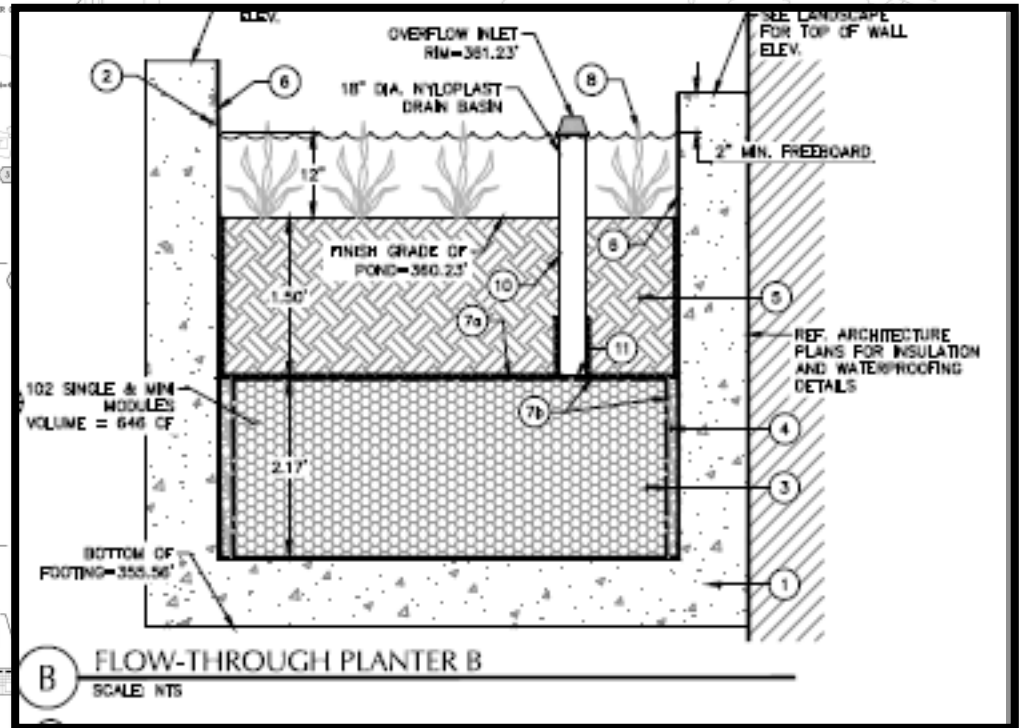
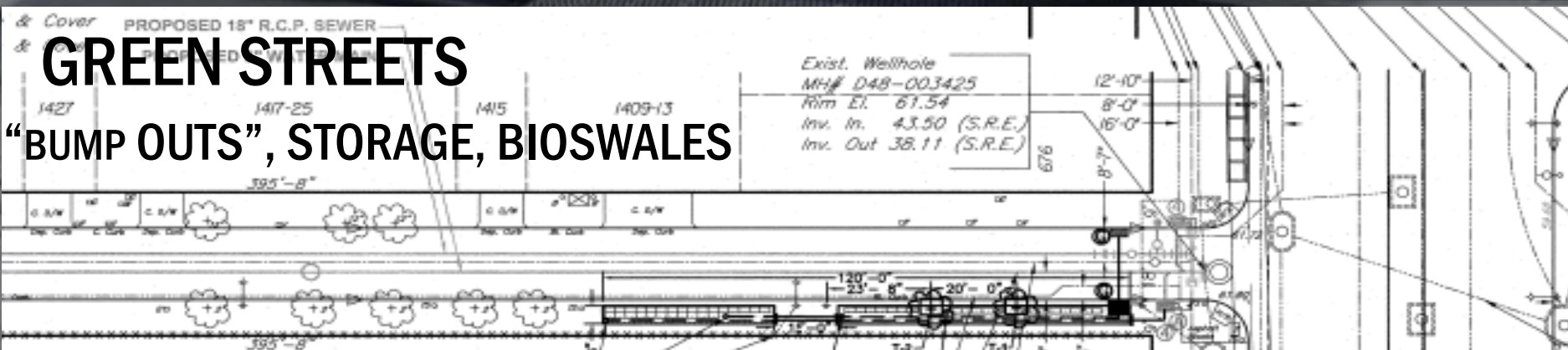


