

STORMWATER MANAGEMENT FACILITIES OPERATIONS & MAINTENANCE MANUAL

Prepared for:

Davidson Properties, LLC

Block 468.01, Lot 20.01
230 Davidson Avenue
Township of Franklin
Somerset County, New Jersey

Prepared by:

BOHLER //

N.J. Certificate of Authorization 24GA28161700

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BENJ File No. JS200729

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January 2023
Revised: October 2023

Stormwater Management Measures Maintenance Plan & Field Manuals

Development Name: Davidson Properties, LLC

Address: 230 Davidson Avenue

Block(s) / Lot(s): 468.01 / 20.01

Township, County: Franklin, Somerset County

Party Responsible for Maintenance:

Davidson Properties, LLC

Address: 100 Franklin Square Drive, Suite 207, Somerset, NJ 08873

Contact Person(s): Adi Mokkalpati

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Prepared by: Bohler Engineering NJ, LLC

Date: October 2023

This plan is recorded in

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

Last Revised on ____/____/_____

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- Maintenance Logs and Inspection Records

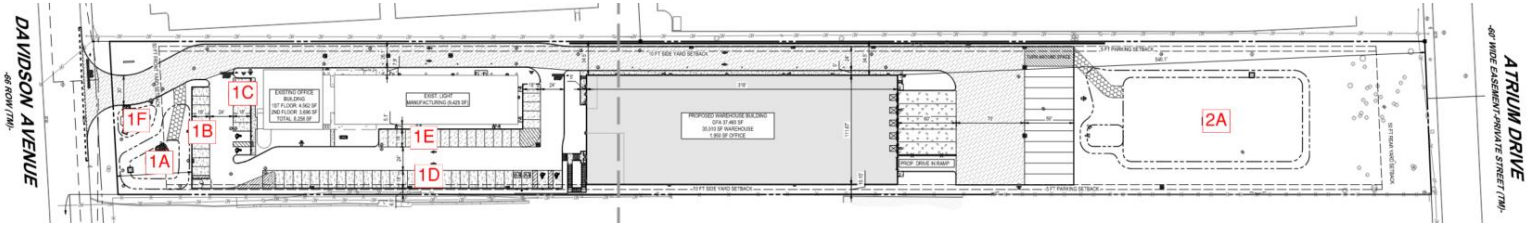
Part I- Maintenance Plan

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.
Surface Infiltration Basin	1A	Western corner of the property along Davison Ave	N: 620212 E: 485312
Outlet Structure	1A	Northwest corner of the basin	N: 620222 E: 485300
Surface Infiltration Basin	1F	Along northwest property line along Davison Ave	N: 620260 E: 485331
Outlet Structure	1F	Western corner of the basin	N: 620250 E: 485320
Surface Infiltration Basin	2A	Southeast of the property between trailer parking and Atrium Drive	N: 619501 E: 486187
Outlet Structure	2A	Northeast side of the basin	N: 619541 E: 486209
Pervious Pavement System	1B	Northwestern most row of parking	N: 620210 E: 485391
Outlet Structure	1B	West side of the basin along the proposed curb	N: 620179 E: 485340
Pervious Pavement System	1C	Parking area immediately to the northwest of the existing building	N: 620195 E: 485443
Outlet Structure	1C	Western corner of the basin	N: 620175 E: 485412
Pervious Pavement System	1D	Parking area along the southwest property line	N: 620015 E: 485500
Outlet Structure	1D	Northern corner of the basin	N: 620118 E: 485391
Pervious Pavement System	1E	Parking area immediately to the south of the existing building	N: 620005 E: 485582
Outlet Structure	1E	Western corner of the basin	N: 620062 E: 485506

Location Map



Description of Stormwater Management Measures

Surface Infiltration Basin (1A)

Design Storm:

- Design Purposes:
 - o Water quality and water quantity
 - o 1.25 inches in 2 hours
 - o 2-year storm (future adjusted - 3.94 inches);
 - o 10-year storm (future adjusted - 6.22 inches);
 - o 100-year storm (future adjusted - 12.40 inches)
- Dimensions: 65' (Length) x 40' (Width) x 3.50' (Depth)

Surface Infiltration Basin (1F)

Design Storm:

- Design Purposes:
 - o Water quality and water quantity
 - o 1.25 inches in 2 hours
 - o 2-year storm (future adjusted - 3.94 inches);
 - o 10-year storm (future adjusted - 6.22 inches);
 - o 100-year storm (future adjusted - 12.40 inches)
- Dimensions: 19' (Length) x 28' (Width) x 1.50' (Depth)

Surface Infiltration Basin (2A)

Design Storm:

- Design Purposes:
 - o Water quality and water quantity
 - o 1.25 inches in 2 hours
 - o 2-year storm (future adjusted - 3.94 inches);
 - o 10-year storm (future adjusted - 6.22 inches);
 - o 100-year storm (future adjusted - 12.40 inches)
- Dimensions: 183' (Length) x 86' (Width) x 2.4' (Depth)

Pervious Pavement System (1B)

Design Storm:

- Design Purposes:
 - o Water quality and water quantity
 - o 1.25 inches in 2 hours
 - o 2-year storm (future adjusted - 3.94 inches);
 - o 10-year storm (future adjusted - 6.22 inches);
 - o 100-year storm (future adjusted - 12.40 inches)
- Dimensions: 93' (Length) x 18' (Width) x 2.25' (Depth)

Pervious Pavement System (1C)

Design Storm:

- Design Purposes:
 - o Water quality and water quantity
 - o 1.25 inches in 2 hours
 - o 2-year storm (future adjusted - 3.94 inches);
 - o 10-year storm (future adjusted - 6.22 inches);
 - o 100-year storm (future adjusted - 12.40 inches)
- Dimensions: 54' (Length) x 18' (Width) x 1.75' (Depth)

Pervious Pavement System (1D)

Design Storm:

- Design Purposes:
 - o Water quality and water quantity
 - o 1.25 inches in 2 hours
 - o 2-year storm (future adjusted - 3.94 inches);
 - o 10-year storm (future adjusted - 6.22 inches);
 - o 100-year storm (future adjusted - 12.40 inches)
- Dimensions: 306' (Length) x 18' (Width) x 2.66' (Depth)

Pervious Pavement System (1E)

Design Storm:

- Design Purposes:
 - o Water quality and water quantity
 - o 1.25 inches in 2 hours
 - o 2-year storm (future adjusted - 3.94 inches);
 - o 10-year storm (future adjusted - 6.22 inches);
 - o 100-year storm (future adjusted - 12.40 inches)
- Dimensions: 229' (Length) x 18' (Width) x 1.6' (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.

