DEPARTMENT OF ENERGY & ENVIRONMENT

Rock Creek Tennis Center LID Retrofits

Operations and Maintenance Plan

March 2020

Carter Barron Amphitheater & Rock Creek Tennis Center, District of Columbia
Contract Number CW49533

Government of the District of Columbia
Department of Energy of Environment
Watershed Protection Division
1200 First Street, NE 5th Floor
Washington, DC 20002

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INTRODUCTION

The thirty-acre Project Area is located in northern Washington, D.C. adjacent to the 16th Street Heights neighborhood. The Rock Creek Park Tennis Center sits at the headwaters of the Blagden Run watershed, a sub-watershed of Rock Creek (Figure 1).

Prior to restoration, the Project Area was identified as a priority restoration area by U.S. Fish and Wildlife Service (FWS) and National Park Service (NPS) due to its impact on existing habitat along Rock Creek. During rain events, stormwater would swiftly leave the Project Area from drainage outfalls, concentrating flows into erodible gullies, reducing localized infiltration and lowering the groundwater table, and reducing native habitat along Rock Creek.

Seven distinct gullies were created by these stormwater flows from outfalls draining the project area. In addition to the outfalls, stormwater also leaves the site through overland flow and a storm drain network that ultimately drains directly to Blagden Run. Prior to the project construction, eleven acres of impervious surface had no stormwater controls because it was developed before promulgation of the District's stormwater regulations.

The goal of the project was to retrofit the targeted eleven-acre impervious area with green infrastructure to restore natural hydrology, prevent erosion, reduce stormwater pollution and protect and restore existing natural habitat. Post construction, the site improvements (a.k.a. facilities) consist of nine stormwater Best Management Practices (BMPs), wood gully stabilization structures within seven gullies, and three sand seepage berms. See Appendix A for a site map illustrating the extent of the site and locations of each facility.

The following Operations and Maintenance manual outlines the original design and intent of each facility, any design alternatives with the facility, and the standard maintenance requirements for each facility type. The maintenance outlined in each section has been adapted to comply with the requirements in the 2013 DOEE Stormwater Management Guidebook[1].

DOEE has developed the "Self-Inspection/Self-Reporting Guidance Manual for Stormwater Management Best Practice Facilities"[2] to provide stormwater management facility owners with clear guidance on the steps to be taken for proper reporting of self-inspections. Additionally, DOEE has developed the "Stormwater Best Management Practice Maintenance Service Report" for reporting inspection and maintenance activities. Both Documents have been provided n Appendix C of this Maintenance Manual.

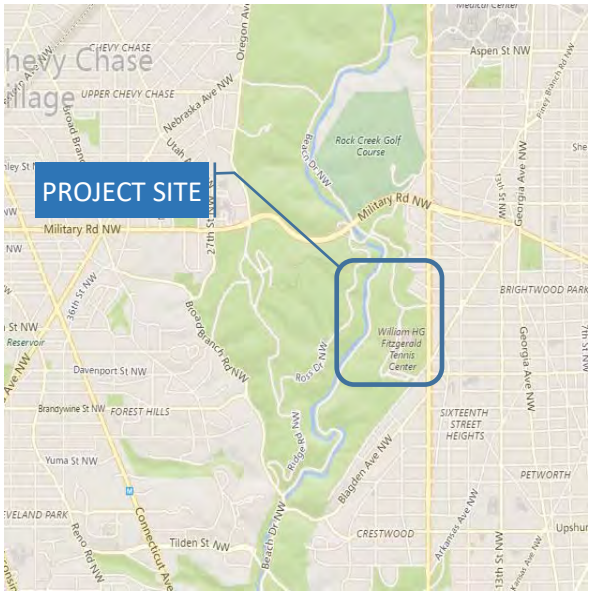


Figure 1: Project study area

[1] District Department of the Environment (DDOE). 2013. Stormwater Management Guidebook. https://doee.dc.gov/swguidebook. 20 January 2020.

[2] District Department of the Environment (DDOE). Self-Inspection/Self-Reporting Guidance Manual for Stormwater Management Best Practices Facilities. September 2018.

1 BIORETENTION FACILITIES

The following BMPs are considered Bioretention Facilities with minor varying design alterations:

- BMP 1-1
- BMP 1-2
- BMP 1-3
- BMP 1-4
- BMP 1-5
- BMP 1-6
- BMP 2-1
- BMP 3-1

The Bioretention Facilities are considered a "standard" type design, as defined within the DOEE Stormwater Management Guidebook. This design consists of a three-inch mulch layer, a minimum eighteen inches of bioretention soil media, three inches of #8 stone, nine inches of AASHTO #57 stone, and a four- or six-inch perforated underdrain embedded into the lowest layer of stone (see Figure 2 below). Soil media within the facilities was specially selected to meet the requirements of the 2013 DOEE Stormwater Management Guidebook. All future replacement of the media should utilize the specifications in the latest version of the DOEE Stormwater Management Guidebook. The mulch layer functions to suppress weeds and supply nutrients to the plants. However, the long-term goal is to establish 100% vegetative cover, eliminating the need for continuous mulch replenishment.

Once stormwater enters the Bioretention Facility, it infiltrates down through the bioretention soil media and stone layers, effectively removing contaminants and improving water quality. Water then enters the perforated underdrain pipes where it is conveyed into a nearby storm drain catch basin. Per DOEE requirements, the underdrains have been sized to ensure that the bioretention facilities fully drain within 72 hours or less.

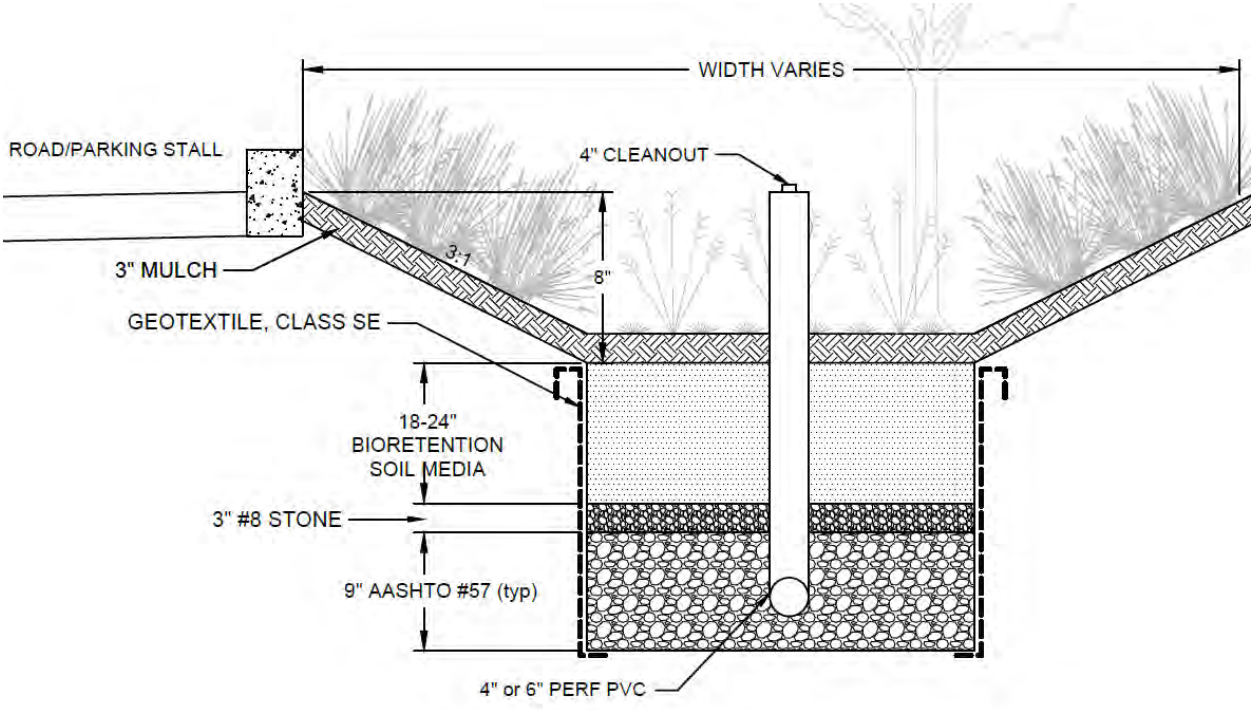


Figure 2: "Standard" Bioretention Typical Section

Many of the Bioretention Facilities installed on this site have unique design alternatives that are not included in the "standard" bioretention design. These alternatives are outlined in the following section. Table 1 below provides a quick lookup reference for which Bioretention Facilities include each of the design alternatives.

Table 1: BMP Design Alternatives by BMP

BMP	1-1	1-2	1-3	1-4	1-5	1-6	2-1	3-1
Gate Valve (S)	X	X	x3			X	X	X
Rain Guardian Turret	X		X	x3			X	X
Rain Guardian Foxhole		X				X		
Trench Drain								X
Ponding Shelf		X			X			
IWS								X

Gate Valves

Most of the Bioretention Facilities (See Table 1 for a list of BMPs) have gate valves placed in-line with the underdrains, located inside a large PVC piping valve box (see Figure 3 and Photo 1 below), that can be opened or closed to control the flow rate through the underdrain, and thus the water level and infiltration capacity within each bioretention facility. The gate valves can be closed if longer retention and increased groundwater recharge is desired. A long hook-shaped valve tool, provided to NPS, can be used to open and close the valves. This can be done by opening the valve housing and pushing the T-shaped valve handle up or down depending on desired position.

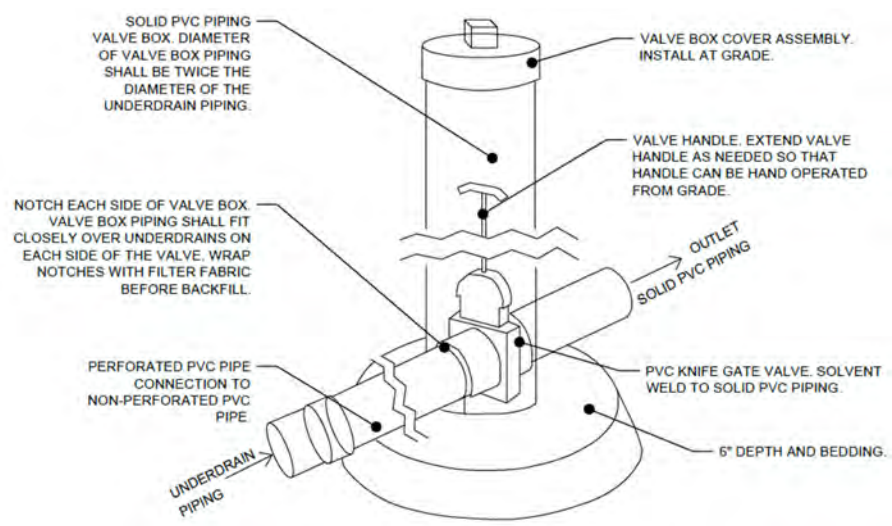


Figure 3: Underdrain Gate Valve & Photo 1: Surface pipe for Gate Valve

Rain Guardian Turret & Foxhole Pretreatment Chambers

Stormwater enters many of the Bioretention Facilities through concrete devices known either as Rain Guardian Turret (See Photo 2) or Foxhole (see Photo 3) Pretreatment Chambers. Table 1 provides a list of the Bioretention Facilities with these structures. The Pretreatment Chambers collect large floatables (plastic bottles, leaves, debris, etc.) and reduces and slows the flow of stormwater entering the facilities. Appendix B includes detail sheets of each of these structures.

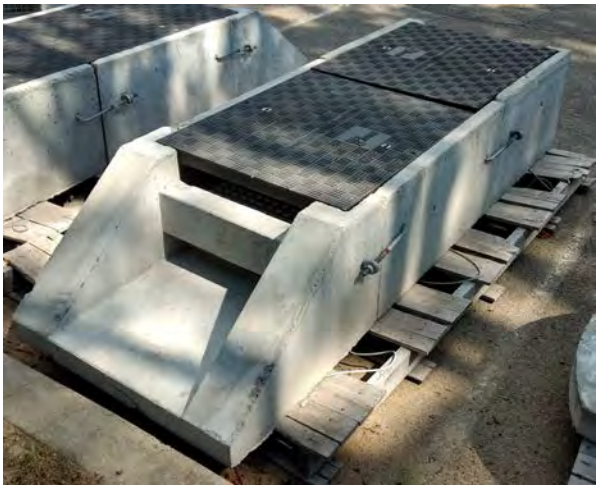



Photo 2 (left) Turret and Photo 3 (right) Foxhole

Trench Drain

BMP 3-1 has a standard trench drain that runs across Morrow Drive NW to capture stormwater from the roadway and direct it into Bioretention Facility. Photos 4 and 5 below show the constructed trench drain.


Photos 4 and 5: Trench Drain

Ponding Shelf

In addition to the standard bioretention design, the design of BMP 1-2 and BMP 1-5 incorporated a shallow ponding shelf. The ponding shelf allows a smaller footprint for the bioretention media by providing a large, shallow area that will pond during larger storm events. The ponding shelf in BMP 1-2 has been sodded while the ponding shelf in BMP 1-5 has been seeded. Both ponding shelves have a very slight slope towards the BMP. It is very important to avoid heavy foot traffic or any type of vehicular traffic which could result in isolated areas of depression that negatively impact the ponding shelf slope. Figures 4 and 5 below illustrate the additional ponding shelf area.

