Operation and Maintenance Plan

Prepared For:

Proposed Washville Car Wash
991 – 995 W. Main Road
Middletown, RI 02842

Owner/Developer:
SITEology
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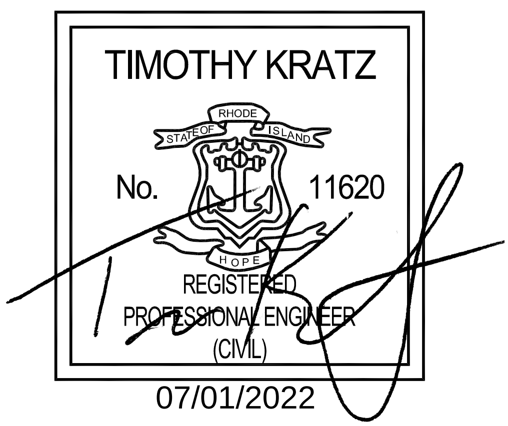

Prepared: June 30, 2022

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Introduction and Purpose of Report

This Operations and Maintenance report were prepared in accordance with the Appendices E and G of the Rhode Island Stormwater Design and Installation Standards Manual (Manual). The purpose of the report is to maintain the effectiveness of the stormwater management system over its operating lifecycle.

The improvements consist of a 4,201 gross square foot Car Wash building with a 110' long wash tunnel and associated vacuum parking lot, access drives, pay stations and pervious areas. Stormwater runoff is collected by the on-site storm sewer system and diverted to two pre-treatment Contech CDS Hydrodynamic separators and a lined sub-drained sand filter system that will provide the required water quality volume for the proposed improvements.

Refer to Appendix B for the proposed stormwater management plan improvements.

Stormwater BMPS

Subsurface Sand Filter

Description

A Subsurface Sand Filter is designed to capture and temporarily store the water quality storm runoff volume in subsurface HDPE chambers and pass it through a sand media layer. In areas of shallow water tables, poorly draining soils, or shallow bedrock, the media is lined with an impermeable membrane and the filtered runoff is collected by an underdrain. This treated runoff is then discharged downgradient. High flow runoff to a sand filter typically bypasses the device entirely. Sand filters are not intended to have permanent pools and should drain within 24 hours.

The stormwater design for this development includes the following subsurface sand filter:
SF-1:
Location: Southwest End of the Site.
Subwatershed Treated: Subarea PR-1
Lined or Unlined: Lined
Pretreatment: Two Contech CDS Hydrodynamic Separators
Discharge Location: Outlet Control Structure to the south of filter.
Description: 63 ADS SC-740 chambers above 12-inches of sand media.

Required Maintenance

Subsurface sand filters shall be inspected following at least the first two precipitation events of at least 1.0 inch to ensure that the system is functioning properly. Thereafter, a filter should be inspected at least annually after storm events of greater than or equal to the 1-year, 24hour Type III precipitation event (2.8 inches). These maintenance objectives are focused on preserving the hydraulic and removal efficiency and maintaining the structural integrity and include the following:

1. Chambers should be inspected for the presence of transported sediments. Should the average depth of sediments exceed 1-inch, all sediments shall be removed using a vacuum truck via the inspection ports. The presence of excessive sediments shall indicate a failure of the system installation. A RI licensed Professional Engineer shall be consulted to determine a corrective course of action.

The following maintenance tasks shall be completed on an annual basis.

1. Silt/sediment shall be removed from the sand filter bed annually, when accumulation exceeds one inch, or when the filtering capacity of the device diminishes substantially. This material shall be disposed of in accordance with all applicable regulations.
2. If standing water is observed more than 48 hours after a storm event, the system must be excavated and then the top six (6) inches of sand shall be removed and replaced in kind. If discolored or contaminated material is found below this removed material, then that material shall also be removed and replaced in kind until all contaminated sand has been removed from the filter media. The sand shall be disposed of in accordance with all applicable regulations. The system shall then be reconstructed according to the original design plans.

Conveyance Structures (including pipes and storm manholes)

<u>Description</u>

Conveyance structures include all man made subsurface structures which collect and convey stormwater surface runoff across the site, typically to stormwater treatment or control devices. These structures include catch basins, curb inlets, drain manholes, culverts, and pipes. These structures are typically made of concrete or high density plastics. In smaller scale projects, these conveyance structures consist of roof leaders and downspouts.

