State of Wisconsin
Department of Natural Resources

dnr.wi.gov

Final Report

Targeted Runoff Management Grant Program and Urban Nonpoint Source and Storm Water Management Grant Program

Form 3400-189 (R 11/05)

Notice: This final report is authorized by ss. 281.65 and 281.66, Wis. Stats., and chs. NR 153 and NR 155, Wis. Adm. Code. Personally identifiable information collected will be used for program administration and may be made available to requesters as required under Wisconsin's Open Records Law [ss. 19.31-19.39, Wis. Stats.].

Instructions: The grant agreement requires grantees to submit a Final Report 60 days after the end date listed in the grant agreement. This Final Report form must be used in conjunction with the "FINAL REPORT INSTRUCTIONS." The instructions detail how to complete and submit the report to DNR.

1. Grant Type

☐ Agricultural - Targeted Runoff Management Grant

☐ Urban - Targeted Runoff Management Grant

☒ Construction - Urban Nonpoint Source & Storm Water Management Grant

☐ Planning - Urban Nonpoint Source & Storm Water Management Grant

2. Grantee & Project Information

Project Name	Grant Number
Bayshore Mall Redevelopment	**USC-M102-40231-05**
Governmental Unit Name	Governmental Unit Type (city, village, town, etc.)
Glendale	**City**
Watershed Name	Watershed Code
Milwaukee River South	**M102-050**
DNR Water Management Unit (River System) Name	Water Body Identification Code (WBIC) (if applicable)
Milwaukee River	**15000**

s. 303(d) Waterbody? ☒ Yes ☐ No

What pollutant(s) were addressed by the project?

Suspended Solids

For **each** project site location provide the following: (attach additional sheets if necessary)

Location:		A	B	C	D	E
Minor Civil Division Name		**City of Glendale**				
PLSS	Town	**8**				
	Range	**22E**				
	Section	**29**				
	Quarter	**SE**				
	Quarter-Quarter	**N. Half of SE Qtr**				
Latitude		**43° 7' 13" N**				
Longitude		**87° 54' 57" W**				
Property Owner(s)	Name	**Corrigan Properties, Inc.**				
	Mailing address	**5800 N. Bayshore Drive Glendale, WI 53217**				
Site address *(if different than mailing address)*						

3. Summary of Results

A. Performance Standards and Prohibitions and Other Water Resources Management Priorities

For grants issued in calendar year 2006 or later, complete Tables A and B (following) consistent with the entries on your grant application. For grants issued prior to calendar year 2006, complete Tables A and B, *to the best of your knowledge*, consistent with the entries on your grant application.

Table A. Performance Standards and Prohibitions (per ch. NR 151, Wis. Adm. Code, effective October 1, 2002)

Performance Standard or Prohibition	Units of Measure	Quantity	Measurement Method Used
Sheet, rill and wind erosion	Acres meeting T		
Manure Storage Facilities: New Construction/Alterations	Number of facilities		
	Number of animal units		
Manure Storage Facilities: Closure	Number of facilities		
Manure Storage Facilities: Failing/Leaking Facilities	Number of facilities		
	Number of animal units		
Clean Water Diversions in WQMA	Pollutant load reduction		
	Number of farms with diversions		
	Number animal units		
Nutrient Management on Agricultural Land	Acres planned		
Prohibition: Manure Storage Overflow	Number of facilities		
	Number of animal units		
Prohibition: Unconfined Manure Pile in WQMA	Number of farms		
Prohibition: Direct Runoff From Feedlot/Stored Manure	Pollutant load reduction		
	Number of facilities		
	Number of animal units		
Prohibition: Unlimited Livestock Access	Feet of bank protected		
	Number of farms		
Urban: 20-40% Reduction in Total Suspended Solids (TSS)	Pounds TSS reduced		
	% TSS reduction	**75**	**Manufacturer Testing**

Table B. Other Water Resources Management Priorities

I. Agricultural Areas	Units of Measure	Quantity	Measurement Method Used
Buffers	Feet of bank protected		
	Number of farms		
Streambank	Tons of bank erosion reduced		
	Feet of bank protected		
Other (specify)			
II. Developed Urban Areas	**Units of Measure**	**Quantity**	**Measurement Method Used**
Urban: 20-40% Reduction in TSS	Pounds TSS reduced		
	% TSS reduction	**75**	**Manufacturer Testing**
Infiltration	% Pre-development stay-on volume		
	Cubic feet stay-on volume		
Peak flow discharge	Change in cubic feet per second		
Protective areas	Feet of bank protected		
Fueling & maintenance areas	Oily sheen presence		
Streambank	Tons of bank erosion reduced		
	Feet of bank protected		
Other (specify)			

III. Planning	Units of Measure	Quantity	Measurement Method Used
Quantify how implementation of the planning project decreased storm water impacts on state waters (*i.e.*, storm water plan, I & E plan, *etc.*)	Municipalities planned for		
	Acres planned for		
Document/track progress made in implementing the planning product (*i.e.*, ordinance, utility district evaluation/formation, storm water management plan information & education, *etc.*)	Municipalities planned for		
	Acres planned for		
Other (specify)			

B. Project Results Narrative

The goal of the Bayshore Mall Redevelopment Project was to install end-of-pipe water quality treatment devices that would achieve a minimum of 40% total suspended solids (TSS) removal from the stormwater discharging from the site. The stormwater discharge permit for Bayshore Mall also requires a maintenance plan that includes regular sweeping of the mall parking lots and catch basin cleaning. It also requires visual inspections of the devices to ensure they are working properly.