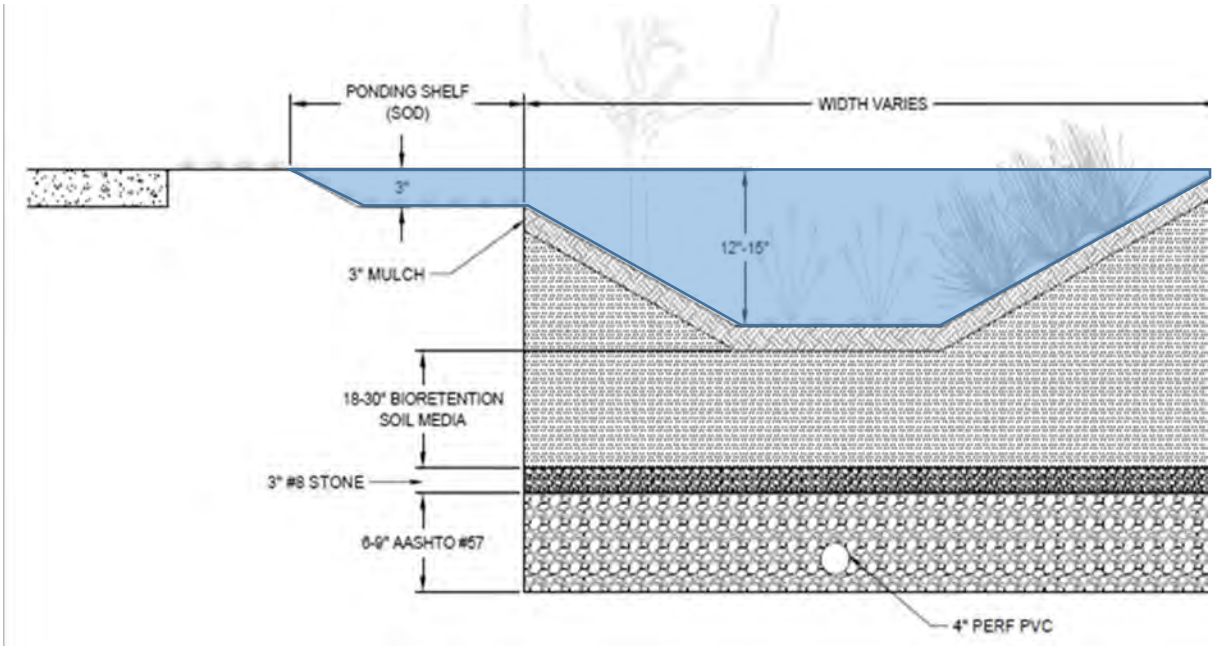


Figure 4: "Standard" Bioretention Typical Section with Ponding Shelf

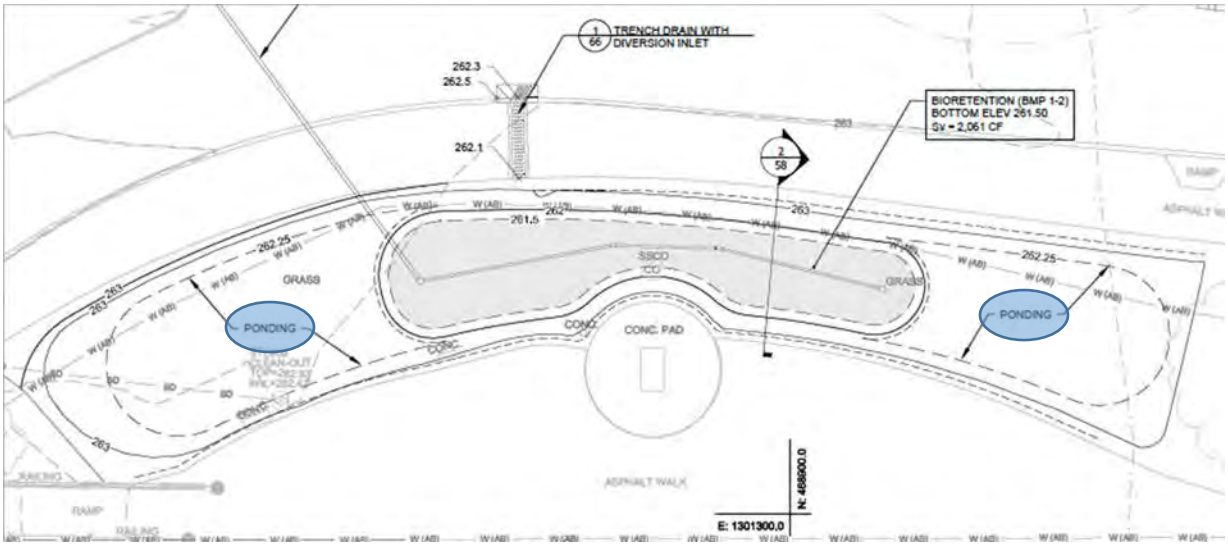


Figure 5: BMP 1-2 with Ponding Shelf

Internal Water Storage (IWS)

BMP 3-1 along Morrow Drive includes an internal water storage (IWS) layer within underground sections of the Bioretention Facility. While the standard underdrain design drains water directly from the bottom of the facility, the underdrain at BMP 3-1 has two 90-degree bends, collectively referred to as an "upturned elbow," that raises the outlet elevation of the pipe. This allows the BMP to retain water within the stone IWS layer and increase the quantity of stormwater that can be infiltrated into the surrounding soils. See Figure 6.

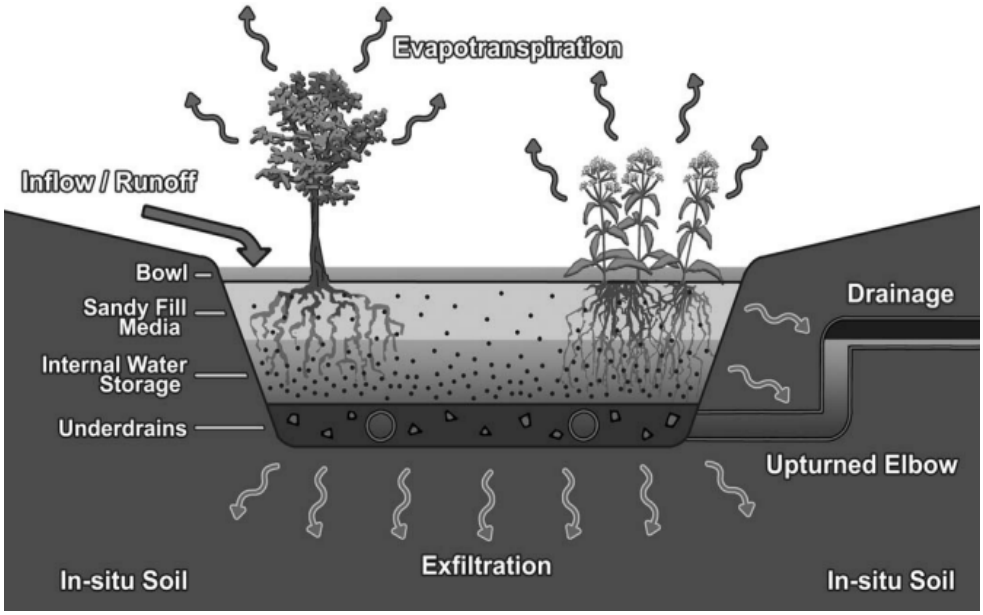


Figure 6: Bioretention Configuration with IWS[2]

MAINTENANCE REQUIREMENTS OF BIORETENTION

Maintenance of bioretention areas should be integrated into routine landscape maintenance tasks. If landscaping contractors will be expected to perform maintenance, their contracts should contain specifics on unique bioretention landscaping needs, such as maintaining elevation differences needed for ponding, proper mulching, sediment and trash removal, and limited use of fertilizers and pesticides. Maintenance tasks and frequency will vary depending on the size and location of the bioretention as well as the landscaping palette in the practice. A generalized summary of common maintenance tasks and their frequency is provided in Table 2.

Standing water is the most common problem outside of routine maintenance. If water remains on the surface for more than 72 hours after a storm, adjustments to the grading or underdrain repairs may be needed. The surface of the Bioretention Facility should be checked for accumulated sediment or a fine crust that builds up after the first several storm events. There are several methods that can be used to rehabilitate the filter. These are listed below, starting with the simplest approach and ranging to more involved procedures (i.e., if the simpler actions do not solve the problem):

[3] Designing Bioretention with an Internal Water Storage (IWS) Layer: Design guidance for an innovative bioretention feature. Brown, A Robert, William F. Hunt, Shawn G. Kennedy Urban Waterways. Department of Biological and Agricultural Engineering 2009

1) Open the underdrain observation well or cleanout and pour in water to verify that the underdrains are functioning and not clogged or otherwise in need of repair. The purpose of this check is to see if there is standing water all the way down through the soil. If there is standing water on top, but not in the underdrain, then there is a clogged soil layer. If the underdrain and standpipe indicate standing water, then the underdrain must be clogged and will need to be cleaned out.
   Note: For BMP 3-1, the IWS layer will cause water levels in the underdrain observation well or cleanout to be approximately 12- to 15-inches deep by design. If water levels exceed these heights, this indicates the underdrain is likely clogged and will need to be cleaned out. A rigid tape measure or dip stick may be needed to measure the water depth to properly assess the condition.
2) If clogging of a sediment layer is diagnosed, remove any accumulated sediment visible on the surface. Place a 2 to 3-inch layer of sand over the affected area and till this sand into the upper 6 to 12 inches of soil to re-establish infiltration in upper section of bioretention media.
3) Remove and replace some or all of the soil media.
4) Install sand wicks from 3 inches below the surface to the #57 stone layer. This reduces the average concentration of fines in the media bed and promotes quicker drawdown times. Sand wicks can be installed by excavating or auguring (i.e., using a tree auger or similar tool) down to the top of the underdrain layer (top of #8 stone) to create vertical columns which are then filled with a clean open-graded coarse sand material (e.g., ASTM C-33 concrete sand or similar approved sand mix for bioretention media). A sufficient number of wick drains of sufficient dimension should be installed to meet the design dewatering time for the facility.

Table 2: General Bioretention Maintenance Schedule (Adapted from the DOEE Stormwater Management Guidebook 2013)

Frequency	Maintenance Tasks
At least 4x per year	• Check Rain Guardian Turret Pretreatment Chambers, adjacent curb and gutters, and curb cuts and inlets for accumulated grit, leaves, and debris. • RainGuardian Turret pretreatment chambers – Inspect for debris on the top metal grate, within the chamber, and on drop-in filter wall. Clean as needed[1]. • RainGuardian Foxhole Pre-treatment chamber - Inspect for debris within the structure. Remove the black composite lid using an Allen wrench and clean the metal grate as well as the drop-in screen. Reset composite lid[1]. • Concrete Trench Drain- Inspect the trench drain for debris within the structure. Remove and clean debris from the metal grate. Clean and dispose of all debris inside the trench drain. Reset metal grate.
Twice during growing season	• Spot weed, remove trash, and rake the mulch.
Annually	• Conduct a maintenance inspection. • Supplement mulch in devoid areas to maintain up to 3-inch layer until 100% vegetative groundcover is established. • Prune trees and shrubs. • Remove sediment in pretreatment cells and inflow points. • Check stone at outlets from pretreatment chambers and trench drain for displacement. Replace as needed. • Check structure for structural integrity.
Once every 2-3 years	• Remove sediment in pretreatment cells and inflow points. • Remove/replace mulch layer until 100% vegetative groundcover is established.
As needed	• Add reinforcement planting to maintain desired vegetation density. • Remove invasive plants. • Remove any dead or diseased plants. • Stabilize the contributing drainage area to prevent clogging of inlets and erosion within the Facility. • Reset stone/cobble within facilities that have been scattered by visitors.

[1] The maintenance steps described above should be completed if areas of the top metal grate are clogged, the chamber is >75% full, or the vertical filter wall is clogged. Maintenance should be completed when stormwater has completely drained from the bioretention practice. The filter wall allows the chamber to dry between rain events, which further simplifies maintenance by ensuring removed debris is largely dry. The drop-in filter should be cleaned with a bristled brush and/or appropriately pressurized water. **The filter shall not be cleaned inside the Bioretention Facility or anywhere prone to washing back into the Facility.** Once cleaning is complete, reinstall the drop-in filter wall inside of the chamber and replace the top metal grate. Ensure all debris collected during cleaning of the chamber is completely removed from the site and properly disposed of according to local environmental rules.

2 LEVEL SPREADER (BMP 1-7)

BMP 1-7 is a concrete level spreader that collects runoff from a small portion of the Upper Parking Lot, east of BMP 1-4. The level spreader is located directly along the edge of the existing curb and gutter with curb cut inlets evenly spaced to allow runoff to enter the proposed level spreader. The level spreader includes a shallow four-inch deep trough that allows water to fill up and evenly spread over the entire length of the level spreader out into the grass. Behind the level spreader, flows are evenly distributed to a grassed area approximately 15-feet in length before reaching a densely vegetated forested area. See Figure 7 below for the level spreader typical section.

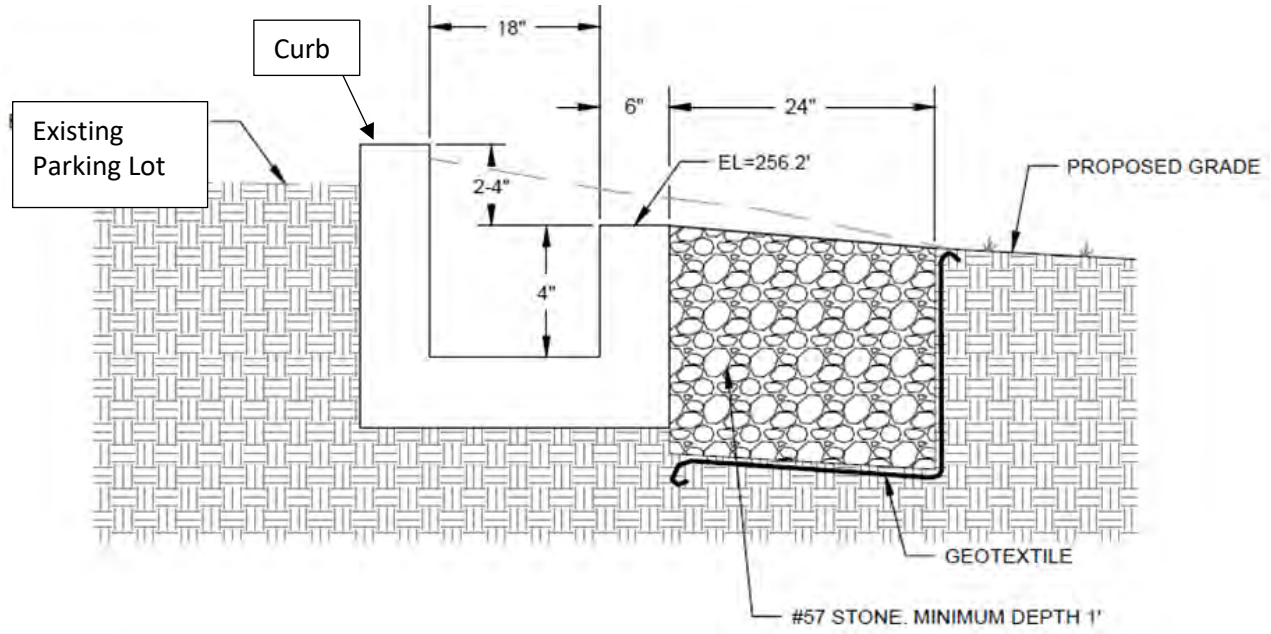


Figure 7: Level Spreader Typical Section

Maintenance Requirements of Level Spreader

Level spreaders require minimal maintenance procedures, mostly clearing of silt and debris from the practice and accounting for repair of potential erosion behind the structure.