Routine Inspection and Maintenance of the Stormwater Management Facilities:

All stormwater management basins have been designed to control degradation of water quality. Without proper routine inspection and maintenance, the basins may lose some or all of their capability to function to their full capacity. Lack of adequate maintenance at these facilities could lead to system failures.

Regularly scheduled maintenance inspections of the stormwater facilities should be performed at least four (4) times each year. The primary purpose of these inspections is to ascertain the operational condition and safety of the facilities,

particularly the condition of embankments, outlet structures, sedimentation, and other safety-related aspects. Inspections will also provide information on the effectiveness of regularly scheduled Preventative and Aesthetic Maintenance Procedures and will help to identify where changes in the extent and scheduling of the procedures are warranted. Finally, the facility inspections should also be used to determine the need for and timing of Corrective Maintenance procedures.

Routine maintenance of these facilities should be separated into two (2) basic types: Functional Maintenance and Aesthetic Maintenance. Functional Maintenance is further broken down into two (2) categories: Preventative and Corrective. Aesthetic Maintenance, which is necessary to maintain the visual appeal and aesthetic quality of UNDER maintenance efforts. Listed below are the Preventative, Corrective and Aesthetic Maintenance Procedures to be performed on a routine basis:

Preventative Maintenance Procedures:

The purpose of Preventative Maintenance is to maximize the effectiveness of the stormwater management aspects of the basins so that they remain operational and safe and to minimize the need for potential emergency or extensive corrective maintenance. These procedures are as follows:

- a) **Maintenance of Adjacent Areas** – Grass areas, trees, and shrubs throughout the site require periodic routine maintenance to include fertilizing, de-thatching, and soil conditioning in order to maintain healthy growth and to provide soil stabilization. The application of fertilizers should follow manufacturer's instructions to reduce run-off of these compounds into the basins. Additionally, provisions should be made to re-seed and re-establish grass cover in areas damaged by sediment accumulation, stormwater flow, or other causes. These tasks should be performed, or at least evaluated, on a quarterly basis. Lawn areas should be mowed at least once a month during the growing season. Vegetated areas must be inspected at least annually for erosion and scour as well as unwanted growth, which should be removed with minimum disruption to the remaining vegetation.

Note: All use of fertilizers, mechanical treatments, pesticides, and other means to ensure optimum vegetation health must not compromise the intended purpose of the stormwater management facility. All vegetation deficiencies should be addressed without the use of fertilizers and

pesticides whenever possible and if necessary, the minimum amount practical.

- b) **Removal and Disposal of Trash/Debris and Sediment** – All stormwater management components expected to receive and/or trap debris and sediment must be inspected for clogging and excessive debris and sediment accumulation at least four times annually as well as after every storm exceeding one inch of rainfall in 24 hours. Such components should include the catch basins, outlet structures, trash racks and discharge points.

Removal of trash and debris will prevent possible damage and minimize potential mosquito breeding habitats. Debris and trash must be properly hauled off the site and transferred to an approved disposal site.

- c) **Elimination of Potential Mosquito Breeding Habitats** – The most effective mosquito control program is one that eliminates potential breeding habitats. Almost any stagnant pool of water can be attractive to mosquitoes and may become the source of a large mosquito population. A maintenance program dedicated to eliminating potential breeding areas is preferable to chemical means of controlling mosquitoes. The most important maintenance function is removal of all obstructions to natural flow patterns before stagnant water conditions can develop.

- d) **Parking lot Maintenance** – This management measure involves employing pavement cleaning practices, such as parking lot sweeping on a regular basis, to minimize pollutant export to the stormwater conveyance system/ detention basins and eventually the receiving waters. These cleaning practices are designed to remove sediment, debris, and other pollutants from access drive and parking lot surfaces that are a potential source of pollution impacting urban waterways. Mechanical machines that use vacuum assisted dry sweeping to remove particulate matter shall be utilized as these have the ability to remove finer sediment particles. Parking lots and access drives shall be swept/ vacuumed at least semi-annually or more often as conditions warrant. The disposal of the swept material must be properly hauled off the site and transferred to an approved disposal site. Other parking lot maintenance features include the use of on-site trash receptacle. These

receptacles should be located in strategic areas where the majority of the pedestrian traffic occurs. These receptacles should be emptied weekly. The disposal of the solid waste must be properly hauled off the site and transferred to an approved disposal site.

Corrective Maintenance Procedures:

- a) **Removal of Debris and Sediment** – Sediment, debris and trash which threaten the discharge capacity of the basins should be removed immediately and properly disposed of. As noted previously, it is recommended that all water be evacuated from the basins before any significant amount of sediment, settled debris or trash is removed from the basins.
- b) **Structural Repairs** – Structural damage to outlet and inlet structures, trash racks, access hatches, and roadways as a result of vandalism, flood events, settlement or other causes must be repaired promptly. The urgency of the repairs will depend upon the nature of the damage and its effects on the safety and operation of the facility. The analysis of structural damage if it occurs and the design and performance of structural repairs should only be undertaken by a Professional Engineer.
- c) **Extermination of Mosquitoes** – If neglected, basins can become a potential mosquito breeding area. The extermination of mosquitoes will usually require the services of the County Mosquito Commission. If mosquito control in the facility becomes necessary, the preventative maintenance program should be re-evaluated, and more emphasis should be placed on control of mosquito breeding habitats.
- d) **Erosion Repair** – Vegetative cover or other protective measures are necessary to prevent the loss of soil due to the forces of wind and water. Where a re-seeding program has not been effective in maintaining a non-erosive vegetative cover, or other factors have exposed soils to erosion, corrective steps should be initiated to prevent further loss of soil that may result in danger to the stability of the facility. Soil loss can be controlled by a variety of materials and methods, including rip-rap, gabion lining, geotextile fabrics, sod, seeding, concrete lining and re-grading.

