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After recording return to:

City Clerk
City of Puyallup
333 South Meridian
Puyallup, WA 98371

info@puyallupwa.gov

Document Title: Stormwater Outfall Management BMP Facilities Agreement
Grantee: City of Puyallup
Grantor: 1124 Valley Ave, LLC
Abbreviate Legal Description: Section 16 Township 20 Range 04 Quarter 34
Complete Legal Description on Page 5 & 6 of this Document
Assessor's Tax Parcel or Account Numbers: 0420163077 & 0420163042
Reference Number of Related Document(s): N A

Stormwater Management & BMP Facilities Agreement

A. **Parties**. The parties to this agreement are Grantee City of Puyallup, a Washington State municipal corporation (City), and Grantor landowner 1124 Valley Ave, LLC, a Washington Limited Liability Company (Landowner).

B. **Property.** Landowner is the owner of certain real property (Property), which is legally described in this document and is located at the following address: 1042 Valley Ave NW, Puyallup, WA 98371 and 1036 Valley Ave NW, Puyallup, WA 98371.

C. **Development Plan & Stormwater Facilities.** The site, subdivision or other development plan (Plan) for the Property, specifically known, entitled or described as Valley Avenue Yard, provides for detention, retention, treatment or management of stormwater that is associated with the Property through the use of identified stormwater facilities or best management practices (collectively, Stormwater Facilities). Upon approval of the Plan by the City, the Plan shall be incorporated herein by this reference. In accordance with the Plan, Landowner shall adequately construct, operate, use, maintain and repair the Stormwater Facilities.

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D. Agreement. On the terms and conditions set forth herein, the City and Landowner agree as follows:

1. The Stormwater Facilities shall be constructed, operated, used, maintained and repaired by Landowner in accordance with the requirements of the Plan, and any other applicable law or regulation.
2. Landowner (which expressly includes its agents, successors and assigns, including any homeowners association) shall adequately and properly operate, use, maintain and repair the Stormwater Facilities as described in the maintenance and operations manual, which is on file with the City, and may be attached and recorded herewith as Exhibit B. This duty extends to all associated pipes and channels, as well as all structures, improvements, and vegetation that are provided to control the quantity and quality of the stormwater. Adequate maintenance shall mean maintenance that is sufficient to keep the Stormwater Facilities in good working order and operating so as to satisfy the design and performance standards of the Plan.
3. Landowner shall regularly inspect the Stormwater Facilities and shall submit an inspection report to the City at least once a year on a date prescribed by the City. The purpose of the inspection(s) is to ensure that the Stormwater Facilities are safe and functioning properly. The scope of the inspection shall include the entire Stormwater Facilities, including but not limited to, berms, outlet structures, pond areas, access roads, and so forth. Deficiencies and any performance or other related issues shall be noted by Landowner in the inspection report. The annual report shall be in a form and include content as prescribed from time to time by the City. An example copy of the report form may be attached hereto as Exhibit A.

1. Landowner hereby grants permission to the City to enter upon the Property to inspect the Stormwater Facilities. Except in case of emergency, the City shall provide Landowner with at least forty-eight (48) hours written notice prior to entering on to the Property. Landowner shall be entitled to have a representative accompany the City during such inspection. The City shall provide Landowner with copies of written inspection reports.
2. If Landowner fails to adequately and properly operate, use, maintain or repair the Stormwater Facilities, the City shall notify Landowner in writing and provide Landowner with a reasonable opportunity to cure. If Landowner fails to timely cure, then the City may enter upon the Property and remedy the issue(s) identified in the notice and those reasonably related thereto; Furthermore, if the City performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like while remedying the identified issues, the City may charge the cost of the remedy to Landowner, and Landowner shall promptly pay the costs to the City. Notwithstanding the foregoing, the City shall be under no obligation to inspect, maintain or repair the Stormwater Facilities.
3. Landowner shall defend, indemnify and hold the City, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including attorney fees, arising out of or in connection with activities or operations, performed by Landowner, or on Landowner's behalf, that relate to the Stormwater Facilities and the subject matter of this agreement, except for injuries and damages caused by the negligence of the City.

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E. Covenant. The terms and provisions of this agreement constitute a covenant, which is subject to the following: This covenant is an equitable covenant. It touches and concerns the land that is described as the Property herein. The parties intend that this covenant shall bind the parties' successor and assigns. This covenant shall run with the land that is described as the Property herein, and shall bind whoever has possession of the land, in whole or in part, without regard to whether the possessor has title, or has succeeded to the same estate that granting parties have or had. Possessors shall include, but are not limited to, leasehold tenants, contract purchasers, subtenants, and adverse possessors. This covenant shall run with the land even in the absence of the transfer of some interest in land, other than the covenant itself, between Landowner and the City. This covenant shall not be governed by the mutuality rule. The burden of the covenant can run independently from the benefit of the covenant, and the benefit need not run. The benefit may be in gross or personal to Landowner or the City. Landowner waives its right to assert any defenses to the enforcement of this covenant, including, but not limited to, the change of neighborhood doctrine, laches, estoppel, balancing of hardships, and abandonment. If Landowner breaches any term of this covenant and agreement, then all remedies in equity and at law, including, but not limited to, injunctions, mandamus, declaratory judgments, and damages, shall be available to the City.

F. Governing Law & Venue. This agreement shall be governed by and construed in accordance with the laws of the State of Washington. The venue for any action that arises from or out of this instrument shall be the Pierce County Superior Court.

<signature page to follow>

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1124 Valley Ave LLC

Dated: 1/7/2025

BY: James Joseph Honan
James Joseph Honan
Manager

City of Puyallup

Dated: 1/8/2025

BY: Kenneth Cook
Kenneth Cook
Development Engineering Manager

City of Puyallup

Dated: 12/18/2024

BY: DocuSigned by: Joseph N Beck EF5BA5DC2EF54B...
Approved as to form:
Joseph N. Beck
City Attorney

STATE OF WASHINGTON)
) -ss
COUNTY OF PIERCE)

Signed or attested before me on January 7, 2025 by James Joseph Honan as Manager of 1124 Valley Ave LLC.

Dated: 1-7-2025

TINA WHITLOCK
NOTARY PUBLIC #104710
STATE OF WASHINGTON
COMMISSION EXPIRES
OCTOBER 29, 2028

Tina Whitlock
Printed Name: Tina Whitlock
Notary Public, State of: WASHINGTON
My appointment expires: 10-29-2028

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Legal Description

PARCEL A

Beginning at the Southwest corner of the Southwest quarter of the Southeast quarter of the Southwest quarter, Section 16, Township 20, Range 4 East, W.M., in Pierce County, Washington;
Thence East 140 feet;
Thence Northeasterly to a point on the Southwesterly line of the Old Pacific Highway which is 219 feet Northwesterly of the intersection of the Southwesterly line of said road, and the South line of Section 16;
Thence Northwesterly along said road 96 feet more or less;
Thence Southwesterly to a point 70 feet North of the True Point of Beginning;
Thence South to the True Point of Beginning;

EXCEPT that portion conveyed to Pierce County by deed recorded under Recording Number 9204090448; and

EXCEPT that portion thereof conveyed to City of Puyallup by deed recorded under Recording Number 202403120460.

