LLC	Tristate Er	gineering	Sample Date:	10/13/23
P.O. Box 1406	2042	Douglass Sti	eet	Stormwater - TP7	
voomees, NJ oo	0040	Elk Lownshi)	Horizon 29"-61"	
MUNICIPALITY	Elk Township				
Form 3b. Tube Perme	ameter Test Data				
1. Test Number	1 Replicate Le	tter A	Date Collected	10/13/2023	
2. Material Tested	Fill	Х	Test in Native Soil - Ir	dicate Depth	48″
3. Type of Sample	Undisturbed		X	Disturbed	
4. Sample Dimensions	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905 3			
5. Bulk Density Determ Sample Weight (Wt. Sample Volume (L x Bulk Density (Sample	nination (Disturbed Samples Only): Tube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R²), cc Wt./Sample Volume), grams/cc	146.49 86.83 1.69			
6. Standpipe Used: Indicate internal Rad	X No Yes dius, cm		-		
7. Height of water Leve At the Beginning of E At the End of Each 7	el above Rim of Test Basin in inches: Each Test Interval, H1 Fest Interval, H2	3.0 2.0			
8. Rate of Water Leve	I Drop (Add additional lines if needed):				
Time, Start of Test Interval, T1 (min sec)	Time, End of Test Length of Test Inte Interval, T2 T, (min) (min sec)	rval,			
0.00	5.30 5.50				
0.00	5.31 5.51				
0.00	5.49 5.81				
9. Calculation of Perm	eability:				
$K_{\rm c}$ (in/hr) = 60 min/hr	· v r²/D² v l /in)/T(min) v ln (H1/H2)				
k = 60 min/hr	x x 3/ 5.81	x In(3/2)	7		
k=	12.56	<u>A (((0/4)</u>)			
	, ,				
10. Detects in the Sar	nple (Check appropriate items):	Channels			
	oracks voinn Chaineis Koot	und III 1918			
	Smooring Compositorian	13			
Dry Soli	omeeningcompactation				

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_____ Other---Specify_____

South Jersey En	gineers LLC	Tristate Engineering	Sample Date: 10/13/23
P.O. Box 1406		Douglass Street	Stormwater - TP7
Voorhees, NJ 08	3043	Elk Township	Horizon 29"-61"
<u>.</u>	a na jana ata ana di kana di kana di ana a Vandan mara 85 ati a''		
MUNICIPALITY	Elk Township		
Form 3b. Tube Permea	ameter Test Data		
1. Test Number	1 Replicate Lette	er B Date Collecte	ed 10/13/2023
2. Material Tested	Fill	X Test in Native Soil -	Indicate Depth 48"
3. Type of Sample	Undisturbed	X	Disturbed
4. Sample Dimensions	Inside Radius of Sample Tube, R, in cm Length of Sample, in inches	1.905 3	
5. Bulk Density Determ Sample Weight (Wt. Sample Volume (L x Bulk Density (Sample	ination (Disturbed Samples Only): Tube Containing Sample - Wt. Empty Tube 2.54 cm/inch x 3.14R ²), cc Wt./Sample Volume), grams/cc	147.19 86.83 1.70	
6. Standpipe Used: Indicate internal Rad	x No Yes dius, cm		
 Height of water Leve At the Beginning of E At the End of Each T 	el above Rim of Test Basin in inches: Each Test Interval, H1 est Interval, H2	3.0 2.0	
8. Rate of Water Leve	Drop (Add additional lines if needed):		
Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Length of Test Interv Interval, T2 T, (min) (min.sec)	al,	
0.00	5.27 5.45		
0.00	5.30 5.50		
0.00	5.52 5.87		
9. Calculation of Perm	eability:		
K, (in/hr) = 60 min/hr k= 60 min/hr	x r ² /R ² x L(in)/T(min) x ln (H1/H2) x x 3/ 5.87	x ln(3/2)	
k=	12.42		
10. Defects in the San None Soil/Tube Co Dry Soil OtherSpect	nple (Check appropriate items): CracksWorm ChannelsRoot Cl ontactLarge GravelLarge Roots SmeeringCompactation cify	nanneis	