<u>Required Maintenance:</u>

All conveyance structures are to be inspected at least three times in the first six months of operation. Additionally, these structures shall be inspected quarterly (four times a year). The inspection objectives are as follows:

1. Any structural faults shall be repaired as necessary for proper function.
2. Pipes and roof runoff conveyances such as gutters and downspouts shall be clean and free of obstructions that reduce flow.
3. A registered professional engineer shall be consulted if necessary to determine whether a structure has been compromised.
4. Manholes shall be cleaned annually and whenever debris is noted at the bottom of the structure.

Pavement Sweeping

In order to provide additional pollutant removal from surface stormwater, the parking lot shall be vacuum swept quarterly (four times a year). These sweepings shall be evenly spaced throughout the year. Records of these sweepings shall be kept with the operations and maintenance manual on site.

Contech CDS Hydrodynamic Separators

See Appendix C for the Contech CDS Operation, Design, Performance and Maintenance Guide which contains a description and required maintenance operations for the structures.

Construction Stormwater Maintenance Plan

During the period of construction and/or until long term vegetation is established, the erosion control measures shall be inspected.

1. Silt fence and straw wattles shall be inspected as indicated in the plan details. At a minimum these devices shall be inspected and repaired once a week and/or immediately following a significant rainfall or snowmelt. Sediment trapped behind these barriers shall be excavated when it reaches a depth of 6" and regraded on the site.
2. Stone construction entrance shall be inspected weekly, and re-established or repaired as necessary. These devices shall be inspected monthly for excessive accumulation of sediment. It may be necessary to remove stones, excavate sediment, and replace stones. If existing paved entrances are utilized to remove construction sediment from vehicle tires, these areas shall be swept on a similar basis. The stabilized construction entrance shall be removed prior to final surfacing.
3. Seeded areas shall be fertilized and reseeded as necessary to ensure establishment of a vegetative growth that meets the approval of reviewing entities.
4. The subsurface sand filter shall be inspected after major storms via the inspection ports. Should the average depth of sediment exceed 50% of the toral storage volume, the sediment shall be removed and disposed of in a manner consistent with the mandates of the RIDEM.
5. Maintenance of the stormwater system during construction shall be the responsibility of the site contractor. Once construction of the site is complete, maintenance of the system shall be the responsibility of the owner.

