

Marco Town Center

Engineer's Report for Additional Drainage Improvements

Prepared for:

BRIXMOR

Prepared By:

**Hole Montes, Inc.
950 Encore Way
Naples, FL 34110**

Wilson A. Garcia,
State of Florida,
Professional
Engineer,
License No.
62436.

Digitally signed by Wilson A. Garcia,
State of Florida, Professional Engineer,
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authentication code.
email=wilson@arciaclahmng.com, c=US
Date: 2018.03.26 09:17:02 -0400

**Wilson A. Garcia, P.E. 62436
950 Encore Way
Naples, Fl, 34110
239-254-2000
HM Authorization #1772**

March, 2018

Introduction

The purpose of this report is to propose additional drainage improvements required for Marco Town Center to comply, to the greatest degree practical, with the Stormwater regulations in the City of Marco Island.

Best Management Practices (BMPs)

The following will be added to the plans:

1. Erosion Control Details
2. Pollution Prevention Plan
3. Urban Stormwater Management Program
4. Additional site improvements to capture and treat stormwater runoff prior to discharge to the public stormwater system. The treatment provided in the inlets filters will reduce suspended solids, nitrogen and phosphorus. Refer to the exhibits in Attachment A indicating the proposed improvements.

Low Impact Design (LID)

The following will be added to the plans to increase the amount of pervious area on the site:

1. Pervious pavers (14,450 sf)
2. Pervious asphalt (12,150 sf)
3. Green space (2,215 sf)

This achieves a reduction from 85% impervious to less than 80% impervious. Please refer to Attachment B indicating the areas where these LID measures are proposed.

Attachment C presents technical information of the products that would be used to accomplish the above improvements.