Table 3: Level Spreader Maintenance Schedule

Frequency	Maintenance Tasks
At least 4x per year	• Check the concrete trough and curb cut openings for accumulated grit, leaves, and debris. Remove all debris from the trough and openings and bag and dispose of offsite. • Inspect grass area for evidence of channelized flow and/or erosion.
Annually	• Conduct a maintenance inspection. • Remove sediment in trough, curb and gutter, and curb cuts. • Replace and/or re-spread stone as needed to provide uniform surface. • Repair/reseed grassed areas receiving flow from level spreader.
As needed	• Stabilize the contributing drainage area to prevent clogging and erosion. • Add fill and reseed to prevent channelization of flows behind stone.

3 WOODEN GULLY STRUCTURES

Within the forested areas that surround the parking lot, gullies began to form due to concentrated flows originating at storm drain outfalls. Within these gullies a series of Post and Wattle Structures, Log Jams, Brush Mattress Weirs, Log Slope Protection were placed to slow and distribute flows out of the eroded channels, promoting additional shallow subsurface interactions to benefit existing habitat.

Post and Wattle Structures

The Post and Wattle Structures consist of two rows of a series of approximately 7-foot-long 3" diameter wooden posts that are driven into the ground. See Figure 8 and Photos 6 & 7 below. In between the two rows of posts, branches were placed and tied down using coir twine rope. These structures function to slow down stormwater entering the gullies and reduce the chance for erosion. Livestakes placed on either side of the post and wattle structures are intended to root within the wattles, adding long-term viability to the structures

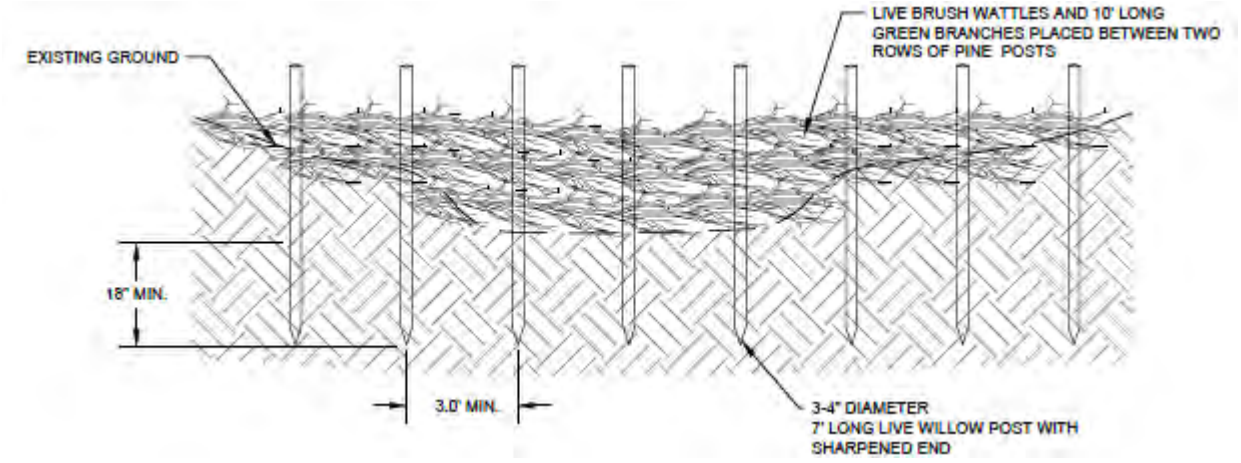


Figure 8: Post and Wattle Cross Section

Photos 6 & 7: Post and Wattle Structures

Log Jam Structures

The log jam structures are similar to the Post and Wattle, utilizing larger diameter wood crossing supports and more significant branches and brush within the internal structure. The Post and Wattle structures provide greater spread of stormwater out of the channel and onto the forested floor, while the log jams are partially buried in the channel bed and provide more substantial in-channel stabilization.

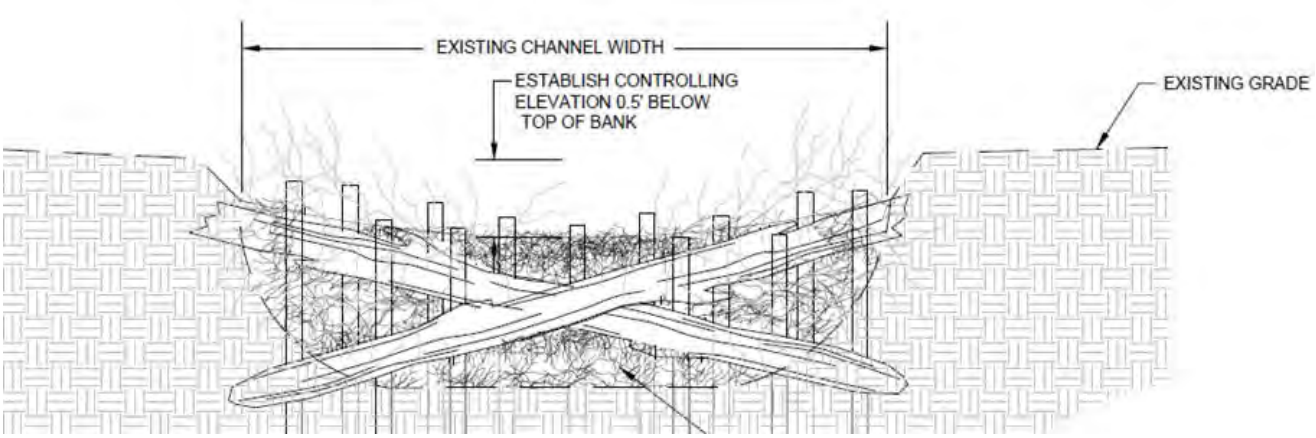


Figure 9: Log Jam Typical Section

Brush Mattress Weir Structures

The Brush Mattress Weirs are constructed of similar material and methods to the Post and Wattle Structures. However, they extend the depth of the structures within the gullies up to 15 feet in length and utilize some larger diameter wood to stabilize the entire structure.

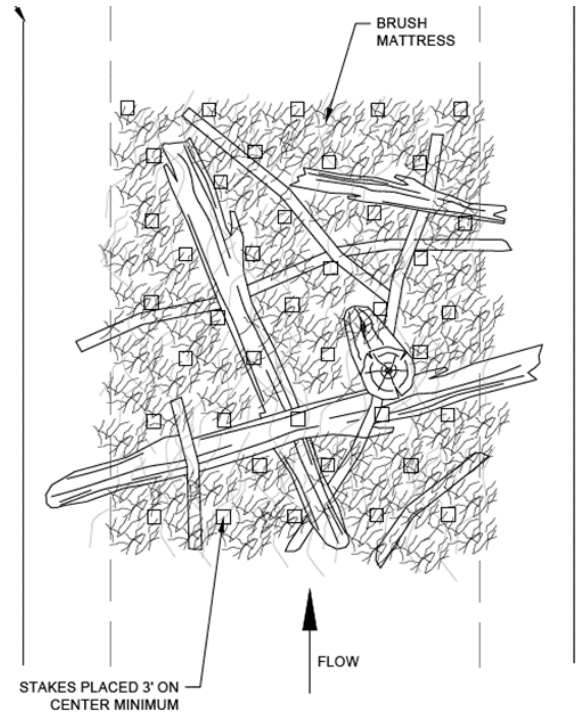


Figure 10 (left) and Photo 8 (right) Brush Mattress

Log Slope Protection

The Log Slope Protection utilizes eight-to twelve-inch diameter logs, placed cross-slope to repair and stabilize eroded slopes. This bioengineering to slope stabilization provides a softer design approach than typical stone or concrete structures. However, it's use should be limited to very minimal flow conditions, as there is potential for erosion of underlying soils.

Maintenance of Wooden Gully Structures

The wood structures, including Post and Wattle, Log Jams, Brush Mattress Weirs, and Log slope protection have been designed to be self-sustaining and not require long-term or regular maintenance. However, the structures should be inspected after significant storms during the first five years, at a minimum, to assess and evaluate for any erosion/blow out that could be occurring. All necessary work required to maintain or repair the project conditions shall be performed shortly after any deficiencies are documented. Minor repairs will be substantially easier to complete than full reconstruction of a structure. Following the initial five years, the gullies should have developed into a self-sustaining system that requires very little to no structural maintenance.

Table 3: Wood Structure Maintenance Schedule (Post and Wattle, Log Jams, Log Slope Protection)

Frequency	Maintenance Tasks
After major storm events	• Inspect woody structures for structural damage. • Inspect edges and bottom of structures for erosion that may create adverse flow paths under or around structures.
As needed	• Add fill (soil, leaves, brush) or vegetation in front of structures to repair erosion. • Repair woody structures with additional staking, brush, and/or wattles.

4 SAND SEEPAGE BERMS

Just southeast of BMP 1-3, a series of three sand seepage berms, constructed perpendicular to flows, provide additional storage, treatment, and velocity reductions of overflows from the bioretention basin. The sand seepage berms pond six inches of water behind each structure, promoting infiltration and seepage through a 50/50 mix of sand and green wood chips (a carbon source). Treatment of runoff occurs through a combination of filtration through the sand and nutrient removal from beneficial bacteria that utilize the wood chips as a carbon source. The slow release of runoff through the berms provides additional habitat improvement by raising the local water surface elevations and allowing water to form pools on the upstream side of the berms. A constructed riffle structure through the middle of the berm provides a stable overflow mechanism to prevent erosion (Figure 11).

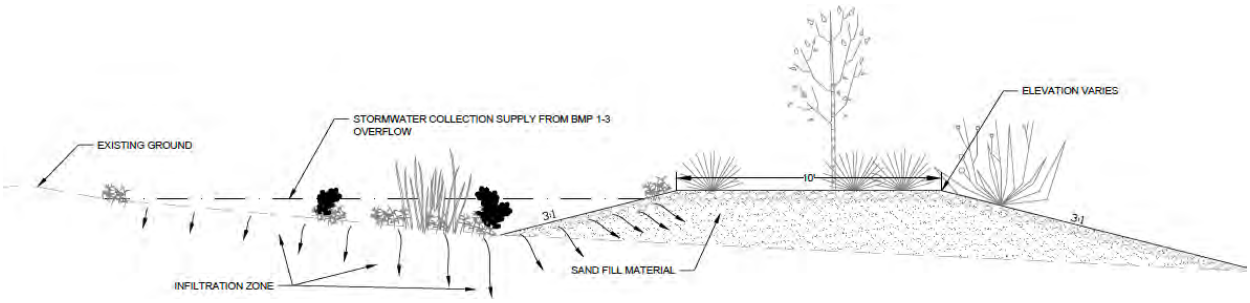


Figure 11: Sand Seepage Berm

Maintenance of Sand Seepage Berms

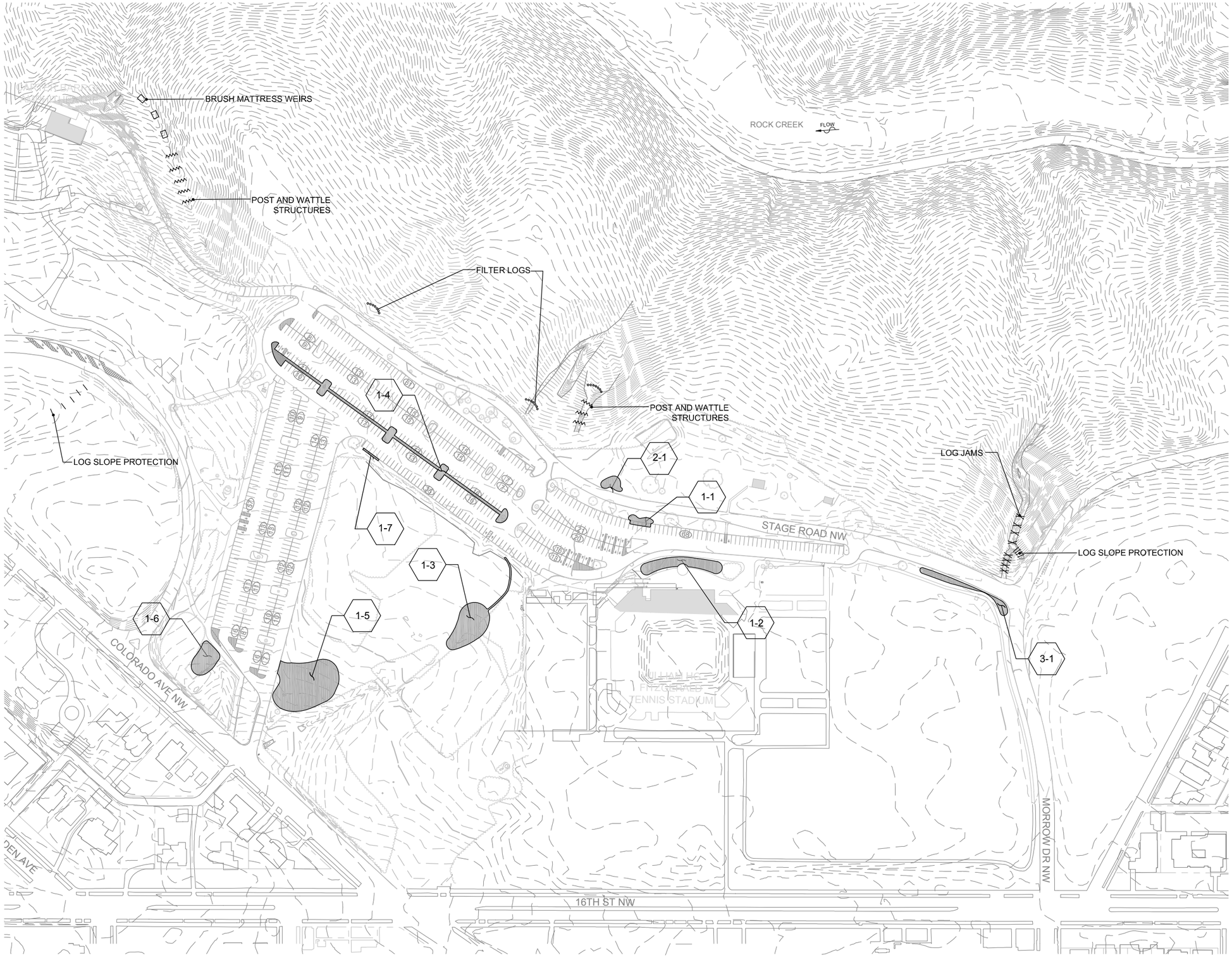
The sand seepage berms have been designed to be self-sustaining and not require long-term or regular maintenance. However, the berms should be inspected after significant storms during the first five years, at a minimum. All necessary work required to maintain or repair the project conditions shall be performed shortly after any deficiencies are documented. Following the initial five years, the berms should have developed into a self-sustaining system with sufficient vegetative cover that requires no structural maintenance.