- e) **Elimination of Trees, Brush, Roots and Animal Burrows** – The stability of embankments can be impaired by large roots and animal burrows. Additionally, burrows can present a safety hazard for maintenance personnel. Trees and brush with extensive, woody root systems should be completely removed to prevent destabilization and the creation of seepage routes. Regular mowing will prevent vegetation that can cause root problems. Roots should also be completely removed to prevent decomposition within the embankment. Root voids and burrows should be filled with material similar to the existing material, and capped just below grade with stone, concrete or other material. If the filling of the burrows does not discourage the animals from returning, further measures should be taken to either move the animal population or to make critical areas of the facility unattractive to them.

- f) **Snow and Ice Removal** – Accumulations of snow and ice can threaten the functioning of the inlets, outlets and emergency spillways. Provision of the equipment, material and personnel to monitor and remove snow and ice from critical areas will assure the function of the facility during the winter months.

Aesthetic Maintenance Procedures:

- a) **Graffiti Removal** - The timely removal of graffiti will restore the aesthetic quality of the basins. Removal can be accomplished by paint or other cover, or removal with scrapers, solvents or cleansers. Timely removal is important to discourage further graffiti and other acts of vandalism.

- b) **Grass Trimming/Landscape Maintenance** – The lawn areas around the site shall be mowed on a regular basis as necessary to maintain the lawn at a height of 2 to 3-inches. These areas shall also be fertilized twice a year, once in the spring and once in the fall. Fertilizer for lawn areas shall be 10-20-10 applied at a rate of 11 lbs. per 1,000 sf. or as determined by a soil test. Any bare, dead or damaged lawn areas shall be re-seeded in accordance with the original procedures as outlined in the Soil Erosion and Sediment Control Plans using the same mix and seeding rates. Stabilization of bare or damaged areas shall be done in a timely fashion so as to avoid exposing the soil to erosion.

If season prevents the re-establishment of turf cover, exposed areas should be stabilized with straw or salt hay mulch as described in the Soil Erosion and Sediment Control Plans until permanent seeding can be done. Seeding can be done between March 15th and June 15th and between September 15th and December 1st, only if adequate water is provided.

The shrubs around the site should also be maintained in order to promote a neat appearance and healthy, vigorous growth. All shrubs should be allowed to grow together in masses as shown on the plans and not pruned into individual plants. The planting beds should be mulched with hardwood mulch every two (2) years in order to provide a suitable growing medium for the shrubbery and to retain moisture around the root zones.

Pruning of shrubs should also be done on a regular basis to maintain the shape and appearance of the shrub masses. The height of the shrubs may vary according to the plant's natural growth habits but should not exceed 6-feet. Pruning should be done as necessary throughout the year to remove dead branches and to control new growth. Any pruning, other than the removal of dead branches, should be done in either late winter/early spring or after the shrub has flowered in the spring.

In the event that a shrub should experience more than 2/3 die back, it should be replaced in kind as soon as possible in either the spring or fall planting season. The replacement shrub should be the same species as the original and installed at the size and condition as specified on the original landscape plans. If, for any reason, a substitution of species or size must be made, it shall be subject to the approval of the project Landscape Architect.

The trees around the site shall be maintained regularly to ensure good health and exhibit an attractive appearance. Their maintenance should include fertilization twice annually, with one application in the spring and another in early fall. The trees shall be pruned in the late winter or early spring. However, dead branches should be removed as soon as they are noticed. Care should be taken to avoid cutting off the central leader of a tree if one is present.

If a tree is severely damaged or experiences more than 2/3 die back, it should be replaced in either the spring or fall planting season, whichever comes first. The only exception to this is if the replacement tree has a fall transplanting hazard. Replacement trees should be planted at the same size and condition as specified on the landscape plans. Any tree or shrub maintenance, tree pruning, or plant material substitution of species or size shall be subject to the approval of the project Landscape Architect.

- c) **Control of Weeds** – Although a regular grass maintenance program will minimize weed intrusion, some weeds will appear. Periodic weeding, either chemically or mechanically, will help to maintain a healthy turf, and keep grassed areas looking attractive. Excessive growth of weeds within the basin can be controlled mechanically as discussed in the previous section.

The recording of all maintenance work and inspections provide valuable data on the facility’s condition. Review of this information will also help to establish more efficient and beneficial maintenance procedures and practices. As the owner is ultimately responsible for site maintenance, all recorded information should be directed to the owners of the basins for review and subsequent follow-up on recommendations. Data obtained from informal inspections should be retained; however, under current regulations, this data does not have to be submitted to NJDEP.