Three Stormceptor brand (http://www.rinkerstormceptor.com/) devices were chosen to be installed at the site in locations that correspond with site catchment areas and sewer outlet points. The Stormceptor devices include the STC-900 (900 gal capacity), STC-1800 (1,800 gallon capacity), and STC-4800 (4,800 gal capacity). According to the manufacture, testing completed by TARP (Technology Acceptance and Reciprocity Partnership) found that Stormceptors have a 75% TSS removal rate, which meets and exceeds the programs required TSS removal rate of 40%.

Stormwater from the Bayshore Mall drains to the Milwaukee River, which is a 303d listed waterway and is used for numerous recreational activities including boating and fishing. The reduction of TSS from the stormwater will greatly contribute to the reduction of pollutants to this highly sensitive and valued natural resource.

Please see the 08/27/07 Project Results Report for further information.

4. Satisfaction of Notice Requirements (if applicable)

If cost sharing for this project was offered under a formal notice to achieve compliance with performance standards or prohibitions, provide information for each notice in the table below.

Notice Information				Notice Satisfaction Information		
				Satisfied?		
Notice Type	Issue Date	From (Name)	To (Name)	Yes	No	Date Letter Sent
Letter	**03/23/06**	**Susan Eichelkraut**	**Dave Eastman, City of Glendale DPW**	☒	☐	**05/05/06**
				☐	☐	
				☐	☐	
				☐	☐	

5. Summary of Project Challenges

No significant challenges were faced during the project.

6. Additional Information about the Project (optional)

Please see 08/27/07 Project Results Report.

7. Planning Product (UNPS&SW - Planning Projects only)

☐ Check here if a printed copy of the planning product (e.g., plans, ordinances, analyses) was sent to your DNR Regional Nonpoint Source Coordinator.

Name of Document	Date(s) effective	Date Submitted to NPS Coordinator

8. Grantee Certification:

☒ Check here to certify that, to the best of your knowledge, the information contained in this report is correct and true.

Type or print Name and Title of Authorized Representative certifying here.

Dave Eastman, City of Glendale Director of Public Works

Signature of Authorized Representative	Date
Dave Eastman	4-9-08

12075 Corporate Pkwy
Suite 200
Mequon, WI 53092

Tel 262-241-4466
Fax 262-241-4901

www.bonestroo.com

Bonestroo

August 27, 2007

Kathleen Thompson
Storm Water Grants Coordinator
WI Dept of Natural Resources
101 S. Webster St.
Madison, WI 53707

Re: Bayshore Mall Redevelopment Devices Urban & TRM Grant Project Results
City of Glendale
Bonestroo File No.: 84507000

Dear Ms. Thompson

As part of the conditions for the Wisconsin Urban Nonpoint Source Water Pollution Abatement & Stormwater Management Grant Program, the WI DNR requires a final letter outlining the project's implementation and effectiveness.

The City of Glendale's Bayshore Mall Redevelopment project required the installation of three end-of-pipe water quality treatment devices that would effectively reduce the amount of total suspended solids (TSS) by 40%. Three Stormceptor brand (http://www.rinkerstormceptor.com/) devices were chosen to be installed at the site in locations that correspond with site catchment areas and sewer outlet points. A location map and photos showing the installed devices have been attached.

The Stormceptor devices include the STC-900 (900 gal capacity), STC-1800 (1,800 gallon capacity), and STC-4800 (4,800 gal capacity). According to the manufacture, testing completed by TARP (Technology Acceptance and Reciprocity Partnership) found that Stormceptors have a 75% TSS removal rate, which meets and exceeds the programs required TSS removal rate of 40%. Testing documentation and technical specifications have been included in this report.

Thank you for your assistance with this program, if you need any further information, please contact me at 262-643-9060.

