

# CONTOUR

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## STORMWATER OPERATIONS AND MAINTENANCE MANUAL AND POLLUTION AND SOURCE CONTROL MANUAL FOR OVERLOOK APARTMENTS PHASE 2 PORT ORCHARD, WASHINGTON

RECEIVED  
PERMIT CENTER  
FEB 19 2020

CITY OF PORT ORCHARD  
COMMUNITY DEVELOPMENT

**FEBRUARY 2020**

**Prepared For:**  
OLAA, LLC  
15234 SE 366<sup>th</sup> Place  
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**Prepared By:**  
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**Approved By:**  
Jeremy Haug, P.E., Project Engineer



**Project # 16-300**

**THIS MANUAL SHALL BE RETAINED ON-SITE OR WITHIN REASONABLE  
ACCESS TO THE SITE AND SHALL BE TRANSFERRED WITH THE PROPERTY TO  
THE NEW OWNER.**

PW20-014

# Operations and Maintenance Manual for Stormwater Conveyance, Treatment and Mitigation Systems

## Project Description

This project will propose the construction of six residential buildings and a community center consisting of a total of 107 dwelling units along with the required infrastructure such as roads, sewer, water, and stormwater facilities. There does not appear to be any significant utilities that run through the subject site, and no apparent evidence of a previous residence(s).

The *2012 Storm Water Management Manual for Western Washington* (SWMM) and the requirements of the City of Port Orchard will establish the methodology and design criteria used for this project.

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The project consists of multiple vacant Kitsap County parcels. The site appears to be a vacant parcel with no obvious signs of residence in the past. The site is comprised mostly of small vegetation with some trees in the southeast corner of the site.

Parcel #:	4598-005-028-0007	19,602 SF (0.45 Ac)
	4598-005-022-0003:	23,522 SF (0.54 AC)
	4598-005-017-0109:	23,522 SF (0.54 AC)
	4598-006-001-0303:	31,363 SF (0.72 AC)
	4598-006-004-0003:	23,522 SF (0.54 AC)
	4598-006-007-0000:	23,522 SF (0.54 AC)
	4598-006-010-0104:	7,841 SF (0.18 AC)
Governing Jurisdiction:	City of Port Orchard	
Zoning:	Residential – 12 units/acre	

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

The project consist of three separate basins, each with their own stormwater management systems. Below is a brief description of each basin and the main stormwater management systems contained within.

### Offsite Basin

The offsite basin consists of the improvements made to SE Lovell Street and Wendell Ave leading into the site. Stormwater will be collected in a series of catch basins before discharging to the underground Infiltration Tank located within Wendell Ave right of way. Stormwater will be treated through the use of a Pre Treatment Device and a Water Quality device.

#### South Basin

The South Basin consists of the onsite improvements from the south and east portions of the site, including runoff the community center buildings, Building B, Building C and the east half of Building A. Runoff from these areas will be collected and conveyed to the infiltration system south of Building C in a CMP infiltration. Stormwater will be treated through the use of a Pre Treatment Device and a Water Quality device.

#### North Basin

The North Basin consists of the onsite improvements from the north and west portions of the site, including runoff from Building D, Building E, Building F, and the east half of Building A. The north basin has been sized to include additional runoff from future development of Phase 3. Runoff from these areas will be collected and conveyed to the infiltration system located between Building A and Building C in a CMP infiltration tank. Stormwater will be treated through the use of a Pre Treatment Device and a Water Quality device.

#### **Maintenance Importance and Intent**

The importance of maintenance for the proper functioning of stormwater control facilities cannot be over-emphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) are due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle.

The fundamental goals of maintenance activities are to insure the entire flow regime and treatment train designed for this site continue to fully function. For this site these include:

- Maintain designed stormwater infiltration capacity
- Maintain ability to safely convey design stormwater flows
- Preserve soil and plant health, as well as stormwater flow contact with plant and soil systems
- Clearly identify systems so they can be protected
- Keep maintenance costs low
- Prevent large-scale or expensive stormwater system failures
- Prevent water quality violations or damage to downstream properties.

The intent of this section and manual is to pass on to the responsible party(s) all the information critical to understand the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost so that realistic budgets can be established.

### **Responsible Parties**

Property owners are responsible for the maintenance, operation, or repair of stormwater drainage systems and BMPs, in addition to maintaining accurate records of inspections and maintenance actions taken.

Stormwater facilities shall be inspected and maintained routinely and cleared of debris sediment and vegetation when the functioning and/or design capacity of the facility is affected. Where lack of maintenance is causing or contributing to a water quality problem, immediate action shall be taken to correct the problem.

Disposal of waste from stormwater maintenance activities shall be conducted in accordance with applicable Solid Waste Handling Standards in Chapter 173-350 WAC and where appropriate, the Dangerous Waste Regulations, Chapter 173-303 WAC.

### **Facilities Requiring Maintenance**

The following are all the components of the sites stormwater system that will require maintenance:

- Conveyance System
- Infiltration Systems
- Pre-Treatment Device
- Water Quality Device

See stormwater facilities exhibit illustrating the locations of all items to be maintained onsite.

### **Maintenance Instructions**

The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. For facilities not owned and maintained by the county, a log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the county.

See Maintenance Checklist Attachment for full details on how and when to maintain stormwater facilities.