PARCEL B:

Beginning at the Southwest corner of the Southwest quarter of the Southeast quarter of the Southwest quarter of Section 16, Township 20 North, Range 4 East, W.M., in Pierce County, Washington;
Thence East 140 feet to the True Point of Beginning;
Thence Northeasterly to a point on the Southwesterly line of the Old Pacific Highway which is 219 feet Northwesterly of the intersection of the Southwesterly line of said road and the South line of Section 16;
Thence Southeasterly along said road 96 feet;
Thence Southwesterly to a point that lies 55 feet North of a point that is 120 feet West of the intersection of the South line of Section 16 and the Southwesterly line of Old Pacific Highway;
Thence South to said point;
Thence West 320 feet, more or less, to the True Point of Beginning;

EXCEPT that portion thereof conveyed to Pierce County by deed recorded under Recording Number 9111010472; and

EXCEPT that portion thereof conveyed to City of Puyallup by deed recorded under Recording Number 202403120460.

PARCEL C:

Beginning at the point of the intersection Southwesterly line of Old Pacific Highway and the South line Section 16, Township 20 North, Range 4 East W.M., in Pierce County, Washington;
Thence Northwesterly along said road, 123 feet;
Thence Southwesterly to a point that lies 55 feet North of a point that is 120 feet West of the intersection of the South line of said Section 16 and the Southwesterly line of said highway;
Thence South to said point;
Thence East 120 feet to the True Point of Beginning;

EXCEPT that portion thereof conveyed to Pierce County by deed recorded under Recording Number 9204090449; and

EXCEPT that portion thereof conveyed to City of Puyallup by deed recorded under Recording Number 202403120460.

PARCEL D:

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Legal Description

Beginning 70 feet North of the Southwest corner of the Southwest quarter of the Southeast quarter of the Southwest quarter of Section 16, Township 20 North, Range 4 East, W.M., in Pierce County, Washington;
Thence Northerly, to the intersection with the Southwesterly line of Old Pacific Highway;
Thence Southeasterly, along said line of said highway, to a point 315 feet Northerly from the intersection of the South line of said section with the Westerly line of said highway;
Thence Southwesterly, 415 feet, more or less, to the True Point of Beginning;

EXCEPT that portion thereof conveyed to Pierce County for additional right-of-way for Valley Avenue by deed recorded under Recording Number 9202240352.

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Exhibit A

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Annual Inspection Report

City of Puyallup - Stormwater BMP Facilities Inspection and Maintenance Log

Facility Name .....

Address .....

Begin Date ..... End Date .....

Date	BMP ID#	BMP Facility Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

Instructions:
Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary. Submit a copy of the completed log with the Annual Independent Inspectors' Report to the City, and start a new log at that time.

BMP ID# — Always use ID# from the Operation and Maintenance Manual.
Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.
Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.
Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.
Comments and actions taken — Describe any maintenance done and need for follow-up.

Return Form to: Stormwater Engineer/City of Puyallup
333 South Meridian
Puyallup, WA 98371

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Annual Inspection Report

City of Puyallup - Stormwater BMP Facilities Inspection and Maintenance Log

Facility Name _____

Date	BMP ID#	BMP Facility Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

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Exhibit B

RANGE	TOWNSHIP	SECTION	QUARTER		
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CONTOUR
ENGINEERING • LLC

STORMWATER OPERATIONS AND MAINTENANCE MANUAL

FOR

VALLEY AVE YARD

CITY OF PUYALLUP, WASHINGTON

OCTOBER 2023
REVISED NOVEMBER 2023

Prepared For:
1124 Valley Ave LLC
550 S Michigan Street
Seattle, WA 98108

Prepared By:
Connor Jost E.I.T., Design Engineer

Approved By:
Kyle Mauren, P.E., Project Engineer
P.O. Box 949
Gig Harbor, WA 98335
(253) 857-5454

11/17/2023

Project # 22-247

THIS MANUAL MUST BE KEPT WITH THE CURRENT OWNER OR OPERATOR. THIS MANUAL MUST BE MADE AVAILABLE FOR INSPECTION BY THE CITY OF PUYALLUP.

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Operations and Maintenance Manual for Stormwater Conveyance and Treatment Systems

Project Description

This Operation and Maintenance Manual accompanies the development plans to construct a new contractor yard in Puyallup, Washington. The contractor yard will consist of a 62,768 SF paved area with associated stormwater infrastructure and landscaping. No structures are proposed as part of this development. The project site is located along Valley Ave on three tax parcels 0420163040, 0420163041 and 0420163042 within the Southwest ¼ of Section 16, Township 20 North, Range 4 East, W.M.

The proposed project will construct a contractor yard. The project activities will include excavating and filling the site to a suitable elevation to allow for stormwater facilities to operate by gravity, paving the site, and placing the stormwater conveyance, treatment, and flow control facilities on site. There are two existing single-family residences onsite that will be removed and one building with a detached garage on tax parcel 0420163042 will remain. This project also proposes to connect the remaining building to the City water line and sanitary sewer system. A summary of the existing and proposed surfaces is included below.

A combination of City of Puyallup Design Standards Manual and the Washington Department of Ecology *2019 Stormwater Management Manual for Western Washington* establishes the methodology and design criteria used for this project. All storm drainage design has been done in accordance with the above regulations.

See Appendix 'A' for Vicinity Map of the project area.

The following is a list of pertinent site information associated with the proposed project:

Parcel #: ~~042016~~ 0420163077 ~~63041~~, and 0420163042
Zoning: Limited Manufacturing (ML)
Owner: 1124 Valley Ave LLC
Contact: Kermit Jorgensen
(206) 787-1475
Disturbed Area: 1.87 AC

This operations and maintenance manual is provided to assist the owner(s) and/or operator of some maintenance practices necessary to maintain stormwater conveyance and water quality devices on-site.

Description of the Stormwater System

Stormwater associated with the project site is collected by three (3) BioPods Biofilter System Surface Vaults along the southern curb of the new paved area. These BioPod

units provide enhanced water quality treatment for the stormwater runoff associated with the new addition to the site. After treatment, stormwater is conveyed to an underground detention system comprised of several rows of StormTech Chambers. The detention system is located in the north central portion of the site. The detention system stores and slowly releases stormwater to the municipal storm system through a control structure located just East of the chamber detention system. The control structure will discharge to the existing storm main line within Valley Avenue northwest.