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South Jersey En	gineers LLC		Tristate En	gineering	Sample Date: 10	/13/23
P.O. Box 1406			Douglass Str	eet	Stormwater - TP8	
Voorhees, NJ 08	043		Eik Townshin	3	Horizon 34"-76"	
MUNICIPALITY [Elk Township					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Letter	A	Date Collect	ed 10/13/2023	
2. Material Tested		Fill	X	Test in Native Soil	- Indicate Depth	60"
3. Type of Sample [Undisturbed		Х	Disturbed	
4. Sample Dimensions	Inside Radius of Sampl Length of Sample, in in	e Tube, R, in cm ches	1.905 3			
5. Bulk Density Determ Sample Weight (Wt. 1 Sample Volume (L x 2 Bulk Density (Sample	ination (Disturbed Sam Fube Containing Sample 2.54 cm/inch x 3.14R²), Wt./Sample Volume), g	bles Only): ∋ - Wt. Empty Tube cc grams/cc	147.64 86.83 1.70			
6. Standpipe Used: Indicate internal Rad	X No lius, cm	Yes		-		
7. Height of water Leve At the Beginning of E At the End of Each Te	el above Rim of Test Ba ach Test Interval, H1 est Interval, H2	sin in inches:	3.0 2.0			
8. Rate of Water Level	Drop (Add additional lir	nes if needed):				
Time, Start of Test Interval, T1 (min 500)	Time, End of Test Interval, T2 (min see)	Length of Test Interva T, (min)	i,			
0.00	12.25	12.42	7			
0.00	12.27	12.45				
0.00	12.38	12.63]			
			4			
9. Calculation of Perme	eability:	<u>k.,.</u>				
K, (in/hr) = 60 min/hr	$x r^2/R^2 x L(in)/T(min) x$	In (H1/H2)		7		
k= 60 min/hr	x x 3/	12.63	x ln(3/2)			
k=	5.78] .				
10. Defects in the Sam	5.78 ple (Check appropriate Cracks Worm Ch	items): annels Root Ch	annels			

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_____Soil/Tube Contact ____Large Gravel _____Large Roots _____Large Roots

_____Other---Specify_____

South Jersey En	gineers LLC		Tristate Er	ngineering	Sample Date:	10/13/23
P.O. Box 1406			Douglass St	reet	Stormwater - TP8	3
Voorhees N.L08	043		Elk Townshi	D	Horizon 34"-76"	
			march officiality			
MUNICIPALITY	Elk Township					
Form 3b. Tube Permea	meter Test Data					
1. Test Number	1	Replicate Letter	r <u>B</u>	Date Collecte	d 10/13/2023	I
2. Material Tested		Fill	X	Test in Native Soil -	Indicate Depth	60"
3. Type of Sample		Undisturbed		X	Disturbed	
4. Sample Dimensions	Inside Radius of Sample Length of Sample, in in	le Tube, R, in cm ches	1.905 3			
5. Bulk Density Determ Sample Weight (Wt. 1 Sample Volume (L x 2 Bulk Density (Sample	ination (Disturbed Sam Fube Containing Sample 2.54 cm/inch x 3.14R ²), Wt./Sample Volume), g	ples Only): ∋ - Wt. Empty Tube cc grams/cc	149.24 86.83 1.72			
6. Standpipe Used: Indicate internal Rac	No lius, cm	Yes		_		
7. Height of water Leve At the Beginning of E At the End of Each T	el above Rim of Test Ba Each Test Interval, H1 Fest Interval, H2	sin in inches:	3.0]		
8. Rate of Water Level	Drop (Add additional lin	nes if needed):				
Time, Start of Test Interval, T1 (min.sec)	Time, End of Test Interval, T2 (min.sec)	Length of Test Interva T, (min)	al,			
0.00	12.26	12.43				
0.00	12.49	12.82	-			
0.00	13.15	13.20	-		•	
9. Calculation of Perm	eability:					
$K_{\rm c}$ (in/br) = 80 min/br	$v r^2/R^2 v (in)/T(min) v$	In (H1/H2)				
k = 60 min/hr	X	13.26	x ln(3/2)			
k= 00 mil/m	5.51		X(9,4)]		
L		4				
10. Defects in the Sam	ple (Check appropriate	items):				
x None	CracksWorm Ch	annelsRoot Ch	annels			

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______Soil/Tube Contact ____Large Gravel ____Large Roots

Dry Soil ____Smeering ____Compactation

_____ Other---Specify_____



PLANTING NOTES

1. A COMPLETE LIST OF PLANTS, INCLUDING A SCHEDULE OF QUANTITIES, SIZES, AND OTHER REQUIREMENTS IS SHOWN ON THE PLANT SCHEDULE. IN THE EVENT THAT DISCREPANCIES OCCUR BETWEEN THE QUANTITIES OF PLANTS INDICATED IN THE PLANT LIST AND THOSE INDICATED ON THE PLAN, THE PLANT QUANTITIES INDICATED ON THE PLAN SHALL GOVERN.