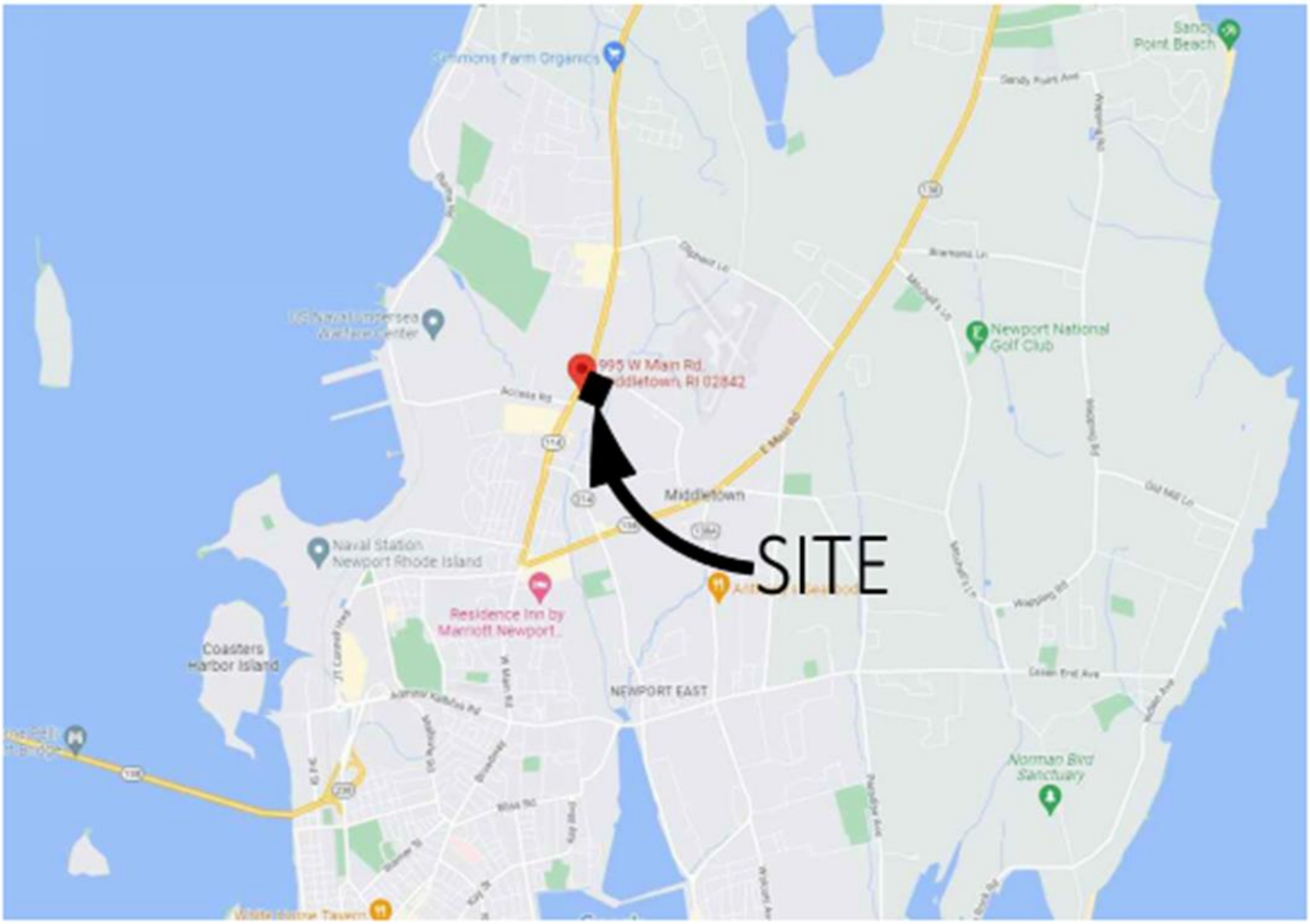
Stormwater Maintenance Agreement

The purpose of the Maintenance Agreement is to identify the responsible parties for the stormwater system. The included sample Maintenance Agreement is to be replaced with a copy of the recorded agreement.

Refer to Appendix D for a Sample Maintenance Agreement

Appendix A

Location Map



Appendix B

Sheet C1.31 Stormwater Management Plan

LEGEND

PROPOSED:

STORM SEWER	STM
ROOF DRAIN	
SANITARY SEWER	SAN
WATER MAIN/SERVICE	W
GAS MAIN/SERVICE	GAS
ELECTRIC SERVICE	UGE
TELEPHONE SERVICE	UGT
OVERHEAD UTILITIES	OH
PROPOSED UTILITIES BY OTHERS	STM

STORM MANHOLE; CATCH BASIN; YARD BASIN; FLARED END SECTION; SANITARY MANHOLE; SANITARY CLEANOUT; TRANSFORMER; LIGHT POLE; WATER VALVE; FIRE HYDRANT

EXISTING:

PROPERTY LINE; EDGE OF PAVEMENT; EDGE OF GRAVEL; OVERHEAD UTILITY LINES (OH); DRAINAGE LINE (D); SEWER LINE (S); GAS LINE (G); TEL. LINE (T); UNDERGROUND ELECT. (UG); DOUBLE YELLOW LINE; SINGLE WHITE LINE; VERTICAL OR SLOPED GRANITE CURB; IRRIGATION CONTROL VALVE

EDGE OF WOODS; CONCRETE; MONITORING WELL; IRON PIPE OR REBAR; GRANITE OR CONCRETE BOUND (GB OR CB); UTILITY POLE; SEWER MANHOLE; DRAIN MANHOLE; CATCH BASIN; WATER SHUTOFF; WATER VALVE; GAS SHUTOFF

UTILITY EASEMENT NOTE:

REFER TO THE BOUNDARY/TOPOGRAPHIC SURVEY PREPARED BY GPI FOR INFORMATION REGARDING EXISTING EASEMENTS.

UTILITY CROSSING NOTE:

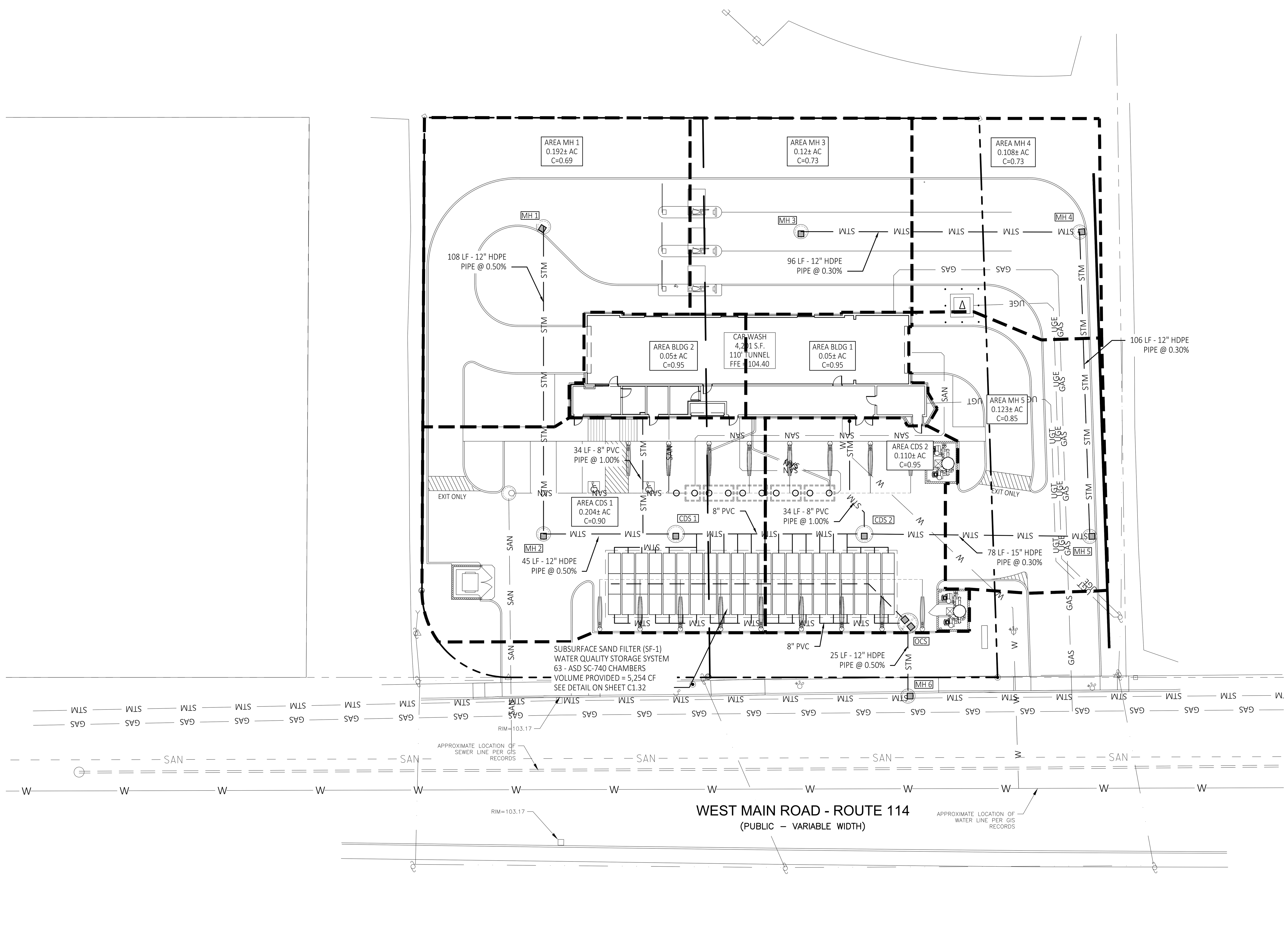
SEE SHEET C1.40 FOR UTILITY CROSSINGS.

STORM STRUCTURE NOTES:

1. SEE DETAILS ON SHEET C5.02.
2. ALL STORM STRUCTURES TO BE INSTALLED IN ACCORDANCE WITH LOCAL STANDARDS AND DETAILS UNLESS NOTED OTHERWISE.
3. PROVIDE INLET FILTERS FOR ALL INLETS. FILTER SHALL BE REGULARLY MAINTAINED AND REMAIN IN PLACE UNTIL FINAL GRADES HAVE BEEN ESTABLISHED. REFER TO SHEET C1.11.
4. ALL STRUCTURE FRAME AND GRATES TO BE STANDARD UNLESS NOTED OTHERWISE.
5. NORTHING AND EASTING PER COORDINATE SYSTEM PROVIDED IN THE SURVEY AUTOCAD FILE PROVIDED BY GPI.
6. ALL CATCH BASINS AND INLETS SHALL HAVE UNDERDRAINS INSTALLED, WRAPPED IN GEOTEXTILE AND PLACED IN THE SEWER TRENCH, NOT MORE THAN 3 FEET BELOW THE TOP OF THE CASTING.