Maintenance and Inspection

The maintenance and inspections of the various storm systems will be the sole responsibility of the owner(s) or owner(s) association, in addition to maintaining accurate records of inspections and maintenance actions taken. The checklists and guidelines that follow should be utilized as a minimum guide to the maintenance procedures of the site. The following are all the components of the sites stormwater system that will require maintenance and suggested inspection interval:

- BioPod Biofilter System
  - Before and after the rainfall seasons (April & November), and after any major storms (>1-inch within 24 hours)
- Catch basins and drains
  - Before and after the rainfall seasons (April & November), and after any major storms (>1-inch within 24 hours)
- Detention Tank
  - A monthly inspection during the rainy season (October – April) and after any major storm event (>1-inch within 24 hours) for the items listed on the checklist contained within Appendix C.
- Control Structure
  - A monthly inspection during the rainy season (October – April) and after any major storm event (>1-inch within 24 hours) for the items listed on the checklist contained within Appendix C.
  - Annual inspection for structural damage or missing components.
- Fencing and Landscaping
  - Before and after the rainfall seasons (April & November), and after any major storms (>1-inch within 24 hours)
- Conveyance System
  - Shall be inspected for sediment and blockages on a bi-annual basis, after large storm events and/or if any signs of possible issues arise.
  - All conveyance lines shall be "jetted" out or equivalent on a yearly basis and/or if blockages arise.

See Appendix A for a figure illustrating the locations of all items to be maintained onsite.

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Instructions for Use of Maintenance Checklists

Appendix C contains maintenance checklists for the components that are part of your drainage system, as well as for some components that you may not have. Ignore the requirements that do not apply to your system. You should plan to complete a checklist for all system components based upon the suggested inspection intervals from the previous section. These intervals may be altered as site conditions allow. During inspections, check off the problems that you looked for and add comments discussing problems found and actions taken.

The owner/operator should familiarize themselves with the BMPs contained in Appendix D.

BioPod Maintenance Requirements

Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the BioPod System Inspection & Maintenance Guide.

The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, site-specific maintenance frequency should be established during the first two or three years of operation.

Old Castle designs their BioPod systems for a target maintenance interval of at least twice a year. Maintenance includes removing accumulated sediment and trash from the surface area of the media, removing the mulch above the media, replacing the mulch, providing plant health evaluation, and pruning the plant if deemed necessary.

Conduct maintenance following manufacturer's guidelines. See Appendix B for the products Inspection & Maintenance Guide.

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MAINTENANCE PROGRAM LOG SHEET

Use copies of this log sheet to keep track of when maintenance checks occur and what items, if any are repaired or replaced. The completed sheets will serve as a record of past maintenance activities and will provide valuable information on how your facilities are operating. Keep all log sheets in a designated area so other can easily access them.

Name of Inspector: _____

Inspector's Signature: _____

Date of Inspection: _____

Facility and Component Checked	Observations (list things that should be done)	Follow-up Actions Taken	Date Action Taken

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APPENDIX B

Product Maintenance Guides

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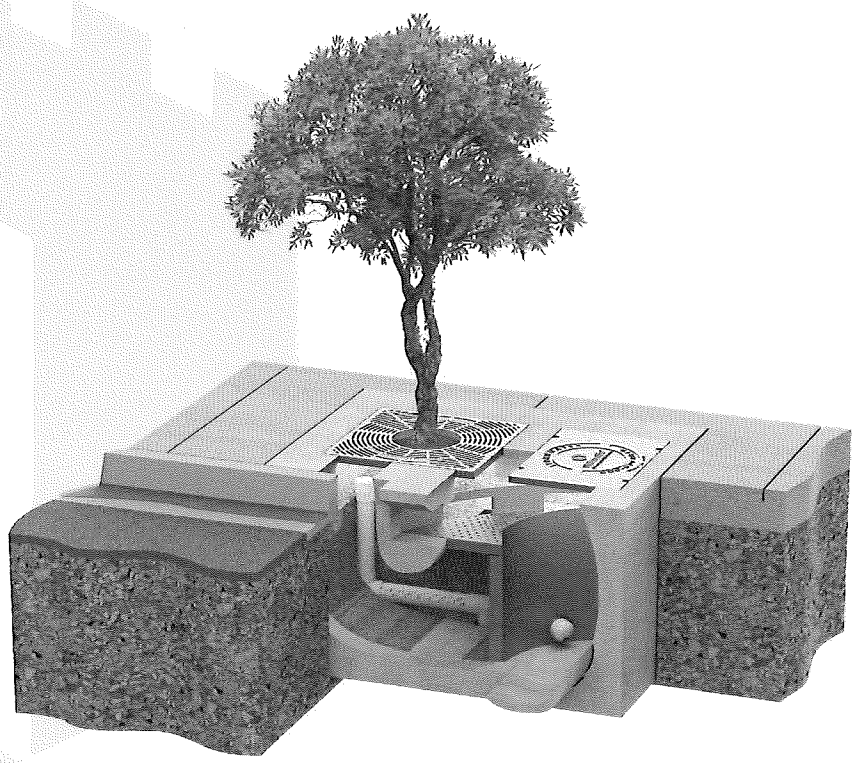
BIOPOD™ SYSTEM

with StormMix™ Media

Inspection & Maintenance Guide



Oldcastle Infrastructure™
A CRH COMPANY

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BIOPOD™ BIOFILTER WITH STORMMIX™ BIOFILTRATION MEDIA

DESCRIPTION

The BioPod™ Biofilter System (BioPod) is a storm water biofiltration treatment system used to remove pollutants from storm water runoff. Impervious surfaces and other urban and suburban landscapes generate a variety of contaminants that can enter storm water and pollute downstream receiving waters unless treatment is provided. The BioPod system uses proprietary StormMix™ biofiltration media to capture and retain pollutants including total suspended solids (TSS), metals, nutrients, gross solids, trash and debris as well as petroleum hydrocarbons.

FUNCTION

The BioPod system uses engineered, high-flow rate filter media to remove storm water pollutants, allowing for a smaller footprint than conventional bioretention systems. Contained within a compact precast concrete vault, the BioPod system consists of a biofiltration chamber and an optional integrated high-flow bypass. The biofiltration chamber is filled with horizontal layers of aggregate, biofiltration media and mulch. Storm water passes vertically down through the mulch and biofiltration media for treatment. The mulch provides pretreatment by retaining most of the solids or sediment. The biofiltration media provides further treatment by retaining finer sediment and dissolved pollutants. The aggregate allows the media bed to drain evenly for discharge through an underdrain pipe or by infiltration.

INSPECTION & MAINTENANCE OVERVIEW

State and local regulations require all storm water management systems to be inspected on a regular basis and maintained as necessary to ensure performance and protect downstream receiving waters. Without maintenance, excessive pollutant buildup can limit system performance by reducing the operating capacity of the system and increasing the potential for scouring of pollutants during periods of high flow.