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GREEN STREETS

"BUMP OUTS", STORAGE, BIOSWALES



Rosedale Runoff Reduction Project

NINE MILE RUN
WATERSHED ASSOCIATION

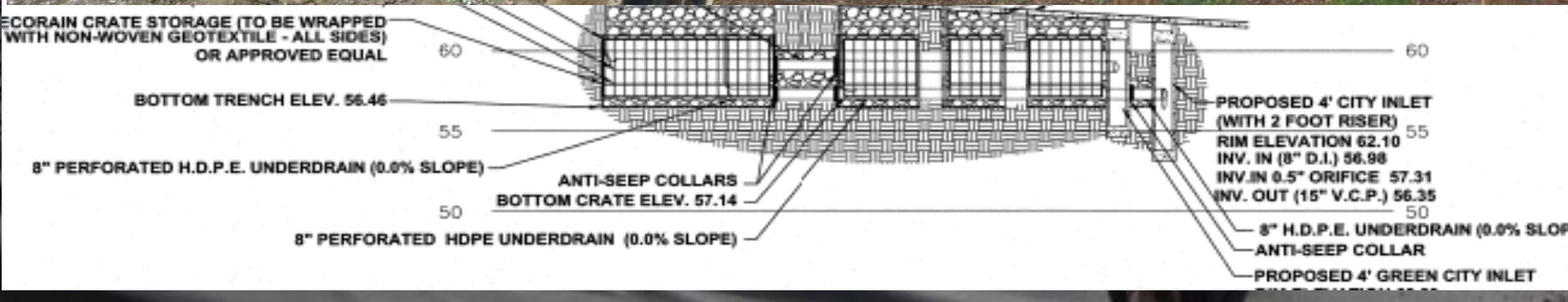
FOUNDERS
Department of Environmental Protection (DEP)
Growing Greener Program
Richard King Mellon Foundation

PARTNERS
ACADEMIA
Carnegie Mellon University
City Councilman Rev. Ricky Burgess
City of Pittsburgh EPM
City of Pittsburgh Planning Dept
City of Pittsburgh USA
Operation Better Block
Pittsburgh Public Schools
PMAA
State Rep. Ed Gurney
State Senator Jay Costa
Western Pennsylvania Conservancy

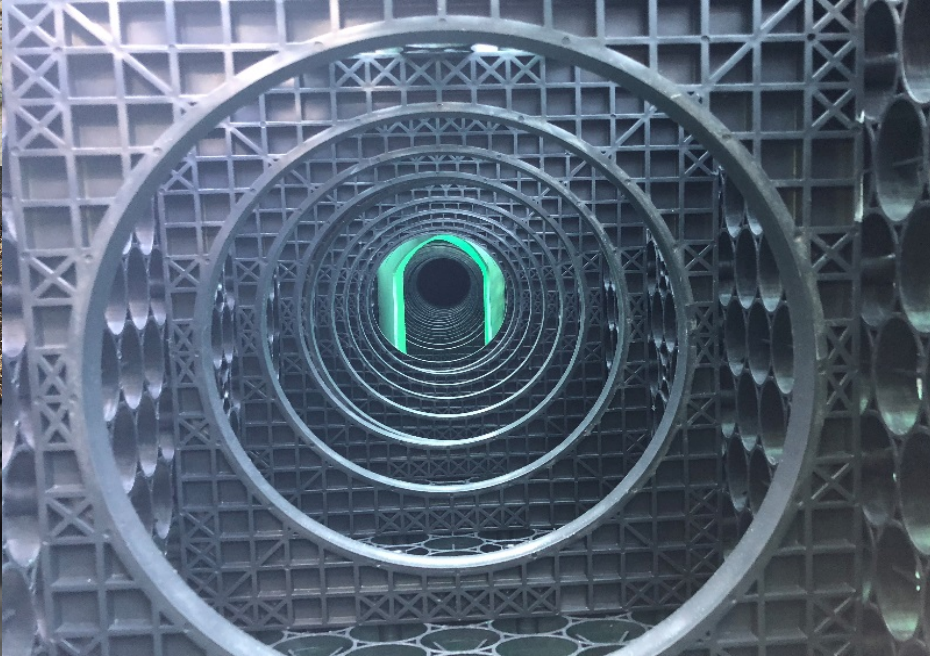
DESIGN TEAM
Fritsch Collaborative
Landscape Systems
Stormworks