Respectfully,
Bonestroo

Joel Brieske

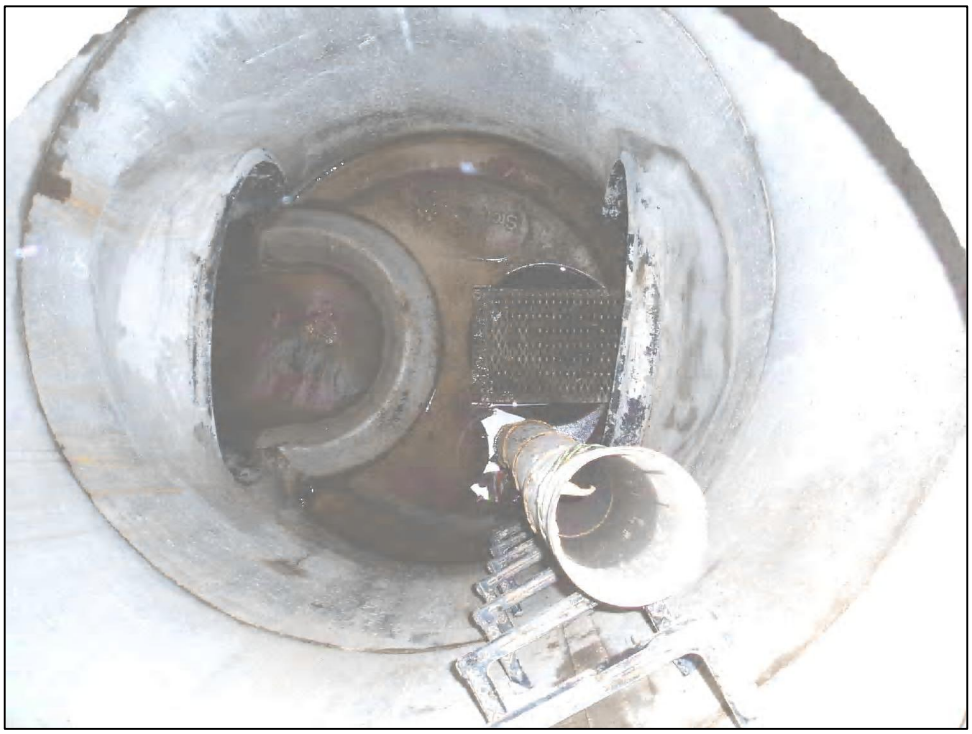
Stormceptor Location Map
Bayshore Town Center
Glendale, Wisconsin

Source: Bayshore Town Center

Bonestroo
Engineers Architects Planners

City of Glendale Bayshore Mall Stormceptor Photographs

Stormceptor STC 4800
Located along Port Washington Rd in Cheesecake Factory Parking Lot



City of Glendale Bayshore Mall Stormceptor Photographs

Stormceptor STC 1800
Located along Port Washington Rd on sidewalk next to Mongolian Grill

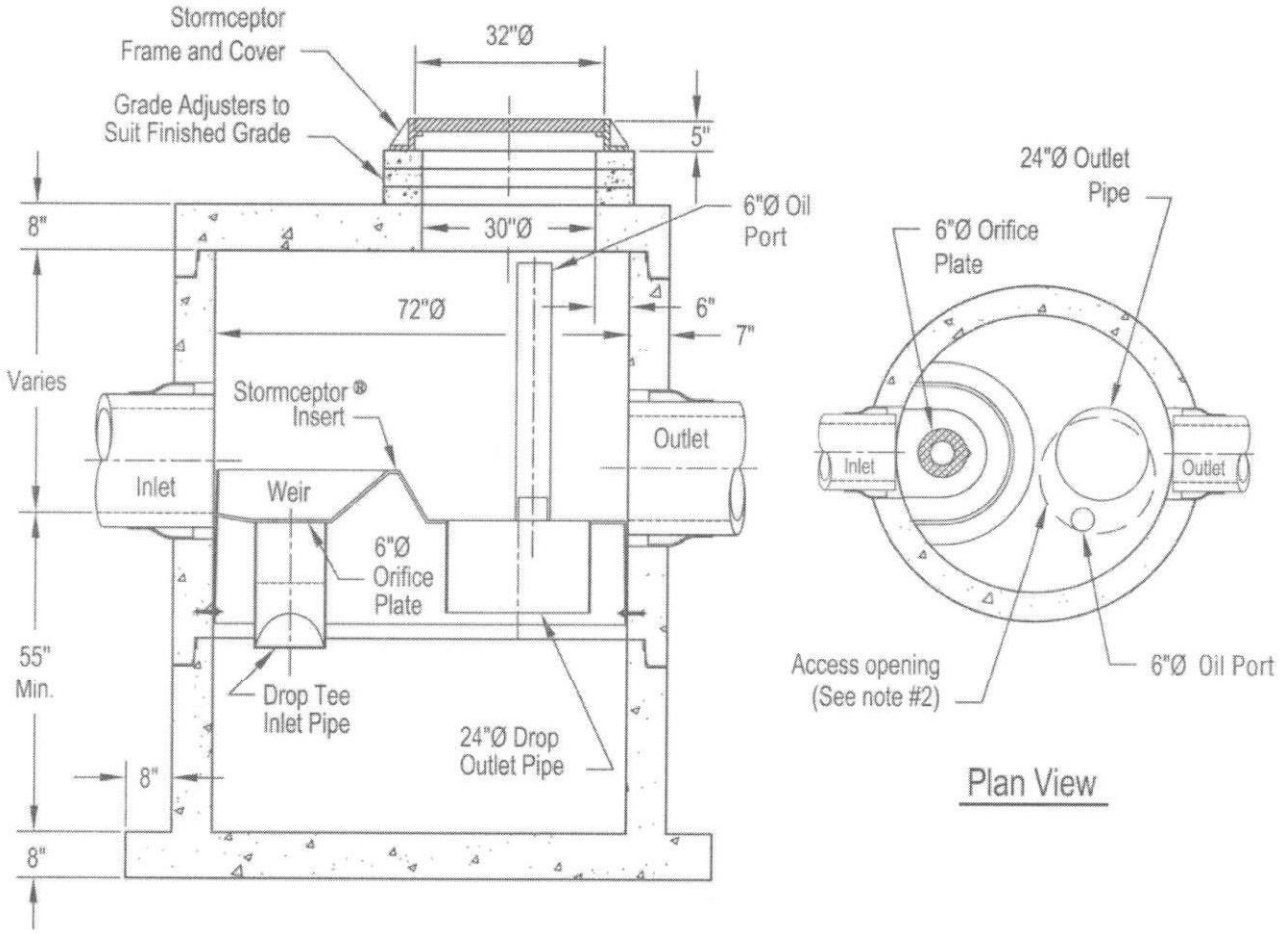
City of Glendale Bayshore Mall Stormceptor Photographs