Some configurations of the BioPod may require periodic irrigation to establish and maintain vegetation. Vegetation will typically become established about two years after planting. Irrigation requirements are ultimately dependent on climate, rainfall and the type of vegetation selected.

INSPECTION & MAINTENANCE FREQUENCY

Periodic inspection is essential for consistent system performance and is easily completed. Inspection is typically conducted a minimum of twice per year, but since pollutant transport and deposition varies from site to site, a site-specific maintenance frequency should be established during the first two or three years of operation.

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INSPECTION EQUIPMENT

The following equipment is helpful when conducting BioPod inspections:

- Recording device (pen and paper form, voice recorder, iPad, etc.)
- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
- PPE as required for entry
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Socket

INSPECTION PROCEDURES

BioPod inspections are visual and are conducted without entering the unit. To complete an inspection, safety measures including traffic control should be deployed before the access covers or tree grates are removed. Once the covers have been removed, the following items should be checked and recorded (see form provided on page 6) to determine whether maintenance is required:

If the BioPod unit is equipped with an internal bypass, inspect the inlet rack (or inlet chamber on underground units) and outlet chamber and note whether there are any broken or missing parts. In the unlikely event that internal parts are broken or missing, contact Oldcastle Storm water at (800) 579-8819 to determine appropriate corrective action.

Note whether the curb inlet, inlet pipe, or inlet rack is blocked or obstructed.
If the unit is equipped with an internal bypass, observe, quantify and record the accumulation of trash and debris in the inlet rack or inlet chamber. The significance of accumulated trash and debris is a matter of judgment. Often, much of the trash and debris may be removed manually at the time of inspection if a separate maintenance visit is not yet warranted.

If it has not rained within the past 24 hours, note whether standing water is observed in the biofiltration chamber.
Finally, observe, quantify and record presence of invasive vegetation and the amount of trash and debris and sediment load in the biofiltration chamber. Erosion of the mulch and biofiltration media bed should also be recorded. Often, much of the invasive vegetation and trash and debris may be removed manually at the time of inspection if a separate maintenance visit is not yet warranted. Sediment load may be rated light, medium or heavy depending on the conditions. Loading characteristics may be determined as follows:

- **Light sediment load** – sediment is difficult to distinguish among the mulch fibers at the top of the mulch layer; the mulch appears almost new.
- **Medium sediment load** – sediment accumulation is apparent and may be concentrated in some areas; probing the mulch layer reveals lighter sediment loads under the top 1" of mulch.
- **Heavy sediment load** – sediment is readily apparent across the entire top of the mulch layer; individual mulch fibers are difficult to distinguish; probing the mulch layer reveals heavy sediment load under the top 1" of mulch.

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MAINTENANCE INDICATORS

Maintenance should be scheduled if any of the following conditions are identified during inspection:

- The concrete structure is damaged or the tree grate or access cover is damaged or missing
- The inlet obstructed
- Standing water is observed in the biofiltration chamber more than 24 hours after a rainfall event (use discretion if the BioPod is located downstream of a storage system that attenuates flow)
- Trash and debris in the inlet rack cannot be easily removed at the time of inspection
- Trash and debris, invasive vegetation or sediment load in the biofiltration chamber is heavy or excessive erosion has occurred

MAINTENANCE EQUIPMENT

The following equipment is helpful when conducting BioPod maintenance:

- Suitable clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.) PPE as required for entry
- Traffic control equipment (cones, barricades, signage, flagging, etc.)
- Manhole hook or pry bar
- Flashlight
- Tape measure
- Rake, hoe, shovel and broom Bucket
- Pruners
- Vacuum truck (optional)
- Socket

MAINTENANCE PROCEDURES

Maintenance should be conducted during dry weather when no flows are entering the system. In most cases, maintenance may be conducted without entering. Entry may be required to maintain BioPod Underground units, depending on system depth. Once safety measures such as traffic control are deployed, the access covers may be removed and the following activities may be conducted to complete maintenance:

- Remove all trash and debris from the curb inlet and inlet rack manually or by using a vacuum truck as required. Remove all trash and debris and invasive vegetation from the biofiltration chamber manually or by using a vacuum truck as required.
- If the sediment load is medium or light but erosion of the biofiltration media bed is evident, redistribute the mulch with a rake or replace missing mulch as appropriate. If erosion persists, rocks may be placed in the eroded area to help dissipate energy and prevent recurring erosion.
- If the sediment load is heavy, remove the mulch layer using a hoe, rake, shovel and bucket, or by using a vacuum truck as required. If the sediment load is particularly heavy, inspect the surface of the biofiltration media once the mulch has been removed. If the media appears clogged with sediment, remove and replace one or two inches of biofiltration media prior to replacing the mulch* layer.
- Prune vegetation as appropriate and replace damaged or dead plants as required.
- Replace the tree grate and/or access covers and sweep the area around the BioPod to leave the site clean. All material removed from the BioPod during maintenance must be disposed of in accordance with local environmental regulations. In most cases, the material may be handled in the same manner as disposal of material removed from sumped catch basins or manholes.

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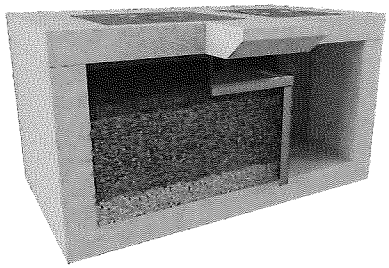
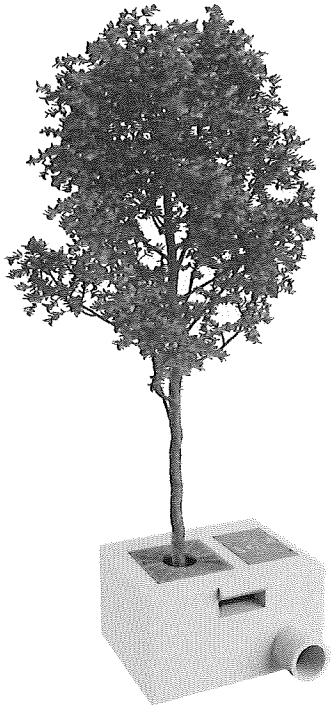
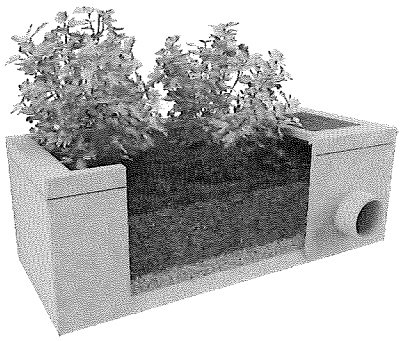
* Natural, shredded hardwood mulch should be used in the BioPod. Timely replacement of the mulch layer according to the maintenance indicators described above should protect the biofiltration media below the mulch layer from clogging due to sediment accumulation. However, whenever the mulch is replaced, the BioPod should be visited 24 hours after the next major storm event to ensure that there is no standing water in the biofiltration chamber. Standing water indicates that the biofiltration media below the mulch layer is clogged and must be replaced. Please contact Oldcastle Infrastructure at (800) 579-8819 to purchase the proprietary StormMix™ biofiltration media.