This site will be the location of a green stormwater infrastructure project that will manage rain runoff from school property. It is part of a larger effort, led by the Nine Mile Run Watershed Association, to reduce sewage and stormwater overflow into the Nine Mile Run stream in Frick Park. For more information please visit www.rosedalein.com

PROPOSAL



High Performance Infiltration Trench



OPTIMIZING BIORETENTION WITH R-TANK IN NASHVILLE, TN

Equation 1.1. Bioretention Level 1 Design Storage Depth

$$\text{Equivalent Storage Depth} = D_E = n_1(D_1) + n_2(D_2) + \dots$$

$$D_E = (2 \text{ ft.} \times 0.25) + (0.5 \times 1.0) = 1.0 \text{ ft.}$$

$$D_E = (2 \text{ ft} \times 0.25) + (0.5 \text{ ft} \times 1.0) + 1.44 \text{ ft} \times 0.95 = 2.37 \text{ ft}$$

$T_v = 1000 \text{ FT}^3$ $DA = 0.289 \text{ ACRES}$		
LEVEL 1 DESIGN	D_E (Equivalent Depth) ft	SA (Minimum Surface Area) ft^2
Without Underdrain	1.0	1000
With R-Tank Underdrain	2.37	422
MIN SURFACE AREA PER 3% RULE = $0.289 \times 43560 \times .03 = 379 \text{ SF}$		

**57.8%
REDUCTION IN SA**

Equations 1.1 through 1.4 should be modified if the storage depths of the soil media (Max. 2–6 ft), gravel layer, or ponded water (Max. 0.5 ft.) vary in the actual design or with the addition of any surface or subsurface storage components (e.g., additional area of surface ponding, subsurface storage chambers, etc.).

BIORETENTION WITH SUBSURFACE STORAGE IN NASHVILLE, TN

1. Follow the GIP01 BIORETENTION 2016 GENERAL APPLICATION MANUAL
2. Level 2 Design with underground storage layer
 1. Can be stone
 2. Can be subsurface storage chambers per Section 6.1
3. Provide equivalent DE value using storage chambers instead of stone
 1. Benefit – decreased depth (contractor does not have to dig as deep, shallower system), maintain acceptable bioretention surface area.
4. Hold the depth you would have used with a stone storage layer, replace with higher void space storage chambers per Section 6.1
 1. Benefit – slightly greater DE value, meet the minimum bioretention surface area.
 2. Less excavation, space efficiency - you can fit Level 2 bioretention in areas you may not have been able to using stone. ALL CONSISTENT WITH GENERAL APPLICATION MANUAL.

BIORETENTION WITH SUBSURFACE STORAGE IN NASHVILLE, TN

LEVEL 2 $D_E=2.85'$

$n=1.0, D=0.5'$

$n=0.25, 3'$ min Level 2

7.5'

