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RANGE	TOWNSHIP	SECTION	QUARTER		
04E-	20N-	20	04	092	1/28
DOCUMENT NUMBER				SERIAL NUMBER	PAGE NUMBER

Name & Return Address:

CITY OF PUYALLUP

333 S MERIDIAN

PUYALLUP, WA 98371

Washington State Recorder's Cover Sheet (RCW 65.04) Please print legibly or type information.

Document Title(s) SFR STORMWATER MANAGEMENT & BMP FACILITIES AGREEMENT

Grantor(s) 106 CALIBER LLC

____ Additional Names on Page _____ of Document

Grantee(s) CITY OF PUYALLUP

____ Additional Names on Page _____ of Document

Legal Description
(Abbreviated: i.e., lot, block & subdivision name or number OR section/township/range and quarter/quarter section)

Section 20 Township 20 Range 04 Quarter 34

Complete Legal Description on Page 5 of Document

Auditor's Reference Number(s) 202308250197

Assessor's Property Tax Parcel/Account Number(s) 6025480320

Non Standard Fee $50.00

By signing below, you agree to pay the $50.00 non standard fee.

I am requesting an emergency non standard recording for an additional fee as provided in RCW 36.18.010. I understand that the recording processing requirements may cover up or otherwise obscure some part of the text of the original document.

_____

Signature of Party Requesting Non Standard Recording

NOTE: Do not sign above or pay additional $50.00 fee if document meets margin/formatting requirements.

The Auditor/Recorder will rely on the information provided on this cover sheet.
Staff will not read the document to verify the accuracy or completeness of the indexing information provided herein.

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After recording return to:

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

Document Title: SFR Stormwater Management & BMP Facilities Agreement
Grantee: City of Puyallup
Grantor: 106 Caliber LLC
Legal Description: Section 20 Township 20 Range 04 Quarter 34
Complete Legal Description on 5 **Page of this Document**
Assessor's Tax Parcel or Account Numbers: 6025480320
Reference Number of Related Document(s): _____

SFR 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 106 Caliber LLC (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: 2504 12TH AVE NW.

C. Development Plan & Stormwater Facilities. The site improvements (Plan) for the Property, specifically, the site improvements (Plan) approved under City of Puyallup building Permit number PRRNSF20220550, provides for detention, retention, treatment, infiltration 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 andrepaired 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, 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 is attached hereto as Exhibit 'C'.

4. 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.

5. If Landowner fails to adequately and properly operate, use, maintain or repair the Stormwater Facilities, and the City sees fit, 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.

6. 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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Dated: 8/25/2023

Ali R.M. Dadgar
Grantor

Dated: 8/24/2023

DocuSigned by:
Hans Hunger
107EB0CED836480...
Grantee: City of Puyallup, Accepted by:
Hans Hunger, PE (City Engineer)

Dated: 8/24/2023

DocuSigned by:
Joseph N Beck
EF5BA50D7E9544B...
Approved as to form:
Joseph N. Beck (City Attorney)

STATE OF Washington)
) -ss
COUNTY OF King)

I certify that I know or have satisfactory evidence that Ali R.M. Dadgar is the person who appeared before me, and on Aug 25th said person acknowledged that he or she signed this instrument, on oath stated that he or she was authorized to execute the instrument and acknowledged it as the Owner / Manag. Mem of 106 Caliber LLC to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated: Aug 25th, 2023

Printed Name: Shuping Lai
Notary Public, State of WA
My appointment expires: 10/22/2026

SHUPING LAI NOTARY PUBLIC 174850 COMMISSION EXPIRES 10-22-26 STATE OF WASHINGTON

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Exhibit 'A' – Legal Description

Section 20 Township 20 Range 04 Quarter 34 Plat ASHLEY MEADOWS PH 3 LOT 32 EASE OF RECORD OUT OF 04-20-20-3-042, 602475-015-0, 016-0 & 022-0 SEG 2007-0570 JU 1/8/07JU

RANGE	TOWNSHIP	SECTION	QUARTER	092	7/28
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To view the stormwater site plan pages, go to the City of Puyallup CityView permit portal using this web address:
https://permits.puyallupwa.gov/Portal/Permit/GetFile/96567

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DOCUMENT NUMBER					

Exhibit 'B' – Operations and Maintenance Manual

RANGE	TOWNSHIP	SECTION	QUARTER		
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Onsite Single Family Stormwater Operation and Maintenance Manual

A stormwater maintenance program is essential to ensure that the facilities designed for this property and installed during construction, continue to function as designed to prevent possible flooding and property damage to this property and to its neighbors. They are typically a combination of vegetation management and structural components that slow, filter, detain, or infiltrate stormwater runoff on-site after a rainfall event.