Stormceptor STC 1800
Located along Port Washington Rd on sidewalk next to Mongolian Grill

Appendix A

STC 900 Precast Concrete Stormceptor®

(900 US Gallon Capacity)



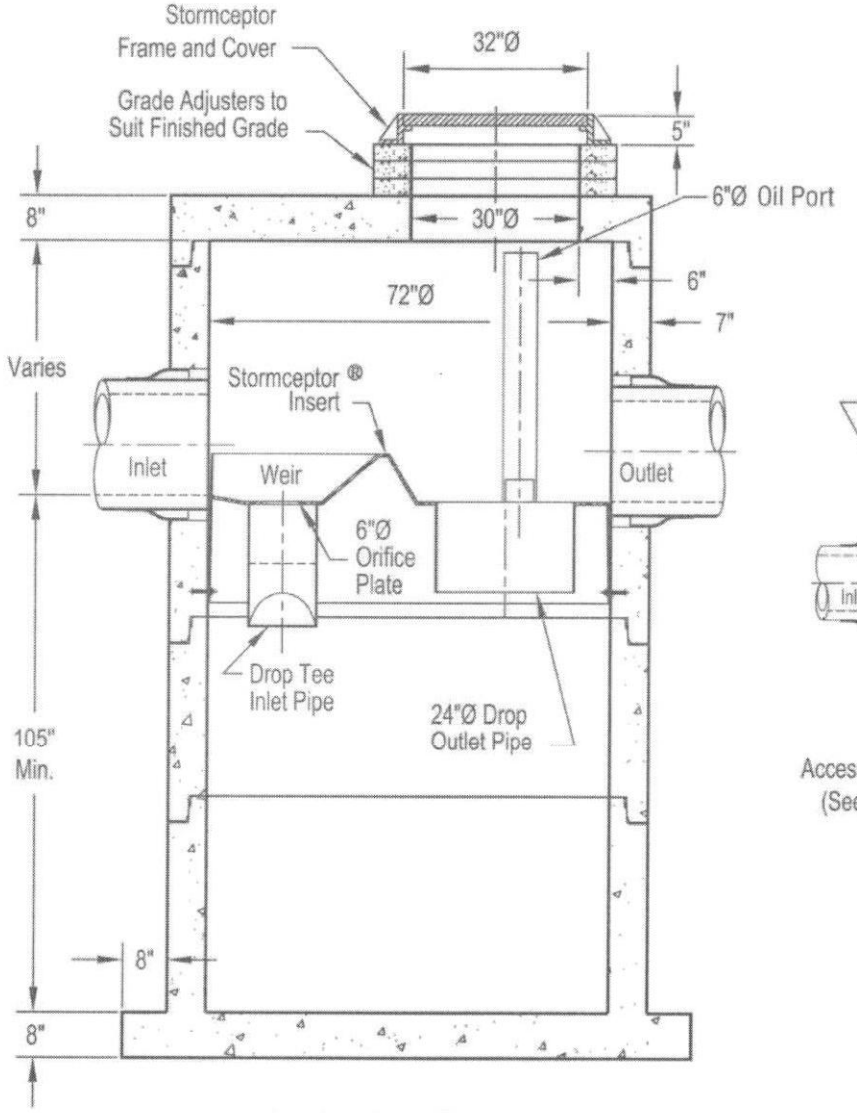
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