Table 5: Wood Structure Maintenance Schedule (Sand Seepage Berms)

Frequency	Maintenance Tasks
After major storm events	• Inspect berms and stone overflows for structural damage. • Inspect edges and bottom of berms and stone overflows for erosion that may create adverse flow paths under or around structures.
As needed	• Add sand and/or vegetation in front of structures to repair erosion. • Add/reset stone at overflows.

APPENDIX A

Site Map



LEGEND

- BMP
- FILTER SOCK
- LOG SLOPE PROTECTION
- LOG JAM
- BRUSH MATTRESS WEIR
- POST AND WATTLE STRUCTURE

CLIENT

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DATE:	ISSUES / REVISIONS
2/23/2018	ISSUED FOR PERMITTING
5/1/2018	PERMIT RESUBMITTAL

TRIANGLE CONTRACTING L.L.C.

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Restore the Earth & Inspire Ecological Stewardship

PROJECT:

ROCK CREEK TENNIS CENTER LID RETROFITS

CONSTRUCTION PLANS

TITLE:

PROPOSED PRACTICE LOCATIONS

PROJECT NO. : 17010.01	SCALE: 1"=100'
SEAL: DISTRICT OF COLUMBIA · BRYAN ARVAI · No. PE928547 · 5/1/2018 · LICENSED PROFESSIONAL ENGINEER	BY: TB · CHECK: GB,BA
	DWG. NO. :
	SHEET. NO. :

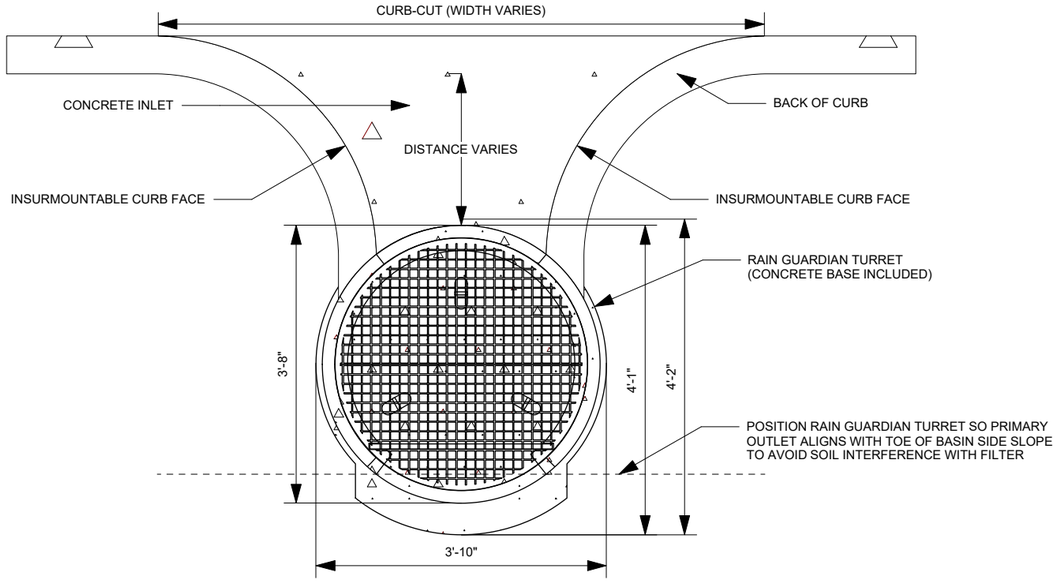
5/1/2018 I:\Projects\17010.01 Rock Creek Tennis Center\CAD\Support\cv01rctc_recover.dwg

APPENDIX B

Rain Guardian Turret detail

Rain Guardian Foxhole Details

PLAN VIEW

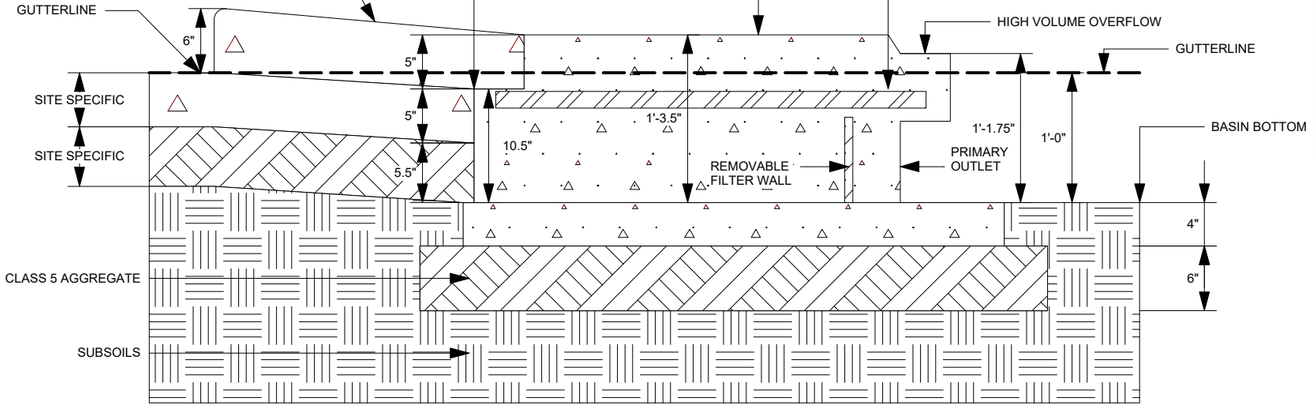


PLAN VIEW NOTES

1. INLET WIDTH AND DISTANCE BETWEEN BACK OF CURB AND RAIN GUARDIAN TURRET MAY VARY WITH SITE CONDITIONS.
2. CONCRETE BASE EXTENDS BEYOND THE FILTER WALL OF THE RAIN GUARDIAN TURRET TO SERVE AS A SPLASH DISSIPATOR.

3D VIEWS

ELEVATION VIEW



CROSS-SECTION VIEW NOTES

1. THE TOP OF THE CLASS 5 BASE (COMPACTED TO 95% STANDARD PROCTOR) IS PRECISELY 1' 4" BELOW THE GUTTERLINE ELEVATION.

SPECIFICATIONS

1. STEEL REINFORCED, COLD JOINT SECURED MONOLITHIC CONCRETE STRUCTURE (1,030 LBS). CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. CONCRETE AIR ENTRAINED (4% TO 8% BY VOLUME). MANUFACTURED AND DESIGNED TO ASTM C858.
2. THREE-POINT PICK USING RECESSED LIFTING POCKETS WITH A STANDARD HOOK.
3. TWO-PIECE FIBERGLASS TOP GRATE (16 LBS/PIECE, 1-1/2" THICK) - 1,760 LB CONCENTRATED LOAD OR 409 LB/SQ-FT UNIFORM LOAD.

INSTALLATION NOTES

1. INSTALL THE CLASS 5 BASE (COMPACTED TO 95% STANDARD PROCTOR). THE DISTANCE FROM THE BACK OF THE CURB MAY VARY BASED ON SITE CONDITIONS, BUT CONSIDERATIONS SHOULD INCLUDE SLOPE OF THE INLET AND BASIN SIDE SLOPES ADJACENT TO THE RAIN GUARDIAN TURRET. POSITION RAIN GUARDIAN TURRET SO PRIMARY OUTLET ALIGNS WITH TOE OF BASIN SIDE SLOPE TO AVOID SOIL INTERFERENCE WITH REMOVABLE FILTER WALL. EXCAVATE 1' 10" BELOW THE GUTTERLINE ELEVATION (I.E. THE BIORETENTION OVERFLOW ELEVATION) TO ACCOMMODATE THE 1' PONDING DEPTH, 6" CLASS 5 AGGREGATE, AND 4" RAIN GUARDIAN TURRET BASE (INCLUDED). THEREFORE, THE TOP OF THE CLASS 5 COMPACTED BASE IS PRECISELY 1' 4" BELOW THE GUTTERLINE ELEVATION. THE INLET TO THE RAIN GUARDIAN TURRET WILL BE 10-1/2" ABOVE THE TOP OF THE CONCRETE BASE AND 1-1/2" BELOW THE GUTTERLINE ELEVATION TO ACCOMMODATE A SLOPED INLET FROM THE GUTTER TO THE RAIN GUARDIAN TURRET.
2. SET RAIN GUARDIAN TURRET ON THE PREPARED CLASS 5 BASE.
3. INSTALL FRAMING FOR INLET BETWEEN RAIN GUARDIAN TURRET AND BACK OF CURB. TOP ELEVATIONS OF THE FRAMING SHOULD MATCH THE TOP OF THE CURB ON THE STREET SIDE AND THE TOP OF THE RAIN GUARDIAN TURRET ON THE BIORETENTION SIDE.
4. INSTALL EXPANSION/CONTRACTION JOINT MATERIAL OR A SHEET OF POLY TO SERVE AS A BOND BREAK BETWEEN RAIN GUARDIAN TURRET AND CONCRETE INLET BEFORE POURING INLET.
5. SIDE CURBS OF THE POURED INLET MUST HAVE AN INSURMOUNTABLE PROFILE TO PREVENT WATER FLOW FROM OVERTOPPING THE DOWNSTREAM SIDE OF THE INLET.
6. REMOVABLE FILTER WALL SHOULD BE INSTALLED WITH FILTER FABRIC FACING THE RAIN GUARDIAN TURRET INLET.

MANUFACTURED BY: FORTERRA™ Structural & Specialty

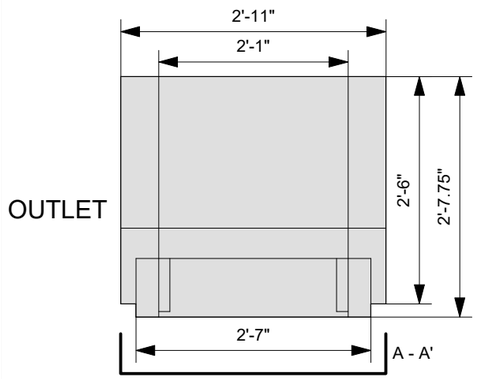
RAIN GUARDIAN U.S. PATENT NO. 8,501,016
PRETREATMENT FOR BIORETENTION
Rain Gardens • Swales • Filtration Basins • Infiltration Basins

RAIN GUARDIAN TURRET
PRETREATMENT CHAMBER
BIORETENTION PONDING DEPTH: 1'
TYPICAL DETAIL

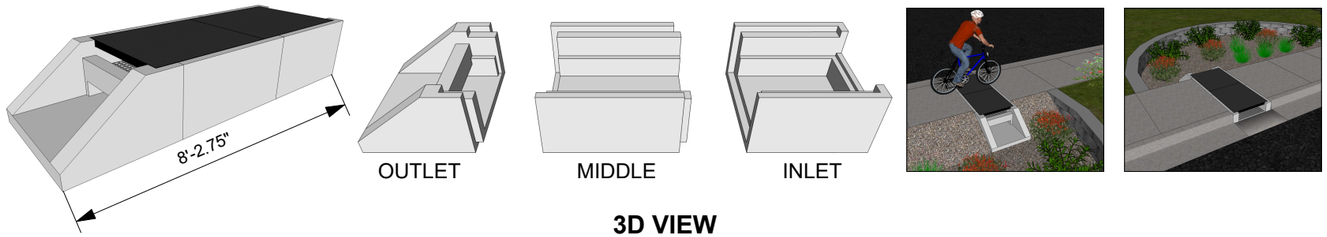
REVISION HISTORY

REV	BY	DATE	DESCRIPTION
A	MDH	08/29/18	TURRET - 1'
SCALE		VARIABLE	
U.S. PATENT NOS.		8,501,016 AND 8,858,804	

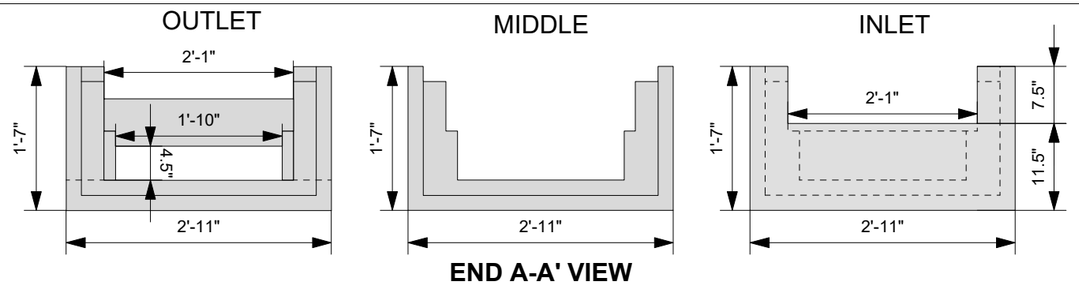
Anoka Conservation District
1318 McKay Dr. NE, Suite 300
Ham Lake, MN 55304
763-434-2030



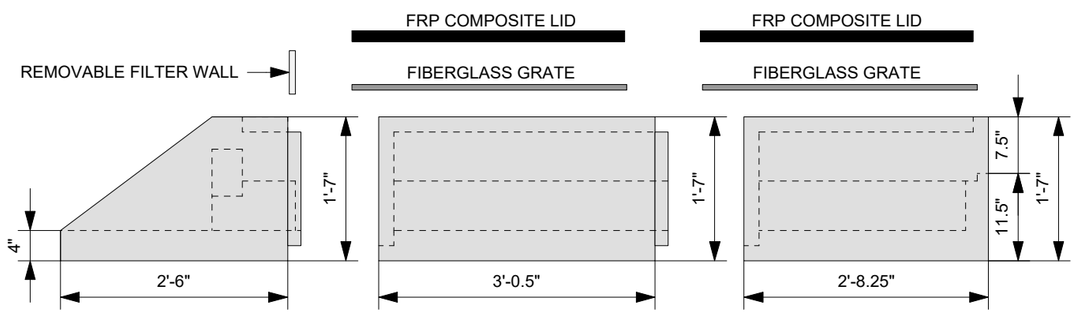
PLAN VIEW



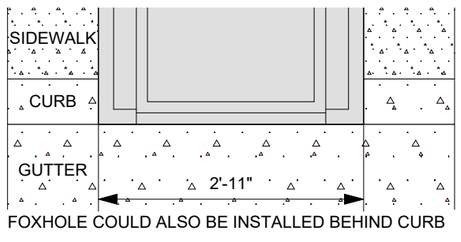
3D VIEW



END A-A' VIEW

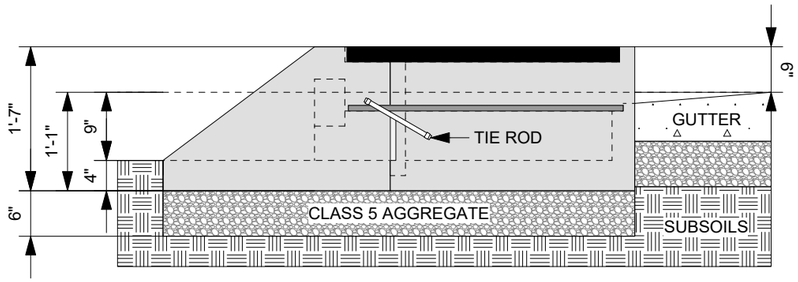


ELEVATION VIEW



FOXHOLE COULD ALSO BE INSTALLED BEHIND CURB

INSTALLED PLAN VIEW - INLET ONLY



INSTALLED ELEVATION VIEW - INLET/OUTLET ONLY

SPECIFICATIONS

1. STEEL REINFORCED, COLD JOINT SECURED MONOLITHIC CONCRETE STRUCTURES (INLET 875 LBS, MIDDLE 965 LBS, AND OUTLET 730 LBS). CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. CONCRETE AIR ENTRAINED (4% TO 8% BY VOLUME). MANUFACTURED AND DESIGNED TO ASTM C858.
2. 2-POINT PICK USING RECESSED LIFTING POCKETS WITH A STANDARD HOOK.
3. FIBERGLASS GRATE (11 LBS/PIECE).
4. FRP COMPOSITE LID (38 LBS/PIECE) WITH CONCENTRATED LOAD CAPACITY OF 11,200 LBS.