*Contech Stormfilter Maintenance Requirements (Water Quality Device)*

The maintenance process comprises the removal and replacement of each Contech cartridge and the cleaning of the manhole with a vacuum (vactor) truck. Filter maintenance should be performed by a certified maintenance contractor, or other party trained by Contech. The maintenance cycle of these filters varies based on the suspended sediment loading, generally a maintenance interval of 1-2 years is expected. Approximate cost of cleaning is \$500 per filter cartridge. Assume a life cycle of 1.5 years for each filter cartridge.

#### Catch basin/Manhole and Conveyance Pipe Requirements

The maintenance process comprises of the removal of collected sediments within a catch basin or manhole. This usually includes the use of a vactor truck to remove any collect debris. This should be done every 1-2 years as expected in the northwest. Approximate cost of cleaning \$50 per catch basin/ manhole.

#### Contech CDS Device (Pre-Treatment Device)

The maintenance process comprises the removal collected sediments and cleaning or replacement of the filter screen. Maintenance should be performed by a certified maintenance contractor, or other party trained by Contech. This should be done every 1-2 years as expected in the northwest. Approximate cost of cleaning \$50 per catch basin/ manhole.

#### Infiltration System Requirements

Maintenance of the infiltration system is crucial to the long term effectiveness of the stormwater management of the site. The infiltration systems should be cleaned of a sediment that has accumulated along the pond bottom once the sediment has reached a depth of 0.5' or more. Inlets and outlets should be checked for any debris which may block the flow of water and to ensure no erosion has occurred. Each infiltration system should be inspected 1-2 times per year and after every major storm event.

#### **Pollution Source Control Measures**

Pollution source control is the application of pollution prevention practices on developed site to reduce contamination of stormwater runoff at its source. BMPs and resource management systems are designed to reduce the amount of contaminants used and potentially discharged to the environment. Pollution source control measures are generally everyday activities with little to no cost impact on the average resident. Some pollution control measures include picking up animal waste, washing vehicles at a commercial car wash, and proper storage of hazardous material. For a full list of Source Control BMPs, descriptions and requirements see Best Management Practices for Single Family Residences at the end of this manual.

**MAINTENANCE PROGRAM  
COVER SHEET**

Inspection Period:

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Number of Sheets Attached:

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Date Inspected:

---

Name of Inspector:

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Inspector's Signature:

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## #2 – Maintenance Checklist for Infiltration Basins and Trenches:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash and Debris	Any trash and debris which exceed five cubic feet per 1,000 square feet. If less than threshold, all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
General	Poisonous Vegetation and Noxious Weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined in the <u>Pierce County Noxious Weeds List</u> . (Apply requirements of adopted integrated pest management policies for the use of herbicides.)	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with Tacoma-Pierce County Health Department) Complete eradication of noxious weeds may not be possible. Compliance with state or local eradication policies required.
General	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.	No contaminants or pollutants present. (Coordinate removal/cleanup with Pierce County Surface Water Management 253-798-2725 and/or Dept. of Ecology Spill Response 800-424-8802.)
General	Rodent Holes	If the facility is constructed with a dam or berm, look for rodent holes or any evidence of water piping through the dam or berm.	Rodents removed and dam or berm repaired. (Coordinate with Tacoma-Pierce County Health Department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
General	Beaver Dams	Beaver dam results in an adverse change in the functioning of the facility.	Facility returned to design function. (Contact WDFW Region 6 to identify the appropriate Nuisance Wildlife Control Operator)
General	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted integrated pest management policies.
General	Performance	Check crest gauge against design expectations (see Maintenance and Source Control Manual).	Crest gauge results reflect design performance expectations. Reading recorded. County notified if not meeting design performance.
Crest Gauge	Crest Gauge Missing/ Broken	Crest gauge is not functioning properly, has been vandalized, or is missing.	Crest gauge present and functioning. Repair/replace crest gauge if missing or broken.
Storage Area	Water Not Infiltrating	Water ponding in infiltration basin after rainfall ceases and appropriate time allowed for infiltration. Treatment basins should infiltrate Water Quality Design Storm Volume within 48 hours, and empty within 24 hours after cessation of most rain events. (A percolation test pit or test of facility indicates facility is only working at 90 percent of its designed capabilities. If 2 inches or more sediment is present, remove).	Facility infiltrates as designed. Sediment is removed and/or facility is cleaned so that infiltration system works according to design.

## #2 – Maintenance Checklist for Infiltration Basins and Trenches:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than one-half full.	Filter bag less than one-half full. Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Water flows through filter. Replace gravel in rock filter if needed.
Trenches	Observation Well (Use Surface of Trench if Well is Not Present)	Water ponds at surface during storm events. Less than 90 percent of design infiltration rate.	Remove and replace/clean rock and geomembrane.
Ponds	Vegetation	Exceeds 18 inches.	Grass or groundcover mowed to a height no greater than 6 inches.
Ponds	Vegetation	Bare spots.	No bare spots. Revegetate and stabilize immediately.
Side Slopes of Pond	Erosion	Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. <i>If erosion is occurring on compacted slope, a professional engineer should be consulted to resolve source of erosion.</i>
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works.	Dike is built back to the design elevation. <i>If settlement is significant, a professional engineer should be consulted to determine the cause of the settlement.</i>
Pond Berms (Dikes)	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue.	No water flow through pond berm. Piping eliminated. Erosion potential eliminated. <i>Recommend a geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.</i>
General	Hazard Trees	If dead, diseased, or dying trees are identified.	Hazard trees removed. <i>(Use a certified Arborist to determine health of tree or removal requirements).</i>
General	Tree Growth and Dense Vegetation	Tree growth and dense vegetation which impedes inspection, maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements).	Trees and vegetation do not hinder inspection or maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood).