A maintenance program for all stormwater controls that are associated with development is required by City code, State of Washington RCWs and Federal Guidelines. This Manual is meant to include a maintenance program that addresses every component of the onsite stormwater system, to ensure the system does not lose its intended capability to manage stormwater.

In addition, Puyallup Municipal Code requires that owners of private stormwater management facilities prepare an annual inspection report be submitted to the City of Puyallup no later than January 30th for the preceding year and the facility be available to the city for inspection at all reasonable times. These reports are required to be kept on hand, at the site for a minimum of 3 years.

Stormwater management facilities are not intended to replace good housekeeping procedures. Good housekeeping includes proper storage and disposal of chemicals and potential pollutants, procedures for spill cleanup, proper use of fertilizers and other lawn care products, and maintenance of equipment to prevent release of pollutants to the stormwater system. Guidelines for establishing good housekeeping procedures (Source Control BMPs) can be found in the Stormwater Management Manual for Western Washington.

The intent of this stormwater maintenance manual is to assist single family stormwater facility owners in performing proper maintenance of the facilities and the required reporting of maintenance procedures to the City of Puyallup.

Vegetation Management

Goals and Philosophy

The vegetation management focus is establishing and maintaining healthy low-maintenance native plantings and sustaining the design function of vegetated filters and buffers. This includes controlling invasive plants where feasible, and planting cover on bare soils.

The State of Washington recognizes the special importance of rivers, streams, wetlands, ponds, and stormwater control and treatment facilities. The sensitive nature of such habitats, their plant and animal communities, and their direct link with other waterways require that we establish specific policies to ensure their health.

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General Practices

Preferred vegetation is native. However, there are non-native plants that are adaptive and drought tolerant that are acceptable to use within the stormwater facilities. Native and non-native plants are listed in the ***Rain Garden Handbook for Western Washington***, appendices a-1 through a-18, and are allowed for use in plantings with in the City of Puyallup.

Stormwater control facilities discharge to surface water or groundwater either directly or through pipes or ditches. Many facilities are built to remove pollutants from stormwater.

Generally, vegetation should be maintained to blend into surrounding areas. Stormwater facilities can provide habitat for aquatic life and birds. Promoting natural vegetation where feasible improves habitat. Swales often blend into intensively managed landscapes. Pond perimeters can include natural vegetation.

The use of pesticides and, in most cases fertilizer, is not compatible with the task of pollutant removal or the direct connection of stormwater facilities to streams and groundwater.

Features of Stormwater Facilities:

- There is a mix of native and non-native plants
- Generally, not used by the homeowner for recreation or other use
- Include areas managed to promote design function, such as turf in swales
- Managed landscapes may be nearby
- May be used by fish and wildlife

Objectives for Stormwater Facilities:

- Maintain healthy plant communities
- Avoid or minimize need for chemical intervention
- Control invasive plants where feasible
- No bare soil areas are allowed
- Tolerance for natural appearance and weeds

Please reference the most current accepted and available ***Rain Garden Handbook for Western Washington*** for approved plant lists located in appendices a-1 through a-18. Not all plants in the Rain Garden Handbook are native, please be sure to locate the correct zone and plants that will best suit your facility. Some plants, other than native, may be approved for use in storm facilities if climate adaptable, low maintenance and drought tolerant for the Puget Sound region. If you do have any questions regarding plant selections please contact the city's Stormwater management team.

In some cases, the original plantings may not be appropriate for the actual condition at a facility. One example is a frequently flooded swale that cannot support normal turf. In cases like this, replace turf with appropriate wetland plants if the underlying drainage problem cannot be fixed.

All onsite areas that were disturbed during initial construction and not initially designed to include impervious area (I.E. sidewalk, driveway, etc.) shall follow the city's vegetation management standards manual- minimum 8" soil depth, 40% compost amended soil by volume. Limit mulch use to covering bare soil while establishing plantings.