INSTALLATION NOTES

1. INSTALL A CLASS 5 BASE (COMPACTED TO 95% STANDARD PROCTOR). THE DISTANCE FROM THE BACK OF THE CURB MAY VARY BASED ON SITE CONDITIONS. EXCAVATE 1' 7" BELOW THE GUTTERLINE ELEVATION (I.E. THE BIORETENTION OVERFLOW ELEVATION) TO ACCOMMODATE THE 9" PONDING DEPTH, 6" CLASS 5 AGGREGATE, AND 4" RAIN GUARDIAN FOXHOLE BASE (INCLUDED). THEREFORE, THE TOP OF THE CLASS 5 COMPACTED BASE IS PRECISELY 1' 1" BELOW THE GUTTERLINE ELEVATION. THE TOP OF THE RAIN GUARDIAN FOXHOLE INLET POINT WILL BE 7-1/2" ABOVE THE TOP OF THE CONCRETE BASE AND 1-1/2" BELOW THE GUTTERLINE ELEVATION TO ACCOMMODATE A SLOPED INLET FROM THE GUTTER TO THE RAIN GUARDIAN FOXHOLE.

2. SET RAIN GUARDIAN FOXHOLE INLET FIRST, FOLLOWED BY MIDDLE SECTION(S), AND FINALLY THE OUTLET ON THE PREPARED CLASS 5 BASE. POSITION RAIN GUARDIAN FOXHOLE OUTLET PIECE SO PRIMARY OUTLET ALIGNS WITH TOE OF BASIN SIDE SLOPE TO AVOID SOIL INTERFERENCE WITH REMOVABLE FILTER WALL.

3. SECURE MODULAR FOXHOLE PIECES AT EACH JOINT USING PROVIDED GALVANIZED TIE RODS.

4. INSTALL EXPANSION/CONTRACTION JOINT MATERIAL OR A SHEET OF POLY TO SERVE AS A BOND BREAK BETWEEN RAIN GUARDIAN FOXHOLE AND CONCRETE INLET BEFORE POURING INLET.

5. REMOVABLE FILTER WALL SHOULD BE INSTALLED WITH FILTER FABRIC FACING THE RAIN GUARDIAN FOXHOLE INLET.

MANUFACTURED BY: FORTERRA™ Structural & Specialty

RAIN GUARDIAN
U.S. PATENT NO. 8,501,016
PRETREATMENT FOR BIORETENTION
Rain Gardens • Swales • Filtration Basins • Infiltration Basins

RAIN GUARDIAN FOXHOLE
MODULAR PRETREATMENT CHAMBER
BIORETENTION PONDING DEPTH: 9"
TYPICAL DETAIL

REVISION HISTORY

REV	BY	DATE	DESCRIPTION
A	MDH	01/11/18	MODULAR FOXHOLE

SCALE	VARIABLE
U.S. PATENT NOS.	8,501,016 AND 8,858,804

ANOKA CONSERVATION DISTRICT
Anoka Conservation District
1318 McKay Dr. NE, Suite 300
Ham Lake, MN 55304
763-434-2030

APPENDIX C

DOEE Self-Inspection/Self-Reporting Guidance Manual

DOEE Maintenance Service Report






SELF-INSPECTION / SELF-REPORTING
GUIDANCE MANUAL
FOR STORMWATER MANAGEMENT BEST PRACTICES FACILITIES

SEPTEMBER 2018

DEPARTMENT OF ENERGY & ENVIRONMENT

GOVERNMENT OF THE DISTRICT OF COLUMBIA
MURIEL BOWSER, MAYOR

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LIST OF FIGURES

DOEE, STORMWATER MANAGEMENT AND YOU: AN OVERVIEW

Who We Are

The Department of Energy and Environment (DOEE) is the leading authority on energy and environmental issues affecting the District of Columbia. Using a combination of regulations, outreach, education, and incentives, our agency administers programs and services to fulfill our mission. We work collaboratively with other government agencies, residents, businesses, and institutions to promote environmentally responsible behavior that will lead to a more sustainable urban environment.

Our Mission

DOEE's mission is to improve the quality of life for the residents and natural inhabitants of the nation's capital by protecting and restoring the environment, conserving our natural resources, mitigating pollution, increasing access to clean and renewable energy, and educating the public on ways to secure a sustainable future. The agency's core responsibilities include, but are not limited to, enforcing environmental regulations; monitoring and assessing environmental risks; developing energy and environmental policies; issuing permits; and providing residents and local businesses with funding, technical assistance, and information on initiatives designed to ensure a more resilient and sustainable city. We perform all agency mission activities with the highest integrity to uphold the public trust.

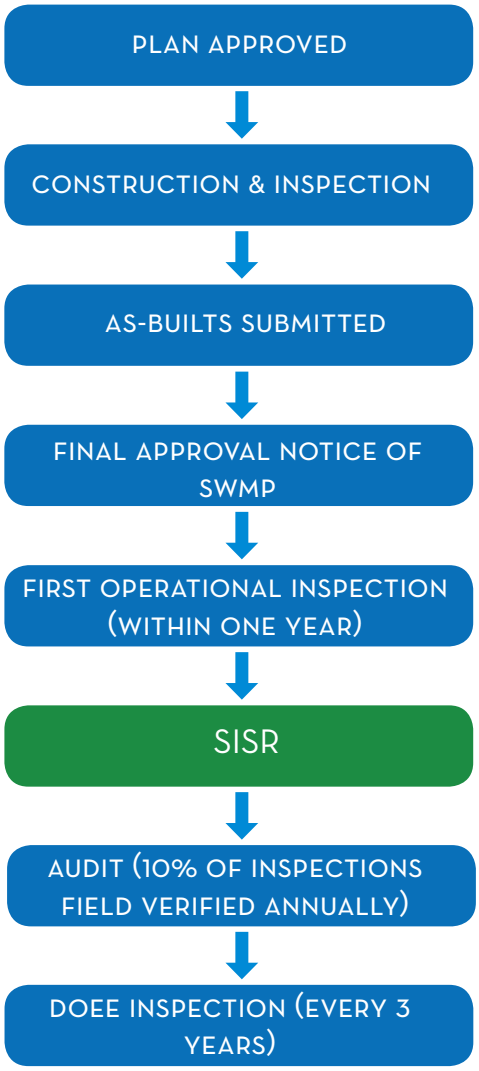

Figure 1: Stormwater facility life cycle

Self-Inspection / Self-Reporting For Stormwater Management Best Practices Facilities

DOEE envisions a city whose rivers and waters are fishable and swimmable for the residents and natural inhabitants of the nation's capital. One way in which DOEE aims to achieve this goal is through the use of stormwater management facilities, sometimes called stormwater best management practices (SWBMP) facilities. A SWBMP facility is a structure or vegetated area that minimizes the impact of stormwater runoff on receiving waterbodies and other environmental resources. The facilities are intended to reduce the volume of water that reaches the city's sewer system as well as the amount of pollutants carried in it. These stormwater facilities have been built throughout the city, in public spaces and on private property. They can range from large structures, such as engineered ponds, to more discreet structures, such as underground tanks and landscaping along curbs.

The Self-Inspection & Self-Reporting (SISR) program is an effort by DOEE to maintain stormwater facilities more consistently and enlist their owners to perform necessary inspections of their own facilities. Having stormwater facilities that are regularly inspected and well-maintained contributes to the District's efforts to meet our sustainability goal of swimmable and fishable waterways. This work also helps improve the quality, health, and safety of water in the Anacostia and Potomac rivers, Rock Creek and their surrounding areas.

SISR is one step in the life cycle of a stormwater facility, as shown in Figure 1. The figure above illustrates where SISR fits within the entire process. More details about the various steps are described in later sections.

Stormwater Management Plans

A (SWMP) is an engineering drawing that lays out the plans for a construction project. In addition to drawings of what is to be built, SWMPs also contain detailed notes for the contractor and the property owner. The notes can provide information on how to construct particular structures, calculations used in developing the structure's design, and certifications granted by engineers. Among the most important information provided for owners, are details on the stormwater facility and maintenance requirements.

SWMPs are critical in helping the District protect the health of its waterways. In general, if 5,000 square-feet or more of land is disturbed during a construction project, a SWMP is required. The central area of the District has a combined sewer system, where sanitary sewage and stormwater are routed through the same pipe system. When large rainfall events occur, DC's wastewater treatment plant may reach capacity. If this happens, the plant cannot manage the large volume of combined sewage and stormwater flowing in the system, so some of this water-sewage mix has to be released to the District's rivers and creeks. This results in a large amount of pollutants and debris ending up in the city's waterways, negatively affecting the water quality.

As properties become developed, natural areas containing trees and grass get replaced by buildings and pavements. These structures do not allow for water to seep into the ground as it would naturally do on most grass surfaces. Instead this water gets routed to the city's sewer system and contributes to the volume of water that may potentially overflow during large rain events. Stormwater facilities are intended to capture and manage some of this stormwater before it can reach the sewers. By reducing the volume of water that makes it into the sewer, the likelihood that an overflow will occur is decreased.

Stormwater Facility Owners' Responsibilities

In an approved SWMP, DOEE assigns maintenance responsibility. When an owner undertakes a construction project that disturbs more than 5,000 square-feet of land coverage, they are required to inspect and maintain their stormwater facility as required by the SWMP. This is described in the District of Columbia Municipal Regulations, Title 21, Chapter 5, Section 528.1:

> Each owner or designee of each lot and parcel that is part of a site that undertook a major regulated project shall be responsible for maintenance required by the Stormwater Management Plan (SWMP) approved by the Department and shall record that responsibility in a declaration of covenants.

Aside from the regulation, it is also in the interest of property owners to perform their own inspections. While self-reporting on stormwater facilities is optional, taking this initiative allows for longer grace periods to be granted for the required maintenance. Performing self-inspections may also prevent costs from accruing in the future.

SISR should be of particular interest to commercial property owners, as their properties often already have maintenance personnel on staff. The requirements of the SISR program may be very similar to tasks already being completed on a regular basis. The SISR creates an easier, more streamlined process for inspection reporting that may already be taking place.

STORMWATER FACILITY TYPES

Green Roofs

Green roofs capture and store rainfall in engineered growing media that is designed to support plant growth. A portion of the captured rainfall evaporates or is used by plants, which helps reduce runoff volumes and pollutants. Green roofs typically contain a layered system of roofing, which is designed to support plant growth and retain water for plant uptake while preventing ponding on the roof surface. The roofs are designed so that water drains vertically through the media and then horizontally along a waterproofing layer towards the outlet. Extensive green roofs are designed to have minimal maintenance requirements. Plant species are selected so that the roof does not need supplemental irrigation and requires minimal, infrequent fertilization after vegetation is initially established. Intensive green roofs are deeper, generally, than extensive green roofs, with a growing media layer that ranges from 6 inches to 4 feet thick.

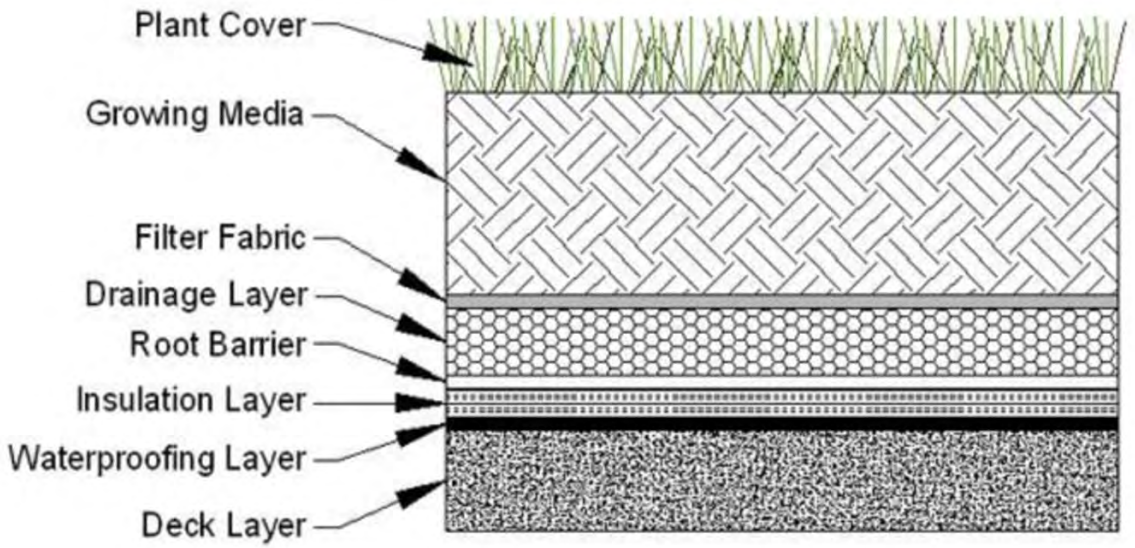

Figure 2: Green roofs

Rainwater Harvesting (cistern)

Rainwater harvesting systems store rainwater and release it for future use. Rainwater that falls on a rooftop or other impervious surface is collected and conveyed into an above- or below-ground tank (also referred to as a cistern), where it is stored for non-potable uses or for on-site disposal. A rain barrell is a simpler type of rainwater harvesting facility.