Stone $n=0.4, 4.0'$

LEVEL 2 $D_E=2.85'$

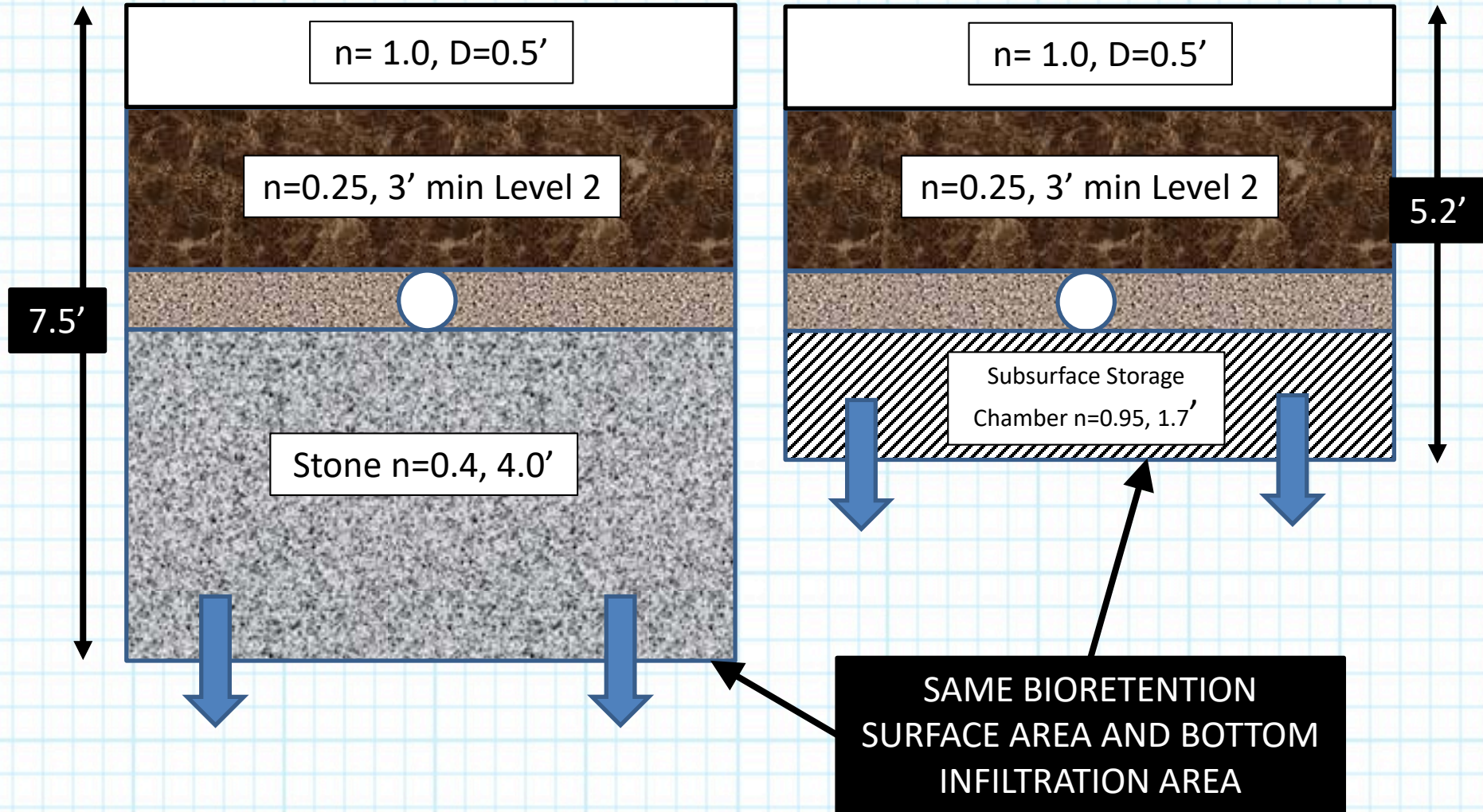