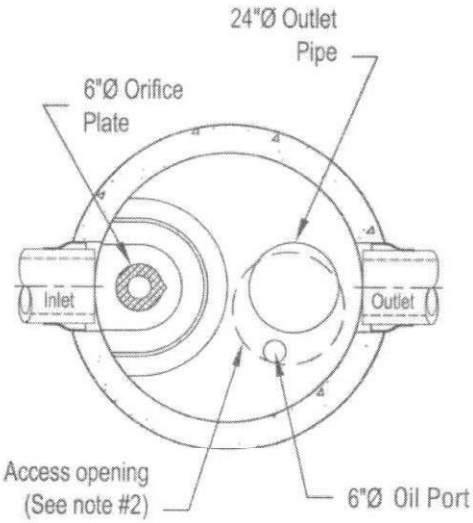
Appendix A

STC 1800 Precast Concrete Stormceptor®

(1800 US Gallon Capacity)



Section Thru Chamber



Plan View

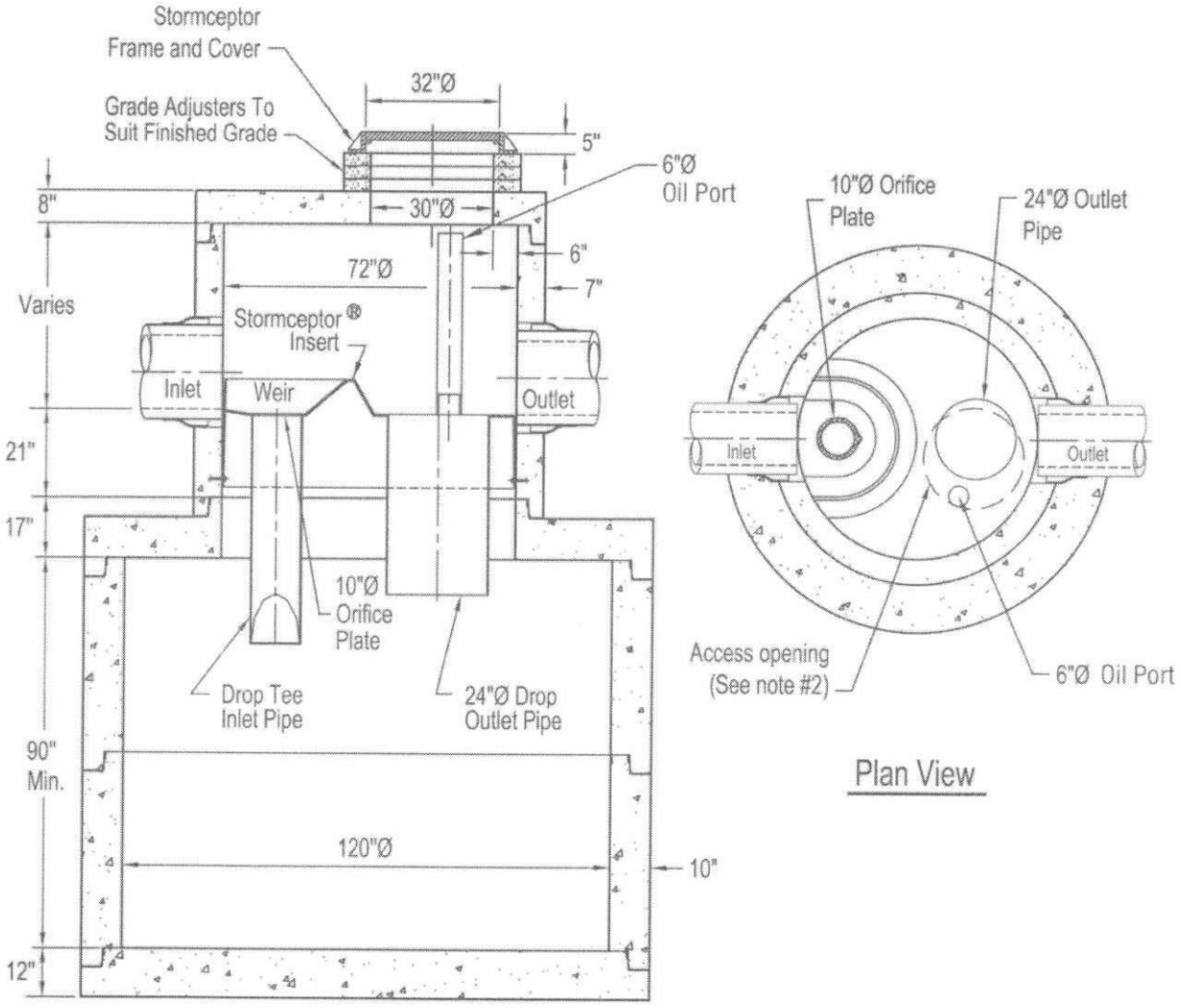
Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

Appendix A

STC 4800 Precast Concrete Stormceptor®

(4800 US Gallon Capacity)



Notes:

1. The Use Of Flexible Connection is Recommended at The Inlet and Outlet Where Applicable.
2. The Cover Should be Positioned Over The Outlet Drop Pipe and The Oil Port.
3. The Stormceptor System is protected by one or more of the following U.S. Patents: #4985148, #5498331, #5725760, #5753115, #5849181, #6068765, #6371690.
4. Contact a Rinker Materials representative for further details not listed on this drawing.