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Chemical use should be avoided within 25 feet of any area that holds or conveys surface water or stormwater.

Annual Reporting Requirements and Storm Facility Checklists

AS MENTIONED PREVIOUSLY, PRIVATE STORMWATER FACILITY OWNERS ARE REQUIRED BY PUYALLUP MUNICIPAL CODE TO SUBMIT A REPORT TO THE CITY OF PUYALLUP STORMWATER DEPARTMENT ANNUALLY, AND KEEP THOSE REPORTS ON HAND FOR UP TO 3 YEARS.

THE FOLLOWING ARE CHECK LISTS THAT WILL HELP THE HOME OWNER INSPECT AND MAINTAIN THE SPECIFIC STORMWATER FACILITIES ON THIS PROPERTY. THESE CHECKLISTS WILL NEED TO BE USED AND FILLED OUT BASED ON THE FREQUENCY OF THE REQUIRED MAINTENANCE, AS STATED ON THE CHECKLISTS. THE COMPLETED CHECKLISTS SHALL BE SUBMITTED ALONG WITH YOUR ANNUAL REPORT.

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Catch Basin

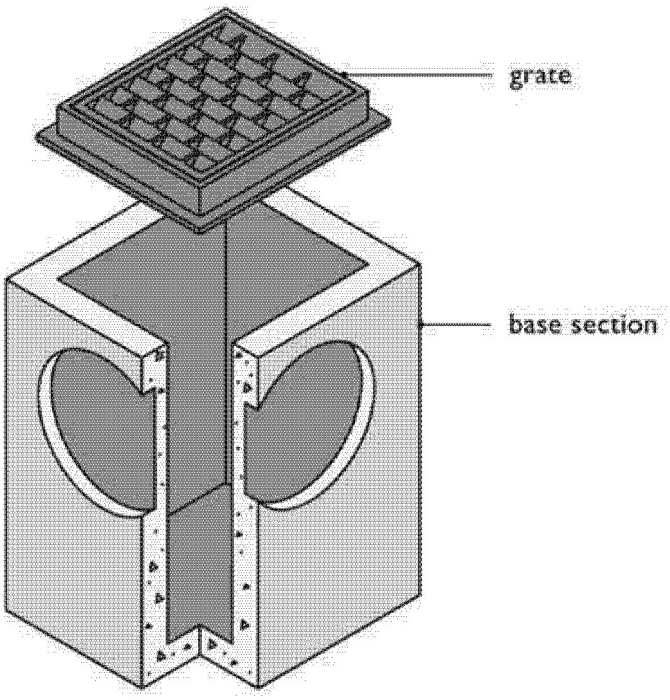
A catch basin is an underground concrete structure typically fitted with a slotted grate to collect stormwater runoff and route it through underground pipes. Catch basins can also be used as a junction in a pipe system and may have a solid lid. There are two types.

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

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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.

	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.

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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.

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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			
Drainag Syste Feature	Potenti Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Contaminan ts 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 Rack Missing or Trash	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.

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Downspout Infiltration - Infiltration

Key Operations and Maintenance

- Keep gutters free of debris and sediment or use a downspout insert to prevent debris or sediment from entering the downspout from the gutter while still allowing water to pass into the downspout.
- The most common tool for cleaning these systems is a hose to flush downspouts.

Downspout Infiltration - Infiltration			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Infiltration Trench	Drainage Slow	Decreased capacity that indicates slow drainage.	Perforated drain pipe has been cleaned and drainage rates are per design specifications. (Do not allow removed sediment and water to discharge back into the storm sewer.)
	Damage to or Trash/ Sediment Accumulation Around Pipes	Accumulation of trash, debris, or sediment in roof drains and gutters. Pipe from sump to trench has accumulated sediment or is plugged. Cracked, collapsed, broken, or misaligned drain pipes.	Trash, debris, and sediment is cleared from dispersion trench components (gutters, pipes, etc.). Pipes are free of damage or defects that hinder system from functioning according to design.

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Permeable Pavement

Permeable pavement is a paving system which allows rainfall to percolate through the surface into the underlying soil or an aggregate bed, where stormwater is stored and infiltrated to underlying soil, or removed by an overflow drainage system.