## #2 – Maintenance Checklist for Infiltration Basins and Trenches:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Pond Berms (Dikes)	Tree Growth	Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees on berms removed. <i>If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.</i>
Emergency Overflow/ Spillway	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping.	Trees on emergency spillways removed. <i>If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A professional engineer should be consulted for proper berm/spillway restoration.</i>
Emergency Overflow/ Spillway	Rock Missing	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway.	Rocks and pad depth restored to design standards. (Riprap on inside slopes need not be replaced.)
Emergency Overflow/ Spillway	Erosion	Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. <i>If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.</i>
Presettling Ponds and Vaults	Facility or sump filled with Sediment and/or Debris	6 inches or designed sediment trap depth of sediment.	No sediment present in presettling pond or vault. Sediment is removed.
Drain Rock	Water Ponding	If water enters the facility from the surface, inspect to see if water is ponding at the surface during storm events. If buried drain rock, observe drawdown through observation port or cleanout.	No water ponding on surface during storm events. <i>Clear piping through facility when ponding occurs. Replace rock material/sand reservoirs as necessary. Tilling of subgrade below reservoir may be necessary (for trenches) prior to backfill.</i>

If you are unsure whether a problem exists, contact a professional engineer.

**#20 – Maintenance Checklist for Grounds (Landscaping):**

<b>Drainage System Feature</b>	<b>Defect or Problem</b>	<b>Condition When Maintenance Is Needed</b>	<b>Results Expected When Maintenance Is Performed</b>
General	Weeds (nonpoisonous)	Weeds growing in more than 20 percent of the landscaped area (trees and shrubs only). See also Pierce County Noxious weeds list at: <a href="http://piercecountywweedboard.wsu.edu/weedlist.html">piercecountywweedboard.wsu.edu/weedlist.html</a>	Weeds present in less than five percent of the landscaped area.
General	Insect Hazard	Any presence of poison ivy or other poisonous vegetation or insect nests.	No poisonous vegetation or insect nests present in landscaped area.
General	Trash or Litter	See Detention Ponds (Checklist #1).	See Detention Ponds (Checklist #1).
General	Erosion of Ground Surface	Noticeable rills are seen in landscaped areas.	Causes of erosion are identified and steps taken to slow down/spread out the water. Eroded areas are filled, contoured, and seeded.
Trees and shrubs	Damage	Limbs or parts of trees or shrubs that are split or broken which affect more than 25 percent of the total foliage of the tree or shrub.	Trim trees/shrubs to restore shape. Replace trees/shrubs with severe damage.
Trees and shrubs	Damage	Trees or shrubs that have been blown down or knocked over.	Tree replanted, inspected for injury to stem or roots. Replace if severely damaged.
Trees and shrubs	Damage	Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Stakes and rubber-coated ties placed around young trees/shrubs for support.

**#22 – Maintenance Checklist for Conveyance Systems (Pipes and Ditches):**

<b>Drainage System Feature</b>	<b>Defect or Problem</b>	<b>Condition When Maintenance Is Needed</b>	<b>Results Expected When Maintenance Is Performed</b>
Pipes	Sediment & Debris	Accumulated sediment that exceeds 20 percent of the diameter of the pipe.	Pipe cleaned of all sediment and debris.
Pipes	Vegetation	Vegetation that reduces free movement of water through pipes.	Vegetation does not impeded free movement of water through pipes. <i>Prohibit use of sand and sealant application and protect from construction runoff.</i>
Pipes	Damaged (Rusted, Bent or Crushed)	Protective coating is damaged: rust is causing more than 50 percent deterioration to any part of pipe.	Pipe repaired or replaced.
Pipes	Damaged (Rusted, Bent or Crushed)	Any dent that significantly impedes flow (i.e. decreases the cross section area of pipe by more than 20 percent).	Pipe repaired or replaced.
Pipes	Damaged (Rusted, Bent or Crushed)	Pipe has major cracks or tears allowing groundwater leakage.	Pipe repaired or replaced.
Open Ditches	Trash & Debris	Dumping of yard wastes such as grass clippings and branches. Unsightly accumulation of non-degradable materials such as glass, plastic, metal, foam, and coated paper.	No trash or debris present. Trash and debris removed and disposed of as prescribed by the County.
Open Ditches	Sediment Buildup	Accumulated sediment that exceeds 20 percent of the design depth.	Ditch cleaned of all sediment and debris so that it matches design.
Open Ditches	Vegetation	Vegetation (e.g. weedy shrubs or saplings) that reduces free movements of water through ditches.	Water flows freely through ditches. Grassy vegetation should be left alone.
Open Ditches	Erosion Damage to Slopes	Erosion damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion.	No erosion damage present. Slopes stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction.
Open Ditches	Erosion Damage to Slopes	Any erosion observed on a compacted berm embankment.	<i>If erosion is occurring on compacted berms a professional engineer should be consulted to resolve source of erosion.</i>
Open Ditches	Rock Lining Out of Place or Missing (If Applicable)	Native soil is exposed beneath the rock lining.	Rocks replaced to design standards.

If you are unsure whether a problem exists, contact a professional engineer.