$n=1.0, D=0.5'$

$n=0.25, 3'$ min Level 2

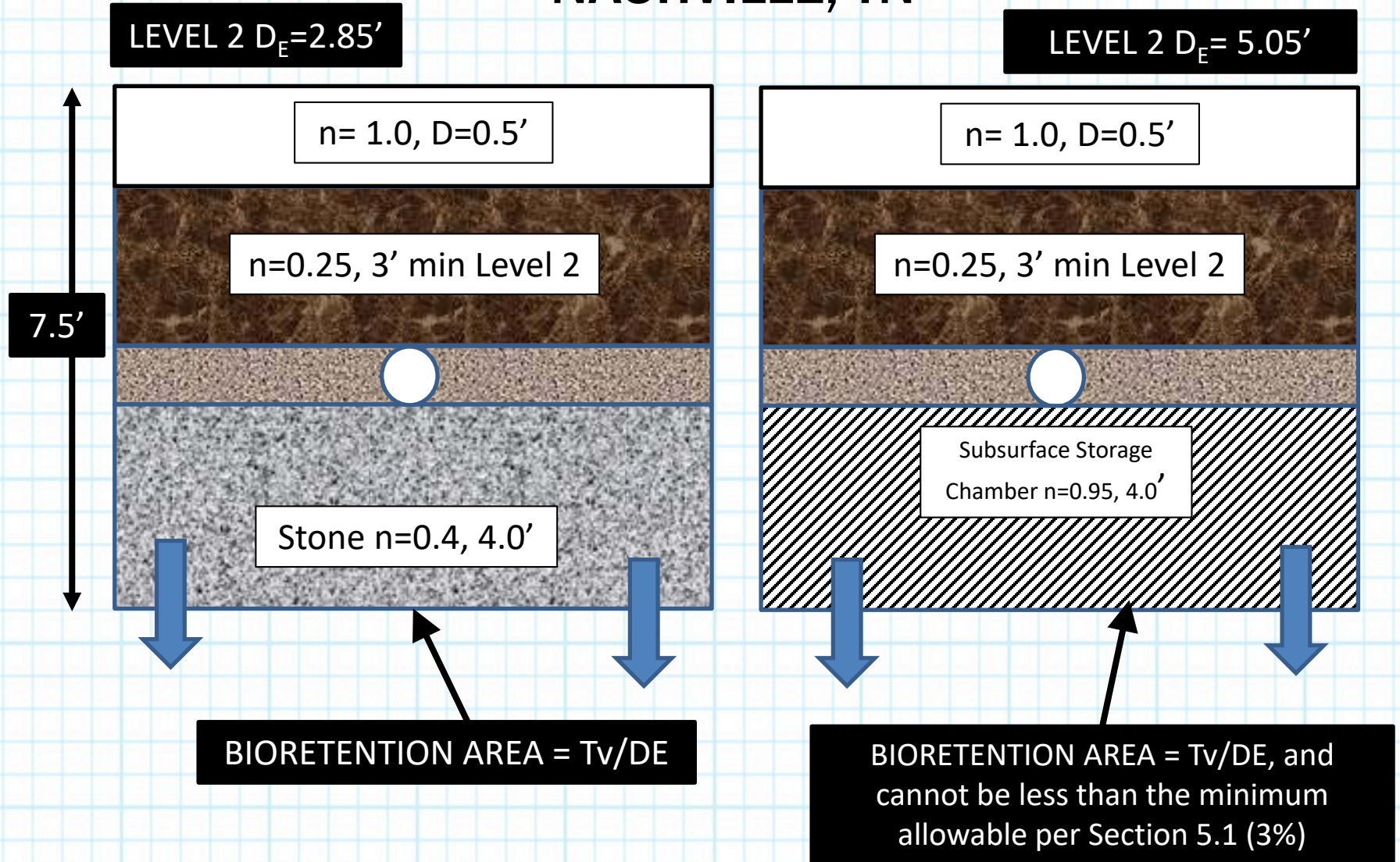
5.2'

