45 Franklin Street, 5th Floor
Boston, MA 02110
617.849.8040

City of Haverhill Conservation Department
City Hall Room 300
4 Summer Street
Haverhill, MA 01830

September 13, 2021

Attn: Mr. Robert E. Moore, Jr., Environmental Health Technician

Re: Peer Review Services – Proposed Mixed-use Redevelopment
Railroad Avenue, Haverhill, MA

Dear Mr. Moore:

Bohler is in receipt of additional peer review comments from Comprehensive Environmental Inc. (CEI) dated September 2, 2021 regarding the proposed stormwater management system for the proposed Mixed-Use Redevelopment project located at Railroad Avenue in Haverhill, MA (the "Project"). A meeting between Bohler, CEI, and yourself was held on September 7, 2021 to further review the Project and CEI's comments. On behalf of the project Proponent, the Procopio Companies, Bohler is pleased to provide the below responses and clarifications to the peer review comments. For simplicity, comments received are denoted in *italics*, while our responses are denoted in **bold**.

Peer Review Comments

1. *A proposed WQU is was added to the plans and designed to provide treatment for stormwater runoff collected by area drains in the public park and dog park area. This unit provides 50% TSS removal, which does not meet Standard 4 requirement of 80% removal. I understand the park will not generate sediment loads that are representative of other areas, such as parking lots, however the proposed treatment design relies on sediment removal to mitigate bacteria and pathogen contaminants associated with the dog park runoff. I feel additional treatment device(s) should be included in the design to meet TSS removal requirements, which will further reduce bacteria and pathogen loads.*

   Although the proposed park is not anticipated to generate heavy sediment loads, the proposed water quality unit (WQU5) has been upgraded to a Stormceptor 900 unit. The Stormceptor 900 has been certified by the MASTEP program to remove 77% of TSS. Supporting documentation from Contech, the manufacturer of the proposed Stormceptor unit, is attached to this response letter. Contech calculates a TSS removal rate of 94% for a contributing impervious area of 0.37 acres, exceeding the MASTEP certified rate. Additionally, the proposed area drains have been revised to include both a sump and a hood. The revised detail sheet now includes both the Stormceptor unit and a revised area drain. The revised TSS removal calculations for the Project are attached to this response letter.

2. *Details for the proposed infiltration systems were added to the plans. The HydroCAD model includes crushed stone height of 6' for Infiltration Systems 1P, 2P and 4P. This would suggest crushed stone would be used to backfill the around the infiltration chambers. The detail for these systems only shows a 6" crushed stone bed beneath the chambers and should be revised to show the additional stone along the sides of the chambers.*

The HydroCAD output provides an outer "field" volume for which the precast units are embedded. The thicknesses of units' top slab and sides walls are accounted for in the model, with stone storage only occurring within the 6-inch stone layer for which the units are set atop. For example, the footprint of system 1P is 21.79'x44.10'. With a 6-inch layer of crushed stone beneath the precast units, that equates to 481 cubic feet, which is the volume represented in the report.

3. *CEI recommended confirmatory test pits within areas for Infiltration System 1P, 2P and 3P. The Applicant indicated additional test pits within these areas will be conducted prior to construction. If the Commission conditions this requirement, test pits should be completed during the clearing and grubbing phase of the project. Test pit requirements should be added to the Construction Sequence provided on the plans (Sheet C-503).*

   The Proponent agrees to conduct test pits during the cleaning and grubbing phase of the project. Notes to that effect have been added to the construction sequence on sheet C-503.

4. *Backup information was provided to support TSS removal efficiencies for WQUs (50% removal). The same removal efficiency was applied to the proposed WQIs and just needs to be confirmed. A detail was included for the proposed Contech Cascade CS-3 (WQU). Is this the same model for the WQIs?.*

   The proposed Contech Cascade CS-3 units do have an optional grate inlet and are proposed as both water quality units and inlets. Both units and inlets achieve a minimum TSS removal rate of 50%. The product brochure flier depicting the grate inlet option is attached to this response letter.