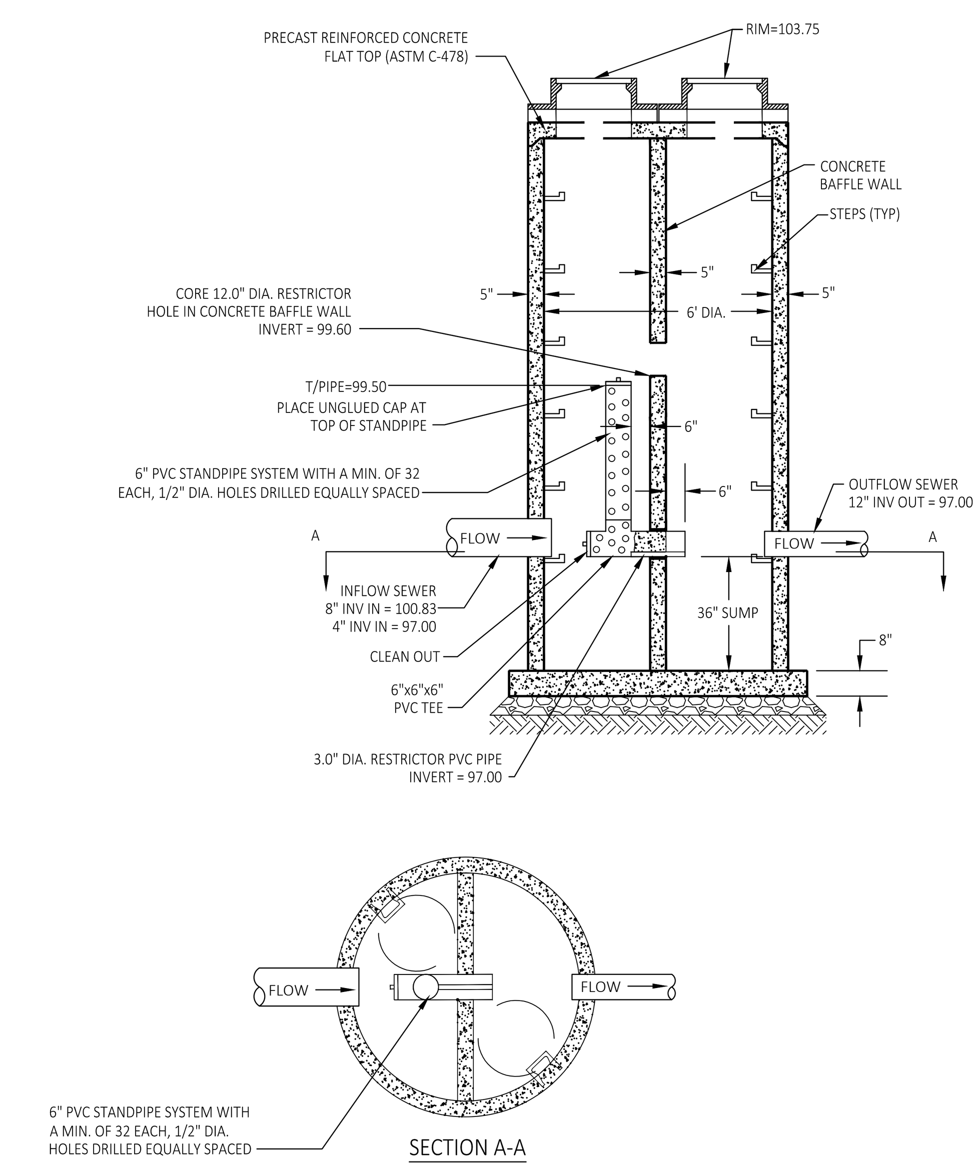
STRUCTURE TABLE

NAME:	DETAILS:	DESCRIPTION:	N	E
MH 1	RIM = 102.90 12" NW INV OUT = 99.90	4' Diameter Concentric Cylindrical Manhole Structure	384326.23	162412.96
MH 2	RIM = 103.75 12" SE INV IN = 99.36 12" SW INV OUT = 99.36	4' Diameter Concentric Cylindrical Manhole Structure	384232.83	162466.18
MH 3	RIM = 102.90 12" SW INV OUT = 99.90	4' Diameter Concentric Cylindrical Manhole Structure	384280.52	162336.16
MH 4	RIM = 102.60 12" NE INV IN = 99.61 12" NW INV OUT = 99.61	4' Diameter Concentric Cylindrical Manhole Structure	384232.48	162252.19
MH 5	RIM = 101.80 12" SW INV IN = 99.29 12" NE INV OUT = 99.29	4' Diameter Concentric Cylindrical Manhole Structure	384138.93	162301.47
MH 6	RIM = 101.16± 12" N INV IN = 96.87 EX. 12" INV = 96.65±	4' Diameter Concentric Cylindrical Manhole Structure; Lat: 41.528721 Long: -71.295021	384128.80	162397.32
OCS	RIM = 103.75 8" NE INV IN = 100.83 4" NE INV IN = 97.00 12" NW INV OUT = 97.00	4' Diameter Concentric Cylindrical Outlet Control Structure; Deep Sump Catch Basin with overflow riser and 3.0" diameter restrictor	384143.98	162371.22
CDS 1	RIM = 103.00 12" NE INV IN = 99.13 8" SW INV OUT = 99.00	Contech CDS Hydrodynamic Separator Model CDS 2020-5-C	384210.81	162425.89
CDS 2	RIM = 103.00 15" SW INV IN = 99.06 8" NE INV OUT = 99.00	Contech CDS Hydrodynamic Separator Model CDS 2020-5-C	384178.43	162369.04