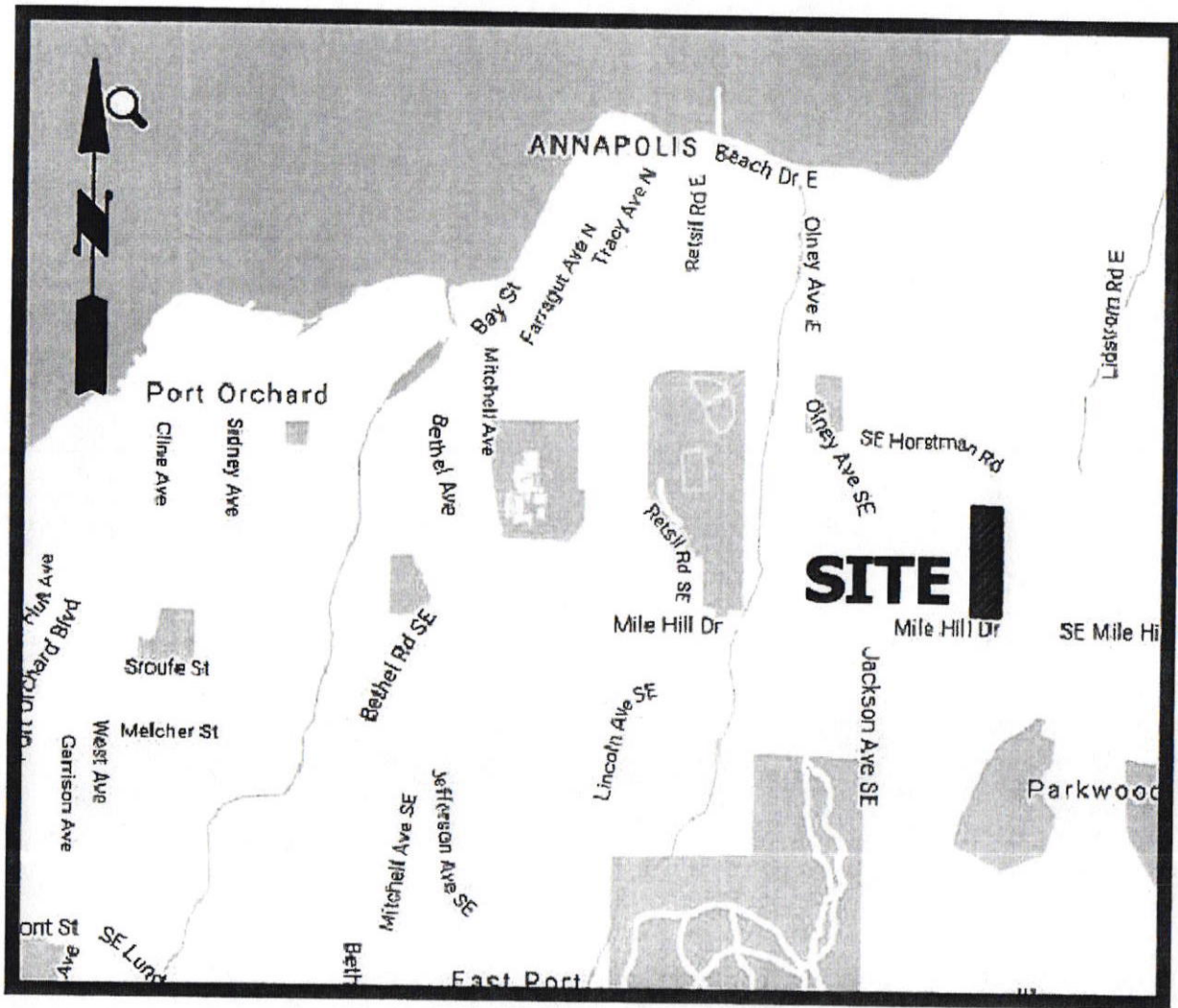
### #32 – Maintenance Checklist for Permeable Pavement:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Facility – General Requirements	Unstable Adjacent Area	Runoff from adjacent pervious areas deposits soil, mulch, or sediment on paving.	No deposited soil or other materials on permeable pavement or other adjacent surfacing. All exposed soils that may erode to pavement surface mulched and/or planted.
Facility – General Requirements	Wearing Course Covered by Adjacent Vegetation	Vegetation growing beyond facility edge onto sidewalks, paths, and street edge.	Vegetation does not impede function of adjacent facilities or pose as safety hazard. Groundcovers and shrubs trimmed to avoid overreaching the sidewalks, paths and street edge.
Porous asphalt or pervious cement concrete	NA	None. Maintenance to prevent clogging with fine sediment.	Conventional street sweepers equipped with vacuums, water, and brushes or pressure washer used to restore permeability. Vacuum or pressure wash the pavement two to three times annually.
Porous asphalt or pervious cement concrete	NA	None. Maintenance to prevent clogging with fine sediment.	Use of sand and sealant application prohibited. Protect from construction runoff.
Porous asphalt or pervious cement concrete	Cracks	Major cracks or trip hazards.	Potholes or small cracks filled with patching mixes. Large cracks and settlement addressed by cutting and replacing the pavement section.
Porous asphalt or pervious cement concrete	NA	Utility cuts.	Any damage or change due to utility cuts replaced in kind.
All Pavement Types	Leaf and Debris Accumulation	Fallen leaves or debris.	Removed/disposed.
Interlocking concrete paver blocks	Missing or Damaged Paver Block	Interlocking paver block missing or damaged.	Individual damaged paver blocks removed and replaced or repaired per manufacturer's recommendations.
Interlocking concrete paver blocks	Settlement	Settlement of surface. When deviation from original grade impedes function.	Original grade re-established. May require resetting.
All pavement types	All Pavement Types	Sediment or debris accumulation between paver blocks, on surface of pavement, or in grid voids.	Sediment at surface does not inhibit infiltration. Remove/dispose of sediment.
Interlocking concrete paver blocks	Void material is missing or low	Loss of aggregate material between paver blocks.	Refill per manufacturer's recommendations.
Open-celled paving grid with gravel	Loss of Aggregate Material in Paving Grid	Loss of aggregate material in grid.	Aggregate gravel level maintained at the same level as the plastic rings or no more than 0.25 inch above the top of rings. Refill per manufacturer's recommendations.