5. *CEI recommended an emergency shut-off valve downstream of the proposed trench drain. The Applicant indicated a hydrodynamic separator (WQU) and oil/water separators are proposed within the garage to capture spills. Locations of the oil/water separators should be identified and a detail should be added to the plans. Based on previous discussions concerning runoff collection from the parking garage (area below the buildings), this area will discharge to the sewer system. Additional discussion is needed to confirm spill containment measures will adequately mitigate potential impacts to the drainage and sewer systems.*

   As discussed during the September 7th meeting, the trench drain will be located at the downstream end of the garage entry drive to collect surface runoff at the garage entrance. All runoff collected by the trench drain will be conveyed to a water quality unit for the capture of TSS and hydrocarbons, should a spill occur in the garage entry drive. Within the garage itself, covered portions will drain to floor drains, which will route to an oil/water separator prior to discharging to the municipal sewer system. Areas open to the sky will drain to a water quality unit that will capture TSS and hydrocarbons, should a spill occur, prior to discharging to the sub slab infiltration system. The proposed locations of the oil/water separators have been added to the utility plan. The final location and size of the oil/water separators will be designed by the project plumbing engineer in accordance with the Massachusetts Uniform State Plumbing Code.

6. *Site plans A & B include notes to require erosion control blanket within the 25-foot buffer area and on slopes greater than 2.5:1 but the plans do not show the extents. Shading the areas that require the blanket would be help avoid confusion where installation is required during Site*

grading activities. Showing this area on the Erosion Control & Sedimentation Plans is recommended since the Site Plans already show hatched areas along the embankment to represent the proposed cover types.

The areas of the existing unarmored embankment with slopes greater than 3:1 have been added to the erosion and sediment control plan. The final location of the erosion control blankets will be field verified by the contractor and the Haverhill Conservation Commission, or its agents, as part of the invasive species removal program included as part of the Project scope.

7. *The infiltration trench ends near the stage platform. Can this extend along the remaining sidewalk and/or around the dog park?*

   The proposed infiltration trench has been extended to the down gradient side of the impervious areas within the proposed park outside the limit of the existing Activity and Use Limitation (AUL).

8. *Does the dog park area have a raised curb to contain runoff?*

   A raised curb has been added to the proposed dog park to contain runoff to that area, direct any stormwater that does not infiltrate to a proposed area drain, and prevent water from sheeting across the dog park.

9. *Including sumps and having perforations in the proposed area drains would provide TSS removal. Perforated pipes within crushed stone trenches between the area drains would also provide TSS removal and promote recharge. The shallow drainage system should provide adequate separation to groundwater.*

   As described above, the proposed areas drains have been revised to include a 4-foot sump and hood and the proposed water quality unit has been upgraded to a Stormceptor 900 unit. The revised TSS removal rate for the proposed park is 83%, as documented in the revised TSS removal calculations.

10. *Construction sequence notes include the installation of temporary swales and sediment basins. These features should be shown on the Erosion Control & Sedimentation Plans*

    The final location of temporary diversion swales and sediment basins, if required, are unknown at this time and will be sited by the contractor. Should temporary swales and sediment basins be required, the contractor will include those locations on the project Construction Management Plan(s) and submit to the Haverhill Conservation Commission.

11. *Concrete cleanout containment location and detail needs to be added to the plans.*

    A concrete cleanout containment location and detail have been added to the site plans.

12. *Include installation of temporary construction fencing in the Construction Sequence notes (Sheet C-503).*

    The installation of temporary construction fencing has been added to the construction sequence notes on sheet C-503.

We trust the above is sufficient for your needs at this time. Should you have any questions or require additional information, please do not hesitate to contact either of us at (617) 849-8040.

Sincerely,

BOHLER

Stephen Martorano, P.E. Brad Johnson, P.E.

Cc: Curt Busto – Comprehensive Environmental Inc.

