LONG TERM STORMWATER OPERATION AND MAINTENANCE PLAN AND POLLUTION PREVENTION AND SOURCE CONTROL

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Long Term Stormwater Operation and Maintenance Measures

Owner/Operator Responsible for Operation and Maintenance

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Maintenance of Stormwater Systems

The following maintenance program shall ensure the continued effectiveness of the structural water quantity and quality controls shown on the project Site Plans prepared by VHB. Refer to the attached Operation and Maintenance Location Plan.

Pavement Systems

Regular Asphalt Pavement

- Sealants for asphalt pavement are a major source of polycyclic aromatic hydrocarbons (PAHs) in our environment. Asphalt based sealants are allowed. Coal-tar based sealants are not allowed.

- Sweep or vacuum standard asphalt pavement areas at least once per year with a commercial cleaning unit and properly dispose of removed material.
- More frequent sweeping of paved surfaces will result in less accumulation in catchment areas, less cleaning of subsurface structures, and less disposal costs.

Structural Stormwater Management Devices

Deep Sump Hooded Catch Basins and Outlet Control Structures

- Do not weld grates to frame to ease inspection and maintenance of sumps.
- Inspect the unit post construction, prior to being placed into service, and ensure unit is clean and free of any structural damage.
- Inspect quarterly for the first year to determine the oil and sediment accumulation rate.
- Inspect twice a year in the spring and fall.
- Clean annually and whenever the depth of sediment is greater than or equal to half the sump depth.
- Inspect the units immediately after an oil, fuel, or chemical spill.
- A licensed waste management company should remove oil and sediment and dispose per state and local regulations.

Roof Drain Leaders

- Perform routine roof inspections twice per year.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.
- Clean inlets twice per year as necessary.

Subsurface Infiltration System

- The subsurface infiltration systems shall be inspected annually and after storms greater than 2.7 inches by removing the manhole/access port covers and determining the thickness of sediment that has accumulated.
- If sediment is more than six inches deep, it must be suspended via flushing with clean water and removed using a vactor truck.
- Emergency overflow pipes will be examined at least once each year and verified that no blockage has occurred.
- If sediment or organic debris build-up has limited the infiltration capabilities of the system so that it does not drain within 48-hours after the storm event then further investigation will be needed/consultant an engineer.

Water Quality Units

- Maintain water quality units in accordance with the manufacturer's specifications, which are provided in the Cascade Separator® Inspection and Maintenance Guide, attached, or at Contech's website.
- Maintain water quality units in accordance with the requirements stated in Stormwater Rule 250-RICR-150-10-8.31-C, which requires the sump to be inspected a minimum of 2 times per year. Additionally, the device must be cleaned out when either pollutant removal capacity is reduced by 50% or more, or when 50% or more of the device's pollutant storage capacity is filled or displaced.
- Properly dispose of all material removed from the unit. Hazardous debris removed shall be disposed of in accordance with State and federal regulations by a properly licensed contractor.
- Water quality units shall be accessible at all times for maintenance and/or emergency removal of oil or chemical spills.
- Inspect devices monthly for the first three months after construction.
- Follow manufacturer instructions and contact manufacturer if system is malfunctioning.

Vegetated Stormwater Management Devices

Surface Infiltration/Detention Basins

Initial Post-Construction Inspection

- Infiltration basins should be inspected after every major storm for the first few months to ensure proper stabilization and function. After that, inspections shall be done on an annual basis and after storm events greater than or equal to the 1-year storm or 2.7 inches of rainfall.

Long-Term Maintenance

- The grass on the side slopes and in the buffer areas should be mowed at least 4 times annually, and grass clippings, organic matter, and accumulated trash and debris removed, at least twice during the growing season.
- Eroded or barren spots should be reseeded immediately after inspection to prevent additional erosion and accumulation of sediment.
- Deep tilling can be used to break up a clogged surface area.
- Sediment should be removed from the basin as necessary. Removal procedures should not take place until the floor of the basin is thoroughly dry.

Inspections and Cleaning

- Infiltration basins should be inspected at least twice a year to ensure proper stabilization and function.

- Visual inspection for erosion and gullying, damage to structural components, embankment stability, and accumulation of sediment.
- Light equipment, which will not compact the underlying soil, should be used to remove the top layer.

Sediment Forebay

- Inspect the forebay yearly and remove any deposited sediment (sand from winter sanding operations). Correct any ponding, erosion, and replant any vegetation that has died. Reset or replace any dislodged stones.