APPENDIX A

ADDITIONAL SITE IMPROVEMENTS

EXHIBIT A – NORTH PARKING LOT

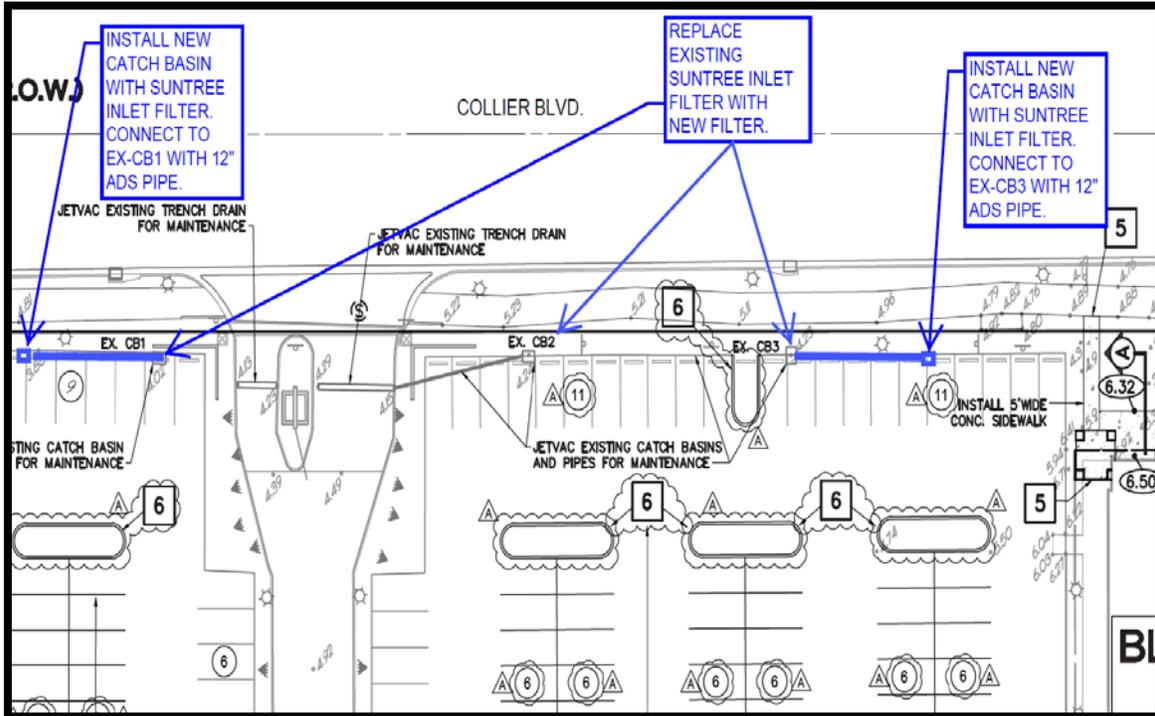


EXHIBIT C- ELKCAM CIRCLE ENTRY

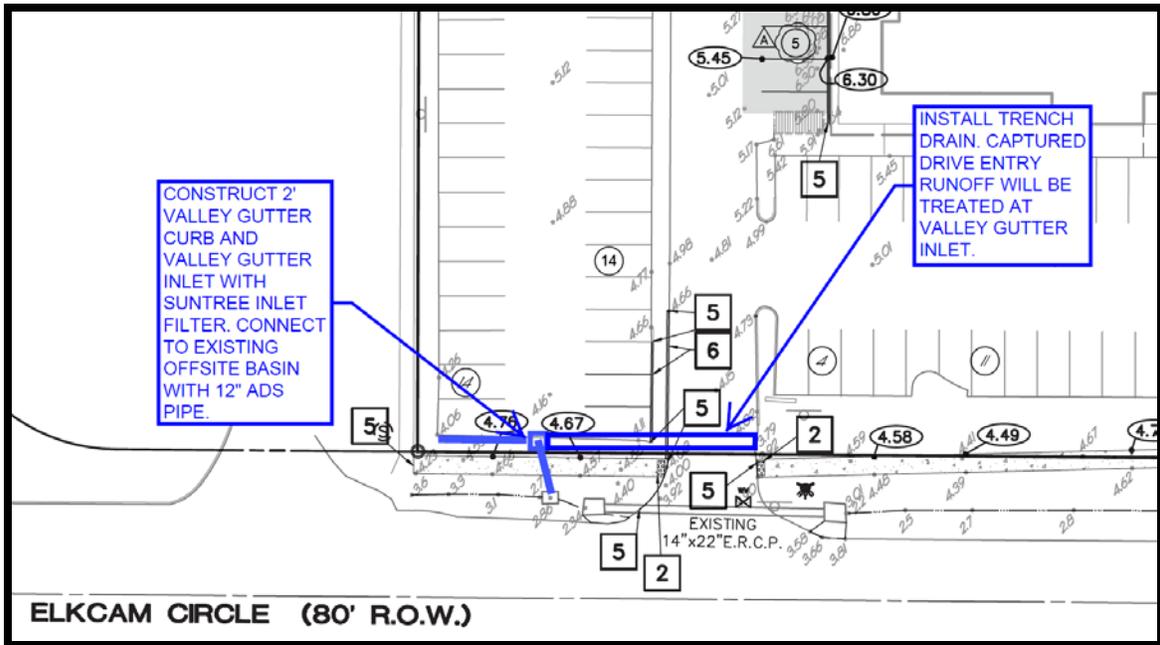
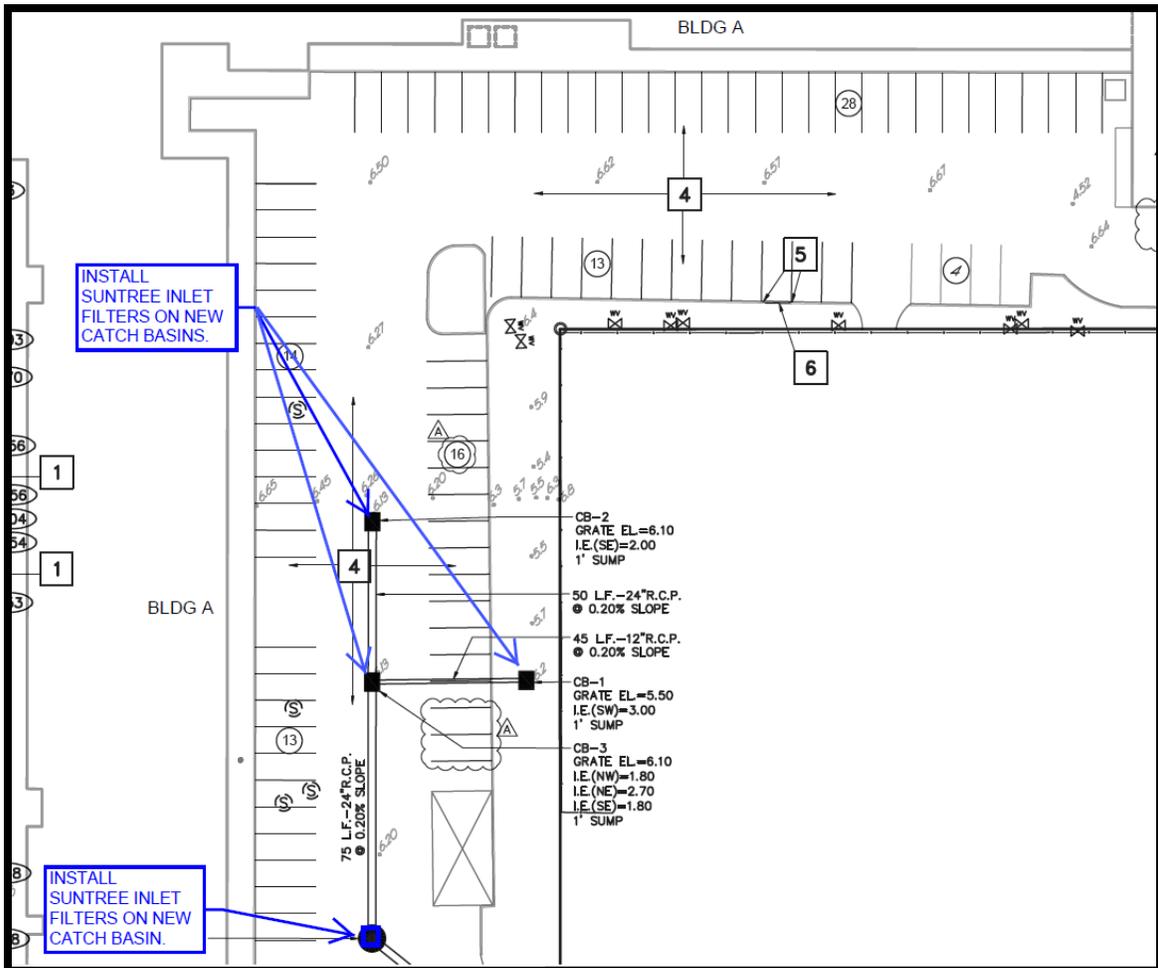


EXHIBIT D – BEHIND BLDG A



APPENDIX B

INCREASE OF PERVIOUS AREA

L17-063 Marco Town Center VAD-Dwg17-063-0m1.dwg, Plotted on 05/27/2016 / 09:53 AM by Christian Andrea
 Any deviations or inaccuracies need to be brought to the attention of the Owner immediately. All base information has been provided by others, verification of setbacks, property lines, etc. need to be provided by others. It is the responsibility of the Architectural Land Design and may not be used or reproduced without
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Marco Island Town Center
 City of Marco Island FL
LANDSCAPE CALCULATIONS

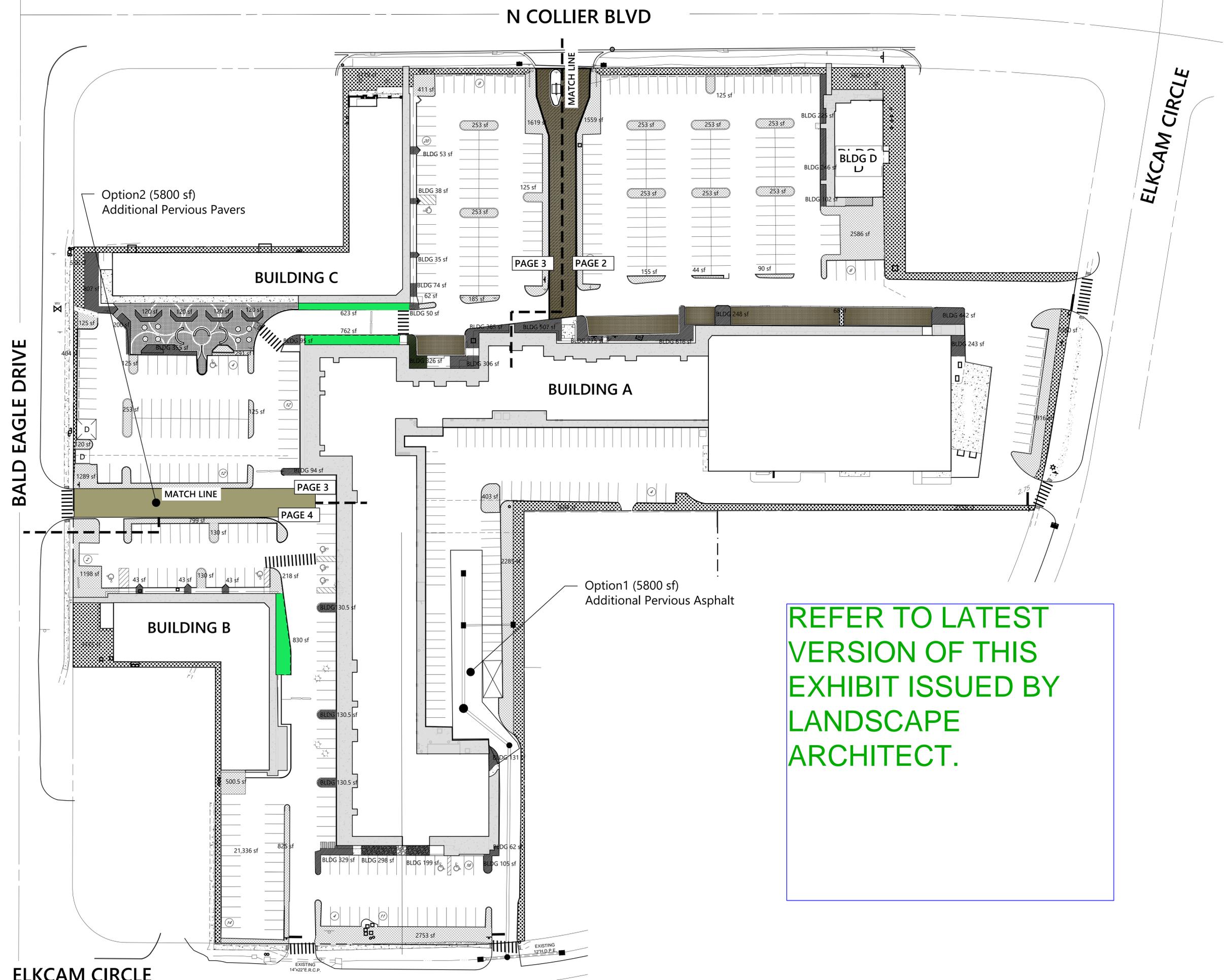
- ▲5 Update Calcs CA 3.07.18
- ▲4 Add Shrub Data to calcs CA 2.26.18
- ▲3 Adj. Planting Plan, Update 50 FT VAC 1.17.18
- ▲2 Rem. Some grasses / RW CA 1.16.18
- ▲1 Rev. basemap/planting CA 1.09.18
- Drawing Date: CA 7.07.17