Attachments: Revised Site Development Plans
Revised TSS Calculations
Manufacturer Water Quality Unit Sizing Calculation
MASTEP TSS Removal Certification
Contech Cascade Brochure (Grate Option)

Proposed Residential Development
Railroad Avenue
Haverhill, MA
Bohler Job Number: M201039
Issued: 7/1/2021
Revised: 09/10/2021
MA DEP Standard 4: Weighted TSS Removal Rate

Subcatchment	Treatment Train	Design Point	TSS Removal (%)	Treated Imp. Area* (sf)	Untreated Imp. Area (sf)
PR01	Treatment Train #3	DP1	80%	3,032	0
PR02	Treatment Train #1	DP1	90%	7,790	0
PR03	Treatment Train #1	DP1	90%	5,190	0
PR04	Treatment Train #3	DP1	80%	4,114	0
PR05	Treatment Train #3	DP1	80%	3,579	0
PR06	Treatment Train #1	DP1	90%	103,558	0
PR07	Treatment Train #1	DP1	90%	11,745	0
PR08	Treatment Train #1	DP1	90%	0	0
PR09	Treatment Train #1	DP1	90%	12,572	0
PR10	Treatment Train #2	DP1	83%	16,150	0
PR11	N/A	DP1	-	0	0
PR12	N/A	DP1	-	0	0
PR13	N/A	DP1	-	0	0
Weighted TSS Removal Rate			**89%**		

1.) Subcatchments PR11 and PR12 are the off-site subcatchment areas for the proposed Railroad Avenue Improvement Project and are therefore not included in the Site's weighted TSS removal calculations.
2.) Impervious areas from subcatchments PR01, PR04, and PR05 consist of walkways for pedestrian access along the Merrimack River. Runoff will be directed to a walkway infiltration trench along the downgradient shoulder of the walkway.
3.) Per the revised site plans, subcatchment PR13 does not include impervious area.

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TSS Removal Calculation Worksheet

Location: Subcatchment PR10

Treatment Train #2

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Area Drain (With Deep Sump and Hood)	**0.25**	**1.00**	**0.25**	**0.75**
Water Quality Unit (Stormceptor 900)	**0.77**	**0.75**	**0.58**	**0.17**

Total TSS Removal = **83%**

Project: **Railroad Avenue**
Prepared By: **Bohler**
Date: **7/1/2021**
Revised: **9/10/2021**

*Equals remaining load from previous BMP (E) which enters the BMP

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Project: The Beck
Location: Haverhill, MA
Prepared For: Bohler Engineering / Brad Johnson

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1/2" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

Q = (qu) (A) (WQV)

where:

Q = flow rate associated with first 1/2" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1/2" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
WQU #1	0.37	0.0005781	6.0	0.100	0.50	752.00	0.22

Brief Stormceptor Sizing Report - WQU #!

Project Information & Location			
Project Name	The Beck	**Project Number**	689080
City	Haverhill	**State/ Province**	Massachusetts
Country	United States of America	**Date**	9/11/2021
Designer Information		**EOR Information (optional)**	
Name	Jim Lyons	**Name**	Brad Johnson
Company	Contech ES	**Company**	Bohler Engineering
Phone #	413-246-5151	**Phone #**	617-849-8040
Email	jlyons@conteches.com	**Email**	bjohnson@bohlereng.com

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU5
Target TSS Removal (%)	80
TSS Removal (%) Provided	94
Recommended Stormceptor Model	STC 900

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	89
STC 900	94
STC 1200	94
STC 1800	95
STC 2400	96
STC 3600	97
STC 4800	98
STC 6000	98
STC 7200	98
STC 11000	99
STC 13000	99
STC 16000	99

Stormceptor®

CONTECH ENGINEERED SOLUTIONS
A QUIKRETE COMPANY

Sizing Details

Drainage Area

Total Area (acres)	0.90
Imperviousness %	41.0

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	0.22

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

OK-110

Particle Diameter (microns)	Distribution %	Specific Gravity
1.0	0.0	2.65
53.0	3.0	2.65
75.0	15.0	2.65
88.0	25.0	2.65
106.0	41.0	2.65
125.0	15.0	2.65
150.0	1.0	2.65
212.0	0.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Fact Sheet #4