Rip-rap Maintenance

- The stone areas shall be inspected annually for missing or dislodged stones. Replace stone as necessary.
- Deposited sediments shall be removed manually at least once per year.
- Trash and debris shall be removed as necessary.

General Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.

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Pollution Prevention and Source Control

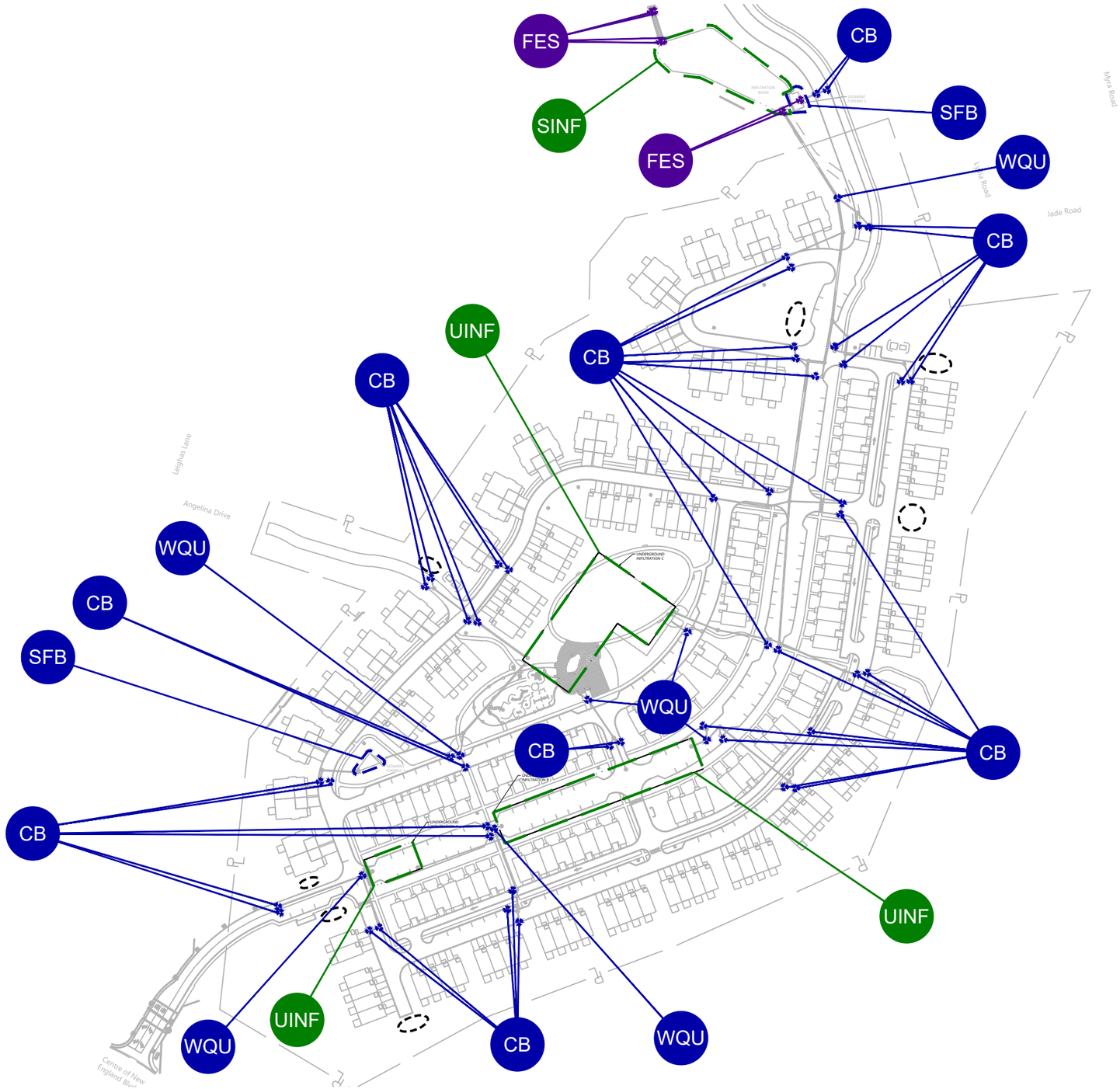
A comprehensive source control program will be implemented at the Site, which includes the following components:

- Regular pavement sweeping or vacuuming as defined previously in this manual.
- Asphalt pavement sealants are a major source of polycyclic aromatic hydrocarbons (PAHs) in our environment. Asphalt based sealants are allowed. Coal-tar based sealants are not allowed.
- Catch basin cleaning.
- Clearing litter from parking areas, islands, and perimeter landscape areas.
- Trash and recycling receptacles must be provided with regular collection.
- Pet Waste Station – Pet waste stations scattered throughout the site will be provided proper collection and disposal of pet waste and to minimize bacteria and nutrient loading to stormwater runoff.
- Spill Prevention training. Maintenance personnel will be instructed in the proper clean-up procedures for spilled materials and the location of clean-up materials.
- Sand and deicing chemicals shall be stored under cover so as to prevent exposure to stormwater. Use calcium chloride and calcium magnesium acetate (CMA) in sensitive ecosystem areas.
- Snow storage areas will be managed to prevent blockage of storm drain catch basins and stormwater drainage swales. Snow combined with sand and

debris may block a storm drainage system, diminishing the infiltration capacity of the system and causing localized flooding.

- Snow shall not be dumped into any water body, pond, or wetland resource area.
- Grounds Management:

- Conduct soil evaluation every 1-3 years to determine suitability for supporting lawn, and to determine how to optimize growing conditions.
- Mowing and thatch management.
- Weed management.
- Pest management.
- Sensible irrigation.



Legend

- CB — CATCH BASIN
- SFB — SEDIMENT FOREBAY
- WQU — WATER QUALITY UNIT
- SINF — SURFACE INFILTRATION BASIN
- UINF — UNDERGROUND INFILTRATION BASIN
- FES — FLARED END SECTION/ RIP RAP
- OCS — OUTLET CONTROL STRUCTURE

0 100 200 Feet

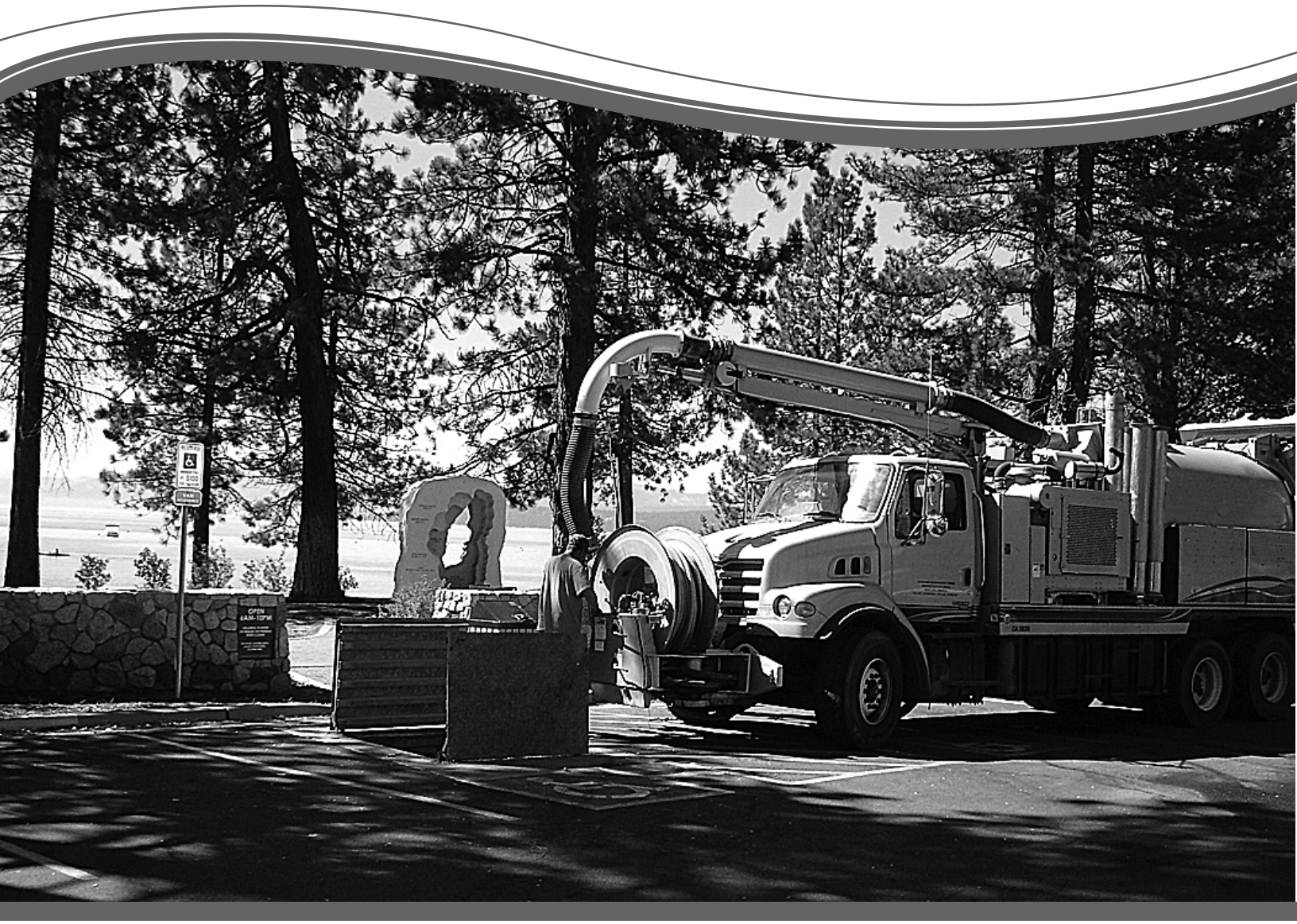
Operations & Maintenance
Device Location Plan
The Dunes
Centre of New England Blvd & Angelina Dr - Coventry, RI