Facility elements that are typically associated with permeable pavement include:

- Wearing course: The surface layer of any permeable pavement system is the wearing course. Categories of wearing courses include:
    - Porous asphalt: A flexible pavement similar to standard asphalt that uses a bituminous binder to adhere aggregate. However, the fine material (sand and finer) is reduced or eliminated, resulting in the formation of voids between the aggregate in the pavement surface that allows water to infiltrate to the underlying aggregate base.
    - Pervious concrete: A rigid pavement similar to conventional concrete that uses a cementitious material to bind aggregate together. However, the fine aggregate (sand) component is reduced or eliminated in the gradation, resulting in the formation of voids between the aggregate in the pavement surface that allows water to infiltrate to the underlying aggregate base.
    - Interlocking concrete paver blocks: Solid, precast, manufactured modular units. Pavements constructed with these units create joints that are filled with permeable aggregate and installed on an open-graded aggregate base.
    - Aggregate Pavers (or Pervious Pavers): Modular precast paving units made with uniformly sized aggregates and bound with Portland cement concrete using a high strength adhesive. Unlike concrete paver blocks, these pavers are permeable. Pavements constructed with these units create joints that are filled with permeable aggregate and installed on an open-graded aggregate base.
    - Open-celled paving grid with gravel: Concrete or plastic grids that are filled with permeable aggregate. The system can be installed on an open-graded aggregate base.
    - Open-celled paving grid with grass: Concrete or plastic grids that are filled with a mix of sand, gravel, and topsoil for planting vegetation. The cells can be planted with a variety of non-turf forming grasses or low-growing groundcovers. The system can be installed on an open-graded aggregate base.

- Inlet (optional): While permeable pavement facilities often manage only the rain falling directly on the pavement surface, they may also be designed to accept stormwater runoff from additional areas (e.g., adjacent impervious areas, nearby rooftops). Runoff can be directed to the facility by two main methods:
    - Sheet flow to the surface: Surface areas of the facility receiving runoff contributions will likely be prone to clogging due to sediment inputs, particularly in areas of concentrated inflow. These areas should be carefully inspected and corrective maintenance should be performed as necessary to maintain the function of the pavement at these sites. In addition, the source of the sediment loads should be evaluated to determine if modifications to features in the drainage area landscape (e.g., stabilization of adjacent planted areas) would help to prevent clogging.
    - Piped flow into the aggregate base: Pipes dispersing water into the aggregate bed should be designed with cleanout access to allow pipe maintenance. Runoff that is piped into the aggregate base should be pretreated for sediment removal (e.g., screens, sumps) to protect the subbase from sedimentation and clogging. The pretreatment system must be maintained to remove accumulated sediment.
- Aggregate Base / Storage Reservoir: Stormwater passes through the wearing course to an underlying aggregate storage reservoir where it is stored prior to infiltration into the underlying soil. This aggregate bed also provides the structural function of supporting design loads (e.g., vehicle loading) for flexible pavement systems. To allow inspection of the aggregate course, some facilities have an observation port (typically installed during construction) that allows monitoring of the water levels in the aggregate bed to determine if the facility is draining properly.
- Overflow: Unless designed to provide full infiltration of stormwater, permeable pavement facilities have an overflow. Facility overflow can be provided by subsurface slotted drain pipe(s) (elevated in the aggregate bed) routed to an inlet or catch basin structure or by lateral flow through the storage reservoir to a daylighted drainage system.
- Underdrain with flow restrictor (optional): A slotted drain pipe with flow restrictor assembly may be installed at the bottom of or elevated within the aggregate storage reservoir. Permeable pavement facilities with underdrains and flow restrictors operate as underground detention systems with some infiltration.
- Signage or pavement marking can also be used to identify permeable pavement as a stormwater BMP and inform maintenance crews and the general public about protecting the facility's function (e.g., no stockpiling of soils or mulch on pavement surface).