Stormwater Technology: Stormceptor

(Hydro Conduit, formerly CSR New England Pipe)

Revised February 2003

*The **Stormceptor Fact Sheet** is one in a series of fact sheets for stormwater technologies and related performance evaluations, which are undertaken by the **Massachusetts STrategic Envirotechnology Partnership (STEP).***

The STEP evaluation entitled, *Technology Assessment, Stormceptor CSR New England Pipe*, January 1998 is the information source for this fact sheet. When a more thorough understanding of a system is required, the full *Technology Assessment* should be reviewed. Copies are available for downloading from the STEP Web site (www.STEPSITE.org/) or by contacting the STEP Program (Phone: 617/626/1197, FAX: 617/626/1180, email: linda.benevides@state.ma.us). This fact sheet is subject to future updates as additional performance information becomes available.

Description/Definition

Stormceptor is a prefabricated, underground unit that separates oils, grease, and sediment from stormwater runoff when installed with an existing or new pipe conveyance system. The unit is divided into two chambers–a treatment and a flow bypass chamber. During typical storm events, runoff is directed by the inflow weir through a drop pipe into the lower treatment chamber where sediment, oil, and grease are separated from the flow by gravity. The bypass chamber is designed to convey excess stormwater, which overtops the inflow weir, through the system without treatment.

Equipment and Sizing

The on-line Stormceptor units are available in eight sizes ranging from six and twelve feet in diameter with capacities of 900 to 7200 gallons. Since issuing the STEP assessment in 1998, the manufacturer has expanded the Stormceptor product line to include a storm drain inlet (STC 450i) and three units (Models STC 11000, STC 13000, and STC16000). These systems are not included in the STEP evaluation. Users and decision-makers may require additional field test results and new data for these new systems in order to accept performance ratings, particularly if they are higher than those reported in the STEP technology assessment and this fact sheet.

Stormceptor units are available in either precast concrete or fiberglass for special applications. Concrete units are pre-engineered for HS-20 min. traffic loading at the surface. Fiberglass units can be used in areas where there is a potential for oil and chemical spills.

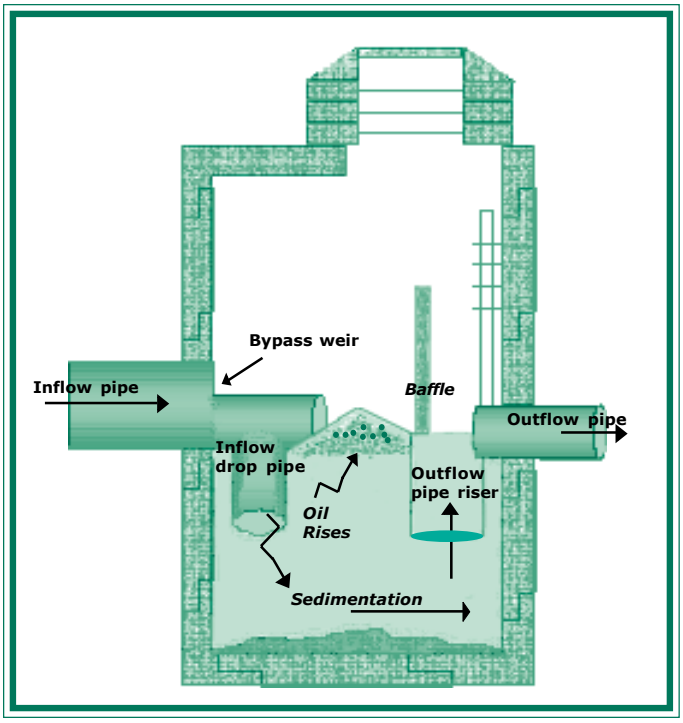


Figure 1. Stormceptor operation during average flow conditions.

Performance/Effectiveness

The system is designed to provide separation of sediment, oil, and grease from stormwater by routing runoff into a low-turbulence environment where solids settle and oils float out of solution. The system sizing is based on the drainage area, historical rainfall data, and the solids removal efficiency required. It is recommended that the system be used in combination with other stormwater controls to conform with the Massachusetts Stormwater Management Policy and standards.