Scale: 1" = 40'
 17-063-0



File Name: 17-063-0m1.dwg
 Architectural Information Provided By:
 Company Name:
 File Name:
 Date:
 Site Information Provided By:
 Company Name:
 File Name:
 Date:

1.1a



Contractor shall verify that he has the most up to date plans, and that they have been approved and accepted by the Owner before commencing construction.

APPENDIX C

TECHNICAL INFORMATION

TRENCH DRAIN

FILCOTEN[®] BY  NDS[®]
We put water in its place

Fiber-Reinforced Trench Drains for All Applications



[ndspro.com](https://www.ndspro.com)



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Calculators



Downloads



Case
Studies



Design
Worx



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a Quote

A heavyweight when it comes to features.

FILCOTEN® by NDS® combines smart engineering and smart materials to provide a superior trench drain suitable for handling a high load capacity. Combining the features of a stable concrete channel with the strength, durability and environmental-friendliness of fiber-reinforced concrete, FILCOTEN® by NDS® is the ideal choice for a wide variety of sites and applications.

Applications. Because FILCOTEN® by NDS® can handle a high load capacity, it is especially suitable for installation in industrial areas such as factories, garages and parking lots. With its sleek design it can easily be used in public places like railway stations, and pedestrian or residential areas.

Vertical outlet on every channel.

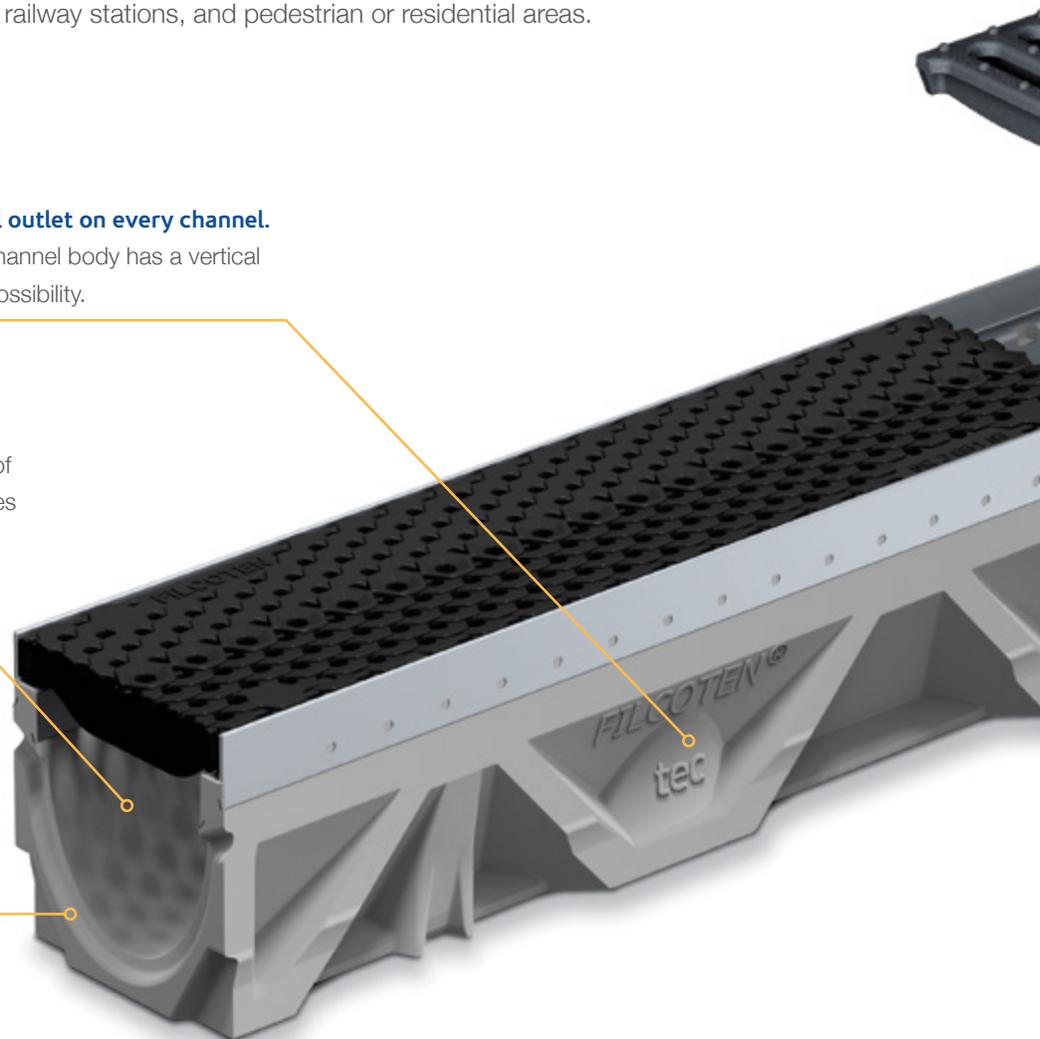
Every channel body has a vertical outlet possibility.

Engineered channel interior.

The particularly smooth inner surface of FILCOTEN® by NDS® channels achieves the best possible flow characteristics and self-cleaning effect.