BIOPOD SURFACE



BIOPOD TREE



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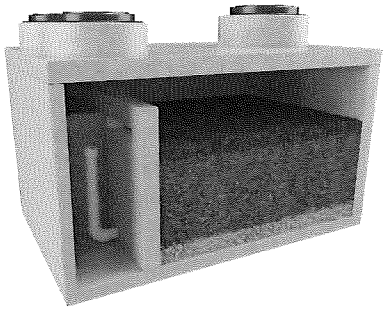

BIOPOD UNDERGROUND

RANGE	TOWNSHIP	SECTION	QUARTER		
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DOCUMENT NUMBER				SERIAL NUMBER	PAGE NUMBER

BIOPOD INSPECTION & MAINTENANCE LOG

BioPod Model _____ Inspection Date _____

Location _____

Condition of Internal Components *NOTES:*

☐ **GOOD** ☐ **DAMAGED** ☐ **MISSING**

Curb Inlet or Inlet Rack Blocked *NOTES:*

☐ **YES** ☐ **NO**

Standing Water in Bio iltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Trash and Debris in Inlet Rack *NOTES:*

☐ **YES** ☐ **NO**

Trash and Debris in Bio iltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Invasive Vegetation in Bio iltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Sediment in Bio iltration Chamber *NOTES:*

☐ **LIGHT** ☐ **MEDIUM** ☐ **HEAVY**

Erosion in Bio iltration Chamber *NOTES:*

☐ **YES** ☐ **NO**

Maintenance Requirements

☐ **YES - Schedule Maintenance** ☐ **NO - Schedule Re-Inspection**

RANGE	TOWNSHIP	SECTION	QUARTER		
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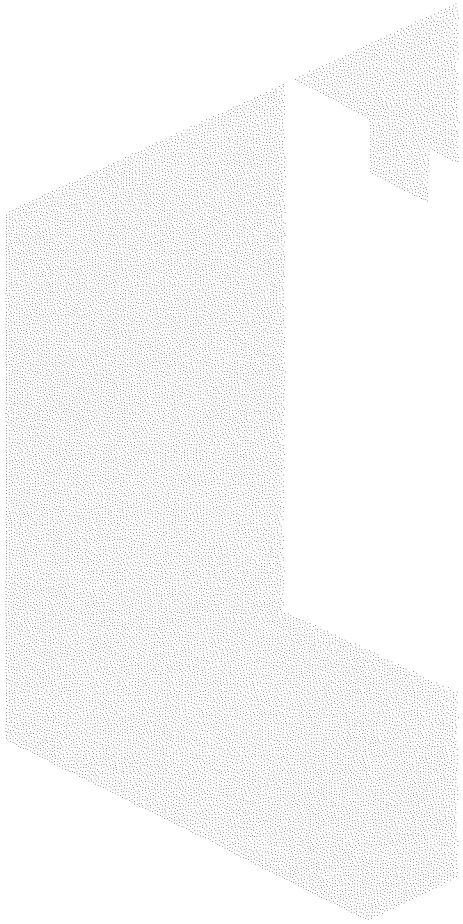
NOTES

RANGE	TOWNSHIP	SECTION	QUARTER		
04E-	20 N-	16	3/4	006	25/ 43
DOCUMENT NUMBER				SERIAL NUMBER	PAGE NUMBER



Oldcastle Infrastructure
A CRH COMPANY

RANGE	TOWNSHIP	SECTION	QUARTER		
04E-	20N-	16	3/4	006	26/43
DOCUMENT NUMBER				SERIAL NUMBER	PAGE NUMBER

APPENDIX C

Stormwater Infrastructure Maintenance Checklists

RANGE	TOWNSHIP	SECTION	QUARTER		
04E-	20 N-	16	3/4	006	27/43
DOCUMENT NUMBER				SERIAL NUMBER	PAGE NUMBER

Catch Basin

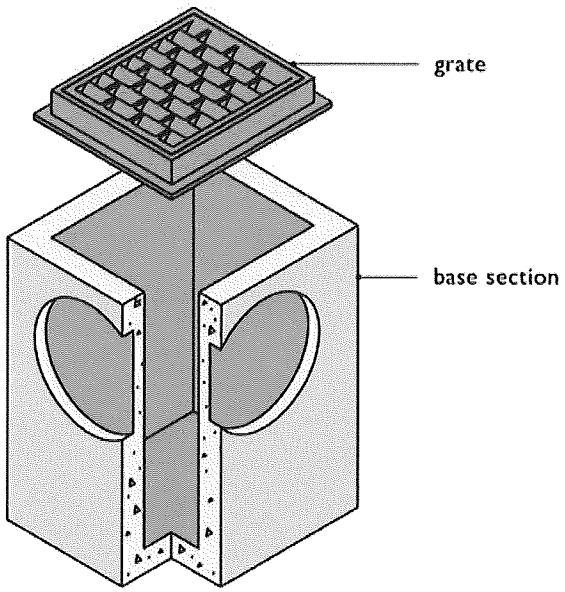
A catch basin is an underground concrete structure typically fitted with a slotted grate to collect stormwater runoff and route it through underground pipes. Catch basins can also be used as a junction in a pipe system and may have a solid lid. There are two types.

A Type 1 catch basin is a rectangular box with approximate dimensions of 3'x2'x5'. Type 1 catch basins are utilized when the connected conveyance pipes are less than 18 inches in diameter and the depth from the gate to the bottom of the pipe is less than 5 feet.

A Type 2 catch basin, also commonly referred to as a storm manhole, is listed separately under "Manhole" in this book.

Catch basins typically provide a storage volume (sump) below the outlet pipe to allow sediments and debris to settle out of the stormwater runoff. Some catch basins are also fitted with a spill control device (inverted elbow on outlet pipe) intended to contain large quantities of grease or debris.

Catch basins are frequently associated with all stormwater facilities.



Type I

RANGE	TOWNSHIP	SECTION	QUARTER	006	28/43
04E-	20 N-	16	3/4		
DOCUMENT NUMBER				SERIAL NUMBER	PAGE NUMBER

Key Operations and Maintenance Considerations

- The most common tool for cleaning catch basins is an industrial vacuum truck with a tank and vacuum hose (e.g. Vactor® truck) to remove sediment and debris from the sump.
- A catch basin may be an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a catch basin, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Catch Basin			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
General	Trash and Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin.)	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.