Preventative Maintenance Actions

Frequency	Preventative Maintenance Actions	Stormwater Measures/ No.
Biweekly	Establishing/restoring vegetation	All Basins
Monthly	Trash removal, vegetation mowing and removal in growing season	All basins, inlets & access
Semiannually	Vegetation inspection (during growth and non-growing seasons)	All Basins
Quarterly	Quarterly inspection, sediment removal	All Basins
Annual	Basin Structural Inspection, vegetation inspection (scour, erosion, unwanted growth)	Infiltration basins
Unscheduled	Quick inspection after every 1” rainfall	All basins and inlets

Corrective Maintenance Actions

Potential Corrective Maintenance Actions	Stormwater Management Measures/No.
<p>Example of corrective maintenance tasks</p> <ul style="list-style-type: none"> - Repair/replacement of eroded or damaged riprap apron - Repair/replacement of missing or damaged trash racks - Repair/ replacement of outlet pipes or orifices - Revegetation of eroded side slope, aquatic bench, march, basin bottoms, grass swales, etc. 	<p>All Basins and Inlets</p>

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 Pervious Paving Systems
- Maintenance Logs and Inspection Records
 - o “Maintenance Work Order and Checklist” – a comprehensive form outlining both required and completed maintenance work.
 - o “Inspection Log” – a summary table for recording the results of all inspections of the 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

Personnel/Equipment/Tools Name	Quantity
General Maintenance Crew	4
General Landscape Equipment	1
Vacuum Truck	1
Power Washer	1
Sub pump	1

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 Field – Onsite

Location of the Onsite Disposal Field:

Disposal will take place on-site using the proposed dumpster

Disposal Field – Offsite

Description of the Offsite Disposal:

Private hauler handles disposal, unloading and covering offsite

A copy of the contract should be 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.

COST ESTIMATES

Opinion of Probable Annual Stormwater Management Maintenance Costs

Item	Description	Rate	Unit	Total Units	Frequency Per Year	Item Total
1	Mowing	\$100.00	Acre	1.96	35	\$6,860.00
2	Landscape Maintenance	\$400.00	Acre	1.96	2	\$1,568.00
3	Landscape Maintenance Materials	\$1,200.00	Acre	1.96	2	\$4,704.00
4	General Maintenance	\$500.00	L/S	1	2	\$1,000.00
5	Preventative Maintenance	\$2,000.00	L/S	1	1	\$2,000.00
6	Corrective Maintenance (every 5 years)	\$10,000.00	L/S	1	0.2	\$2,000.00
7	Engineering Inspection	\$500.00	L/S	3	1	\$1,500.00
8	Parking Lot Sweeping	\$50.00	Acre	1.626	12	\$975.60
9	Trash Collection	\$50.00	Day	1	365	\$18,250.00
10	Porous Pavement System	\$10,000	L/S	4	1	\$40,000.00
Estimated Annual SWM Maintenance Cost						\$ 78,857.60
Estimated Annual Insurance Cost						\$ 1,000.00
Total Estimated Annual SWM Maintenance Costs						\$ 79,857.60

Safety Measures and Procedures

All maintenance activities must comply with all local, state and federal regulations regarding occupational safety. These include but are not limited to the following:

1. N.J.A.C. 7:26G-1 – Hazardous Waste Regulations
2. N.J.A.C. 7:8 – Stormwater Management
3. O.S.H.A. Permit-Required Confined Spaces and all other OSHA regulations applicable to any work that is conducted on site

The stormwater inspection/maintenance company is required to follow the above referenced requirements.

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

Types of Training

- Mandatory Stormwater Management Basic Training and Field Manual Usage Training for new maintenance crews
- Occupational Safety Training
- Subcontractor training, if applicable

Content of Training

- Vegetation Care

Training Material

- NJDEP Stormwater BMP Manual, Chapter Seven: Landscaping
(*provides information on vegetation and landscaping for stormwater management measures*)

- Field Manual Usage Training

Training Material

- Field Manuals attached to this Maintenance Plan

- Equipment and Tools Operation Training

Training Material

- Equipment or tool manufacturer's Operation & Maintenance Manual

- Occupational Safety Training

Training Material

- OSHA Training
- Equipment or tool manufacturer's Operation & Maintenance Manual
- Other

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
		<input type="checkbox"/> Maintain current version OR <input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page) <input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)
		<input type="checkbox"/> Maintain current version OR <input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page) <input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)
		<input type="checkbox"/> Maintain current version OR <input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page) <input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)

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). Design engineers should prepare the field manuals in accordance with the design of each measure and the specific requirements of the site. See the sample field manuals for further guidance.

Field Manual for Surface Infiltration Basins

Field Manual for Pervious Pavement Systems

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

Surface Infiltration Basin Basins 1A, 1F & 2A on the Location Map

Development Name: 230 Davidson Ave; Proposed Warehouse

Township, County: Township of Franklin, Somerset County

Surface Infiltration Basin 1A: N: 620212; E: 485312

Surface Infiltration Basin 1F: N: 620260; E: 485331

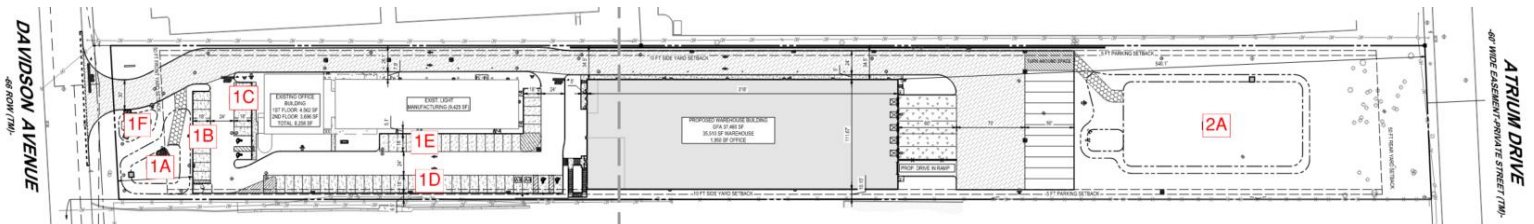
Surface Infiltration Basin 2A: N: 619501; E: 486187

Location Description (1A): Western corner of the property along Davidson Ave

Location Description (1F): Along northwest property line along Davidson Ave

Location Description (2A): Southeast of the property between trailer parking and Atrium Drive

Location Map



NOTE

This Field Manual 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. The Engineer should supplement information and best management practice to assist the responsible party to perform maintenance.

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Surface Infiltration Basin Overview

Functionality

An infiltration basin is a stormwater management facility constructed of highly permeable soils, which provides temporary storage of stormwater runoff. Infiltration basins are used to remove pollutants and to infiltrate stormwater. In addition to pollutant removal and groundwater recharge, infiltration may help to reduce increases in both the peak rate and total runoff volume caused by land development. Pollutant removal is achieved through filtration of the runoff through the soil, as well as biological and chemical activity within the soil. The total suspended solids (TSS) removal rate attributed to infiltration basins is 80%.