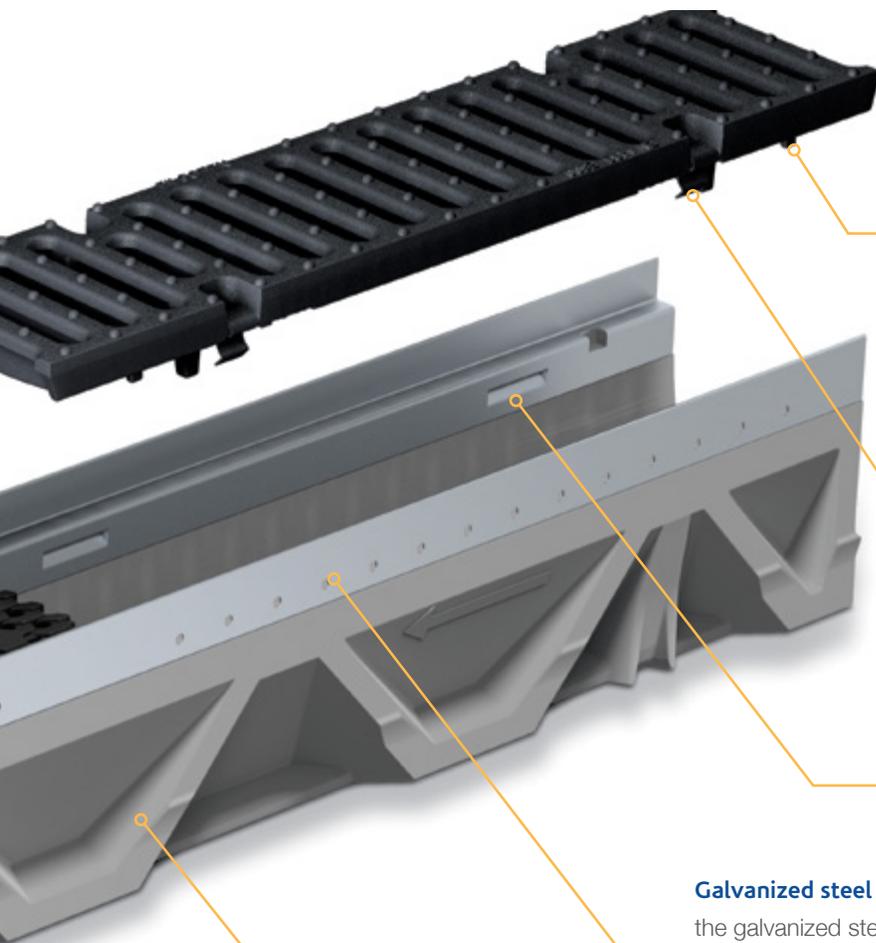
Sealant groove.

Sealant groove for waterproof installation.



FILCOTEN® Trench Drain

- **Temperature, frost and UV resistant.** Less contraction and expansion and longer product life.
- **Product impact stability.** Less susceptible to cracking and breaking during transport and installation.
- **100% recyclable / 0% harmful substances.** Sustainable solution without VOCs or heavy-metal residue that can leach into the ground. Qualifies for LEED credits.
- **Non-flammable.** Manufactured without resins, FILCOTEN® is rated A1, non-combustible.
- **Monolithic adhesion.** Free from de-molding agents, FILCOTEN® bonds securely with the surrounding concrete.



Engineered for stability.

Four anti-sliding lugs secure the grate against any longitudinal shifting and provides additional safety.

Fast and secure fix-connection snap-on-anchoring system.

The intelligent fix-connection uses an amazingly simple four-point, quick-release, integral design to securely hold the grate in place.

Designed with security in mind. Anti-vandal locking devices are available to ensure grates are only removed by authorized personnel. Four locking devices per channel section are recommended.

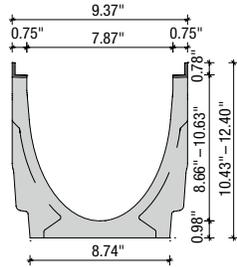
Galvanized steel rails. The special design of the galvanized steel rails allows for secure grate locking with the fix-connection self-locking system.

Engineered channel exterior. The anchoring ribs have been specially designed to support the channel and increase the exposed surface area, providing far better adhesion to the surrounding concrete.

FILCOTEN® Pro 200



FILCOTEN Pro 200
Galvanized Steel



17020228 & 17020229



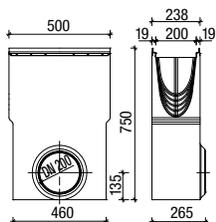
17020104



17020105



FILCOTEN® Pro Sump Unit 200



FILCOTEN® Pro V 200 Trench Drain

8"/200mm wide channel body with galvanized rail, pre-sloped and neutral sections

Item No.	Product Name	Slope	Length (in.)	Height at Channel End (in.)	Weight (lb.)
10620200	FILCOTEN Pro V 200 Channel 0 with Galvanized Rail - Neutral	0%	39.37	10.43	97.00
10620201	FILCOTEN Pro V 200 Channel 1 with Galvanized Rail	0.5%	39.37	10.43-10.63	98.11
10620202	FILCOTEN Pro V 200 Channel 2 with Galvanized Rail	0.5%	39.37	10.63-10.83	100.31
10620203	FILCOTEN Pro V 200 Channel 3 with Galvanized Rail	0.5%	39.37	10.83-11.02	102.51
10620204	FILCOTEN Pro V 200 Channel 4 with Galvanized Rail	0.5%	39.37	11.02-11.22	104.72
10620205	FILCOTEN Pro V 200 Channel 5 with Galvanized Rail	0.5%	39.37	11.22-11.42	106.92
10620261	FILCOTEN Pro V 200 Channel 5-0 with Galvanized Rail - Neutral	0%	39.37	11.42	108.30
10620206	FILCOTEN Pro V 200 Channel 6 with Galvanized Rail	0.5%	39.37	11.42-11.61	109.13
10620207	FILCOTEN Pro V 200 Channel 7 with Galvanized Rail	0.5%	39.37	11.61-11.81	111.33
10620208	FILCOTEN Pro V 200 Channel 8 with Galvanized Rail	0.5%	39.37	11.81-12.01	113.54
10620209	FILCOTEN Pro V 200 Channel 9 with Galvanized Rail	0.5%	39.37	12.01-12.20	115.74
10620210	FILCOTEN Pro V 200 Channel 10 with Galvanized Rail	0.5%	39.37	12.20-12.40	117.95
10620262	FILCOTEN Pro V 200 Channel 10-0 with Galvanized Rail - Neutral	0%	39.37	12.40	118.83
10620264	FILCOTEN Pro V 200 Channel 20-0 with Galvanized Rail - Neutral	0%	39.37	14.37	138.23