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	Basin Walls/ Bottom	Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	Catch basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. • Identify and remove source	No contaminants or pollutants present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread. One or more bolts are missing.	Mechanism opens with proper tools. All bolts are seated and no bolts are missing. Cover is secure.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure (Intent is to keep cover from sealing off access to maintenance).	Cover can be removed by one maintenance person.
Metal Grates (If Applicable)	Grate Opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Oil/Debris Trap (If Applicable)	Dislodged	Oil or debris trap is misaligned with or dislodged from the outlet pipe.	Trap is connected to and aligned with outlet pipe.

RANGE	TOWNSHIP	SECTION	QUARTER	006	30/43
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Compost-Amended Soil

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition.

Compaction from construction can reduce the soil's natural ability to provide these functions. Compost-amended soils are intended to replace these lost functions by establishing a minimum soil quality and depth in the post-development landscape.

Sufficient organic content is a key to soil quality. Soil organic matter can be attained through numerous amendments such as compost, composted woody material, biosolids, and forest product residuals. The full benefits of compost-amended soils are realized when desired soil media depths are maintained and soil compaction is minimized.

Key Operations and Maintenance Considerations

- Replenish soil media as needed (as a result of erosion) and address compacted, poorly draining soils.
- Site uses should protect vegetation and avoid soil compaction. Care should be taken to prevent compaction of soils via vehicular loads and/or excessive foot traffic, especially during wet conditions.
- The table below provides the recommended maintenance frequencies, standards, and procedures for compost-amended soils. The level of routine maintenance required and the frequency of corrective maintenance actions may increase for facilities prone to erosion due to site conditions such as steep slopes or topography tending to concentrate flows.

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Compost-Amended Soil			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Soil Media	Soils Waterlogged or Not Infiltrating	Soils become waterlogged, or otherwise do not appear to be infiltrating.	Soils have been aerated or amended such that infiltration occurs and soils to not remain completely saturated, per design specifications.
	Erosion/Scouring	Areas of potential erosion are visible, such as gullies or scouring.	Any eroded areas have been repaired, and sources of erosion addressed to prevent further soil erosion.
Vegetation	Vegetation in Poor Health	Less than 75% of planted vegetation is healthy with a generally good appearance.	At least 75% of planted vegetation is healthy with generally good appearance. Any conditions found that were deleterious to plant health have been corrected where possible. Routine maintenance schedule has been updated as necessary to ensure continued plant health and satisfactory appearance.
	Poisonous Plants and Noxious Weeds	Any poisonous plants or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations.	No danger of poisonous vegetation where maintenance personnel or the public might normally be. Eradication of Class A weeds as required by State law. Control of other listed weeds as directed by local policies. Apply requirements of adopted IPM policy for the use of herbicides.
	Other Weeds Present	Other weeds (not listed on City/State noxious weed lists) are present on site.	Weeds have been removed per the routine maintenance schedule, following IPM protocols.

RANGE	TOWNSHIP	SECTION	QUARTER	006	32/43
04E-	20 N-	16	3/4		
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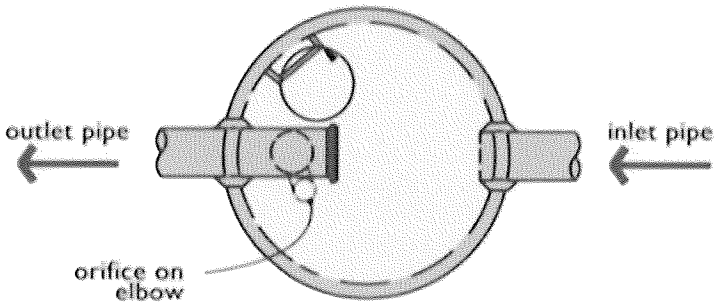
Control Structure/Flow Restrictor

Flow control structures and flow restrictors direct or restrict flow in or out of facility components. Outflow controls on detention facilities are a common example where flow control structures slowly release stormwater at a specific rate. The flow is regulated by a combination of orifices (holes with specifically sized diameters) and weirs (plates with rectangular or "V" shaped notch). Lack of maintenance of the control structure can result in the plugging of an orifice. If these flow controls are damaged, plugged, bypassed, or not working properly, the facility could overtop or release water too quickly.

Control structures have a history of maintenance-related problems and it is imperative to establish a good maintenance program for them to function properly. Sediment typically builds up inside the structure, which blocks or restricts flow to the outlet. To prevent this problem, routinely clean out these structures and conduct regular inspections to detect the need for non-routine cleanout.

Facility objects that are typically associated with a control structure/flow restrictor include:

- detention ponds
- media cartridge filters
- closed detention system
- conveyance stormwater pipe



BIRD'S-EYE VIEW

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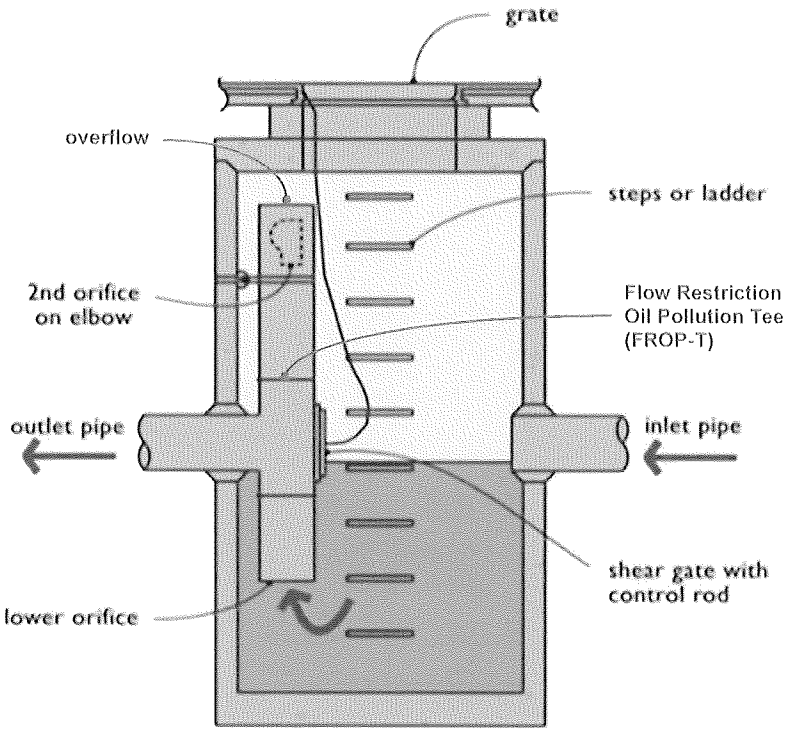
DOCUMENT NUMBER				SERIAL NUMBER	PAGE NUMBER



SECTION PROFILE

Key Operations and Maintenance Considerations

- Conduct regular inspections of control structures to detect the need for non-routine cleanout, especially if construction or land-disturbing activities occur in the contributing drainage area.
- The most common tool for cleaning control structures/flow restrictors is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris from the sump.
- A control structure is an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a control structure, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