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 Only

An infiltration basin 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.

This surface infiltration basin is designed for **infiltration only** and is **not** designed for extended detention.

**For the field manual for a surface infiltration basin with extended detention, please see:
Surface Infiltration – Extended Detention Basin Field Manual.**

Basic Design Information - Basin 1A

Hydrology Design Targets

1. This basin is designed with a subsoil permeability rate of 0.5 inches/hour (pre-construction) and 5 inches/hour (post-construction - tested on 08 /02 /2021).
2. The design drain time is 21.60 hours.
3. The elevation of the seasonal high water table of this basin was observed on 08 /02 /2021 and it was not encountered below the basin bottom surface.
4. This basin will be discharged to municipal stormwater sewer system.

Hydraulic Design Targets

1. This basin is designed to infiltrate the runoff from the Water Quality Design Storm, which generates 1,002 cubic feet of runoff.
2. The invert elevation of the outlet for the design storm is at EL. 69.09 feet. The water surface elevation is at EL. 69.08 feet.
3. The emergency spillway is at EL. 71.75 feet.

Basin Configuration Targets

1. Pretreatment is provided by a scour hole that can hold 10% of the volume of the Water Quality Storm. A perforated riser is not used.
2. This basin bottom is covered by a sand layer. If a sand layer is used:
 - The depth of sand layer shall be 6 inches, which requires a volume of 763 cubic feet of sand.
 - The invert elevation of the sand layer is EL. 68 feet.
3. Vegetation
 - The top of sand bed is designed to have no vegetation (if the basin is vegetated, a Landscaping Plan should be included in the Reference Documents section.)

Critical Maintenance Features

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clippings shall be collected from the basin and properly disposed.

Basic Design Information - Basin 1F

Hydrology Design Targets

1. This basin is designed with a subsoil permeability rate of 0.5 inches/hour (pre-construction) and 5 inches/hour (post-construction - tested on 08 /02 /2021).
2. The design drain time is 12.20 hours.
3. The elevation of the seasonal high water table of this basin was observed on 08 /02 /2021 and it was not encountered below the basin bottom surface.
4. This basin will be discharged to municipal stormwater sewer system.

Hydraulic Design Targets

1. This basin is designed to infiltrate the runoff from the Water Quality Design Storm, which generates 392 cubic feet of runoff.
2. The invert elevation of the outlet for the design storm is at EL. 69.70 feet. The water surface elevation is at EL. 69.70 feet.
3. The emergency spillway is at EL. 70.25 feet.

Basin Configuration Targets

1. Pretreatment is provided by a scour hole that can hold 10% of the volume of the Water Quality Storm. A perforated riser is not used.
2. This basin bottom is covered by a sand layer. If a sand layer is used:
 - The depth of sand layer shall be 6 inches, which requires a volume of 218 cubic feet of sand.
 - The invert elevation of the sand layer is EL. 68.50 feet.
3. Vegetation
 - The top of sand bed is designed to have no vegetation (if the basin is vegetated, a Landscaping Plan should be included in the Reference Documents section.)

Critical Maintenance Features

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clippings shall be collected from the basin and properly disposed.

Basic Design Information - Basin 2A

Hydrology Design Targets

1. This basin is designed with a subsoil permeability rate of 0.5 inches/hour (pre-construction) and 5 inches/hour (post-construction - tested on 08 /02 /2021).
2. The design drain time is 21.60 hours.
3. The elevation of the seasonal high water table of this basin was observed on 08 /02 /2021 and it was at EL. 66.58 feet.
4. This basin will be discharged to municipal stormwater sewer system.

Hydraulic Design Targets

1. This basin is designed to infiltrate the runoff from the Water Quality Design Storm, which generates 5,968 cubic feet of runoff.
2. The invert elevation of the outlet for the design storm is at EL. 69.52 feet. The water surface elevation is at EL. 69.45 feet.
3. The emergency spillway is at EL. 71.25 feet.

Basin Configuration Targets

1. Pretreatment is provided by a scour hole that can hold 10% of the volume of the Water Quality Storm. A perforated riser is not used.
2. This basin bottom is covered by a sand layer. If a sand layer is used:
 - The depth of sand layer shall be 6 inches, which requires a volume of 7,849 cubic feet of sand.
 - The invert elevation of the sand layer is EL. 68.60 feet.
3. Vegetation
 - The top of sand bed is designed to have no vegetation (if the basin is vegetated, a Landscaping Plan should be included in the Reference Documents section.)

Critical Maintenance Features

1. No heavy equipment on the basin surface or sand layer.
2. Trash racks and discharge outlet shall be cleaned frequently.
3. Grass clippings shall be collected from the basin and properly disposed.

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 Inflow pipe is clogged by sediment and vegetation.

Corrective Action: Clear and remove sediment and unwanted vegetation.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.



Issue: The Inflow pipe is entirely clogged by sediment and trees.

Corrective Action: Clear and remove sediment and trees.

Preventative Action: Routine inspection & removal of sediment and unwanted vegetation.



Issue: The excessive sediment in inflow pipe (shown above) might be caused by a blockage of flow to the basin due to excessive vegetation and overgrown trees.

Corrective Action: Clear and remove trees and vegetation. If necessary, re-grade the bottom slope to ensure the flow properly spreads over the basin bottom.

Preventative Action: Routine inspection and removal of sediment and unwanted vegetation.



Issue: Eroded inflow apron

Corrective Action: Repair apron.

Preventative Action: Routine inspection and rehabilitation, if necessary.



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.

Preventative Action: Routine inspection and tilling/aeration, if necessary.



Issue: The low flow channel has excessive accumulation of sediment and debris. The 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.



Issue: Trash rack is damaged.

Corrective Action: Repair the trash rack.