**#32 – Maintenance Checklist for Permeable Pavement:**

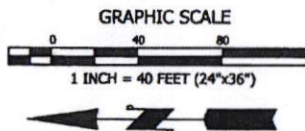
<b>Drainage System Feature</b>	<b>Defect or Problem</b>	<b>Condition When Maintenance Is Needed</b>	<b>Results Expected When Maintenance Is Performed</b>
Open-celled paving grid with grass	Lack of Grass Coverage	Loss of soil and/or grass material in grid.	Refill and/or replant per manufacturer's recommendations. Growing medium restored, facility aerated and reseeded or planted, and vegetated area amended as needed.
Inlet/outlet pipe	Pipe is Damaged	Pipe is damaged.	Pipe is repaired/replaced.
Inlet/outlet pipe	Pipe is Clogged	Pipe is clogged.	Roots or debris is removed.
Inlet/outlet pipe	Erosion	Native soil exposed or other signs of erosion damage present.	No eroded or scoured areas Cause of erosion or scour is addressed.
Underdrain pipe	Blocked Underdrain	Plant roots, sediment or debris reducing capacity of underdrain (may cause prolonged drawdown period).	Underdrains and orifice free of sediment and debris. Jet clean or rotary cut debris/roots from underdrain(s). If underdrains are equipped with a flow restrictor (e.g., orifice) to attenuate flows, the orifice must be cleaned regularly.
Spill Prevention and Response	NA	Storage or use of potential contaminants in the vicinity of facility.	Spill prevention measures exercised whenever handling or storing potential contaminants.
Spill Prevention and Response	Release of Pollutants	Any evidence of contaminants such as oil, gasoline, concrete slurries, paint, etc.	Spills are cleaned up as soon as possible to prevent contamination of stormwater. No contaminants or pollutants present. <i>(Coordinate source control, removal, and/or cleanup with Pierce County Surface Water Management 253-798-2725 and/or Dept. of Ecology Spill Response 800-424-8802.)</i>

If you are unsure whether a problem exists, contact a professional engineer.