An Imperial Model STC 2000 (equivalent to the Model STC 2400) in Edmonton, Canada treats flow from a 9.8 acre commercial parking lot. This system was monitored during four storm events in 1996 and shown to have an average total suspended solids (TSS) removal efficiency of 52 percent. In designing a system to achieve a comparable removal efficiency, the relationship between system size and impervious drainage area should be considered, as detailed in Table 1 and the Technology Assessment Report.

A Model STC 1200 in Westwood, Massachusetts treats flow from 0.65 acres consisting of a paved truck loading area at a manufacturing facility. The unit was monitored for six storm events in 1997, but only four events had measurable TSS influent concentrations. Of these four events, the average TSS removal efficiency was calculated to be 77 percent, which is less than the 80 percent removal targeted by the manufacturer.

Based on these field monitoring results, and when the unit sizing follows the guidance in Table 1, removal efficiencies between 52 percent and 77 percent may be achieved where installations have similar rainfall and land use characteristics as those reviewed for the STEP evaluation. It is recommended that additional field research and new data be evaluated to validate performance ratings higher than those verified by STEP.

Specific performance claims for oil and grease were not evaluated by STEP. However, total petroleum hydrocarbons (TPH) were analyzed during the Westwood study. Results indicated that the unit was effective in capturing oils.

Stormceptor Model Number	Maximum Impervious Area (acres)	
	77% TSS removal	52% TSS removal
STC 900	0.45	0.9
STC 1200	0.7	1.45
STC 1800	1.25	2.55
STC 2400	1.65	3.35
STC 3600	2.6	5.3
STC 4800	3.6	7.25
STC 6000	4.6	9.25
STC 7200	5.55	11.25

Table 1: Sizing for TSS removal (adapted from the manufacturer's sizing in the 1998 STEP Report) Use the table to determine a TSS removal rate. Use the new Rinker method for sizing Stormceptor units. The sizing method has been changed since publication of the STEP Report. **Note:** To achieve 52% and 77% TSS removal rates on some sites, it may be necessary to use lower maximum impervious areas than those in Table 1.

Technology Status

The Stormceptor system provides greater solids separation and higher TSS removal efficiencies than oil and grit separators. Stormceptor systems are among the category of hydrodynamic separators, which are flow-through devices with the capacity to settle or separate grit, oil, sediment, or other pollutants from stormwater. According to the U.S. Environmental Protection Agency, "Hydrodynamic separators are most effective where the materials to be removed from runoff are heavy particulates - which can be settled - or floatables - which can be captured, rather than solids with poor settleability or dissolved pollutants."

The field studies evaluated for the STEP assessment predate the Stormwater Best Management Practice Demonstration Tier II Protocol (2001), which is applicable in Massachusetts and other states in the Technology Acceptance Reciprocity Partnership (TARP), to ensure quality controlled studies that can be shared among participating states. Therefore, interstate reciprocity is not available to the manufacturer, based on performance claims that were evaluated by STEP in 1998. If the TARP Protocol requirements are fulfilled in the future, the manufacturer could pursue reciprocal verification for Stormceptor systems in participating TARP states. More information on the TARP Protocol is available on the following Web site: www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp.

Applications/Advantages

- Stormceptor systems identified in Table 1 should be used in combination with other BMPs to remove 80 percent of the average annual load of TSS (DEP Stormwater Policy Standard 4). Systems may be well suited for pretreatment in a mixed component system designed for stormwater recharge.
- Performance data show that Stormceptor may provide TSS removal rates in the range of 52 percent to 77 percent when sized according to Table 1. Higher TSS removal rates were achieved during low flow, low intensity storms with less than one third of an inch of runoff. Also, by reducing the impervious drainage area, relative to the system size, the STEP Technology Assessment Report indicated that higher removal efficiencies may be achievable. However, STEP recommends collection of additional data "representing a varied set of operating conditions over a realistic maintenance cycle to verify TSS removal rates greater than 80 percent."
- The Stormceptor system is suitable for new and retrofit applications. For retrofit applications, it should not

take the place of a catch basin for the systems that have been verified. Also, for retrofit applications, it should be installed in lateral lines and not main trunk lines.