RANGE	TOWNSHIP	SECTION	QUARTER		
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Control Structure/Flow Restrictor			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Structure	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the structure opening or is blocking capacity of the structure by more than 10%.	No Trash or debris blocking or potentially blocking entrance to structure.
		Trash or debris in the structure that exceeds 1/3 the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the structure.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Sediment	Sediment exceeds 60% of the depth from the bottom of the structure to the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section or is within 6 inches of the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section.	Sump of structure contains no sediment.
	Damage to frame and/or top slab	Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¾ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering structure through cracks, or maintenance person judges that structure is unsound.	Structure is sealed and structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering structure through cracks.	No cracks more than 1/4 inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Structure has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the structure at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film
	Ladder rungs missing or unsafe	Ladder is unsafe due to missing rungs, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
FROP-T Section	Damage	T section is not securely attached to structure wall and outlet pipe structure should support at least 1,000 lbs of up or down pressure.	T section securely attached to wall and outlet pipe
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight or show signs of deteriorated grout.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes—other than designed holes —in the structure.	Structure has no holes other than designed holes.
Shear Gate	Damaged or missing	Shear gate is missing.	Replace shear gate.
		Shear gate is not watertight.	Gate is watertight and works as designed.

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		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
Orifice Plate	Damaged or missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
	Deformed or damaged lip	Lip of overflow pipe is bent or deformed.	Overflow pipe does not allow overflow at an elevation lower than design
Inlet/Outlet Pipe	Damaged	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.
Metal Grates (If Applicable)	Unsafe grate opening	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris.
	Damaged or missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open structure requires urgent maintenance.	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

RANGE	TOWNSHIP	SECTION	QUARTER	006	36/43
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Conveyance Pipe

Storm sewer pipes convey stormwater. Inlet and outlet stormwater pipes convey stormwater in, through, and out of stormwater facilities.

Pipes are built from many materials. Pipes are cleaned to remove sediment or blockages when problems are identified. Stormwater pipes must be clear of obstructions and breaks to prevent localized flooding. All stormwater pipes should be in proper working order and free of the possible defects listed below.

Key Operations and Maintenance Considerations

- The most common tool for cleaning stormwater conveyance pipes is a truck with a tank, vacuum hose, and a jet hose (Vactor® truck) to flush sediment and debris from the pipes.

Conveyance Pipe			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants. Sheen, obvious oil, or other contaminants present. • Identify and remove source.	No contaminants or pollutants present.
	Obstructions, Including Roots	Root enters or deforms pipe, reducing flow.	Roots have been removed from pipe (using mechanical methods; do not put root-dissolving chemicals in storm sewer pipes). If necessary, vegetation over the line removed.
	Sediment and Debris	Sediment depth is greater than 20% of pipe diameter.	Pipe has been cleaned and is free of sediment/ debris. (Upstream debris traps installed where applicable.)
	Debris Barrier or Trash Rack Missing	Stormwater pipes > than 18 inches need debris barrier.	Debris barrier present on all stormwater pipes 18 inches and greater.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.

RANGE	TOWNSHIP	SECTION	QUARTER	006	37/43
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Fencing/Gates/Bollards/Water Quality Sign

Stormwater facilities such as detention ponds or treatment wetlands often have fences to protect them from damage and keep children away from ponds or hazardous areas. Some facilities are required to have informational signs telling the public that the site is a stormwater facility.

Fencing/Gates/Bollards/Water Quality Sign			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Fencing (Site)	Site erosion or holes under fence	Erosion or holes more than 4 inches high and 12-18 inches wide permitting access through an opening under a fence.	No access under the fence.
Fencing (Wood Posts, Boards, and Cross Members)	Missing or damaged parts	Missing or broken boards, post out of plumb by more than 6 inches or cross members broken	No gaps on fence due to missing or broken boards, post plumb to within 1½ inches, cross members sound.
	Weakened by rotting or insects	Any part showing structural deterioration due to rotting or insect damage	All parts of fence are structurally sound.
	Damaged or failed post foundation	Concrete or metal attachments deteriorated or unable to support posts.	Post foundation capable of supporting posts even in strong wind.
Fencing (Metal Posts, Rails, and Fabric)	Damaged parts	Post out of plumb more than 6 inches.	Post plumb to within 1½ inches.
		Top rails bent more than 6 inches.	Top rail free of bends greater than 1 inch.
		Any part of fence (including post, top rails, and fabric) more than 1 foot out of design alignment.	Fence is aligned and meets design standards.
		Missing or loose tension wire.	Tension wire in place and holding fabric.
	Deteriorated paint or protective coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.	Structurally adequate posts or parts with a uniform protective coating.
	Openings in fabric	Openings in fabric are such that an 8-inch diameter ball could fit through.	Fabric mesh openings within 50% of grid size.
Chain Link Fencing Gate	Damaged or missing members	Missing gate.	Gates in place.
		Broken or missing hinges such that gate cannot be easily opened and closed by a maintenance person.	Hinges intact and lubed. Gate is working freely.
		Gate is out of plumb more than 6 inches and more than 1 foot out of design alignment.	Gate is aligned and vertical.
		Missing stretcher bar, stretcher bands, and ties.	Stretcher bar, bands, and ties in place.
	Locking mechanism does not lock gate	Locking device missing, non-functioning or does not link to all parts.	Locking mechanism prevents opening of gate.
	Openings in fabric	Openings in fabric are such that an 8-inch diameter ball could fit through.	Fabric mesh openings within 50% of grid size.

Fencing/Gates/Bollards/Water Quality Sign			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Bollards	Damaged or missing	Bollard broken, missing, does not fit into support hole or hinge broken or missing.	No access for motorized vehicles to get into facility.
	Does not lock	Locking assembly or lock missing or cannot be attached to lock bollard in place.	No access for motorized vehicles to get into facility.
Water Quality Sign	Sign is Damaged or Missing	Water quality sign is leaning more than 8 inches off vertical.	Sign reset to plumb.
		Water quality sign is missing or 20% of the surface is unreadable.	Sign replaced.

Modular Detention Systems

Modular detention systems are passive, flow-through, stormwater detention systems that detain (store) stormwater underground. These detention systems function similarly to a detention pond with the temporary storage volume provided by an underground structure to regulate the storm discharge rate from the site. The structure is typically constructed of modular units that provide void space for stormwater detention surrounded by a structural aggregate, filter fabric, and/or membrane to isolate the detention from surrounding material and support various above-ground uses (such as parking, roadways, etc.). These systems are typically utilized for sites that do not have space available for an above-ground system and are more commonly associated with commercial sites. The modular nature allows them to be installed with various sizes to accommodate site-specific detention volumes and used for sites with irregularly-shaped spaces available for stormwater detention.