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Key Operations and Maintenance Considerations

- Installations can be monitored for adequate or designed minimum infiltration rates by observing drainage immediately after heavier rainstorms for standing water or infiltration tests using ASTM C1701.
- The following practices are recommended to maintain proper function of porous pavement systems:
    - Do not use of sealant on porous asphalt
    - Protect from construction site runoff with proper temporary erosion and sediment controls and flow diversion measures
    - Modifying utility cut procedures for permeable pavements - Protocols should recommend restoring permeable pavement section in-kind, where feasible, and require restoring permeable pavement section in-kind where replacement with conventional pavement would impact overall facility function. Utility cuts should be backfilled with the same aggregate base used under the permeable paving to allow continued conveyance of stormwater through the base, and to prevent migration of fines from the standard base aggregate to the more open graded permeable base material (Diniz, 1980). Replacing permeable pavement with conventional pavement is acceptable if it is a small percentage of the total facility area and does not impact the overall facility function.
- A critical component of a successful maintenance program is regular removal of sediment, debris, and excessive moss from the facility surface to prevent clogging of the permeable wearing course. Surrounding landscaped areas should be inspected regularly and possible sediment sources controlled immediately.
- Protect the surface from stockpiles of landscaping materials (e.g., mulch, soil, compost).
- Clean permeable pavement surfaces to maintain infiltration capacity at least once or twice annually following recommendations below.
    - Porous asphalt and pervious concrete
        - Clean surfaces using suction, sweeping with suction or high-pressure wash and suction (sweeping alone is minimally effective). Hand held pressure washers are effective for cleaning void spaces and appropriate for smaller areas such as sidewalks.
        - Small utility cuts can be repaired with conventional asphalt or concrete if small batches of permeable material are not available or are too expensive.
    - Permeable pavers
        - The Interlocking Concrete Paving Institute (ICPI) recommends cleaning if the measured infiltration rate falls below 10 inches per hr.

- Use sweeping with suction when surface and debris are dry 1-2 times annually (see next bullet for exception). Apply vacuum to a paver test section and adjust settings to remove all visible sediment without excess uptake of aggregate from paver openings or joints. If necessary, replace No 8, 89 or 9 stone to specified depth within the paver openings. Washing or power washing should not be used to remove debris and sediment in the openings between the pavers.
- For badly clogged installations, wet the surface and vacuum aggregate to a depth that removes all visible fine sediment and replace with clean aggregate.
- If necessary, use No 8, 89 or 9 stone for winter traction rather than sand (sand will accelerate clogging).
- Replace broken pavers as necessary to prevent structural instability in the surface.

o Plastic or Concrete grid systems

- Remove and replace top course aggregate if clogged with sediment or contaminated (vacuum trucks for stormwater collection basins can be used to remove aggregate).
- Remove and replace grid segments where three or more adjacent rings are broken or damaged.
- Replenish aggregate material in grid as needed.
- For grass installations, use normal turf maintenance procedures except do not aerate. Use very slow release fertilizers if needed.

• Modify typical snow removal procedures, such as:

o Using a snow plow with skids or rollers to slightly raise the blade above permeable pavers or open-celled paving grid systems to prevent loss of top course aggregate and damage to paver blocks or grids.

o Avoiding stockpiling plowed snow (i.e., dirty snow) directly on top of permeable pavement.

o Use deicers in moderation (e.g., salt, molasses-based and chemical deicers) if needed.

Maintenance Standards

The table below provides the minimum required maintenance standards for permeable pavement components. The level of routine maintenance required and the frequency of corrective maintenance actions may increase for facilities receiving high sediment loads (e.g., sanding) or facilities subject to extended wet, shady conditions where moss may accumulate.