STORM WATER MANAGEMENT PLAN

SCALE: 1" = 20'-0"



1 OUTLET CONTROL STRUCTURE DETAIL

C1.31 SCALE: NONE

sevan ENGINEERING

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37704 Hills Tech Drive
Farmington Hills, MI 48331
734.367.4445 Telephone

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Downers Grove, IL 60515
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REVISIONS

NO.	DATE	DESCRIPTION
0	03.19.2022	SITE PLAN REVIEW
1	06.30.2022	REVISED PER RIDEM AND RIDOT

CONSULTANT

SEAL

CUSTOMER

Washville Your Hometown Car Wash

PROJECT DESCRIPTION

WASHVILLE CARWASH

PROJECT LOCATION

991-995 W MAIN RD
MIDDLETOWN, RI 02842
(NEWPORT COUNTY)

SHEET TITLE

STORM WATER MANAGEMENT PLAN

SHEET MANAGEMENT

PROJECT NO.:	MIDDLETOWN RI
DATE:	-
CRITERIA:	110' TUNNEL
PROJECT MANAGER:	--

SHEET NUMBER

C1.31

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Appendix C

Contech CDS Operation, Design, Performance and Maintenance Guide

CONTECH
ENGINEERED SOLUTIONS

CDS Guide
Operation, Design, Performance and Maintenance

CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

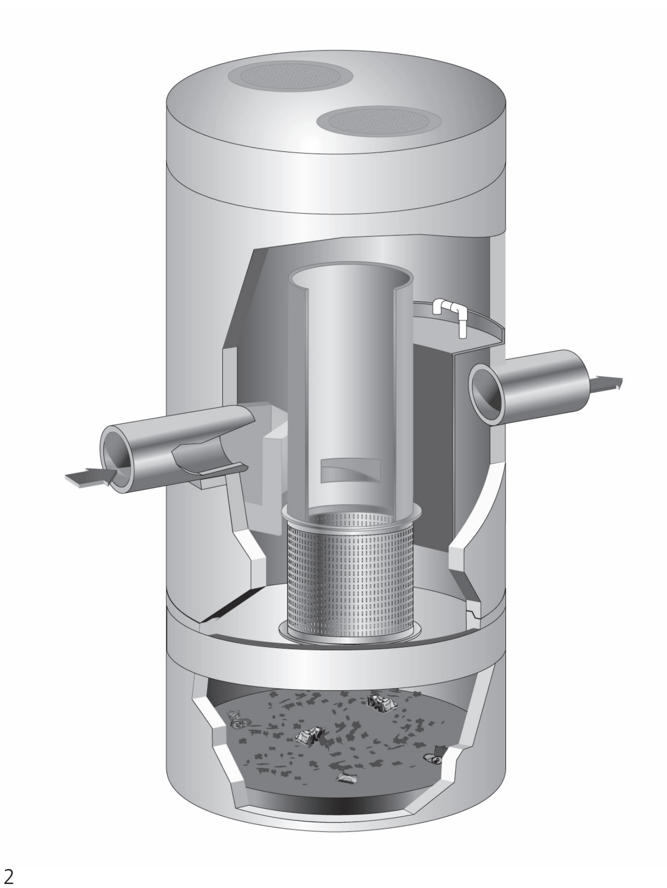
Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