Subsurface Storage
Chamber $n=0.95, 1.7'$

SAME BIORETENTION
SURFACE AREA AND BOTTOM
INFILTRATION AREA



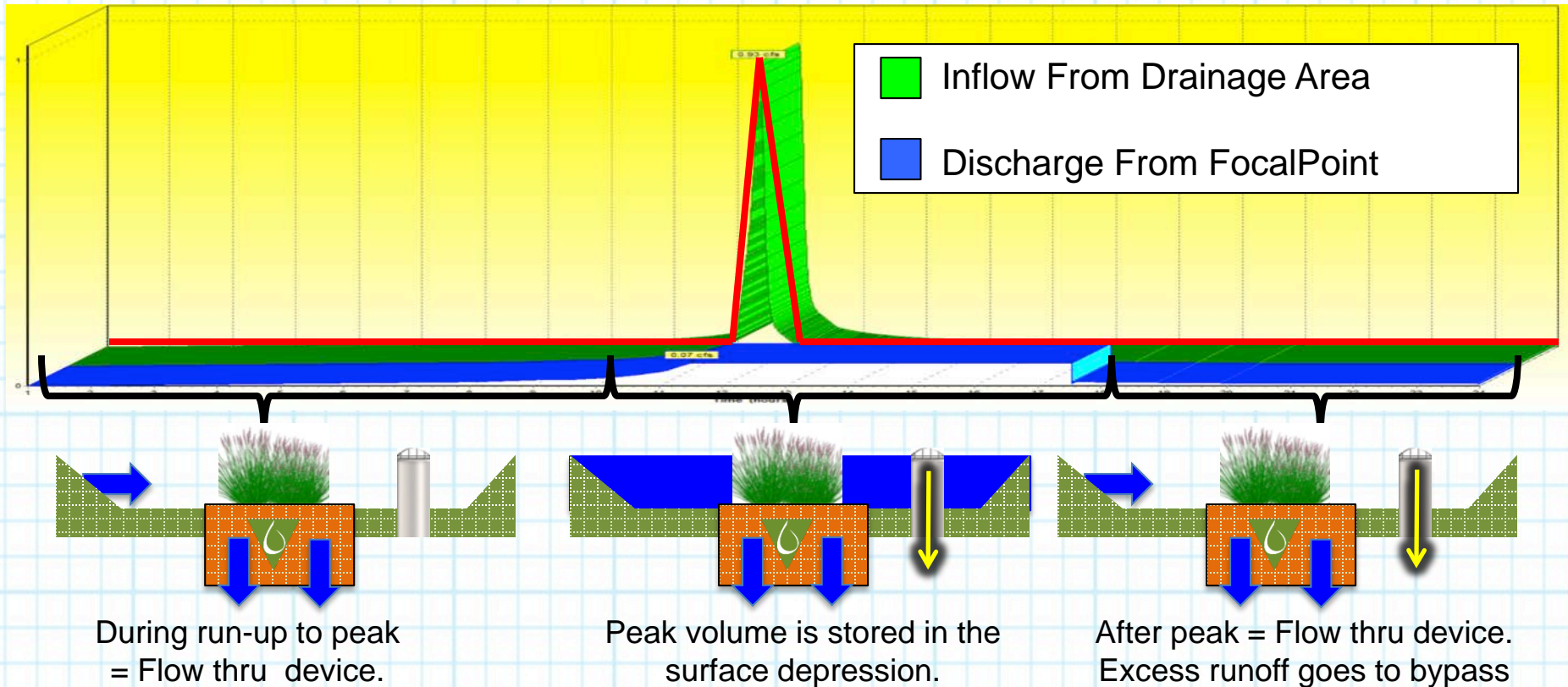
BIORETENTION WITH SUBSURFACE STORAGE IN NASHVILLE, TN



FocalPoint TR-55 Rainfall and Distribution Based Sizing: Construction (Full Event) Design

New

— = Water Quality Volume — = FocalPoint Treatment — = Volume > WQv to bypass





GREEN ROADWAY PROJECTS





Construction Issues: Erosion Control

CAUTION: BIOFILTRATION SYSTEM

DO NOT REMOVE GEOTEXTILE COVER

No quite la cubierta geotextil

DO NOT PLACE SOIL ON TOP OF ENGINEERED MEDIA OR COVER

No coloque tierra en la parte superior de la cubierta protectora

DO NOT STOCKPILE DIRT OR HAZARDOUS MATERIAL UPSTREAM

No acumular tierra o materiales peligrosos en el canal de drenaje

CAUTION: This FocalPoint Biofiltration System is an engineered stormwater treatment system. It must not be compromised prior to activation by Construction EcoServices. Do not remove the protective geotextile.

PRECAUCIÓN: FocalPoint Biofiltration System es un sistema de tratamiento de agua de lluvias. La cubierta protectora no debe ser removida o abierta, antes de ser activado solamente por Construction EcoServices.