- The system is particularly well suited in constricted areas and where space is limited.
- It also is suitable for use in areas of high potential pollutant loads (DEP Stormwater Policy Standard 5), where it may be used effectively in capturing and containing oil and chemical spills. *Web site:* www.state.ma.us/dep/brp/stormwtr/stormpub.htm.

Considerations/Limitations

- Systems are not expected to provide significant nutrient (nitrogen and phosphorus) or fecal coliform removal.
- The systems are not recommended for use in critical areas, such as public drinking water supplies, certified vernal pools, public swimming beaches, shellfish growing areas, cold water fisheries, and some Areas of Critical Environmental Concern (ACECs), except as a pretreatment device for BMPs that have been approved by DEP for use in critical areas. The structural BMPs approved for use in critical areas are described in Standard 6 of the Stormwater Management Policy, www.state.ma.us/dep/brp/stormwtr/stormpub.htm.
- There is a limited set of useful data for predicting the relationship between treatment efficiency and loading rates. Removal efficiencies have not been demonstrated for all unit sizes.
- Further research is needed to determine how much TSS bypasses the treatment chamber during certain, higher velocity storm events which recur less frequently.
- Systems require regular maintenance to minimize the potential for washout of the accumulated sediments.

Reliability/Maintenance

All BMPs require scheduled, routine maintenance to ensure that they operate as efficiently as possible. Although maintenance requirements are site specific, a general relationship between cleaning needs and depths of sediment has been established by the manufacturer. Inspection of the Stormceptor interior should be done after major storm events, particularly in the first year of operation. It is recommended that material in the treatment chamber be pumped out by a vacuum truck semiannually, or when the sediment and pollutant loads reach about 15 percent of the total storage. If the unit is used for spill containment, it should be pumped after the event is contained. Typical cleaning costs were estimated by the manufacturer in 1998 to be $250, with disposal costs averaging $300 to $500. The expected life of a system has been estimated to be 50 to 100 years.

Sediment Depths Indicating Required Maintenance	
Model Number	**Sediment Depth (feet)**
STC 900	0.5
STC 1200	0.75
STC 1800	1
STC 2400	1
STC 3600	1.25
STC 4800	1
STC 6000	1.5
STC 7200	1.25

Table 2: The Stormceptor clean out is based on 15 percent of the sediment storage volume in the

References

Winkler, E.S. 1998. "Technology Assessment, Stormceptor." University of Massachusetts, Amherst, MA. *STEP Web site:* www.STEPSITE.org/

Massachusetts Department of Environmental Protection and Office of Coastal Zone Management. 1997. "Stormwater Management Handbooks, Volumes One and Two." Boston, MA. *Handbooks Web site:* www.state.ma.us/dep/brp/stormwtr/stormpub.htm.

United States Environmental Protection Agency. "Storm Water Technology Fact Sheet Hydrodynamic Separators." EPA 832-F-99-017.