Preventative Action: Routine inspection, especially after large storm events. Tighten any loose bolts and repair structural flaws.



A well maintained detention basin

Reference Documents

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)

Attach Reference Documents Here

**Inspection Checklist / Maintenance Actions
Surface Infiltration Basin**

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

Checklist No. _____

Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):

Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):

Dry / Moist / Ponding / Submerged / Snow accumulation

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

	For Inspector		For Maintenance Crew
Component No. Component Name	Inspection Item and Inspection Item No.		Result
			Preventative / Corrective Maintenance Actions
A1 Pretreatment (Forebay)	1	Scouring or erosion is present at inlet structure and/or riprap apron	Y__ N__ Work Order # _____
	2	Clogged pipes or excessive sediment in the forebay	Y__ N__ Remove sediment or debris
	3	Damaged outlet structure (e.g., cracking, subsidence, spalling, erosion, or deterioration)	Y__ N__ Repair or replace the outlet structure Work Order # _____
A2 Pretreatment (MTD, if installed)	1	MTD inspection	Y__ N__ (If a MTD is used for pretreatment, see manufacturer's maintenance manual)
A3 Pretreatment (Structural BMP)	1	BMP inspection	Y__ N__ (See BMP No. _____ Field Manual)

Note:

	For Inspector		For Maintenance Crew
Component No. Component Name	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
B Infiltration Bed	1	<p>Standing water is present after the design drain time</p> <p>The observed drain time is approximately _____ hours.</p>	<p>Y__</p> <p>N__</p> <p>Recheck to determine if there is standing water after 72 hours</p> <p>If standing water is present longer than 5 days, report to mosquito commission.</p> <p>Remove any sediment buildup</p> <p>Replace the sand layer (if sand layer is installed; volume of replacement sand is specified in the Basin Configuration Targets in the Basic Design Information Section of this Manual)</p> <p>Work Order # _____</p>
	2	Excessive sediment, silt, or trash accumulation on basin bed	<p>Y__</p> <p>N__</p> <p>Clean pretreatment system</p> <p>Remove silt, sediment, and trash</p> <p>Work Order # _____</p>

Note:

	For Inspector		For Maintenance Crew
Component No. Component Name	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
B Infiltration Bed	3	Erosion or channelization is present	Y__ N__ Check whether the flow bypass or diversion device is clogged Re-grade the infiltration bed Work Order # _____
	4	Animal burrows/rodents are present	Y__ N__ Pest control Work Order # _____
	5	Uneven bed	Y__ N__ Use light equipment to resurface the bed Work Order # _____
	6	Evidence of sinkholes or subsidence	Y__ N__ Monitor for sinkhole development

Note:

	For Inspector		For Maintenance Crew	
Component No. Component Name	Inspection Item and Inspection Item No.		Result	Preventative / Corrective Maintenance Actions
C Vegetation	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 # _____
	2	Overgrown vegetation	Y__ N__	Mow/trim the vegetation Work Order # _____
	3	Tree growth in the basin	Y__ N__	Clear, trim, or prune the trees according to the original Landscaping Plan Inspect to determine if the tree roots caused any structural damage Work Order # _____

Note:

	For Inspector		For Maintenance Crew
Component No. Component Name	Inspection Item and Inspection Item No.		Preventative / Corrective Maintenance Actions
D Basin Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	<p>Y__</p> <p>N__</p> <p>Check for excessive overland runoff flow through the embankment.</p> <p>Check for any sink hole development</p> <p>Direct the overland runoff to the forebay or pretreatment area</p> <p>Restabilize the bank</p> <p>Work Order # _____</p>
Note:			

	For Inspector		For Maintenance Crew
Component No. Component Name	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
E Outlet	1	Trash or debris accumulation more than 20%	Y__ N__ Clean and remove Determine source of trash and address to reduce future maintenance costs or basin failure
	2	Trash rack is damaged or rusted greater than 50% Trash rack is bent, loose, or missing parts	Y__ N__ Repair or replace trash rack Work Order # _____
	3	Outlet components (e.g., orifice plates or weir plate) skewed, misaligned, or missing	Y__ N__ Repair or replace component Work Order # _____
	4	Discharge pipe apron is eroded or scoured	Y__ N__ Restabilize the discharge riprap apron Work Order # _____
	5	Standing water is present in the outlet structure longer than 72 hours	Y__ N__ Pump out the standing water Work Order # _____

Note:

	For Inspector		For Maintenance Crew	
Component No. Component Name	Inspection Item and Inspection Item No.		Result	Preventative / Corrective Maintenance Actions
F Emergency Spillway	1	Trees or excessive vegetation present	Y__ N__	Remove trees and roots, and restore berms if necessary Work Order #_____
	2	Damaged structure	Y__ N__	Repair Work Order #_____
G Miscellaneous	1	Fence: broken or eroded parts	Y__ N__	Repair or replace Work Order #_____
	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:				

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, if standing water is present longer than 5 days.

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 Sediment removal should take place when the basin is thoroughly dry	A1/A2/A3 – Pretreatment	
	B – Infiltration Bed	
	D – Basin Embankment and Side Slopes	
	E – Outlet	
Vegetation removal	A1/A2/A3 – Pretreatment	
	B – Infiltration Bed	
	D – Basin Embankment and Side Slopes	
	E – Outlet	
	F – Emergency Spillway	

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

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

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

If a sand layer is installed, replacement of the sand will occur according to the scheduled frequency (see Basin Configuration Targets above). The next scheduled replacement is _____ (date).