- 2. ANY PLANT SCHEDULE MODIFICATIONS SHALL BE SUBJECT TO THE APPROVAL BY THE TOWNSHIP REPRESENTATIVE OR PROJECT LANDSCAPE ARCHITECT PRIOR TO THE PRECONSTRUCTION MEETING REQUEST TO BE MADE IN WRITING TO AUTHORITY.
- 3. ALL PLANTS SHALL BE TYPICAL OF THEIR SPECIES OR VARIETY. ALL PLANTS SHALL HAVE NORMAL, WELL DEVELOPED BRANCHES AND VIGOROUS ROOT SYSTEMS. THEY SHALL BE FREE FROM DEFECTS, DISFIGURING KNOTS, ABRASIONS OF THE BARK, SUNSCALD INJURIES, PLANT DISEASES, INSECT EGGS, BORERS, AND ALL OTHER FORMS OF INFECTIONS. ALL PLANT MATERIAL SHALL BE THOROUGHLY WETTED WITH AN ANTI-TRANSPARANT UPON DELIVERY OF MATERIAL TO THE SITE. ALL EVERGREEN MATERIAL SHALL BE RESPRAYED PRIOR TO THE FIRST WINTER BY THE OWNER.
- 4. SIZE AND GRADING STANDARDS SHALL CONFORM TO ANSI #1, OR BETTER AND SHALL BE GUARANTEED FOR A PERIOD OF <u>2 YEARS</u> AFTER ACCEPTANCE BY THE OWNER. AS REQUIRED BY ORDINANCE, "ALL PLANT MATERIAL NOT SURVIVING FOR A PERIOD OF (2) TWO YEARS SHALL BE REPLACED WITH THE EQUIVALENT SIZE AND SPECIES."
- 5. ALL PLANTS SHALL BE PACKED, TRANSPORTED AND HANDLED WITH THE UTMOST CARE TO INSURE ADEQUATE PROTECTION AGAINST INJURY AND DEHYDRATION. EACH SHIPMENT SHALL BE CERTIFIED TO BE FREE FROM DISEASES AND INFESTATION. ANY INSPECTION CERTIFICATES REQUIRED BY LAW TO THIS EFFECT SHALL ACCOMPANY EACH SHIPMENT INVOICE OR ORDER OF STOCK AND ON ARRIVAL.
- 6. NO PLANT MATERIAL SHALL BE PLANTED BY THE CONTRACTOR UNTIL IT IS INSPECTED AND APPROVED BY THE LANDSCAPE ARCHITECT OR HIS AGENT AT THE SITE. THE LANDSCAPE ARCHITECT OR HIS REPRESENTATIVE SHALL BE THE SOLE JUDGE OF THE QUALITY AND ACCEPTABILITY OF THE MATERIALS. ALL REJECTED MATERIALS SHALL BE IMMEDIATELY REPLACED WITH ACCEPTABLE MATERIAL AT NO ADDITIONAL COST.
- 7. SHADE AND EVERGREEN PLANTS SHALL BE FIELD ADJUSTED TO MAINTAIN A MINIMUM HORIZONTAL SEPARATION OF 10 FEET FROM ANY SEWER MAIN OR STORM SEWER.
- 8. SHADE AND EVERGREEN TREES SHALL BE PLANTED AT LEAST TWO (2) FEET FROM ANY CURBING, PAVING OR SIDEWALK. WHENEVER POSSIBLE THIS DIMENSION SHOULD BE INCREASED TO FOUR (4) FEET.
- 9. PLANTING MIXTURE SHALL CONSIST OF ACCEPTANCE NATURAL TOPSOIL AND 10% BY WEIGHT OF STA-CERTIFIED COMPOST, THOROUGHLY MIXED. ONLY ADD ORGANIC FERTILIZER AND ONLY AFTER SOIL TEST IS PERFORMED BY YOUR LOCAL EXTENSION SERVICE WITH TYPE AND QUANTITY RECOMMENDATIONS.
- 10. WHERE APPLICABLE, PEAT MOSS FOR PLANTING MEDIUM SHALL BE IMPORTED CANADIAN SPHAGNUM PEAT MOSS, BROWN, LOW IN CONTENT OF WOODY MATERIAL AND BE FREE OF MINERAL CONTENT HARMFUL TO PLANT LIFE.