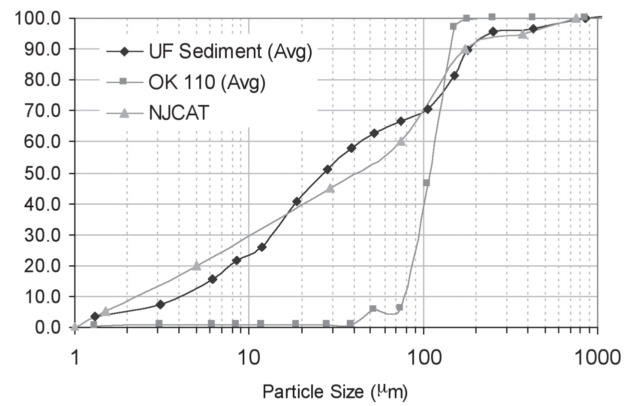


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

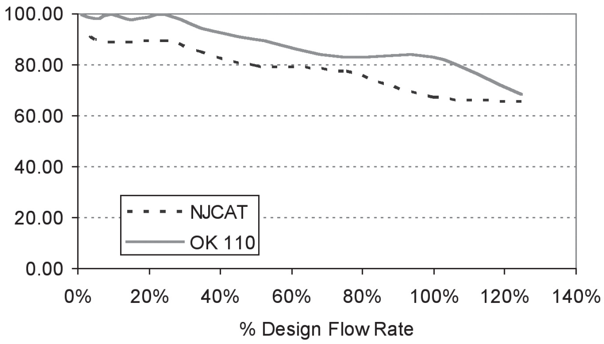


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

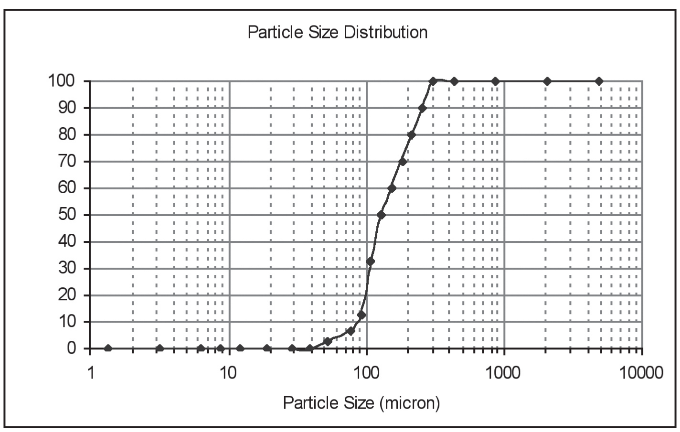


Figure 3. WASDOE PSD

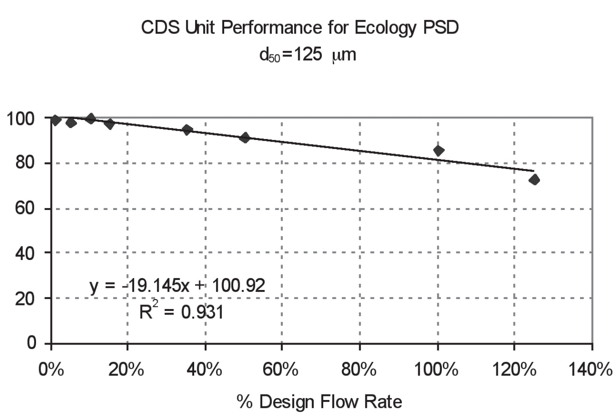


Figure 4. Modeled performance for WASDOE PSD.

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 allows 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 weather 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 systems 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.

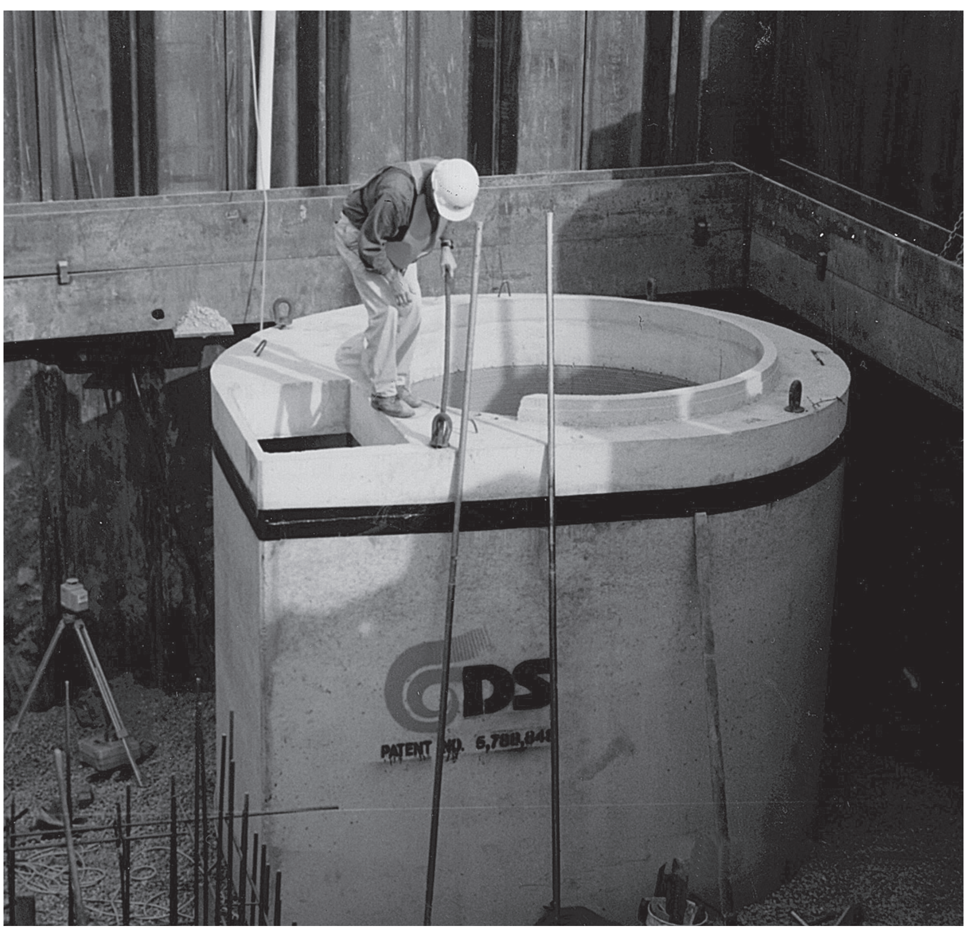
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should 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 cleaned 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. Check your local regulations for specific requirements on disposal.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	yd3	m3
CDS2015-4	4	1.2	3.0	0.9	0.5	0.4
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	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