2.4 Technical Specifications

The Stormceptor dimensions vary with the size of unit that is specified. Dimensions of the concrete Stormceptor units are provided in Table 5.

Table 5. Stormceptor Dimensions *		
Model	**Treatment Chamber Diameter**	**Pipe Invert to Bottom of Base Slab**
450*i*	4'	68"
900	6'	63"
1200	6'	79"
1800	6'	113"
2400	8'	104"
3600	8'	144"
4800	10'	140"
6000	10'	162"
7200	12'	148"
11000*s***	10'	140"
13000*s***	10'	162"
16000*s***	12'	148"

* Depths are approximate
** Two vertical structures

Storage capacities for Stormceptor are provided in Table 6. The STCs series consists of two vertical structures, storage capacities represent the total storage for both chambers.

Table 6. Stormceptor Capacities				
Model	**Down Pipe Orifice**	***Sediment Capacity (ft^3)**	**Oil Capacity (US Gal.)**	**Total (US Gal.)**
450*i*	6	9	86	470
900	6	19	251	952
1200	6	25	251	1234
1800	6	37	251	1833
2400	8	49	840	2462
3600	8	75	840	3715
4800	10	101	909	5059
6000	10	123	909	6136
7200	12	149	1059	7420
11000*s*	10	224**	2797**	11194**
13000*s*	10	268**	2797**	13348**
16000*s*	12	319**	3055**	15918**

* Capacity prior to recommended maintenance
** Total both structures combined

Stormceptor®

TECHNICAL SHEET

Stormceptor has TARP covered

TARP Tier I Approval Verifies Stormceptor's Superior Performance

What is TARP?

TARP (Technology Acceptance and Reciprocity Partnership) was established in 2000 as a standardized method of evaluating the performance of stormwater treatment technologies.

The TARP program is a three-tiered process that includes rigorous laboratory testing, field tests and regulatory permits. TARP standards are currently recognized by eight participating states - New Jersey, California, Illinois, Maryland, Massachusetts, New York, Pennsylvania and Virginia.

What does TARP do?

TARP's certification program provides scientific data on stormwater technologies and related performance claims, which helps:

- Regulators and engineers make sound decisions when addressing stormwater treatment needs.
- Spread technology performance data quickly, giving jurisdictions an opportunity to better meet their water quality objectives.

How was Stormceptor recognized by TARP?

In February 2005, Stormceptor received TARP Tier I interim certification from the New Jersey Department of Environmental Protection (NJDEP), verifying Stormceptor's ability to perform beyond normal operational capacity during extreme rainfall.

What does TARP test for?

TARP Tier I focused on the removal of total suspended solids (TSS) and scour testing under various operating rates and sediment loadings. Seven stormwater treatment technologies were tested, including the Stormceptor System.

Particle Size Distribution (PSD) testing

Stormceptor was one of only two units tested to utilize the NJDEP PSD testing – treating a sample of particles between one and 1,000 microns. Instead of following TARP standards, the other technologies opted to test a preferred particle size range that best suited their unit's performance (see TARP Tier I – Hydrodynamic Comparison Results) – testing coarser, larger particles that are easier to remove.

Of the devices tested, Stormceptor removed the broadest range of pollutants.

Total Suspended Solids (TSS) removal efficiency

TARP protocol required testing at varying TSS concentrations – 100 mg/L, 200 mg/L, 300 mg/L, with the unit filled to 50% of the recommended capacity before maintenance.

How did Stormceptor perform?

Of all the technologies tested, Stormceptor recorded the highest TSS removal while removing a significant portion of clay and fine silts (NJDEP PSD).

Stormceptor:	75% TSS removal, tested with NJDEP fine PSD
High Efficiency CDS:	73.7%, tested with a much coarser PSD than NJDEP PSD
Downstream Defender:	70%, tested with sand particles
VortSentry:	69%, tested with sand particles
Vortechs:	64%, tested with a much coarser PSD than NJDEP PSD
Aquaswirl:	60%, tested with sand particles
BaySaver:	51%, tested with NJDEP fine PSD

Not only did Stormceptor record the highest TSS removal, it did so removing NJDEP's specified PSD, meaning it removed both a higher percentage as well as a broader range of particles than the other technologies.

Scour test results

Stormceptor was one of only two technologies that completed the scour test as mandated by NJDEP. **Tests demonstrated Stormceptor did not scour with the unit loaded to design capacity.**

The calm *during* the storm

Stormceptor removes more pollutants from stormwater than any other separator. Stormceptor does not scour as the flow rate increases, maintaining a continuous positive treatment of suspended solids. Stormceptor is designed to remove a wide range of particles, as well as free oils, heavy metals and nutrients that attach to fine sediment. Units can also be designed to remove a specific particle size distribution.