- 11. CONTRACTOR SHALL SCALE PLANT LOCATIONS FROM PLANS AND STAKE LOCATIONS ON SITE FOR APPROVAL BY THE LANDSCAPE ARCHITECT OR HIS AGENT. 12. ALL SEEDED AREAS THAT DO NOT SHOW A PROMPT UNIFORM GERMINATION SHALL BE RESEEDED BY THE
- LANDSCAPE CONTRACTOR AT INTERVALS OF 45-60 DAYS, UNTIL A GOOD GROWTH IS ESTABLISHED OVER THE ENTIRE LAWN AREA. 13. ALL PLANT BEDS SHALL BE MULCHED WITH THREE (3) INCHES OF SHREDDED HARDWOOD MULCH OR OTHER MATERIAL APPROVED BY THE LANDSCAPE ARCHITECT. THE LIMIT OF THIS MULCH FOR TREES
- SHALL BE THE AREA OF THE PIT AND FOR SHRUBS AND BEDS, THE ENTIRE SHRUB OR BED AREAS AS INDICATED ON THE PLAN. DO NOT CREATE MULCH PYRAMIDS, SEE PLANTING DETAIL FOR MULCH APPLICATION. 14. ALL PLANTING BEDS SHALL BE ROTOTILLED TO A DEPTH OF TEN (10) INCHES PRIOR TO ANY PLANTING.
- ALL STONES, WIRE, CONCRETE AND UNSUITABLE MATERIALS SHALL BE REMOVED. 15. PLANTING BEDS SHALL BE THOROUGHLY EXCAVATED, AND BACKFILLED WITH THE PLANT MIXTURE DESCRIBED IN 9 ABOVE. ALL PAVEMENT SUBBASE AND UNSUITABLE MATERIAL SHALL BE REMOVED FROM THE ISLAND PLANTING BEDS UNTIL VIRGIN SOIL IS REPLACED.
- 16. IT IS UNDERSTOOD THAT THE OWNER SHALL ASSUME RESPONSIBILITY FOR WATERING ALL PLANT MATERIAL AND LAWN AREAS BEYOND THE GUARANTEE PERIOD COMMENCING WITH THE DATE OF INITIAL ACCEPTANCE.
- 17. THE CONTRACTOR SHALL BECOME RESPONSIBLE FOR VERIFYING LOCATIONS OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES BEFORE EXCAVATING.
- 18. ANY AND ALL IRRIGATION SYSTEMS SHALL CONTAIN A RAIN SENSOR. IT IS RECOMMENDED THAT IF PLANTING BEDS ARE IRRIGATED, DRIP IRRIGATION IS PREFERRED. 19. ALL EVERGREEN TREES SHALL BE CONICAL IN SHAPE UNLESS OTHERWISE NOTED. CONICAL SHALL MEAN THE PLANT SHALL HAVE A WIDER BASE, (5:3 RATIO) AT A MINIMUM AND TAPER TO THE TOP. PLANT LEADER
- SHALL BE NO LONGER THAN 12 INCHES. CONICAL SHALL ALSO IMPLY A FULL SHAPE FROM THE BOTTOM OF PLANT (6-12" FROM ROOT BALL) TO TOP LEADER. REFER TO ANSI 260-1996, 4.1.2.5 TYPE 5- CONE TYPE.
- 20. SPECIMEN PLANT MATERIAL SHALL MEAN FOR EVERGREEN SPECIES: EXCEPTIONALLY HEAVY, WELL SHAPED PLANTS WHICH HAVE BEEN TRIMMED TO FORM A PERFECTLY SYMETRICAL, TIGHTLY KNIT PLANT. 21. FOR CONICAL AND EVERGREEN PLANT MATERIAL AVERAGE HEIGHT SHALL BE MEASURED FROM THE
- UPPER LIMIT OF BRANCH WHORL AND MIDPOINT OF LEADER. 22. ALL EVERGREEN TREES MUST BE SLIGHTLY SHEARED

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				P.O. BOX 1304 BLACKWOOD, NJ 08012 OFFICE: (856) 677-8742 FAX: (856) 879-2024 www.tristatecivil.com						
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