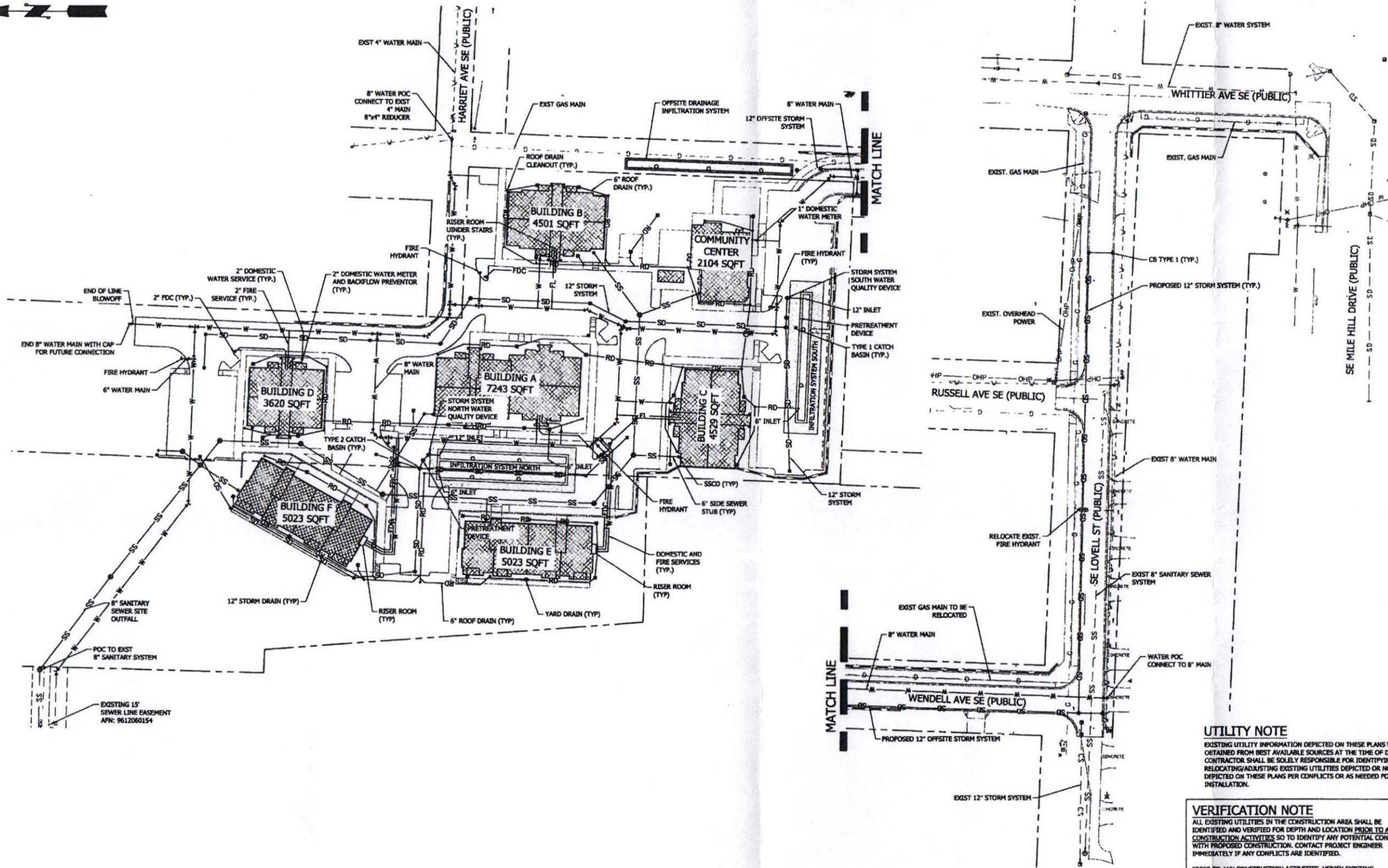


# VICINITY MAP

NOT TO SCALE



**OVERLOOK APARTMENTS PHASE II**  
 A PORTION OF THE SE 1/4 OF THE SW 1/4 OF SECTION 30, TOWNSHIP 24 NORTH, RANGE 2 EAST W.M.  
 CITY OF PORT ORCHARD, KITSAP COUNTY, WASHINGTON



**UTILITY NOTE**  
 EXISTING UTILITY INFORMATION DEPICTED ON THESE PLANS WAS OBTAINED FROM BEST AVAILABLE SOURCES AT THE TIME OF DESIGN. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR IDENTIFYING AND RELOCATING/ADJUSTING EXISTING UTILITIES DEPICTED OR NOT DEPICTED ON THESE PLANS FOR CONFLICTS OR AS NEEDED FOR INSTALLATION.

**VERIFICATION NOTE**  
 ALL EXISTING UTILITIES IN THE CONSTRUCTION AREA SHALL BE IDENTIFIED AND VERIFIED FOR DEPTH AND LOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES SO TO IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION. CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.  
 PRIOR TO ANY CONSTRUCTION ACTIVITIES, VERIFY EXISTING TOPOGRAPHY IS CONSISTENT WITH WHAT IS SHOWN ON PLANS AND IF THERE ARE ANY POTENTIAL CONFLICTS WITH PROPOSED CONSTRUCTION ACTIVITIES, CONTACT PROJECT ENGINEER IMMEDIATELY IF ANY CONFLICTS ARE IDENTIFIED.

**CALL 811 AT LEAST 48 HOURS BEFORE YOU DIG**

REVISION	DESCRIPTION	DATE	BY

<p align="center"><b>CONTOUR ENGINEERING, L.L.C.</b>          CIVIL ENGINEERS/SURVEYORS/LAND PLANNERS          3309 56th Street NW, Suite 106 Gig Harbor, WA 98335          Phone: 253-857-5454 - Fax: 253-509-0044 - info@contourllc.com</p>	
	<p>PHONE: (253) 255-7624</p>
<p>SHEET TITLE: OVERALL UTILITY PLAN</p>	<p>DESIGNER: K. ROSE          ENGINEER: J. HAUG          DRAWN: B. MORRIS          S 30 T 24N R 2E WM          DATE: 2020.02.14          REVISED:</p>
<p>PROJECT: 16-300          DWG NAME: 16-300-C</p>	<p>CONTACT: MARK NORDLIE</p>
<p>CLIENT: OUMA, LLC          15234 SE 366TH PLACE          ALBURN, WA 98092</p>	<p>PROJECT: 16-300          DWG NAME: 16-300-C</p>
<p>SHEET SW1</p>	<p>REV. 1</p>
<p>35 OF 42</p>	

## CatchBasin StormFilter™

*Important: These guidelines should be used as a part of your site stormwater plan.*

### Overview

The CatchBasin StormFilter™ (CBSF) consists of a multi-chamber steel, concrete, or plastic catch basin unit that can contain up to four StormFilter cartridges. The steel CBSF is offered both as a standard and as a deep unit.

The CBSF is installed flush with the finished grade and is applicable for both constrained lot and retrofit applications. It can also be fitted with an inlet pipe for roof leaders or similar applications.

The CBSF unit treats peak water quality design flows up to 0.13 cfs, coupled with an internal weir overflow capacity of 1.0 cfs for the standard unit, and 1.8 cfs for the deep steel and concrete units. Plastic units have an internal weir overflow capacity of 0.5 cfs.

### Design Operation

The CBSF is installed as the primary receiver of runoff, similar to a standard, grated catch basin. The steel and concrete CBSF units have an H-20 rated, traffic bearing lid that allows the filter to be installed in parking lots, and for all practical purposes, takes up no land area. Plastic units can be used in landscaped areas and for other non-traffic-bearing applications.