FILCOTEN® Pro 200 Grates with fix-connection self-locking system

Item No.	Product Name	Dimensions L / W / H (in.) / (mm)	Load class per EN1433	Max. Design Load (lb.)	Slot/mesh width	Weight (lb.)	Weight (kg.)	Intake Area (in. ² /ft.)	Intake Area (cm ² /m)	Flow Rate Through Grate* (GPM)
17020228	FILCOTEN 200 Galvanized Steel Perforated Grate Class C - 1m	39.37"/8.74"/0.78" 1000/222/20	Class C	56,200	1/4" hole	29.76	13.5	8.03	170	80.702
17020229	FILCOTEN 200 Galvanized Steel Perforated Grate Class C - 1/2m	19.69"/8.74"/0.78" 500/222/20	Class C	56,200	1/4" hole	14.77	6.7	8.03	170	80.702
17020104	FILCOTEN 200 Ductile Iron Longitudinal Bar Grate Class D - 1/2m	19.69"/8.74"/0.78" 500/222/20	Class D	89,920	1.14 x 0.51	7.5	3.6	44.41	940	446.24
17020105	FILCOTEN 200 Ductile Iron Slotted Grate Class E - 1/2m	19.69"/8.74"/0.78" 500/222/20	Class E	134,800	7.87"x 0.55" (200 x 14mm)	18.96	8.6	45.59	965	458.108

*Calculated using simple orifice equation with 1/2 inch head

FILCOTEN® Pro 200 Accessories

Item No.	Product Name	Material	Weight (lb.)
10620290	FILCOTEN Pro V 200 Sump with Galvanized Rail	High-Performance Fiber-Reinforced Concrete	105.82
22512	FILCOTEN 200 Silt Bucket	Plastic	1.54
32089	FILCOTEN 200 Anti-Vandalism Locking Device	Galvanized Steel	0.22
19020216	FILCOTEN 200 End Cap with 8" Outlet	Galvanized Steel	1.10
19020295	FILCOTEN 200 Step Connector Plate	Galvanized Steel	0.44
19021208	FILCOTEN B let 8" - 12"	Galvanized Steel	2.20
70154	FILCOTEN Catch Basin to 8" Pipe Connector	Plastic	2.40
19020230	FILCOTEN Front /End Cap, No Outlet	Galvanized Steel	1.68

NOTE: Will accept 8" pipe

From NDS®

The Leader in Stormwater Management

Resources:

Load Ratings according to EN1433 Standards:



CLASS A

- Max Design Load: 3,372 lbs.
- Pedestrians
- Bicyclists
- Planted areas



CLASS B

- Max Design Load: 28,100 lbs.
- Pedestrians
- Parking lots
- Delivery vehicles



CLASS C

- Max Design Load: 56,200 lbs.
- Curbs
- Road shoulders
- Parking lots



CLASS D

- Max Design Load: 89,920 lbs.
- Roadways
- Pedestrian zones
- Parking lots



CLASS E

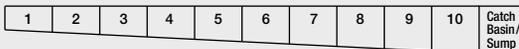
- Max Design Load: 134,800 lbs.
- Industry
- Military
- High wheel loads

Neutral run

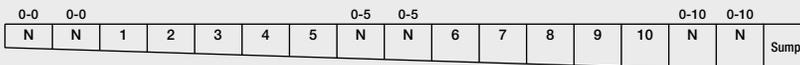
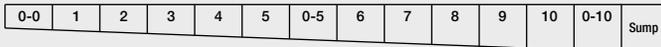


*Any neutral channel can be used in this application.

Linear run without neutrals



Linear run with neutrals



Step Slope



Counter-directional



Note: Drawings are not to scale. See previous pages for actual product dimensions.

Visit ndspro.com for:



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Case
Studies



Design
Worx

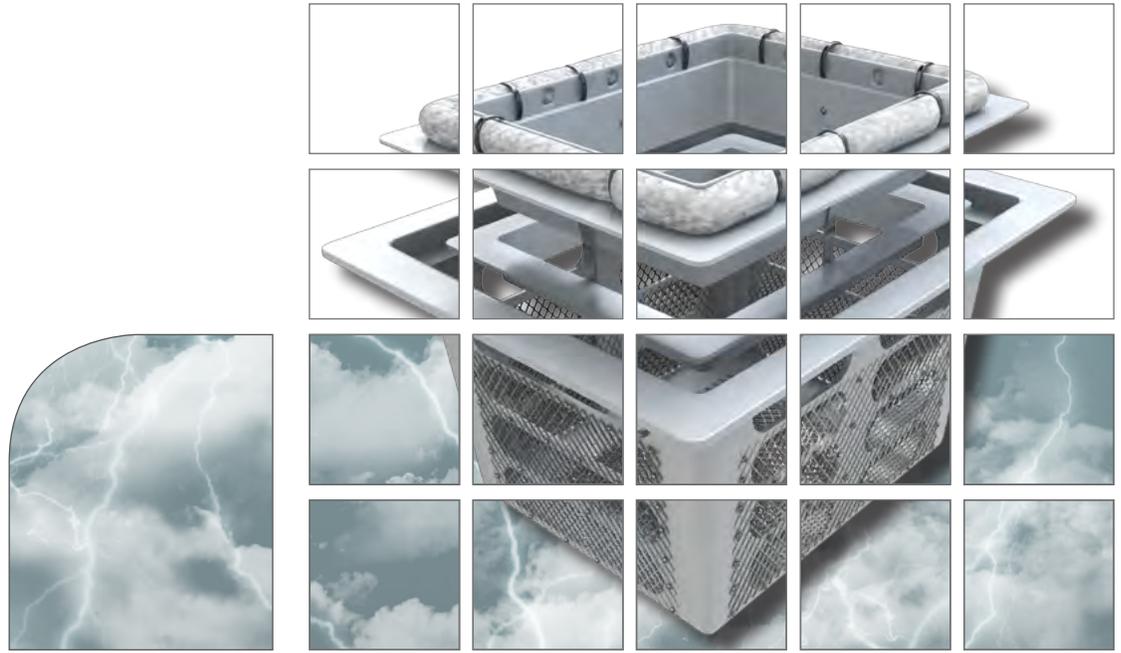


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HYDRO BG
Sustainable innovation.

STORM INLET FILTER



SUNTREE INLET FILTERS



PROVEN SOLUTIONS for Stormwater Treatment



STORMWATER TREATMENT

WHY SUNTREE INLET FILTERS?

When selecting inlet treatment consideration should be given towards lifetime performance results and annual costs for maintenance and replacement.

Suntree Inlet Filters have a **LOWER LIFETIME COST PER INLET:**

- » **HIGH CAPACITY** - Fiberglass inlet filters can accommodate heavy debris and high pollutant loads without obstructing the flow of the inlet.
- » **KEEP WHAT YOU CAPTURE** - Non Scouring screens prevent washout of debris during peak flows.

- » **NO REPLACEMENT COSTS** - Unlike bag or cartridge filters, Suntree fiberglass inlet filters are permanent BMP's which do not need to be replaced.
- » **LOWER MAINTENANCE COSTS** - Easy to service (approx. 15 minutes per inlet with vacuum truck). Suntree inlet filters are the preferred choice of maintenance crews!
- » **NUTRIENT CAPTURE** - Foliage is stored DRY between rain events to prevent nutrient loss.
- » **BEST IN CLASS** - No other inlet device exceeds Suntree's Warranty!
- » **PROVEN** - Thousands of installs nationwide (since 1993) and still performing as specified!