ACTIVATION PREREQUISITES

Requisitos de activación

70% OF THE DRAINAGE AREA MUST BE STABILIZED

El 70% del área que rodea el drenaje debe ser estabilizada

STREET/PARKING MUST BE SWEEPED

La calle / estacionamiento debe ser barrido

90% OF THE SWALE MUST BE VEGETATED OR MULCHED

El 90% del canal de drenaje debe tener por cobijación vegetación o mulch

CONTACT CONSTRUCTION ECOSERVICES FOR ACTIVATION

Comuníquese con Construction EcoServices para la activación

832.456.1000





FocalPoint in the Divided Highway Median – Birnamwood Drive, Harris County, TX



High Performance Modular Biofiltration System: Merritt Road, Rowlett, TX

PARKING LOT APPLICATIONS







FOCALPOINT BIOFILTRATION SYSTEM

Water Quality and Flood Storage



KITTERY TRADING POST – FOCALPOINT BIOFILTRATION SYSTEM

FocalPoint
BIOFILTRATION SYSTEMS



ACF
ENVIRONMENTAL
LET'S GET IT DONE
**LOW IMPACT
DEVELOPMENT
SOLUTIONS**

HIGH PROFILE RETAIL- FOCALPOINT BIOFILTRATION SYSTEM

FocalPoint
BIOFILTRATION SYSTEMS



ACF
ENVIRONMENTAL
LET'S GET IT DONE