With over 18,000 units operating worldwide, Stormceptor protects waterways every day in every storm.

TARP TIER I - Hydrodynamic Comparison Results[1]

		DESCRIPTION	HYDRODYNAMIC DEVICES: Stormceptor	High Efficiency CDS	Downstream Defender	VortSentry	Vortechs	Aquaswirl	Baysaver System
MODEL TESTED		Model ID	STC 900	New Design: PMSU20_20_6 (tank diameter incr. by 1 foot, diff. baffle arrangement)	4-FT	VS40	Model 2000	AS-3	1K
		Treatment Chamber Diameter (ID)	6 ft	6 ft	4 ft	4 ft	4 ft	2.5 ft	2 ft
		Marketed Water Quality Peak Flow Treatment Capacity	n/a[2]	1.1 cfs (31.1 L/s)	3.0 cfs (85 L/s)	1.1 cfs (31.1 L/s)	2.8 cfs (79.3 L/s)	1.8 cfs (51 L/s)	2.4 cfs (68 L/s)
		100% Operating Rate Tested	0.64 cfs (18 L/s)	1.1 cfs (31.1 L/s)	1.1 cfs (31.1 L/s)	1.1 cfs (31.1 L/s)	1.12 cfs (32 L/s) **(40 % of Original)**	0.9 cfs (30.6 L/s) **(60 % of Original)**	1.1 cfs (31 L/s) **(46 % of Original)**
		Original Physical Design Tested	YES	NO (New Design: Increased Tank Volume & Changed Baffle Arrangement)	YES	YES	YES	YES	YES
NJCAT VERIFICATION	PARTICLE SIZE USED	Used NJCAT Specified PSD	YES	NO	NO	NO	NO	NO	YES
		PSD Range	NJCAT PSD Tested	10-100 µm (i.e. fines washed out of sediment samples used via plankton nets)	53 - 300 µm	53 - 300 µm	38 - 75 µm	50 - 150 µm	NJCAT PSD Tested
		PSD Name		sub-100 PSD	F-95 Sand	F-95 Sand		OK-110	
			Refer to Particle Size Distribution (PSD) Chart for details & differences between the distributions used						
	TSS REMOVAL RESULTS	100% Operating Rate Tested	YES	YES	YES	YES	NO (Up to **40%** of operating rate tested)	NO (Up to **60%** of operating rate tested)	NO (Up to **46%** of operating rate tested)
		125% Operating Rate Tested	YES	NO	YES	YES	NO	NO	NO
		Pre-loaded unit at 50% Sediment Capacity prior to evaluating performance	YES	NO	NO	YES	NO	NO	YES
		NJCAT Verification For TSS Removal	**75 % TSS** (up to 125% of operating rate)	**73.7 % TSS** (up to 100% of operating rate)	**70 % TSS** (up to 125% of operating rate)	**69 % TSS** (up to 125% of operating rate)	**64 % TSS** (up to **40%** of operating rate)	**60 % TSS** (up to **60%** of operating rate)	**51 % TSS** (up to **46%** of operating rate)
	SCOUR TEST RESULTS	Scour Test Performed	YES	NO	NO	YES	NO	NO	Yes - in second chamber only
		50% Sediment Loading Capacity at 125% Operating Rate	NO SCOUR 0 ppm	Not Tested	Not Tested	NO SCOUR 0 ppm	Not Tested	Not Tested	SCOUR 11 ppm
		100% Sediment Loading Capacity at 125% Operating Rate (Level were maintenance is recommended)	NO SCOUR[3] 3 ppm	Not Tested	Not Tested	SCOUR 8 ppm	Not Tested	Not Tested	SCOUR 16 ppm
TARP TIER I NJDEP INTERIM APPROVAL		NJDEP Accepted NJCAT Verified Value for TSS Removal	**Interim Approval set at 50% TSS**	Interim Approval set at 50% TSS	Interim Approval set at 50% TSS	Interim Approval set at 50% TSS	Interim Approval set at 50% TSS	Interim Approval set at 50% TSS	Interim Approval set at 50% TSS
		Original Design Approved by NJDEP	YES	NO Only the "new" high efficiency design can be used. Original CDS design not approved.	YES	YES	NO Must reduce original flow capacity marketed in literature by 60%.	NO Must reduce original flow capacity marketed in literature by 50%.	NO Must reduce original flow capacity marketed in literature by 54%; Must increase tank surface area by 44% to 79% for design safety.