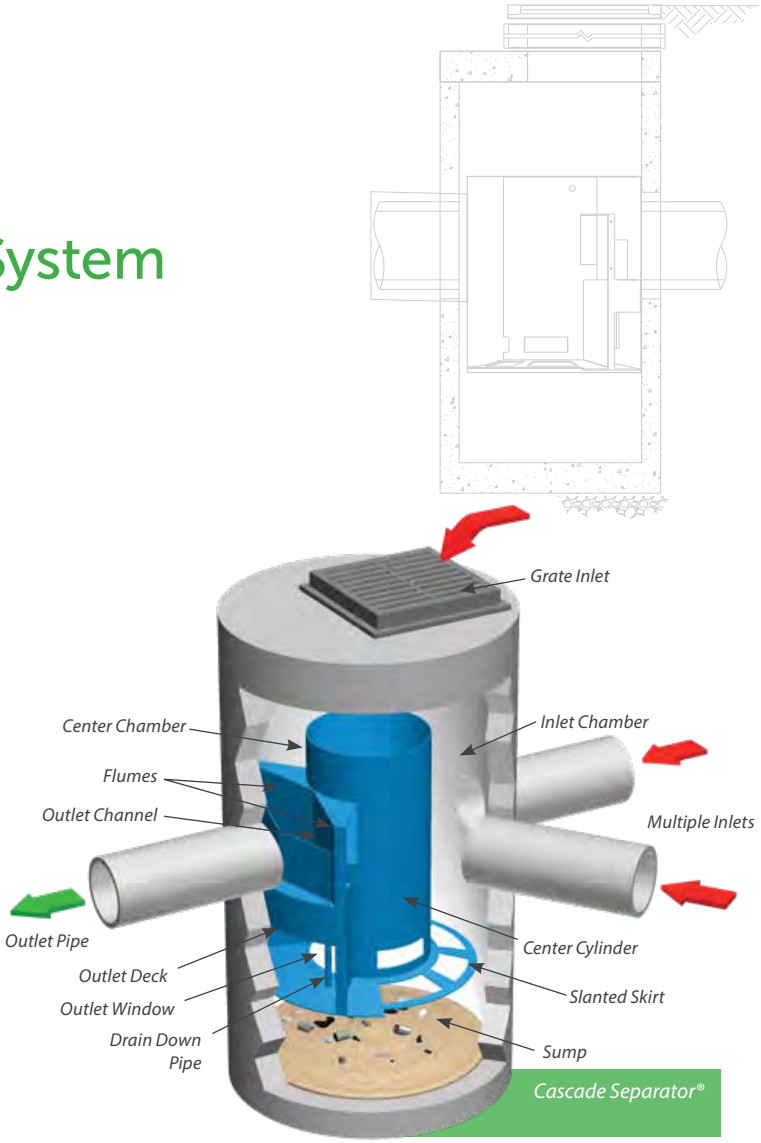
Stormceptor Web sites: www.rinkermaterials.com/stormceptor

TARP Web site: www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp

STEP Verification vs. Regulatory Approval

STEP assistance to developers of innovative technologies and STEP verification of stormwater treatment systems is not required to receive necessary approvals from conservation commissions or the Department of Environmental Protection (DEP). However, if a system has received verfication, a conservation commission shall presume that the technology will function as proposed, provided the conditions are similar to those in which performance was verified. STEP reports are not technology approvals, and do not constitute an endorsement or recommendation for use. Questions on regulatory issues should be referred to the DEP regional offices.

The Cascade Separator® System



Advanced Sediment Capture Technology ...

The Cascade Separator® is the newest innovation in stormwater treatment from Contech. The Cascade Separator was developed by Contech's stormwater experts using advanced modeling tools and Contech's industry leading stormwater laboratory.

This innovative hydrodynamic separator excels at sediment capture and retention while also removing hydrocarbons, trash, and debris from stormwater runoff. What makes the Cascade Separator unique is the use of opposing vortices that enhance particle settling and a unique skirt design that allows for sediment transport into the sump while reducing turbulence and resuspension of previously captured material. These two factors allow the Cascade Separator to treat high flow rates in a small footprint, resulting in an efficient and economical solution for any site.

FEATURE	BENEFIT
Unique skirt design & opposing vortices	Superior TSS removal; reduced system size and costs
Inlet area accepts wide range of inlet pipe angles	Design and installation flexibility
Accepts multiple inlet pipes *	Eliminates the need for separate junction structure
Grate inlet option*	Eliminates the need for a separate grate inlet structure
Internal bypass	Eliminates the need for a separate bypass structure
Clear access to sump and stored pollutants	Fast, easy maintenance

** NJDEP testing based on Cascade Separator with one inlet pipe and no grate inlet*

Learn More:
www.ContechES.com/cascade

SELECT CASCADE APPROVALS

- New Jersey Department of Environmental Protection Certification (NJDEP)

CASCADE MAINTENANCE

Cascade provides unobstructed access to stored pollutants, making it easy to maintain using a vacuum truck, with no requirement to enter the unit.