O&M

09/24/2026

CONTECH®
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Cascade Separator® Inspection and Maintenance Guide



CASCADE
separator®

Maintenance

The Cascade Separator® system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump 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 (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. 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 in this Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

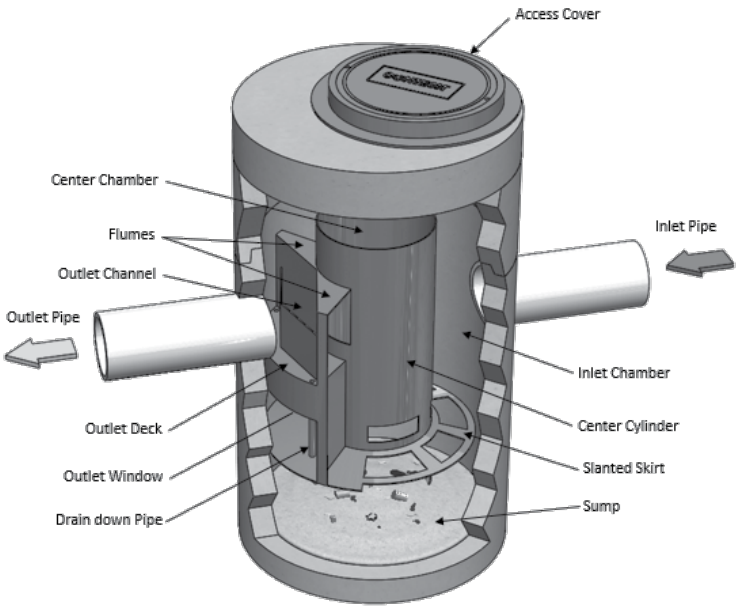
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. Contech recommends maintaining the system when sediment level reaches 50% of maximum storage volume. The level of sediment is easily determined by measuring the distance from the system outlet invert (standing water level) 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. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the chart in this document to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage.

Cleaning

Cleaning of a Cascade Separator 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 cover and insert the vacuum tube down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

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. 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. Then the system 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 to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.



Cascade Separator® Maintenance Indicators and Sediment Storage Capacities

Model Number	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CS-3	3	0.9	1.5	0.5	0.4	0.3
CS-4	4	1.2	2.5	0.8	0.7	0.5
CS-5	5	1.3	3	0.9	1.1	0.8
CS-6	6	1.8	3.5	1	1.6	1.2
CS-8	8	2.4	4.8	1.4	2.8	2.1
CS-10	10	3.0	6.2	1.9	4.4	3.3
CS-12	12	3.6	7.5	2.3	6.3	4.8

Note: The information in the chart is for standard units. Units may have been designed with non-standard sediment storage depth.



A Cascade Separator unit can be easily cleaned in less than 30 minutes.



A vacuum truck excavates pollutants from the systems.

Cascade Separator® Inspection & Maintenance Log

Cascade Model:			Location:		
Date	Depth Below Invert to Top of Sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The depth to sediment is determined by taking a measurement from the manhole outlet invert (standing water level) to the top of the sediment pile. Once this measurement is recorded, it should be compared to the chart in the maintenance guide to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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Project: **The Dunes**

Annual Operation & Maintenance Budget

BMP	**Approx. Maintenance Cost per year**
Annual Pavement Sweeping	$2,000
Annual inspection and debris removal of CBs, Infiltration Basin, Rip Rap Areas, etc.	$5,000
BI-Annaul Inspection and annual debri removal Water Quality Units (7)	$4,000
Underground Detention System Maintenance (3)	$3,000
Total annual cost	**$14,000.00**

On Demand Needs (as needed)

Drainage system cleaning	$4,000