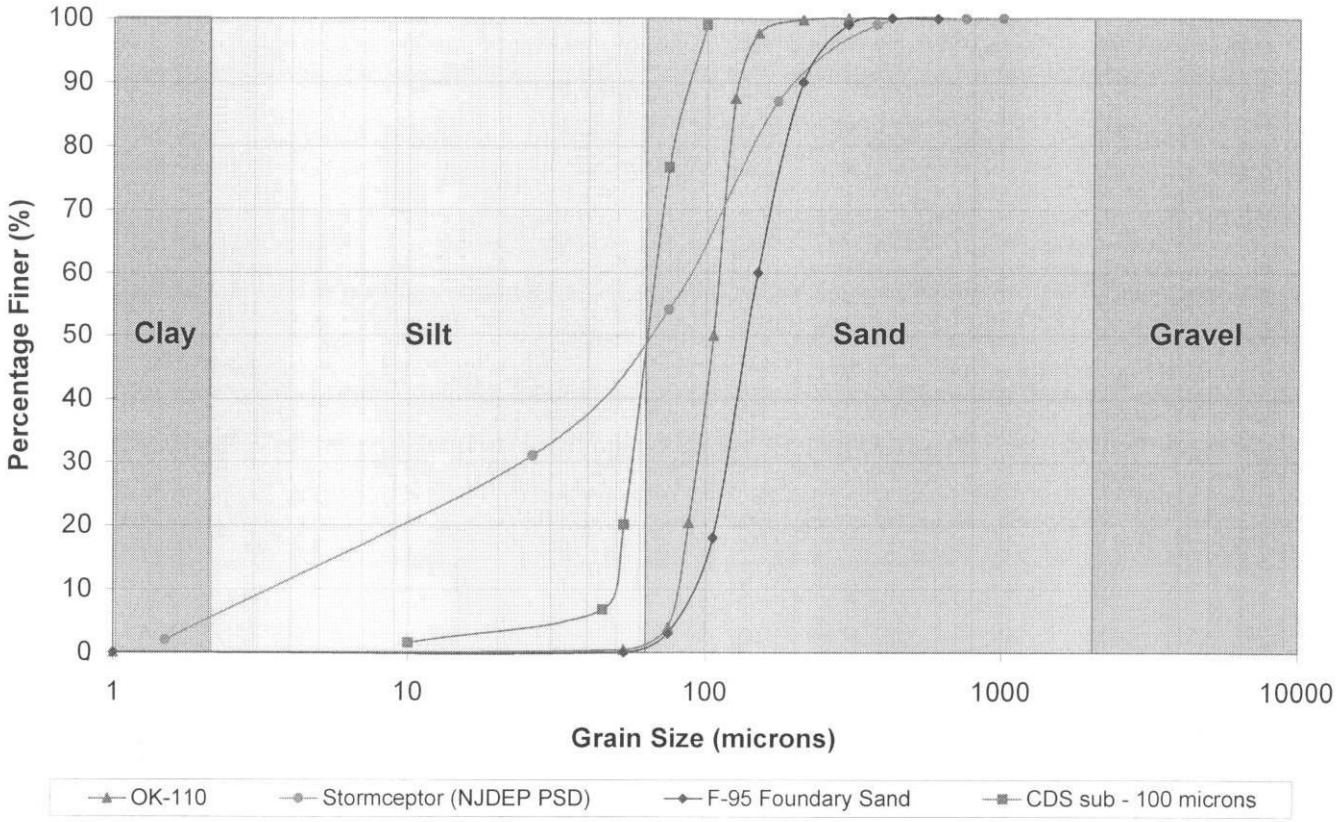
1. The Technology Acceptance and Reciprocity Partnership (TARP) is a workgroup of the Environmental Council of States (ECOS) that was originally made up of California, Illinois, Maryland, Massachusetts, New Jersey, New York, Pennsylvania and Virginia. Source of all NJDEP & TARP documented information: www.state.nj.us/dep/dsr/bscit/CertifiedMain.htm .

2. Stormceptor is marketed and designed to achieve water quality objectives, rather than sizing primarily for flow-based criteria.

3. Indicated in the NJDEP interim-certification letter (Feb. 15, 2005) which can be obtained from the below web link, Stormceptor did not scour at a 125% operating rate and 100% unit sediment loading. 3 ppm is considered to be within the tolerance of the testing error.

For NJDEP Interim Certified Stormwater Technologies go to: **http://www.state.nj.us/dep/dsr/bscit/CertifiedMain.htm**

Comparison of Particle Size Distributions (PSD) used in TARP Tier I Testing



TIER I - Lab Testing Protocol

1. Measure TSS Removal Efficiency

- Influent concentrations: 100, 200, 300 mg/L
- Five operating rates (25, 50, 75, 100, 125%)
- 50% pre-loaded with sediment

2. Measure Scouring / Re-suspension

- 50% and 100% pre-loaded at 125% operating rate

3. Utilize Pre-defined NJDEP Particle Size Distribution

- 5% clay / 40% silt / 55% sand

Source of all NJDEP and TARP documented information, go to: http://www.state.nj.us/dep/dsr/bscit/CertifiedMain.htm

City of Glendale Bayshore Mall Stormceptor Installation Photographs

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6