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: ______________________ Location: ______________________

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. **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.

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Support

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

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The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

Appendix D

Sample Maintenance Agreement

Sample Stormwater Facility Maintenance Agreement

THIS AGREEMENT, made and entered into this ___ day of _________, 20___, by and between (Insert Full Name of Owner) ____ hereinafter called the "Landowner", and the [Local Jurisdiction], hereinafter called the "[Town/City]". WITNESSETH, that WHEREAS, the Landowner is the owner of certain real property described as (Tax Map/Parcel Identification Number) ____________________________ as recorded by deed in the land records of [Local Jurisdiction] Deed Book __________ Page __________, hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and WHEREAS, the Site Plan/Subdivision Plan known as __________________________________, (Name of Plan/Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the [Town/City], provides for detention of stormwater within the confines of the property; and

WHEREAS, the [Town/City] and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of [Local Jurisdiction] require that on-site stormwater management facilities be constructed and maintained on the Property; and

WHEREAS, the [Town/City] requires that on-site stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the plans and specifications identified in the Plan.
2. The Landowner, its successors and assigns, including any homeowners association, shall adequately maintain the stormwater management facilities in accordance with the required Operation and Maintenance Plan. This includes all pipes, channels or other conveyances built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions. The Stormwater Best Management Practices Operation, Maintenance and Management Checklists are to be used to establish what good working condition is acceptable to the [Town/City].

3. The Landowner, its successors and assigns, shall inspect the stormwater management facility and submit an inspection report annually. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, basin areas, access roads, etc. Deficiencies shall be noted in the inspection report.
4. The Landowner, its successors and assigns, hereby grant permission to the [Town/City], its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the [Town/City] deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The [Town/City] shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.
5. In the event the Landowner, its successors and assigns, fails to maintain the stormwater management facilities in good working condition acceptable to the [Town/City], the [Town/City] may enter upon the Property and take <u>whatever steps necessary</u> to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be construed to allow the [Town/City] to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the [Town/City] is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the [Town/City].
6. The Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.
7. In the event the [Town/City] pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner, its successors and assigns, shall reimburse the [Town/City] upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the [Town/City] hereunder.
8. This Agreement imposes no liability of any kind whatsoever on the [Town/City] and the Landowner agrees to hold the [Town/City] harmless from any liability in the event the stormwater management facilities fail to operate properly.
9. This Agreement shall be recorded among the land records of [Local Jurisdiction] and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

WITNESS the following signatures and seals:

____

Company/Corporation/Partnership Name (Seal)

By: ____

____
(Type Name and Title)

The foregoing Agreement was acknowledged before me this ____ day of
____________, 20___, by
____
___.

____
NOTARY PUBLIC
My Commission Expires: ____________

By: ____
____
(Type Name and Title)

The foregoing Agreement was acknowledged before me this ____ day of
____________, 20___, by
____
___.

____
NOTARY PUBLIC
My Commission Expires: ____________

Approved as to Form:

___________________________ __________
[Town/City] Attorney Date