Example Proprietary Modular Detention System Installation

(Source: Contech Engineered Solutions)

Key Operations and Maintenance Considerations

- The most common tool for cleaning manufactured modular detention systems is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris.
- Underground detention systems are enclosed spaces where harmful chemicals and vapors can accumulate. Therefore, the inspection and maintenance of these facilities should be conducted by an individual trained and certified to work in hazardous confined spaces.
- Periodic inspections of the inlet and outlet areas to ascertain correct operation of the system.
- Access and maintenance requirements and methods vary by type of system; some maintenance activities may be accomplished without human entry into the system. Check the manufacturer's publications and the site's maintenance plan for details.

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Modular Detention Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Storage Area	Plugged Air Vents	One-half of the cross section of a vent is blocked at any point or the vent is damaged.	Vents open and functioning.
	Debris and Sediment	Accumulated sediment depth exceeds 10% of the depth of the storage area for 1/2 length of storage area or any point depth exceeds 15% of depth. (Example: 72-inch deep storage area would require cleaning when sediment reaches depth of 7 inches for more than 1/2 length of storage area.)	Storage area free of sediment and debris.
	Leaks in Joints Between Storage/ Vault/ Pipe Section	Any openings or voids allowing material to be transported into facility. (Will require engineering analysis to determine structural stability.)	All joints between tank/pipe sections are sealed.
	Tears, Cracks, or Leaks in Storage Area Structure	Cracks wider than 1/2 inch and any evidence of soil particles entering the storage area through cracks or tears in top, bottom or walls, or maintenance/inspection personnel determines that the storage area is not structurally sound.	Storage area replaced or repaired to design specifications and is structurally sound. No further evidence of soil particles entering through cracks/tears in enclosure.
	Poor Water Quality	Inspection of discharge water for obvious signs of poor water quality (i.e. obvious oil or other contaminants present).	Effluent discharge from vault clear, without thick visible sheen.
	Other Defects Listed in Manufacturer Specifications or Maintenance Literature	Other damage or defects that prevent the system from functioning to design specifications.	Defects repaired/ corrected per manufacturer's documentation and/ or design specifications.
	Vegetation Encroachment	Root encroachment of tree or shrub have impacted function or integrity of system.	Roots are found in system to be removed and repair system.

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04E-	20 N-	16	3/4		
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Planter Box Media Filters

Planter box media filters are passive, flow-through, stormwater treatment systems. They are comprised of a planter box, treatment media and a tree. Stormwater runoff enters the planter box system through a curb-inlet opening or pipe and flows through a specially designed filter media mixture contained in a landscaped concrete container. The filter media captures pollutants; those pollutants are then decomposed, volatilized, and incorporated into the biomass of the system's micro/macro fauna and flora. Stormwater runoff flows through the media and into an underdrain system at the bottom of the container.

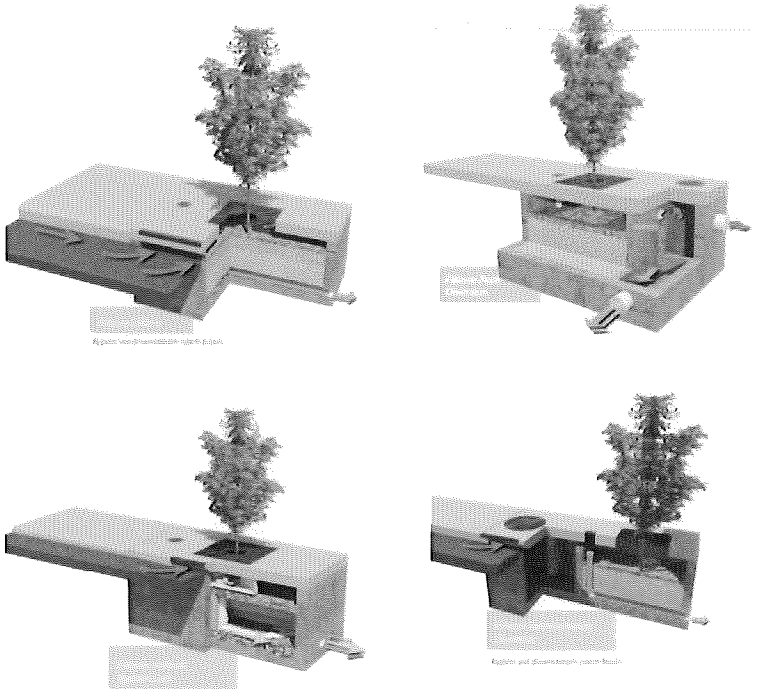
Filterra® units are an example of a proprietary manufactured filter media planter box system. See manufacturer's publications for additional maintenance information.

Facility objects that are typically associated with a manufactured planter box media filter system include:

- conveyance stormwater pipe

Key Operations and Maintenance Considerations

- The main maintenance need is keeping the mulch surface permeable.
- Filter media may become clogged due to a pollutant discharge.
- The main treatment function is due to the tree roots and soil biota. Dead or severely damaged trees must be replaced.
- Trees may need to be trimmed to provide clear sight lines along roads.



Planter Box Media Filter Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance is Needed	Minimum Performance Standard
Inlet	Excessive Sediment or Trash Accumulation	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions, allowing free distributed flow of water into Filterra
Mulch Cover	Trash and Floatable Debris Accumulation.	Excessive trash and/or debris accumulation.	Mulch cover is free of trash and debris.
	"Ponding" of Water on Mulch Cover	Clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover
	Mulch Depth	Depth of mulch is less than 3 inches.	Total depth of mulch is 3 inches.
Amended Soil	Soil Nutrients	Soil not providing plant nutrients.	Soil providing plant nutrients.
	Bare Spots	Bare spots on soil in bioretention area.	No bare spots, bioretention area covered with vegetation or mulch mixed into the underlying soil.
	Compaction	Poor infiltration due to soil compaction in the bioretention area.	No soil compaction in the bioretention area.
Vegetation	Plants not Growing or in Poor Conditions	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.
	Plant Growth Excessive	Tree growth inhibits traffic visibility and/or pedestrian access.	Trim tree in accordance with typical landscaping and safety.
Structure	Structure has Visible Cracks	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
	Settlement/ Misalignment	Structure has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Structure replaced or repaired to design standards.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into vault.)	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.

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Planter Box Media Filter Systems			
Drainage System Feature	Potential Defect	Conditions When Maintenance is Needed	Minimum Performance Standard
Access Manhole	Cover/lid not in place	Cover/lid is missing or only partially in place. Any open manhole requires immediate maintenance.	Manhole access covered.
	Locking mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
Tree Grate (If Applicable)	Grate Opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
	Grate not in Place	Grate does not fit securely on frame (1/4 inch lip or greater).	Grate is flush with sidewalk and/or structure.
	Grate Difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.
High Flow Bypass	Trash and Debris	Trash and debris blocking bypass.	Bypass is unobstructed and free of trash and debris.
	Default Overflow	System is defaulting to high flow bypass.	System does not default to the high flow bypass. Amended soils and mulch replaced and system returned to design standards.