**"SIMPLE. WE WILL NOT BE
OUTPERFORMED!"**

» ADVANTAGES

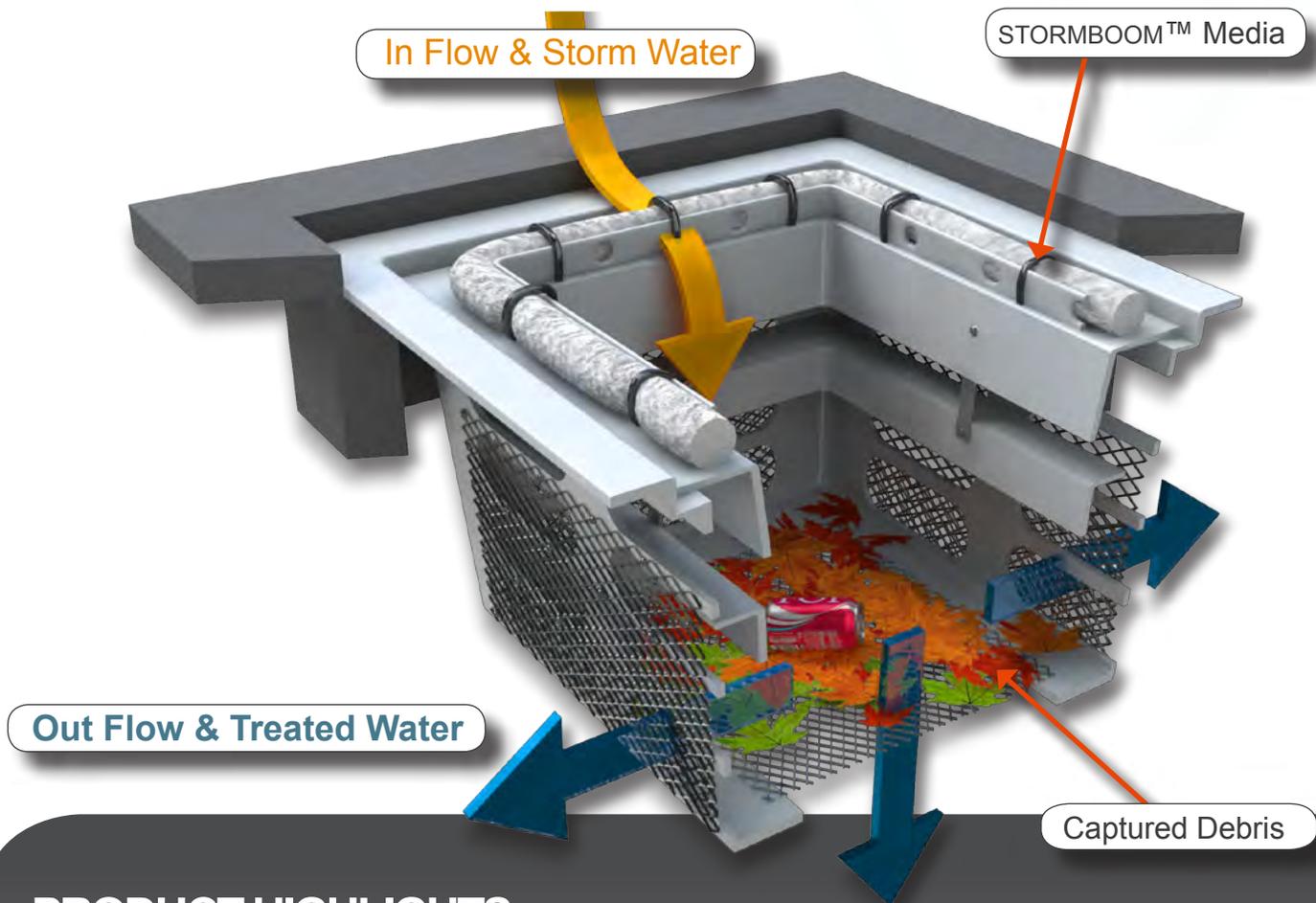
- 5 Year Warranty
- No Nets or Geofabrics
- Fiberglass Construction
- Will not impede inlet flow
- Meets LEED Requirements
- Easy to install and Maintain

» PERFORMANCE

- Up to 74%-86% Removal of TSS
- Up to 54% Removal of Oils & Grease
- Up to 57%-71% Removal of Phosphorus
- Up to 56%-60% Removal of Nitrogen



INLET FILTER OPERATION



PRODUCT HIGHLIGHTS

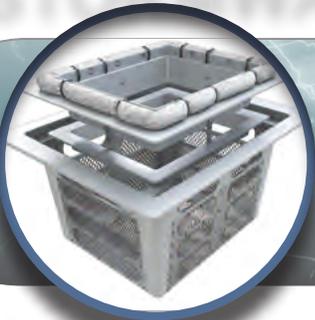
- » **PERMANENT** - Durable fiberglass body with UV filter and stainless steel screens. The effective life of the filter will likely span decades. It's durability is engineered to be a part of your permanent infrastructure.
- » **OPTIMIZED REMOVAL EFFICIENCY** -Stainless steel screens of multiple sieve sizes ensure the effective passage of water and a high removal efficiency of pollutants of concern.
- » **NON-SCOURING** - The unique arrangement of turbulence deflectors within the filter act to calm the water to create a greater removal efficiency and prevent previously captured debris.
- » **NOT A BAG** - Suntree products are not made on a sewing machine and you can't roll them up and put them into your pocket. Bag filters fail, clog, tear, dry rot, can collapse into the catchbasin and plug pipes, and typically need frequent replacing.
- » **EASY TO SERVICE** - The exceptional strength of the rigid body enables easy removal and servicing by vacuum trucks. A trucks vacuum will not be able to suck up the filter or accidentally tear down through the bottom of the filter.
- » **PATENTED** - The unique engineering of Suntree's inlet filter line is protected by multiple patents and will not be found in any other product...Suntree is the Real Deal!

ALL OF OUR SUNTREE INLET FILTERS CAN BE CUSTOM SIZED FOR ANY PROJECT NEED



www.suntreetech.com | 321-637-7552

STORMWATER TREATMENT PRODUCTS



GRATE INLET SKIMMER BOX™ for grated catch basins

The Grate Inlet Skimmer Box™ is manufactured from marine grade fiberglass and with stainless steel screens and is built to last!

Incoming stormwater passes through a skimmer tray with hydrocarbon absorption boom. Solids are captured in the lower section allowing filtered stormwater to pass into the catch basin.

The filter drains dry after each storm event.



CURB INLET BASKET™ for shallow catch basins

Stormwater Filter for curb type inlets. Manufactured of marine grade fiberglass and with stainless steel screens .

Stormwater filter for a shallow curve inlet. A shelf system directs water flow into the filtration basket and positions the basket directly under the manhole for easy access. If necessary, the water flow can bypass the entire filtration system simply by flowing past the filter and into the catchbasin.