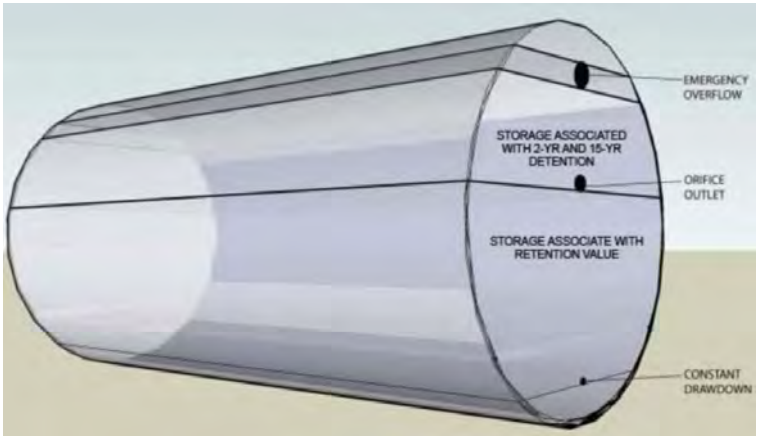

Figure 3: Rainwater harvesting (cistern)

Permeable Pavement

Permeable pavement is an alternative paving surface that captures and temporarily stores stormwater by filtering it through voids in the pavement surface into an underlying stone reservoir. Filtered stormwater may be collected and returned to the conveyance system, or allowed to partially infiltrate into the soil. Design variants include: porous asphalt, pervious concrete, permeable pavers.

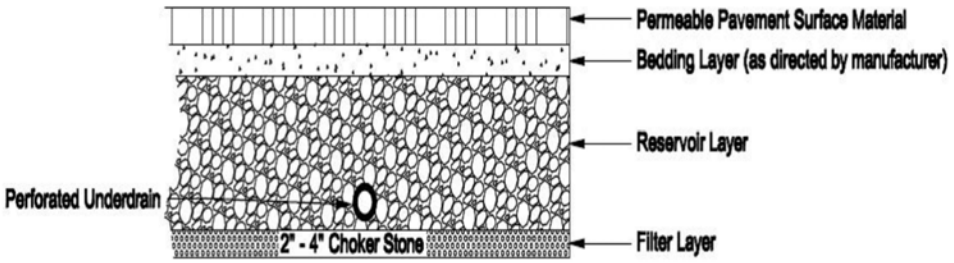

Figure 4: Permeable pavement

Bioretentions/Rain Gardens

Bioretentions capture and store stormwater runoff and pass it through a filter bed of soil media composed of sand, soil, and organic matter. Filtered runoff may be collected and returned to the conveyance system, or allowed to infiltrate into the soil. Design variants include:

- Traditional bioretention
- Streetscape bioretention
- Engineered tree pits
- Stormwater planters
- Residential rain gardens

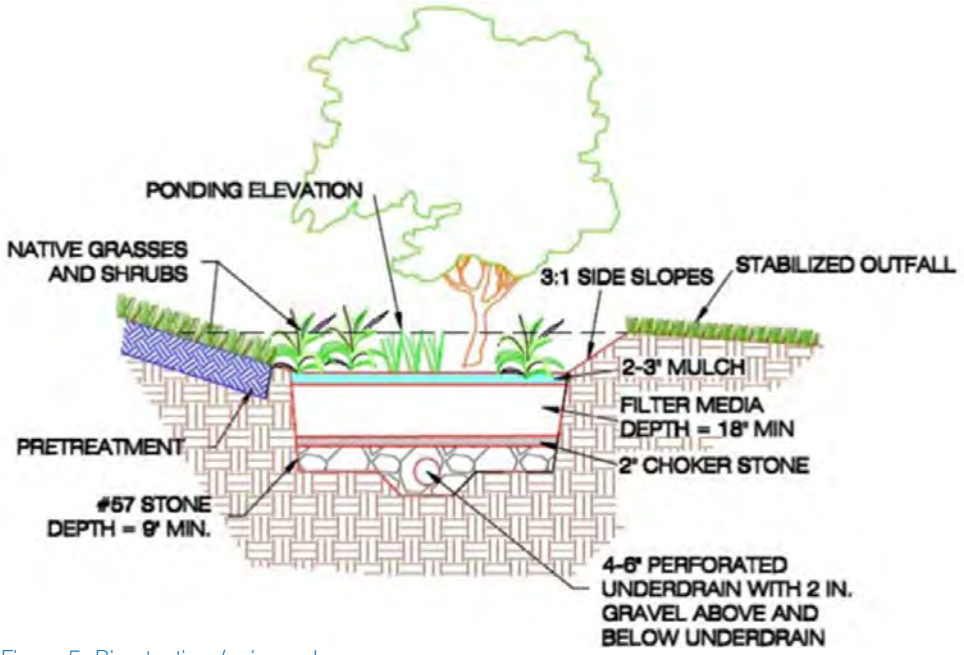

Figure 5: Bioretention / rain garden

Sand Filters

A sand filter captures and temporarily stores stormwater and passes it through a filter bed of sand and stone. A typical District of Columbia sand filter is contained in an underground or sometimes above ground concrete vault. The filter consists of three chambers: the first is devoted to separating sediment and trash from the water, the second is a filter bed consisting of a sand and stone, and the third allows for treated water to discharge from the facility.

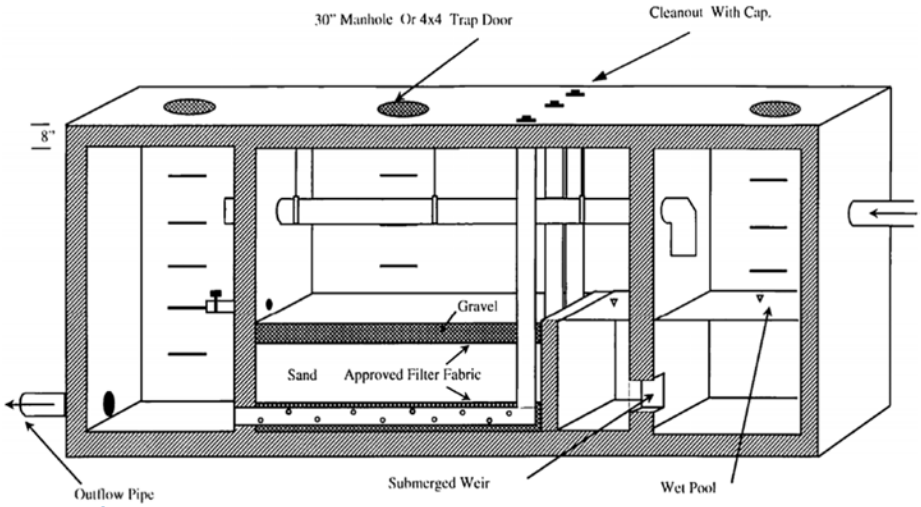

Figure 6: Sand filter

Infiltration Trenches and Basins

Infiltration trenches capture and temporarily store stormwater before allowing it to infiltrate into the soil over a two day period. This type of facility includes infiltration trenches and infiltration basins. Infiltration facilities use temporary surface or underground storage to allow incoming stormwater runoff to infiltrate into underlying soils. Polluted stormwater first passes through multiple pretreatment mechanisms to trap sediment, plant debris, and trash before it reaches the facility. As the stormwater penetrates the underlying soil, chemical and physical processes remove pollutants. Infiltration facilities are suitable for use in residential and other urban areas where field measured soil infiltration rates are sufficient.

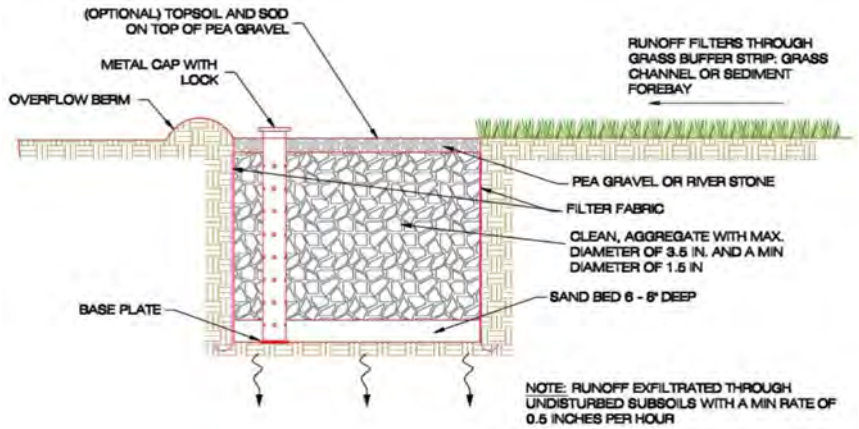

Figure 7: Infiltration trench

Proprietary Facilities

Proprietary facilities are manufactured stormwater treatment facilities that utilize settling, filtration, absorptive/adsorptive materials, vortex separation, vegetative components, and/or other appropriate technology to manage the impact of stormwater runoff. Proprietary facilities may be used to achieve treatment compliance, provided they have been approved by the District and meet the performance criteria outlined in this specification. Historically, proprietary facilities do not provide retention volume.

Stormwater Facilities that May Be Reported Using SISR

Certain SWMPs may be reported using SISR, while others may not. Eligibility depends on the stormwater facility type. Some Stormwater facilities are more complex and may require more specialized knowledge to properly inspect. Other limitations to self-inspection include safety concerns for particular stormwater facilities. Stormwater facilities will not be eligible for SISR if they cannot be safely accessed. For example, facilities that require the inspector to enter confined spaces are not appropriate for most owners to inspect. Table 1 shows which Stormwater facilities are eligible for self-inspection and self-maintenance and which require action by licensed professionals.

Additionally, certain documentation needs to be in place within the first five years of a stormwater facility being constructed. To be eligible for SISR, plans must have an as-built set of engineering drawings that include a certification that the project was completed and that it was built as designed. Also, an initial inspection of the stormwater facility is required by DOEE. These two conditions must be met within the first years of a stormwater facility being constructed. If after five years either the as-built is missing or the stormwater facility has not been inspected by DOEE, then it is no longer eligible for SISR.

Table 1: Stormwater Facility Eligibility for SISR and Professional Inspection & Maintenance

FACILITY TYPE	SELF-INSPECTION	PROFFESIONAL INSPECTIONS	SELF-MAINTENANCE	PROFESSIONAL MAINTENANCE
Green Roof	**Conditional**	✓	**Conditional**	✓
Rainwater Harvesting (Cistern)		✓		✓
Rainwater Harvesting (Rain Barrel)	✓	✓	✓	✓
Permeable Pavement	✓	✓	✓	✓
Bioretention	✓	✓	✓	✓
Sand Filter	✓	✓		✓
Infiltration Facility	✓	✓	✓	✓
Storage Facility	✓	✓		✓
Proprietary Facility	✓	✓		✓

Who may perform the inspections?

As a stormwater facility owner, may be able to take responsibility for performing inspections for your own facilities. Refer to Table 1 to determine whether your facility qualifies for self-inspection. In some cases it is infeasible for a non-professional to inspect a stormwater facility due to safety concerns or the complex nature of particular facilities.

Stormwater management professionals can provide specialized knowledge and services regarding Stormwater facilities. This can include both stormwater facility inspections and maintenance. Professionals have completed the necessary training to understand the various stormwater facilities and how they should operate. They have experience locating and evaluating Stormwater facilities, and if necessary can perform maintenance to bring facilities back to optimal conditions. Performing inspections and maintenance can come with safety risks. Professionals have had the proper training to know how to effectively manage these risks and safely accomplish their work. For a list of professionals in the DC area, see appendix A.

DOEE Review Process

Once an owner submits an inspection report to the stormwater database, the report is sent to a DOEE inspector for review. Based on the answers submitted to the inspection questions, the DOEE inspector will issue either a maintenance compliance letter or a maintenance notice. A maintenance compliance letter will inform the stormwater facility owner that his or her facility is up to date on maintenance activities and meets maintenance requirements. If a maintenance notice is issued it means that the stormwater facility owner needs to perform further maintenance. In addition, before a maintenance letter or notice is issued, the DOEE inspector will confirm that the inspection meets established quality standards. DOEE may audit submitted self-inspections to confirm accuracy of reported information. Inaccurate reporting could result in warning notices, subsequent inspections by DOEE, and removal from the SISR program.

This SISR Guidance Manual provides details on what maintenance activities are needed for each stormwater facility type.

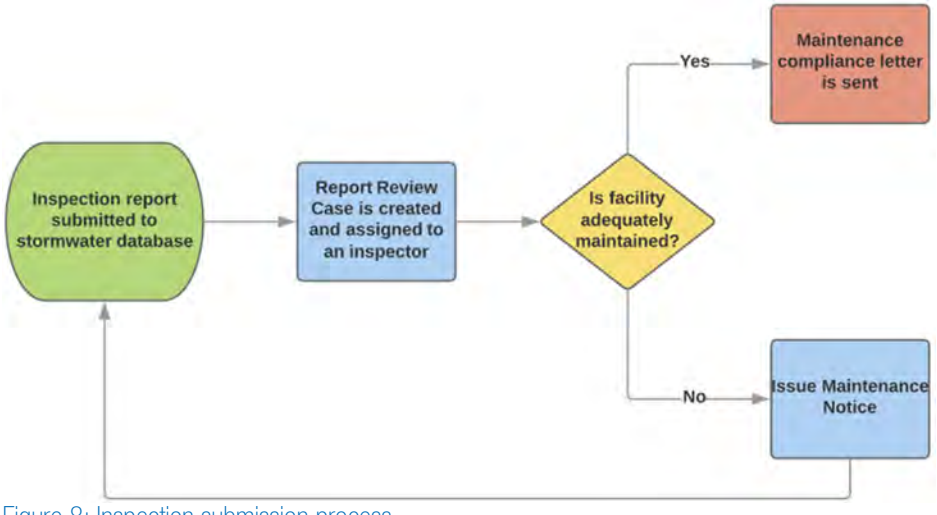

Figure 8: Inspection submission process

INSPECTION PROCESS

Overview

The steps necessary for SISR are outlined in the sections below. The primary tasks that need to be completed include accessing the database, locating the stormwater facilities, and conducting the inspection. See Figure 9 for the detailed inspection process.