Crew member: _____ / _____ Date: _____
(name/ signature)

Supervisor: _____ / _____ Date: _____
(name/ signature)

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

Corrective Maintenance Record

1. Work Order # _____ Date Issued _____

2. Issue to be resolved:
(e.g., orifice plate is loose and bent)

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

4. Required Actions

Actions	Planned Date	Date Completed
New bolts to fix the orifice plate		
Repair/replace the trash rack		
Restabilize side slope (indicate location)		
Repair riprap apron with 100 cubic yards of aggregate		
Revegetate		

5. Responsible person(s):

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

Approved by _____ / _____ Date _____
(name/signature)

Verification of completion by _____ / _____ Date _____
(name/signature)

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

Pervious Paving System Basins 1B, 1C, 1D & 1E on the Location Map

Development Name: 230 Davidson Ave; Proposed Warehouse

Township, County: Township of Franklin, Somerset County

Porous Pavement 1B: N: 620210; E: 485391

Porous Pavement 1C: N: 620195; E: 485443

Porous Pavement 1D: N: 620015; E: 485500

Porous Pavement 1E: N: 620005; E: 485582

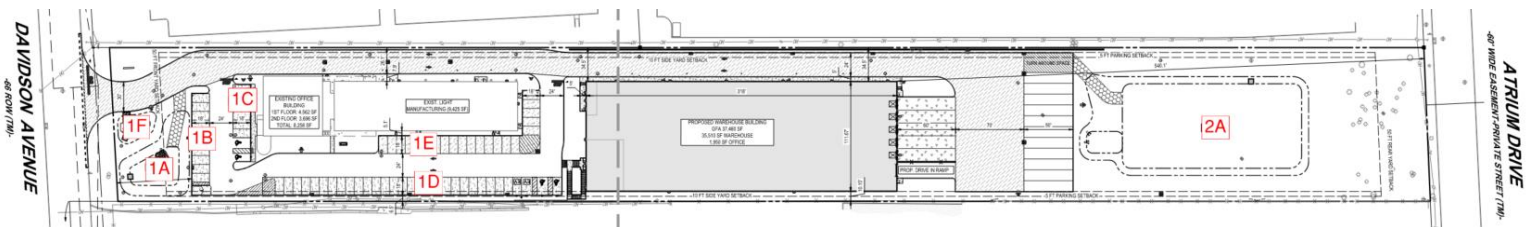
Location Description (1B): Northwestern most row of parking

Location Description (1C): Parking area immediately to the northwest of the existing building

Location Description (1D): Parking area along the southwest property line

Location Description (1E): Parking area immediately to the south of the existing building

Location Map



NOTE

This Field Manual 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. The Engineer should supplement information and best management practice to assist the responsible party to perform maintenance.

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Pervious Pavement System Overview

Functionality

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

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

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

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

Type of BMP – Dry Stormwater Management Measure

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

Basic Design Information – Pervious Pavement 1B

Hydrology Design Targets

1. The system is porous pavement with storage bed.
2. This system is designed with a soil permeability rate of 0.5 inches/hour (pre-construction) and 0.5 inches/hour (post-construction - tested on 08 /02 /2021).
3. The design drain time is 13.10 hours.
4. The elevation of the seasonal high water table of this pavement area was observed on 08 /02 /2021 and it was not encountered below the pavement bottom surface.
5. The TSS removal rate is 80%.

Hydraulic Design Targets

1. This system is designed to infiltrate the runoff from the Water Quality Design Storm, which generates 479 cubic feet of runoff. The peak flow entering the system is 0.42 cubic feet per second.
2. The invert elevation of the outlet is at EL. 68.50 feet.
3. The water quality storm is at EL. 69.02 feet.
4. The 100-year storm is at EL. 70.40 feet.

System Configuration Targets

1. The system has no pretreatment.
2. The depth of uniformly graded coarse aggregate in the storage bed is 2.25 feet.
3. The top of the system is not vegetated.

Critical Maintenance Features

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

Basic Design Information – Pervious Pavement 1C

Hydrology Design Targets

1. The system is porous pavement with storage bed.
2. This system is designed with a soil permeability rate of 0.5 inches/hour (pre-construction) and 0.5 inches/hour (post-construction - tested on 08 /02 /2021).
3. The design drain time is 12.00 hours.
4. The elevation of the seasonal high water table of this pavement area was observed on 08 /02 /2021 and it was not encountered below the pavement bottom surface.
5. The TSS removal rate is 80%.

Hydraulic Design Targets

1. This system is designed to infiltrate the runoff from the Water Quality Design Storm, which generates 131 cubic feet of runoff. The peak flow entering the system is 0.10 cubic feet per second.
2. The invert elevation of the outlet is at EL. 69.00 feet.
3. The water quality storm is at EL. 69.30 feet.
4. The 100-year storm is at EL. 70.24 feet.

System Configuration Targets

1. The system has no pretreatment.
2. The depth of uniformly graded coarse aggregate in the storage bed is 1.75 feet.
3. The top of the system is not vegetated.

Critical Maintenance Features

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

Basic Design Information – Pervious Pavement 1D

Hydrology Design Targets

1. The system is porous pavement with storage bed.
2. This system is designed with a soil permeability rate of 0.5 inches/hour (pre-construction) and 0.5 inches/hour (post-construction - tested on 08 /02 /2021).
3. The design drain time is 16.50 hours.
4. The elevation of the seasonal high water table of this pavement area was observed on 08 /02 /2021 and it was not encountered below the pavement bottom surface.
5. The TSS removal rate is 80%.

Hydraulic Design Targets

1. This system is designed to infiltrate the runoff from the Water Quality Design Storm, which generates 1,309 cubic feet of runoff. The peak flow entering the system is 1.07 cubic feet per second.
2. The invert elevation of the outlet is at EL. 68.50 feet.
3. The water quality storm is at EL. 68.98 feet.
4. The 100-year storm is at EL. 71.00 feet.

System Configuration Targets

1. The system has no pretreatment.
2. The depth of uniformly graded coarse aggregate in the storage bed is 2.66 feet.
3. The top of the system is not vegetated.

Critical Maintenance Features

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

Basic Design Information – Pervious Pavement 1E

Hydrology Design Targets

1. The system is porous pavement with storage bed.
2. This system is designed with a soil permeability rate of 0.5 inches/hour (pre-construction) and 0.5 inches/hour (post-construction - tested on 08 /02 /2021).
3. The design drain time is 13.50 hours.
4. The elevation of the seasonal high water table of this pavement area was observed on 08 /02 /2021 and it was not encountered below the pavement bottom surface.
5. The TSS removal rate is 80%.