Up to 93% TSS removal.



HIGH CAPACITY CURB INLET BASKET™ for deep catch basins

Stormwater Filter for curb type inlets where the only access is a manhole. Manufactured of marine grade fiberglass and with stainless steel screens.

A patented shelf system directs water into the curb inlet basket. The filter is positioned under manhole for easy access.

STORMBOOM™ MEDIA HYDROCARBON ABSORPTION BOOMS

Suntree manufactures various storm booms designed for stormwater applications.

- » **Type 1** - Absorbent W : A wide spectrum absorbent with large sieve covering. Capable of absorbing chemicals other than hydrocarbons
- » **Type 2** - Melt blown polypropylene with a large sieve size covering. Will not biodegrade. Absorption is limited to hydrocarbons.
- » **Type 3** - 50-50 blend of Absorbent W and melt blown polypropylene with a large sieve size covering. This boom offers wide spectrum absorption with an extra emphasis on hydrocarbon absorption.
- » **Type 4** - Polymer crumb filler with a fine sieve size covering. The polymer crumb filler will not absorb water and can float indefinitely, and it will not biodegrade.



PROVEN SUCCESS IN THE FIELD

- No need to enter the confined space of the catchbasin to service.
- Multi-stage Filtration Captures everything from hydrocarbons, sediment, grass clippings, and litter.
- Easily serviced by vacuum truck without tearing.
- Will not cause street flooding - All filters are designed with adequate bypass to meet design flows of the inlet.
- Does not need replacement - unlike pesky cartridges or bag filters.



PERVIOUS PAVERS



COLOR GUIDE

BLENDED
COLORS



SUNSET BURST BLEND



RIVER ROCK BLEND

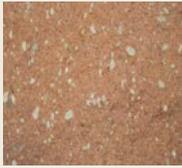


QUARRY RIDGE BLEND

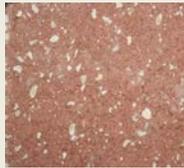


ROCKY ROAD BLEND

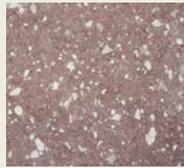
SOLID
COLORS



CANDLEWOOD



CRIMSON



MULBERRY



CAFE' MOCHA



GRANITE RIDGE



CAPPUCCINO



SUNDANCE



SUNSET BURST BLEND



80% NATURAL GRAY, 20% SUNDANCE



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 WWW.TITANAMERICA.COM
 WWW.ACFENVIRONMENTAL.COM

NOTE: The color illustrations on this page are as accurate as digitally possible. Variations may occur between samples and actual finished products. Final color selections and approvals should be made from actual samples.

PAVE DRAIN

STORMWATER'S ARCH ENEMY

Sustainable Stormwater Solutions



Structural and Environmental Benefits

The PaveDrain® system combines modern-day functionality with a structural concrete concept used for centuries to create *the* revolutionary permeable paving solution. This system incorporates a patented arch design in the middle of an articulating concrete block to create an internal storage chamber that can be used as a reservoir for stormwater runoff, while simultaneously providing strength for heavy vehicular loads. The PaveDrain system is designed to be a critical component of Low Impact Development (LID) allowing for the infiltration of stormwater runoff.

The PaveDrain system is an aesthetically pleasing Permeable Articulating Concrete Block (P-ACB) that provides installation ease and flexibility to meet current and future stormwater management regulations. The PaveDrain system provides infiltration, storage, detention, conveyance and a concrete paving surface all in one. When combined, these features allow for a reduction or elimination in stormwater infrastructure costs while minimizing environmental impact. The PaveDrain system WORKS!

ASTM Standards & ADA Compliance

The PaveDrain system meets the requirements of ASTM D6684-04 and is recognized by the USEPA as a structural Best Management Practice (BMP) for stormwater infiltration. The Americans with Disabilities Act (ADA) Design Guidelines required that surface openings shall not exceed ½" and shall be firm, stable, and slip resistant. The PaveDrain system easily exceeds all these requirements by incorporating a ¼" gap between individual PaveDrain blocks.

Applications

- Parking Lots
- Low Speed Roadways
- Alley Ways
- Emergency Access Lanes
- Intersections
- Residential Driveways



Why the PaveDrain System?

As part of the Clean Water Act, the EPA developed the National Pollution Discharge Elimination System (NPDES) to improve water quality by regulating point sources and non-point sources that discharge pollutants into waters of the U.S. The PaveDrain system captures and infiltrates massive amounts of surface water and allows land owners to route stormwater and control peak flows.



PaveDrain blocks work with existing infrastructure and can be used as the form for small concrete pours. No small, cut pieces to become dislodged.



Infiltration Report

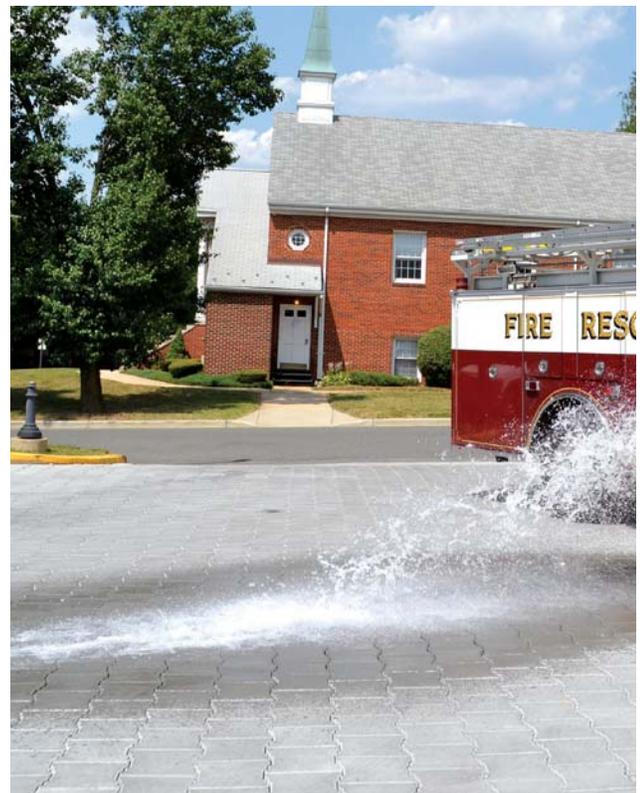
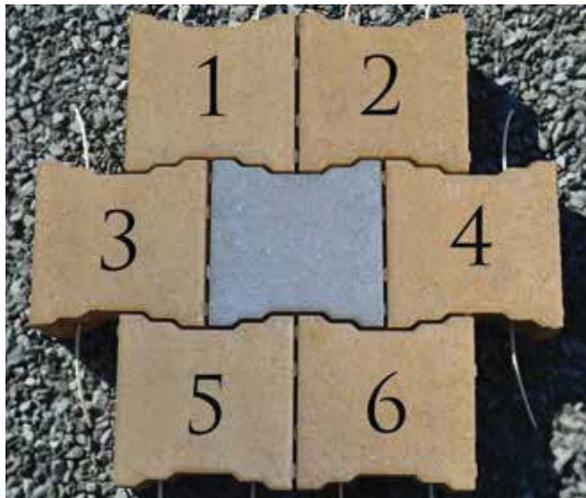
The **PaveDrain®** system was tested in accordance with ASTM C1701/C1701M-09 by an independent third party engineering firm. The tests were conducted on different **PaveDrain** installations that had not been maintained on an average of more than 2 years and still infiltrated in excess of 1,500 inches/hour per one foot diameter.