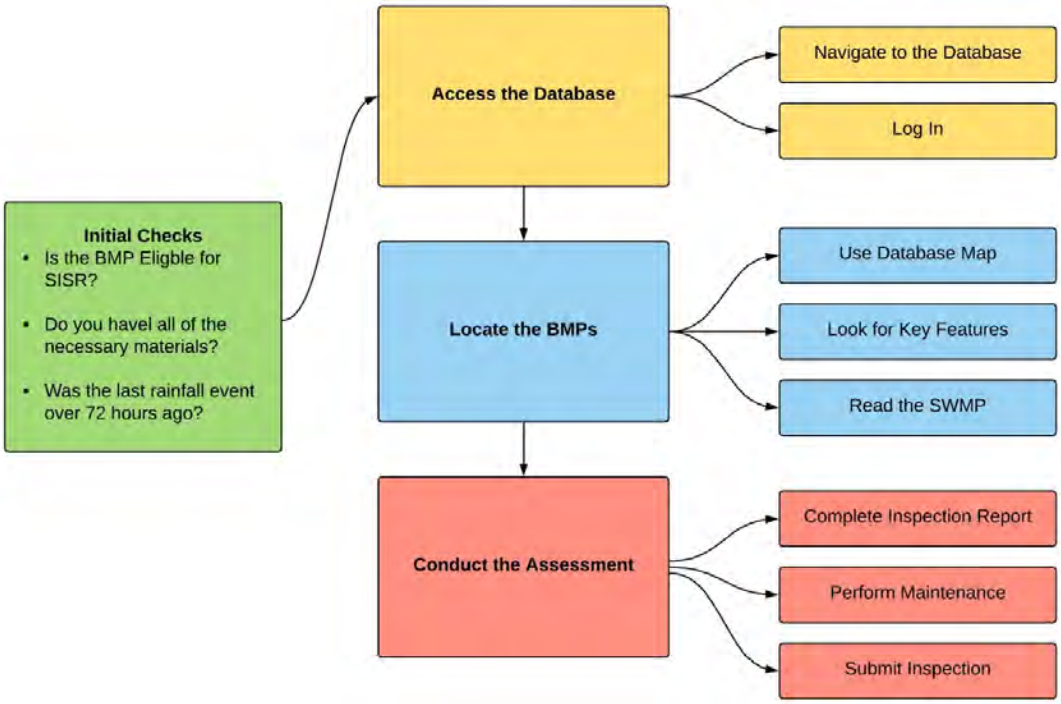

Figure 9: Inspection process

What You Will Need

Before getting started on the inspection, you will need internet access, either through a mobile device or a laptop or desktop PC. You will need to be able to take photos and access the photos so they can be uploaded with the completed inspection report. Additional documents may also be helpful for reference if questions arise during the inspection

What you will need for the inspection:

- Laptop or mobile device, with the following capabilities:
  - o Camera for uploading photos
  - o Internet access
- Login credentials for database
- Self-Inspection Approval Notice
- SISR Guidance Manual or Stormwater Facility Fact Sheets
- Flashlight (if inspecting sand filters, storage facilities, or proprietary facilities)
- Footwear that cannot be easily punctured by glass or other sharp objects

Accessing the Database

Using your laptop or mobile device, visit the Stormwater Database at https://octo.quickbase.com. Once you navigate to this page, you will be asked to login to the site. This should be done using your old login credentials.

Once you are signed into your account, you will be able to:

- view all approved SWMPs associated with your address
- Submit the inspection and maintenance reports associated with your facilities.
- View previous inspections and maintenance reports
- Grant access to someone who will conduct inspections and/or maintenance on your behalf

Who to contact with issues?

If you are not able to recover your login credentials using the system options, please email Matthew Espie matthew.espie@dc.gov.

Locating the Stormwater facilities

Using Database Map to Locate Stormwater Facility

In the database you will find an embedded map that can be used to help locate your facilities. The points on the map indicate the approximate location of stormwater facilities. If there is more than one stormwater facility in your SWMP, you can use the stormwater facility number and stormwater facility type displayed on the map to differentiate between the multiple points. You can also zoom in to the map to see more details or zoom out to get a larger perspective of the surrounding area.

Key Features to Look For

You can also locate your stormwater facility by simply inspecting your site. This section is provided to give you examples of what various stormwater facility types might look like. Stormwater facilities can vary in design and appearance and are not limited to what is shown in the following images.

Green Roofs

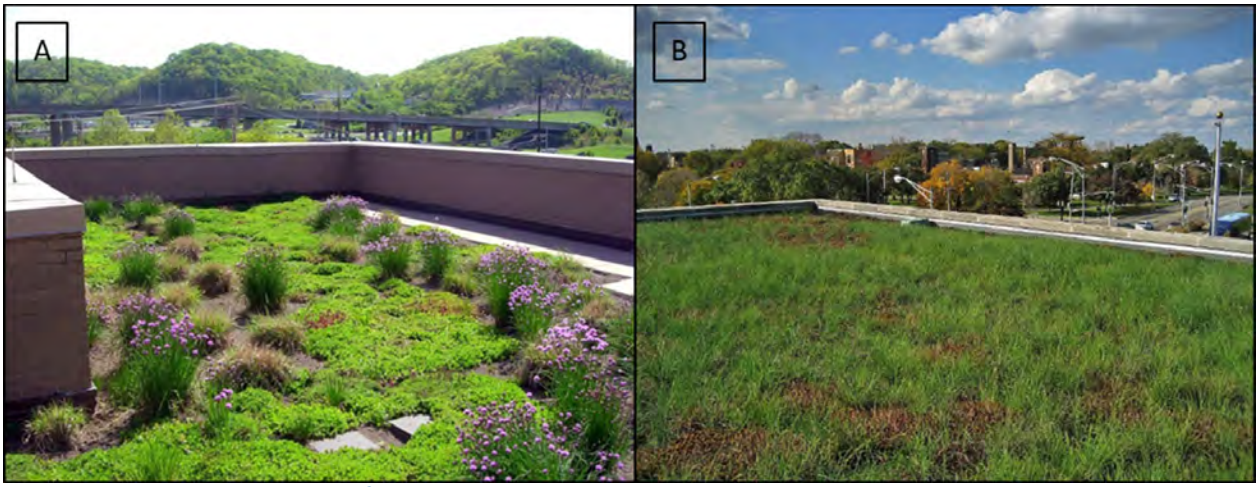

Figure 10: (A) and (B) Vegetation on Green Roofs

Rainwater Harvesting

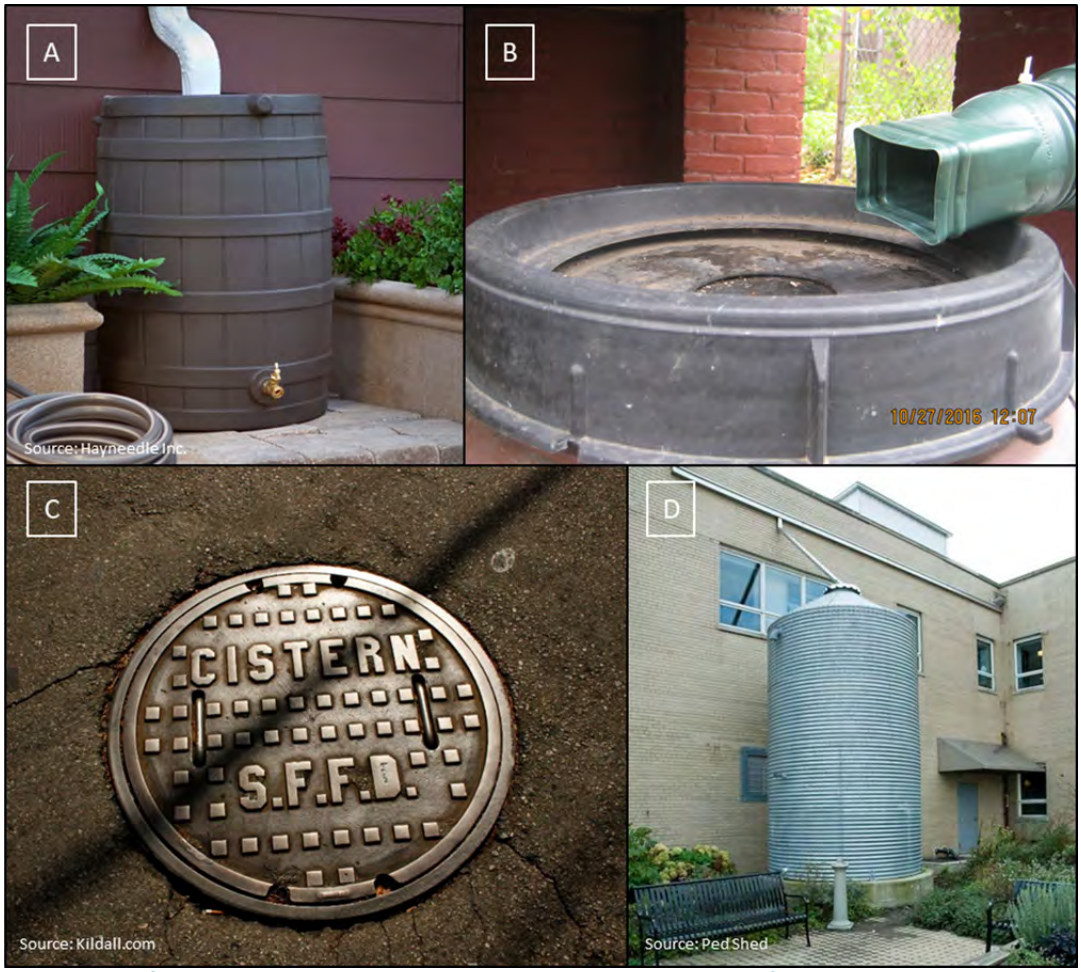

Figure 11: (A) Side view of rain barrel. (B) Downspout draining into rain barrel (C) Manhole for underground cistern. (D) Above-ground cistern

Permeable Pavement

Figure 12: (A) Permeable pavers (B) Pervious concrete

Permeable Pavement

Figure 13: (A) Vegetation in bioretention. (B) and (C) Overflow structures. (D) Curb cut for runoff to flow into bioretention

Sand Filters

Figure 14: (A). Manhole for sand filter (B) and (C) Top view of sand filter

Infiltration Facilities

Figure 15: (A) Inlet leading to dry well (B) Infiltration trench

Storage Facilities

Figure 16: (A) Storage facility during construction (B) Manhole of storage facility

Proprietary Facilities

Figure 17: (A) Bayfilter (B) Manhole StormFilter (C) Catch Basin Jellyfish (D) Snout

Conducting the Assessment

After you have identified the location of your stormwater facility, you may be ready to begin the inspection. However, the ability to proceed is weather dependent. Assessments should not occur while it is raining or within 72 hours of a rain event. If it has been less than 72 hours from the last rainfall event, you must wait to perform your inspection.

Complete Inspection Report

This assessment process involves making visual observations of the stormwater facility and surrounding area, as well as submitting answers to inspection questions. The stormwater facility-specific inspection questions will dictate what sort of conditions and features you should look for.

The following information will be requested in the inspection report:

- **Owner Information:** Provide the contact information for the owner of the facility. Please indicate if this is a new owner of the facility.
- **Facility Information:** Enter the information from your Self Inspection Approval Notice.
- **Inspection Information:** To be completed by the individual performing the inspection, stormwater facility owner, or the person responsible for maintenance.
- **Inspection Tasks:** The person inspecting each component is required to complete this information. Describe completed maintenance in the notes section.
- **Photos:** Attach a minimum of two date-stamped photos of the facility to this completed form. One photo should show the facility, and one or more photos should show areas inspected or serviced for maintenance. See the examples below.
- **Supporting Documents:** When applicable, attach material receipts, dump tickets, and a contractor invoice

Figure 18: Wide View

Figure 19: Close-up of inspected areas

The Appendix provides examples of the types of questions asked for each stormwater facility. The paper forms are for reference only. They cannot be submitted in place of the online inspection report. All SISR submissions must be sent through the online database.

Further Steps if Maintenance Needed

If you answered "Yes" or "True" to all of the questions in the Inspection Task section, maintenance is not required and you may proceed to the final step of submitting your inspection. If you answered "No" or "False" to any of the question in the Inspection Task section maintenance is required. When you submit your inspection form, you will also need to provide additional documentation. This will include:

- Material receipts
- Dump tickets
- Contractor invoices
- Photos

The maintenance needs differ depending on the stormwater facility. The following subsections provide details on what next steps you may need to take to optimize the effectiveness of your stormwater facility and meet its maintenance requirements.

Green Roofs

The use of herbicides, insecticides, and fungicides should be avoided, since their presence could hasten degradation of some waterproofing membranes. Fertilization is generally not recommended due to the potential for leaching of nutrients from the green roof. Recommended maintenance activities are as follows:

As needed or as required by manufacturer

- Water to promote plant growth and survival
- Inspect the green roof and replace dead or dying vegetation

Semi – annually

- Inspect the waterproof membrane for leaks and cracks.
- Weed to remove invasive plants (do not dig or use pointed tools where there is potential to harm the root barrier or waterproof membrane)
- Inspect roof drains, scuppers, and gutters to ensure they are not overgrown and have not accumulated organic matter deposits. Remove any accumulated organic matter or debris.
- Inspect the green roof for dead, dying, or invasive vegetation. Plant replacement vegetation as needed.
- Inspect for standing water

Warning: Exercise caution and utilize proper fall protection when working on a roof

Rainwater Harvesting

Periodic inspections and maintenance shall be conducted for each system by a qualified professional. Maintenance requirements for rainwater harvesting systems vary according to use. Systems that are used to provide supplemental irrigation water have relatively low maintenance requirements, while systems designed for indoor uses have much higher maintenance requirements. Maintenance tasks must be performed by a — Inspector Specialist, certified by the American Rainwater Catchment Association. Recommended maintenance activities are as follows:

Owner (Rain Barrel)

Four times a year

- Inspect and clean prescreening devices and first flush diverters.

Twice a year

- Keep gutters and downspouts free of leaves and other debris.

Once a year

- Inspect and clean storage cistern lids, paying special attention to vents and screens on inflow and outflow spigots. Check mosquito screens and patch holes or gaps immediately.
- Inspect condition of overflow pipes, overflow filter path, and/or secondary stormwater treatment facilities.

Every third year

- Clear overhanging vegetation and trees over roof surface.

Qualified Third Party Inspector (Cistern)

According to Manufacturer

- Inspect water quality devices.

As indicated in tiered risk assessment management (TRAM)

- Provide water quality analysis to DDOE.

Every third year

- Inspect cistern for sediment buildup.
- Check integrity of backflow preventer.
- Inspect structural integrity of cistern, pump, pipe, and electrical system.
- Replace damaged or defective system components.