Hydraulic Design Targets

1. This system is designed to infiltrate the runoff from the Water Quality Design Storm, which generates 479 cubic feet of runoff. The peak flow entering the system is 0.40 cubic feet per second.
2. The invert elevation of the outlet is at EL. 70.00 feet.
3. The water quality storm is at EL. 70.31 feet.
4. The 100-year storm is at EL. 71.25 feet.

System Configuration Targets

1. The system has no pretreatment.
2. The depth of uniformly graded coarse aggregate in the storage bed is 2.25 inches.
3. The top of the system is not vegetated.

Critical Maintenance Features

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

Visual Aid for Pervious Paving System Inspection

Currently, no photos are available. Photos will be updated upon availability.

Reference Documents

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

- As-built Drawings with Drainage Plans
- Manufacturer's Operation and Maintenance Manual
- Soil Boring Logs
- Permeability Test (Pre-construction)
- Permeability Test (Post-construction)

Attach Reference Documents Here

Inspection Checklist / Maintenance Actions Pervious Pavement System

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

Checklist No. _____ Inspection Date: _____

Date of most recent rain event: _____

Rain Condition (circle one):

Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):

Dry / Moist / Ponding / Submerged / Snow accumulation

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

Component No. Component Name	For Inspector		For Maintenance Crew
	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
A Pretreatment (Vegetative Filter Strip)	1 Poor quality vegetation, erosion, sedimentation, or debris	Y___ N___	(See Vegetative Filter Strip Field Manual)
B1 Pavement Surface (Porous Pavement)	1 Standing water is present after the design drain time The observed drain time is approximately _____ hours. Excessive sediment or mud accumulation on top of the pavement	Y___ N___	Recheck to determine if there is standing water after 72 hours If standing water is present longer than 5 days, report to mosquito commission. If excessive sediment is present, the system may be clogged - Sweep the surface - Power wash (at 45 degree angle to the top) - Vacuum the surface - Excavate to inspect the storage bed for clogging, replace the storage bed material if it is severely clogged - Check the permeability rate of the subsoil Work Order # _____
B 1 Pavement Surface (Porous Pavement)	2 Cracking, subsidence, spalling, or other damage to the pavement	Y___ N___	Repair according to the manufacturer's procedures and material. See Reference Documents section. Work Order # _____
	3 Weeds or other vegetation on the porous pavement	Y___ N___	Remove the vegetation

Note:

Component No. Component Name	For Inspector		For Maintenance Crew
	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
B 2 Pavement Surface (Permeable Paver)	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours..	Y__ N__ Recheck to determine if there is standing water after 72 hours If standing water is present longer than 5 days, report to mosquito commission. If excessive sediment is present, the system may be clogged - Sweep the surface - Vacuum the surface - Excavate to inspect the storage bed for clogging, replace the storage bed material if it is severely clogged - Check the permeability rate of the subsoil Work Order # _____ (Note: Do not power wash a permeable paver system)
	2	Excessive sediment or mud accumulation on the system	Y__ N__ Sweep and/or vacuum surface Replenish aggregate in joints Work Order # _____
	3	Cracking, subsidence, spalling, deformation, uneven settlement, broken unit(s), or other damage to the pavers	Y__ N__ Repair according to the manufacturer's procedures and material. See Reference Documents section. Work Order # _____
	4	Loss of aggregate between joints	Y__ N__ Replenish aggregate in joint Work Order # _____
Note:			

Preventative Maintenance Record

Corresponding Checklist No. _____
 Component No. _____, Inspection Item No. _____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal	A – Pretreatment (Vegetative Filter Strip)	
	B1 – Pavement Surface (Porous Pavement)	
	B2 – Pavement Surface (Permeable Paver)	
	D – Outlet	
Vegetation removal	A – Pretreatment (Vegetative Filter Strip)	
	B2 – Pavement Surface (Permeable Paver)	
	C – Vegetation	

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

Crew member: _____ / _____ Date: _____
(name/ signature)

Supervisor: _____ / _____ Date: _____
(name/ signature)

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

Corrective Maintenance Record

1. Work Order # _____ Date Issued _____

2. Issue to be resolved:
(e.g., clogged surface)

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

4. Required Actions

Actions	Planned Date	Date Completed
Repair pavers		

5. Responsible person(s):

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

Approved by _____ / _____ Date _____
(name/signature)

Verification of completion by _____ / _____ Date _____
(name/signature)

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

Stormwater Management Measures Maintenance Plan

Maintenance Logs and Inspection Records

NOTE

This Maintenance Logs and Inspection Records are 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. The Engineer should supplement information and best management practice to assist the responsible party to perform maintenance.

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Inspection Checklist Log

1. The responsible party shall report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.
2. The maintenance crew should fill out the checklist in the field manual when performing each inspection/maintenance task.
3. After the maintenance task is performed, the checklist should be filed in the Maintenance Plan and recorded in the log below.

Cycle of Inspection	Stormwater Management Measure No.	Checklist No.	Date(s) of Inspection
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			
1st Quarter			
2nd Quarter			
3rd Quarter			

Cycle of Inspection	Stormwater Management Measure No.	Checklist No.	Date(s) of Inspection
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			

Attach the Inspection Checklist after each inspection

Preventative Maintenance Log

Maintenance Schedule	Stormwater Management Measure No.	Preventative Maintenance Record No.	Date(s) of Maintenance
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			

Attach the Preventative Maintenance Record after each maintenance task performed

Corrective Maintenance Log

Maintenance Schedule	Stormwater Management Measure No.	Corrective Maintenance Record No.	Date(s) of Maintenance
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			
1st Quarter			
2nd Quarter			
3rd Quarter			
4th Quarter			
Unscheduled Inspection; e.g., after 1" rain			

**Attach the Corrective Maintenance Record after each
maintenance task performed**