The CBSF consists of a sumped inlet chamber and a cartridge chamber(s). Runoff enters the sumped inlet chamber either by sheet flow from a paved surface or from an inlet pipe discharging directly to the unit vault. The inlet chamber is equipped with an internal baffle, which traps debris and floating oil and grease, and an overflow weir. While in the inlet chamber, heavier solids are allowed to settle into the deep sump, while lighter solids and soluble pollutants are directed under the baffle and into the cartridge chamber through a port between the baffle and the overflow weir.

Once in the cartridge chamber, polluted water ponds and percolates horizontally through the media in the filter cartridges. Treated water collects in the cartridge's center tube from where it is directed by an under-drain manifold to the outlet pipe on the downstream side of the overflow weir and discharged.

When flows into the CBSF exceed the water quality design value, excess water spills over the overflow weir, bypassing the cartridge bay, and discharges to the outlet pipe.

### Applications

The CBSF is particularly useful where small flows are being treated or for sites that are flat and have little available hydraulic head to spare. The unit is ideal for applications in which standard catch basins are to be used. Both water quality and catchment issues can be resolved with the use of the CBSF.

### Retro-Fit

The retrofit market has many possible applications for the CBSF. The CBSF can be installed by replacing an existing catch basin without having to "chase the grade," thus reducing the high cost of re-piping the storm system.



## CatchBasin StormFilter™

### Maintenance Guidelines

Maintenance procedures for typical catch basins can be applied to the CatchBasin StormFilter (CBSF). The filter cartridges contained in the CBSF are easily removed and replaced during maintenance activities according to the following guidelines.

1. Establish a safe working area as per typical catch basin service activity.
2. Remove steel grate and diamond plate cover (weight 100 lbs. each).
3. Turn cartridge(s) counter-clockwise to disconnect from pipe manifold.
4. Remove 4" center cap from cartridge and replace with lifting cap.
5. Remove cartridge(s) from catch basin by hand or with vactor truck boom.
6. Remove accumulated sediment via vactor truck (min. clearance 13" x 24").
7. Remove accumulated sediment from cartridge bay. (min. clearance 9.25" x 11").
8. Rinse interior of both bays and vactor remaining water and sediment.
9. Install fresh cartridge(s) threading clockwise to pipe manifold.
10. Replace cover and grate.
11. Return original cartridges to Contech for cleaning.

Media may be removed from the filter cartridges using the vactor truck before the cartridges are removed from the catch basin structure. Empty cartridges can be easily removed from the catch basin structure by hand. Empty cartridges should be reassembled and returned to Contech as appropriate.

Materials required include a lifting cap, vactor truck and fresh filter cartridges. Contact Contech for specifications and availability of the lifting cap. The vactor truck must be equipped with a hose capable of reaching areas of restricted clearance. The owner may refresh spent cartridges. Refreshed cartridges are also available from Contech on an exchange basis. Contact the maintenance department of Contech at 503-258-3157 for more information.

Maintenance is estimated at 26 minutes of site time. For units with more than one cartridge, add approximately 5 minutes for each additional cartridge. Add travel time as required.

### Mosquito Abatement

In certain areas of the United States, mosquito abatement is desirable to reduce the incidence of vectors.

In BMPs with standing water, which could provide mosquito breeding habitat, certain abatement measures can be taken.

1. Periodic observation of the standing water to determine if the facility is harboring mosquito larvae.
2. Regular catch basin maintenance.
3. Use of larvicides containing *Bacillus thuringiensis israelensis* (BTI). BTI is a bacterium toxic to mosquito and black fly larvae.

In some cases, the presence of petroleum hydrocarbons may interrupt the mosquito growth cycle.

### Using Larvicides in the CatchBasin StormFilter

Larvicides should be used according to manufacturer's recommendations.

Two widely available products are Mosquito Dunks and Summit B.t.i. Briquets. For more information, visit [http://www.summitchemical.com/mos\\_ctrl/default.htm](http://www.summitchemical.com/mos_ctrl/default.htm).

The larvicide must be in contact with the permanent pool. The larvicide should also be fastened to the CatchBasin StormFilter by string or wire to prevent displacement by high flows. A magnet can be used with a steel catch basin.

For more information on mosquito abatement in stormwater BMPs, refer to the following: <http://www.ucmrp.ucdavis.edu/publications/managingmosquitoesstormwater8125.pdf>

## CDS® Inspection and Maintenance Guide

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## Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

## Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allow both sump cleanout and access outside the screen.

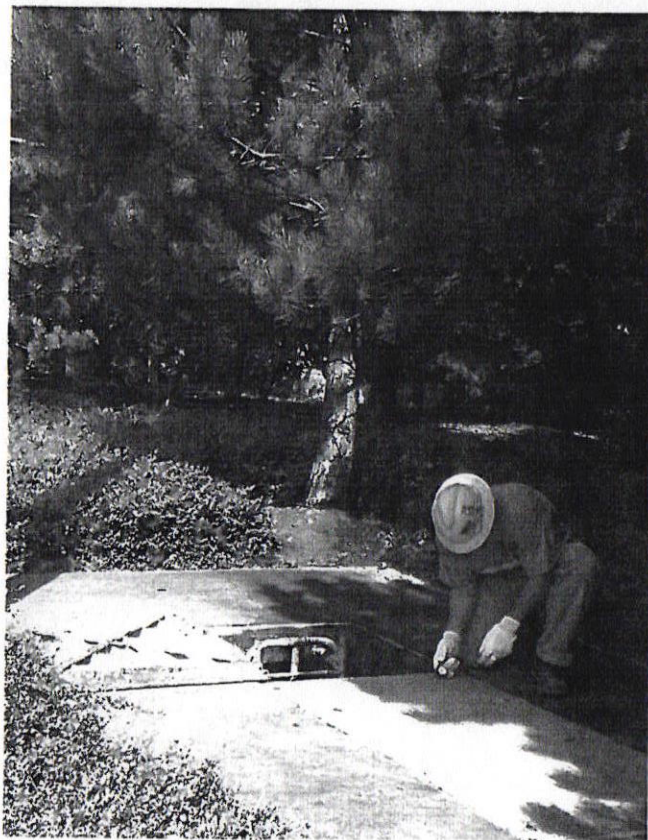
The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