Permeable Pavement

It is difficult to prescribe the specific types or frequency of maintenance tasks that are needed to maintain the hydrologic function of permeable pavement systems over time. The frequency of maintenance will depend largely on the pavement use, traffic loads, and the surrounding land use. One preventative maintenance task for large-scale applications (e.g., parking lots) involves vacuum sweeping on a frequency consistent with the use and loadings encountered in the site. Many experts consider an annual, dry-weather sweeping in the spring months to be important. The contract for sweeping should specify that a vacuum sweeper be used that does not use water spray, since spraying may lead to subsurface clogging. Additional, recommended maintenance activities are as follows:

After installation

- For the first 6 months following construction, the facility and contributing drainage area (CDA) should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization.

Once every 1–2 months during the growing season

- Mow grass in grid paver applications.

As needed

- Stabilize the CDA to prevent erosion.
- Remove any soil or sediment deposited on pavement.
- Replace or repair any pavement surfaces that are degenerating or spalling.

2–4 times per year (depending on use)

- Mechanically sweep pavement with a standard street sweeper to prevent clogging.

Annually

- Conduct a maintenance inspection.
- Spot weed for grass applications.

Once every 2-3 years

- Remove any accumulated sediment in pretreatment cells and inflow points.

If clogged

- Conduct maintenance using a regenerative street sweeper or a vacuum sweeper.
- Replace any necessary joint material.

Bioretention

Standing water is the most common problem in bioretention facilities. If water remains on the surface for more than 72 hours after a storm, adjustments to the grading or underdrain repairs may be needed. The surface of the filter bed should also be checked for accumulated sediment or a fine crust that builds up after the first several storm events. There are several methods that can be used to rehabilitate the filter:

- Open the underdrain observation well or cleanout and pour in water to verify that the underdrains are functioning and not clogged or otherwise in need of repair. The purpose of this check is to see if there is standing water all the way down through the soil. If there is standing water on top, but not in the underdrain, then there is a clogged soil layer. If the underdrain and stand pipe indicates standing water, then the underdrain must be clogged and will need to be cleaned out.
- Remove accumulated sediment and till 2 to 3 inches of sand into the upper 6 to 12 inches of soil.
- Install sand wicks from 3 inches below the surface to the underdrain layer. This reduces the average concentration of fines in the media bed and promotes quicker drawdown times. Sand wicks can be installed by excavating or auguring (i.e., using a tree auger or similar tool) down to the top of the underdrain layer to create vertical columns which are then filled with a clean open-graded coarse sand material (e.g., ASTM C-33 concrete sand or similar approved sand mix for bioretention media). A sufficient number of wick drains of sufficient dimension should be installed to meet the design dewatering time for the facility.
- Remove and replace some or all of the soil media.

Additional recommended maintenance activities are as follows:
At least 4 times per year

- Mow grass filter strips and bioretention with turf cover.
- Spot weed, remove trash, and rake the mulch.
- Supplement mulch in to maintain a 3 inch layer.
- Prune trees and shrubs.
- Remove sediment in pretreatment cells and inflow points.
- Add reinforcement planting to maintain desired vegetation density.
- Remove invasive plants using recommended control methods.
- Remove any dead or diseased plants.
- Stabilize the contributing drainage area to prevent erosion.

Sand Filters

Maintenance of filters is required and involves several routine maintenance tasks. A cleanup should be scheduled at least once a year to remove trash and floatables that accumulate in the pretreatment cells and filter

bed. Frequent sediment cleanouts in the dry and wet sedimentation chambers are recommended every 1 to 3 years to maintain the function and performance of the filter. If the filter treats runoff from a stormwater hotspot, crews may need to test the filter bed media before disposing of the media and trapped pollutants. Petroleum hydrocarbon contaminated sand or filter cloth must be disposed of according to District solid waste disposal regulations. Testing is not needed if the filter does not receive runoff from a designated stormwater hotspot, in which case the media can be safely disposed of in a landfill. Additional recommended maintenance activities are as follows:

By Owner

Twice a year

- Check for oil, trash, and sediment accumulation in the first chamber.
- Stabilize contributing drainage area and side-slopes to prevent erosion.

Once a month

- Remove blockages and obstructions from inflows. Trash collected on the grates protecting the inlets shall be removed regularly to ensure the inflow capacity of the stormwater facility is preserved.

By qualified professional

Annually

- Dig a small test pit in the filter bed to determine whether the first 3 inches of sand are visibly discolored and need replacement.
- Check to see if inlets and flow splitters are clear of debris and are operating properly.
- Check concrete structures and outlets for any evidence of spalling, joint failure, leakage, corrosion, etc.
- Ensure that the filter bed is level and remove trash and debris from the filter bed. Sand or gravel covers should be raked to a depth of 3 inches.

Every 5 years

- Replace top sand layer.
- Till or aerate surface to improve infiltration/grass cover.

Infiltration Facilities

Effective long-term operation of infiltration facilities requires a dedicated and routine maintenance inspection schedule with clear guidelines and schedules. Where possible, facility maintenance should be integrated into routine landscaping maintenance tasks. Recommended maintenance activities are as follows:

Quarterly

- Ensure that the contributing drainage area, inlets, and facility surface are clear of debris.
- Ensure that the contributing drainage area is stabilized. Perform spot-reseeding where needed.
- Remove sediment and oil/grease from inlets, pretreatment devices, flow diversion, structures, and overflow structures.
- Repair undercut and eroded areas at inflow and outflow structures.

Semi-annual inspection

- Check observation wells three days after a storm event in excess of 1/2 inch in depth. Standing water observed in the well after three days is a clear indication of clogging.
- Inspect pretreatment devices and diversion structures for sediment build-up and structural damage.

Annually

- Clean out accumulated sediment from the pretreatment cell.

As needed

- Replace pea gravel/topsoil and top surface geotextile fabric (when clogged).
- Mow vegetated filter strips as necessary and remove the clippings.

Storage Facilities

Maintenance requirements for underground storage facilities will generally require quarterly visual inspections by a qualified professional from the manhole access points to verify that there is no standing water or excessive sediment buildup. Entry into the system for a full inspection of the system components (pipe or vault joints, general structural soundness, etc.) should be conducted annually. Confined space entry credentials are typically required for this inspection. Additional recommended maintenance activities are as follows:

As Needed

- Water dry pond side slopes to promote vegetation growth and survival.
- Remove sediment and oil/grease from inlets, pretreatment devices, flow diversion structures, storage facilities and overflow structures.
- Ensure that the contributing drainage area, inlets, and facility surface are clear of debris.
- Ensure that the contributing drainage area is stabilized. Perform spot-reseeding where needed.
- Repair undercut and eroded areas at inflow and outflow structures.

Annual Inspection

- Measure sediment accumulation levels in forebay. Remove sediment when 50% of the forebay capacity has been lost.
- Inspect the condition of stormwater inlets for material damage, erosion or undercutting. Repair as necessary.
- Inspect the banks of upstream and downstream channels for evidence of sloughing, animal burrows, boggy areas, woody growth, or gully erosion that may undermine pond embankment integrity.
- Inspect outfall channels for erosion, undercutting, rip-rap displacement, woody growth, etc.
- Inspect condition of principal spillway and riser for evidence of spalling, joint failure, leakage, corrosion, etc.
- Inspect condition of all trash racks, reverse sloped pipes or flashboard risers for evidence of clogging, leakage, debris accumulation, etc.
- Inspect maintenance access to ensure it is free of debris or woody vegetation, and check to see whether valves, manholes, and locks can be opened and operated.
- Inspect internal and external side slopes of dry ponds for evidence of sparse vegetative cover,

erosion, or slumping, and make needed repairs immediately.

• Monitor the growth of wetlands, trees and shrubs planted in dry ponds. Remove invasive species and replant vegetation where necessary to ensure dense coverage.

Proprietary Facilities

In order to ensure effective and long-term performance of a proprietary facility, regular maintenance tasks and inspections are required. All proprietary facilities should be inspected by a qualified professional and maintained in accordance with the manufacturer's instructions and recommendations and any maintenance requirements associated with the device's verification by DDOE.

Submitting Inspection

If maintenance is not required or already completed, you may finish the SISR process by submitting the report via the stormwater database. If maintenance is required and has not been completed, you must first complete maintenance and then submit the report with supporting documentation.

After you have finished going through all of the inspections questions, please review your answers. Before the report can be submitted, you will be asked to confirm that all answers were answered and entered as intended. You will need to read the final statement and declare that all of the provided information is accurate.

APPENDIX A

Frequently Asked Question

What if I've used all the guidance provided, and still can't find my stormwater facility?

Contact professional maintenance service provider for assistance. See the Gray and Green Maintenance Professional Service Providers section for a list of recommended stormwater professionals.

What if my stormwater facility doesn't have the same characteristics as mentioned in the manual examples?

The design of stormwater management facilities can vary depending on the engineer, the characteristics of the site, and a number of other factors. The manual provides general information for various facilities, but providing details on the numerous design variances is out of scope for this document. The inspection questions are intended to determine whether a facility is functioning properly. As an inspector you must be able to identify the necessary features to answer the inspection questions. If more information on stormwater facilities is needed refer to the Stormwater Management Guidebook (https://doee.dc.gov/swguidebook). If you are still having difficulties identifying stormwater facility features and answering the inspection questions, contacts a professional inspector for assistance.

Who should I contact if I'm having technical issues with the database/inspection site?

Matthew Espie
(202) 281-7450
Matthew.Espie@dc.gov

Where can I find more detailed documentation on the stormwater facilities?

Please refer to the Stormwater Management Guidebook. This document can be found on the Department of Energy & Environment website: https://doee.dc.gov/swguidebook.

DOEE Natural Resource Administration (NRA) Contacts

Self-Inspection and Self-Reporting program

Alecia Jenkins
alecia.jenkins@dc.gov
(202) 480-3867

Requesting a maintenance inspection

Rickeisha Goldsby
Rickeisha.goldsby@dc.gov
(202) 480 – 5067

Gray and Green Maintenance Professional Service Providers

Gray Maintenance Service Providers

A2Z Environmental Group, LLC
250 S. Kresson St.
Baltimore, MD 21224
(410) 679-8877
http://a2zgroup.com

AIA Green Solutions LLC
1629 K Street NW #300
Washington, DC 20006
(202) 709-9882
https://aiags.com

Apex Companies, LLC
15850 Crabbs Branch Way, 200
Rockville, MD 20855
(301) 417-0200
https://www.apexcos.com/all-locations/maryland/rockville-md

Atlas Environmental Services, LLC
10139 Giles Run Road
Lorton, VA 22079
(703) 339-9770
https://www.atlasontheweb.com

B & P Environmental One LLC
1230 Cronson BLVD
Crofton, MD 21114
(410) 721-7091
http://www.bandpenvironmental.com

Busy Service, Inc.
7840 Cessna Ave. Unit Ste C,
Gaithersburg, MD 20879
(410) 635-8560
http://busyserviceinc.com/

JP Seworootor, Inc.
5350 Odell Rd.
Beltsville, MD 20705
(202) 822-9581
http://jpsinc.com/

Magnolia Plumbing
600 Gallatin St, NE
Washington, DC 20017
(202) 829-8510
https://www.magnoliaplumbing.com

Remcon3, LLC
5320 Enterprise St Unit A
Eldersburg, MD 21784
(410) 781-0002
https://remcon3.com

MPS Utilities
5512 Oakwood Rd.
Alexandria, VA 22310
(703) 313-6771
http://www.mps-utilities.com

Storm Water Management FRG, Inc.
8345 A Beechcraft Ave
Gaithersburg, MD 20879
(301) 869-2200
http://www.bmpclean.org/aaa-storm-water-management-frg-inc_c866.html

Stormwater Maintenance LLC
10944 Beaver Dam Rd, Suite C
Hunt Valley, MD 21030
(202) 787-1971
https://swmaintenance.com

Petroleum Management, Inc.
2138 Priest Bridge Court Suite# 10
Crofton, MD 21114
(410) 354-0200
https://www.petromgt.net/

First Class Plumbing
2084 General Hwy.
Annapolis, MD 21401
(866) 989-2837
https://1stclassplumber.com

Waste Strategies
200 Harry S Truman Pkwy
Annapolis, MD 21401
(866) 241-1134
http://www.wastestrategies.com

Old Colony Group, LLC
3031 Carroll Road
Huntingtown, MD 20639
(908) 923-4006
http://www.labpack.com/

Green Maintenance Service Providers

Angler Environmental
5367 Telephone Road
Warrenton, VA 20187
(703) 393-3833
www.AnglerEnvironmental.com

Arya Civil, LLC
57 N Street NW Unit H
Washington, DC 20001
(443) 535 -2325
www.aryacivilllc.com

AIA Green Solutions LLC
1629 K Street NW #300
Washington, DC 20006
(202) 709-9882
www.aiags.com

Ecological Restoration & Management, Inc.
10600 York Road #203
Cockeysville, MD 21030
(410) 337-4899
www.er-m.com

Environmental Quality Resources, LLC
1 Church View Road
Millersville, MD 21108
410-932-8680
www.eqri.com

Furbish
3430 2nd Street, Suite 100
Baltimore, MD 21225
443-874-7465
www.furbishco.com

Low Impact Development Center
5000 Sunnyside Avenue, Suite 100
Beltsville, MD 20705
301-982-9305
www.lowimpactdevelopment.org

Pratum Greenroofs, LLC
10300 Farnham Dr
Bethesda, MD 20814
202-415-2674
www.pratumgreenroofs.com

Prospect Waterproofing Company
118 Acacia Lane
Sterling, VA 20166
703-450-2355
www.pwcompany.com

Submit by Email

GOVERNMENT OF THE DISTRICT OF COLUMBIA
Department of Energy and Environment
Natural Resource Administration
Inspection and Enforcement Division

Stormwater Best Management Practice Maintenance Service Report

Date: _____ DOEE Plan No. _____
Service Provider Name: _____
Service Provider Address: _____
Contact Person: _____ Email: _____
Full Address of BMP Serviced: _____

Person/Company Responsible for Maintenance

Owner	Or	Agent
Company Name: _____		Company Name: _____
Contact Person: _____		Contact Person: _____
Address: _____		Address: _____
_____		_____
Email: _____		Email: _____
Telephone: _____		Telephone:

Date of Service: Start: _____ Completion: _____

	Type of BMP	Number
Type and Number of BMPs Serviced:		

Details of Service(s) Provided:

Recommendation(s):

Photographs Attached:	☐ Yes ☐ No	Disposal Record Attached:	☐ Yes ☐ No

Please attach photos which clearly show the BMP location within the premises, and before and after condition of the BMP serviced. Attach Disposal Record and Waste Transfer Manifest.