	Test #1	Test #2
Inside Dia. of infiltration Ring (in)	12.19	12.19
Elapsed time of Test (sec)	20.9	21.95
Infiltration Rate (in/hr) (I=KM/(D2*tr))	1,630	1,560
Avg. Infiltration Rate (in/hr)	1,595	

PaveDrain® Systems Properties

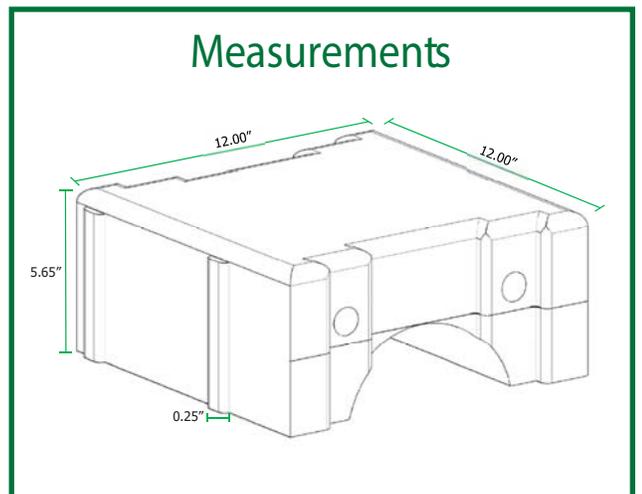
Thickness 5.65" (± 1/8")
 Unit Dimensions 12.00" x 12.00"
 Unit Weight 45-49 lbs
 Unit 1 Sq. Ft. Nominal
 Percentage Open Space: 7% Surface, 20% Storage Area

Each individual block is interlocked by six (6) units

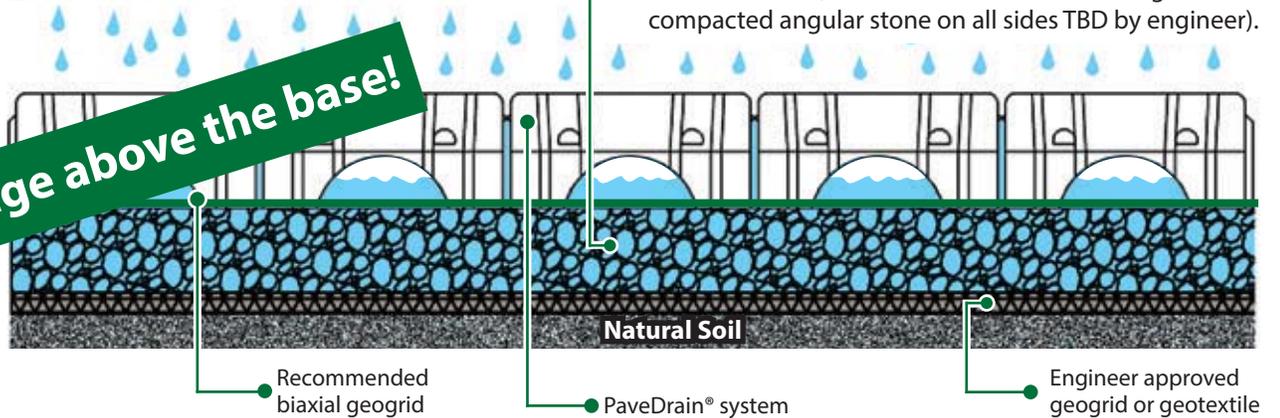


Passes AASHTO HS-25 Truck Loading

Measurements



PaveDrain® System Blocks End View Cross Section



Maintenance and Repair

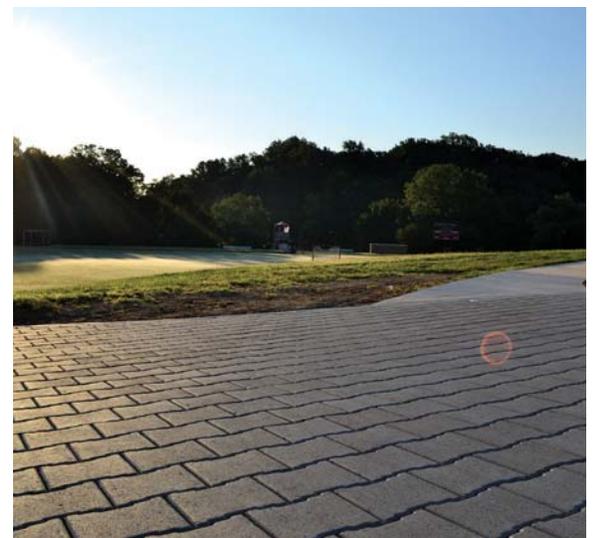
The PaveDrain® system is designed as an open joint concept between the blocks. Existing installations have required little, if any maintenance over multiple years. If the joints become filled or obstructed, maintenance is accomplished by using a vacuum truck or a combination sewer vacuum truck and the PaveDrain Vac Head. If a significant amount of sediment accumulates in the aggregate bedding stone, part or all of the PaveDrain system can be removed allowing the subgrade to be cleaned and then the same product re-installed without affecting the surrounding blocks. Repair of individual PaveDrain blocks can be accomplished with a block puller without affecting the surrounding blocks. For more detailed information on these topics go to www.pavedrain.com and select Installation & MAINTENANCE and then click REPAIR.



ELGIN Whirlwind® & Megawind® are registered trademarks of Elgin Sweeper Co.

Additional Benefits

- Up to 5 LEED Credits: Sustainable Sites; Credit 6.1, 6.2, 5.1, 5.7 & Materials & Resources: Credit 5.1.
- Initial Installations show a drastic reduction in the use of deicing salts over traditional asphalt and concrete surfaces.
- Since it is a precast concrete block, it can be installed in all types of weather.
- Available in several color options.
- No seams to catch on steel snow plow blades.
- Solar Reflectance Index (SRI) range of 36 - 41 for lighter colored units.
- Unlike traditional catch basins, varmints cannot enter drainage system.
- Regional manufacturing supporting local economies.
- Adaptable to small areas (retrofits) where retention ponds are outdated or not practical.



Represented Locally By:

PaveDrain, LLC

Global Water Center
247 Freshwater Way Milwaukee, WI 53204
(888) 575-5339 Office
www.pavedrain.com



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The PaveDrain systems is protected by the following U.S. and Canadian Patents; U.S. No. 8,251,607, No. D609,369, No. 8,366,343 & Canadian No. 133082. Additional patents pending.