Permeable Pavement			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
Permeable Pavements (all)	Material Deposited on Pavement	Runoff from adjacent pervious areas deposits soil, mulch, or sediment on paving.	Soil, mulch, or sediment from adjacent areas has been removed from permeable pavement and measures taken to prevent further deposition of soil/ mulch material from adjacent areas on permeable pavement.
	Vegetative Debris	Accumulation of organic debris and leaf litter. Vegetation related fallout clogs or will potentially clog voids.	Vegetative debris removed and sources trimmed/ pruned as appropriate to reduce further debris accumulation. Water infiltrates per design function.
Porous Asphalt or Pervious Concrete	Surface Clogged	Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate). Infiltration rate testing using ASTM C1701 indicates an infiltration rate of 10 inches per hour or less.	Surface has been cleaned/ cleared of sediment, debris, vegetation or other material and water infiltrates per design function.
	Sediment on Surface	Sediment present at the surface of the pavement.	Source of sediment has been identified and addressed, if possible. Surface of pavement is free of sediment.
	Moss Growth on Pavement	Moss growth inhibits infiltration or poses slip safety hazard.	Moss removed such that there is not a slip safety hazard and pavement infiltrates per design function.
	Pavement Damaged	Major cracks or trip hazards and concrete spalling and raveling.	Cracks or other damage to pavement repaired to grades and tolerances per design specifications; infiltration functions per design.
Interlocking Concrete Paver Blocks and Aggregate Pavers	Surface Clogged	Surface is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).). Infiltration rate testing using ASTM C1701 indicates an infiltration rate of 10 inches per hour or less.	Surface has been cleaned/ cleared of sediment, debris, vegetation or other material and water infiltrates per design function.
	Settlement	Settlement of pavement surface (may indicate other problems).	Pavement restored to finished grades per design specifications and record drawings. Surface drainage function restored.
	Sediment on Surface	Sediment present at the surface of the pavement.	Surface of pavement is free of sediment and infiltrates per design function.
	Moss Growth on Pavement	Moss growth inhibits infiltration or poses slip safety hazard.	Moss removed such that there is not a slip safety hazard and pavement infiltrates per design function.
	Pavers Missing/ Damaged	Paver block(s) are missing or damaged.	Paver blocks repaired or replaced per design specifications and record drawings.
	Loss of Aggregate	Loss of aggregate material between paver blocks.	Aggregate replaced per design specifications and paver manufacturer's recommendations.

Permeable Pavement			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
	Settlement	Surface has settled in a manner that poses a safety hazard or inhibits infiltration.	Pavers restored to finished grades per design specifications and record drawings.
Open-Celled Paving Grid With Gravel	Aggregate Clogged	Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).	Aggregate has been cleaned/ cleared of sediment, debris, vegetation or other material and water infiltrates per design function.
	Paving Grid Missing/ Damaged	Paving grid missing or damaged.	Paving grid replaced or restored per design specifications and record drawings.
	Settlement	Settlement of pavement surface (may indicate other problems).	Pavement restored to finished grades per design specifications and record drawings.
	Loss of Aggregate	Loss of aggregate in paving grid.	Aggregate replaced per design specifications.
Open-Celled Paving Grid With Grass	Aggregate Clogged	Aggregate is clogged: Ponding on surface or water flows off the permeable pavement surface during a rain event (does not infiltrate).	Surface has been rehabilitated per manufacturer's recommendations and water infiltrates per design function.
	Paving Grid Missing/ Damaged	Paving grid missing or damaged.	Paving grid and grass surface replaced or restored per design specifications and record drawings.
	Settlement	Settlement of pavement surface (may indicate other problems).	Pavement restored to finished grades per design specifications and record drawings.
	Poor Grass Coverage	Poor grass coverage in paving grid.	Grass coverage restored per design specifications and manufacturer's recommendations.
Inlets/ Outlets/ Pipes	Inlet/ Outlet Pipe Damaged	Pipe is damaged.	Damaged pipe has been repaired/ replaced and flow capacity functions per design.
	Inlet/ Outlet Pipe Clogged	Pipe is clogged.	Pipe has been cleared and flow capacity functions per design.
	Underdrain Pipe Clogged	Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period).	Pipe has been cleared and infiltration rate/ flow capacity of system functions per design.
	Raised Subsurface Overflow Pipe Clogged	Plant roots, sediment or debris reducing capacity of underdrain.	Pipe has been cleared and infiltration rate/ overflow capacity of system functions per design specifications.
	Outlet Structure Clogged	Sediment, vegetation, or debris reducing capacity of outlet structure.	Blockage has been cleared and outlet structure functions at full capacity per design.
	Erosion at Overflow	Native soil is exposed or other signs of erosion damage are present at discharge point.	Erosion has been repaired and eroded area stabilized.

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Permeable Pavement			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
Observation Port	Water Visible in Storage Aggregate	Water remains in the storage aggregate longer than anticipated by design after the end of a storm.	Cause or ponding investigated and addressed as needed to bring facility into conformance with design function.

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Exhibit C – Annual Inspection Report Form

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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

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