**LOW IMPACT
DEVELOPMENT
SOLUTIONS**

FOCALPOINT BIOFILTRATION SYSTEM

3-year Time Lapse

FocalPoint
BIOFILTRATION SYSTEMS

2015 Install



2016 Winter



CONVERGENT
WATER TECHNOLOGIES

2016 Summer



2018 Summer



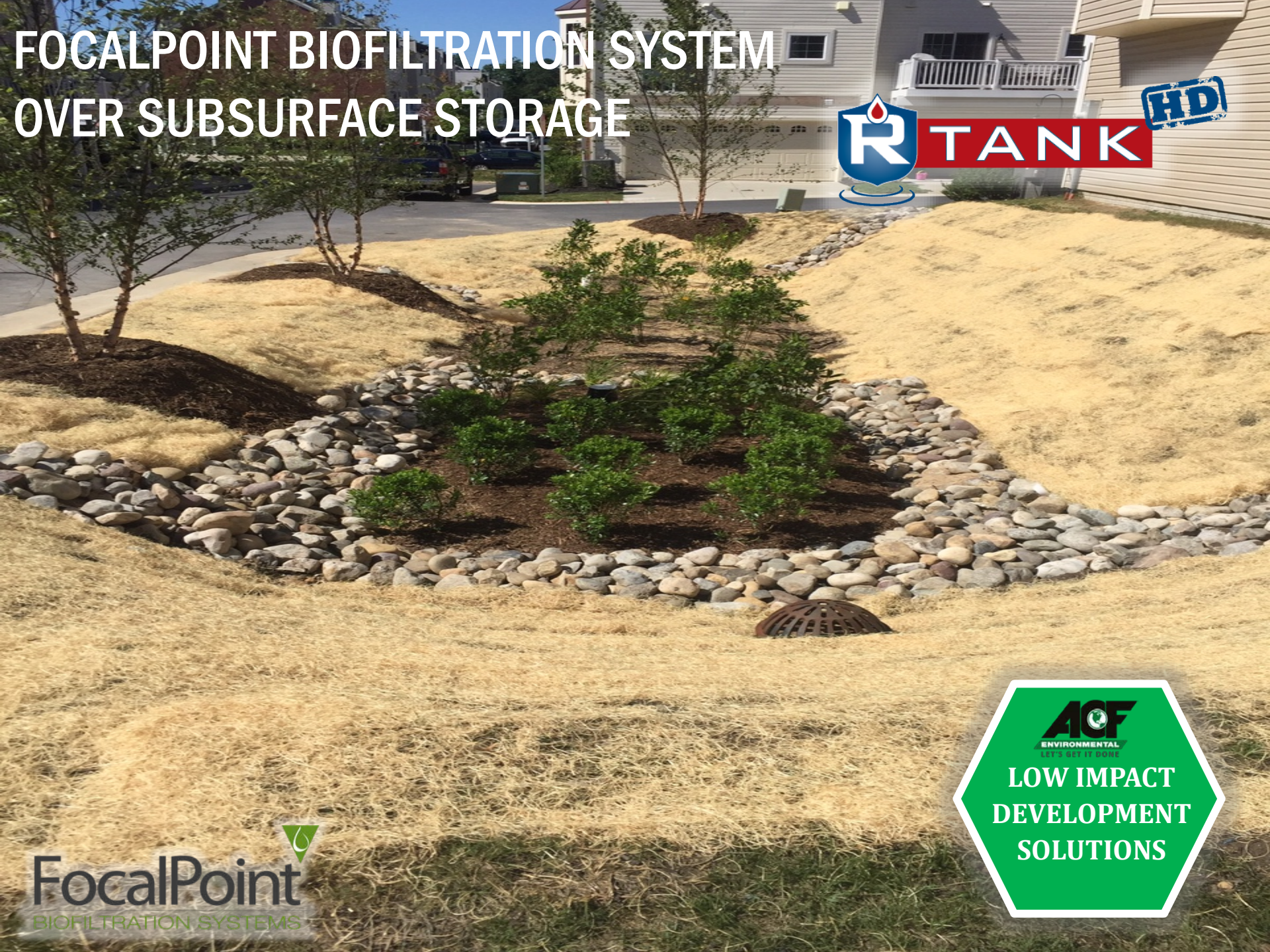


FOCALPOINT BIOFILTRATION SYSTEM OVER SUBSURFACE STORAGE



TANK

HD



FocalPoint
BIOFILTRATION SYSTEMS

ACF
ENVIRONMENTAL
LET'S GET IT DONE

**LOW IMPACT
DEVELOPMENT
SOLUTIONS**



- 
-
- Infiltration Tanks**
- ✓ Green Infrastructure
 - ✓ Low Impact Development
 - ✓ Treatment Train
 - ✓ Infiltration Based
 - ✓ At least 80% TSS Removal
 - ✓ At least 65% TP Removal
 - ✓ At least 50% Bacteria Removal



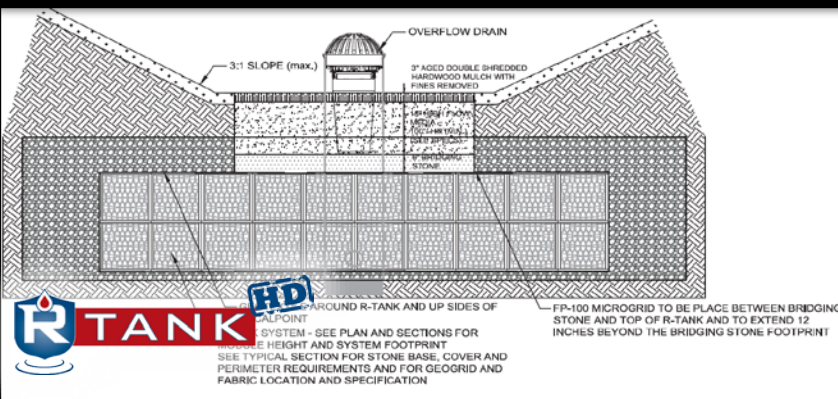
Infiltration Tanks

- ✓ Green Infrastructure
- ✓ Low Impact Development
- ✓ Treatment Train
- ✓ Infiltration Based
- ✓ At least 80% TSS Removal
- ✓ At least 65% TP Removal
- ✓ At least 50% Bacteria Removal



Filtration Over
Infiltration Tanks

FocalPoint
BIOFILTRATION SYSTEMS



Filtration Over
Infiltration Tanks

FocalPoint
BIOFILTRATION SYSTEMS