## Cleaning

Cleaning of a CDS system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y <sup>3</sup>	m <sup>3</sup>
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



**Support**

- Drawings and specifications are available at [www.contechstormwater.com](http://www.contechstormwater.com)
- Site specific design support is available from our engineers.

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# Contech® CMP Detention Inspection and Maintenance Guide

Underground stormwater detention and infiltration systems must be inspected and maintained at regular intervals for purposes of performance and longevity.

## Inspection

Inspection is the key to effective maintenance of CMP detention systems and is easily performed. Contech recommends ongoing, annual inspections. Sites with high trash load or small outlet control orifices may need more frequent inspections. The rate at which the system collects pollutants will depend more on-site specific activities rather than the size or configuration of the system.

Inspections should be performed more often in equipment washdown areas, in climates where sanding and/or salting operations take place, and in other various instances in which one would expect higher accumulations of sediment or abrasive/corrosive conditions. A record of each inspection is to be maintained for the life of the system.

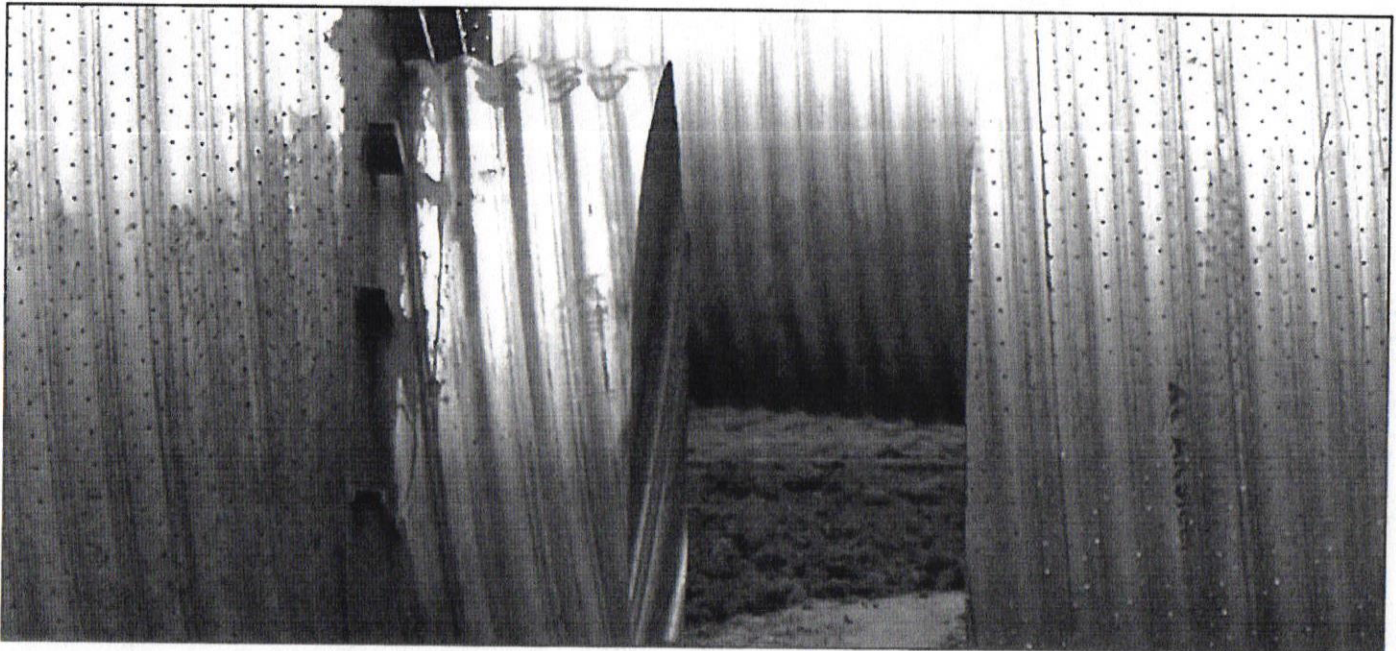
## Maintenance

CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice. Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities. Contech suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

Annual inspections are best practice for all underground systems. During this inspection if evidence of salting/de-icing agents is observed within the system, it is best practice for the system to be rinsed, including above the spring line soon after the spring thaw as part of the maintenance program for the system.

Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

The foregoing inspection and maintenance efforts help ensure underground pipe systems used for stormwater storage continue to function as intended by identifying recommended regular inspection and maintenance practices. Inspection and maintenance related to the structural integrity of the pipe or the soundness of pipe joint connections is beyond the scope of this guide.



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