Manufactured Water Quality Solutions

Problem. Solution.

Parking Lot Project

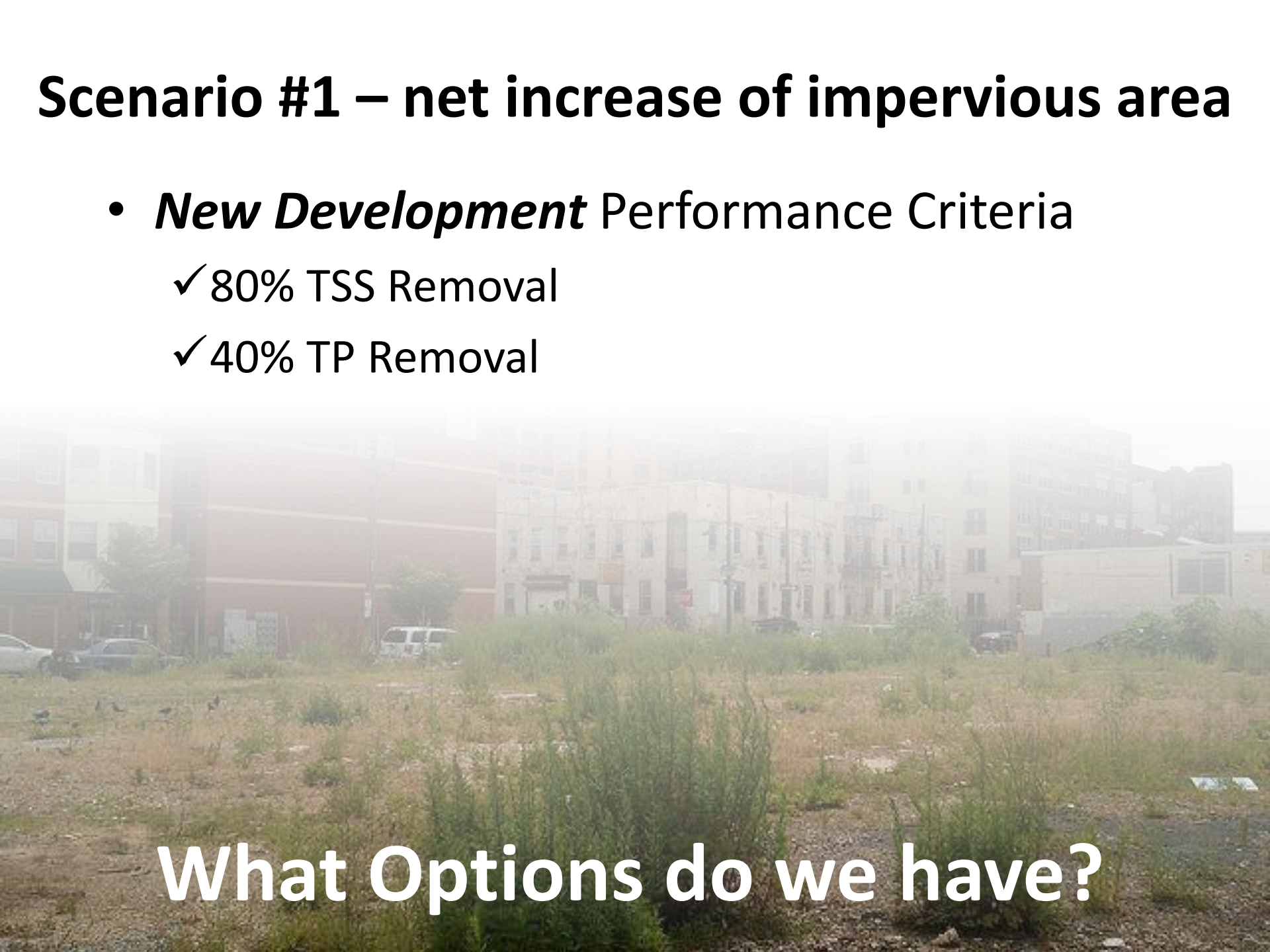
- Scenario #1 – Parking Lot Expansion with a net increase of impervious area
- Scenario #2 – Parking Lot Redevelopment with no increase of impervious area

Problem

- Urban Area
- 100% RRv is not feasible
- **Subsurface WQ treatment is required**

Scenario #1 – net increase of impervious area

- ***New Development*** Performance Criteria
  - ✓80% TSS Removal
  - ✓40% TP Removal



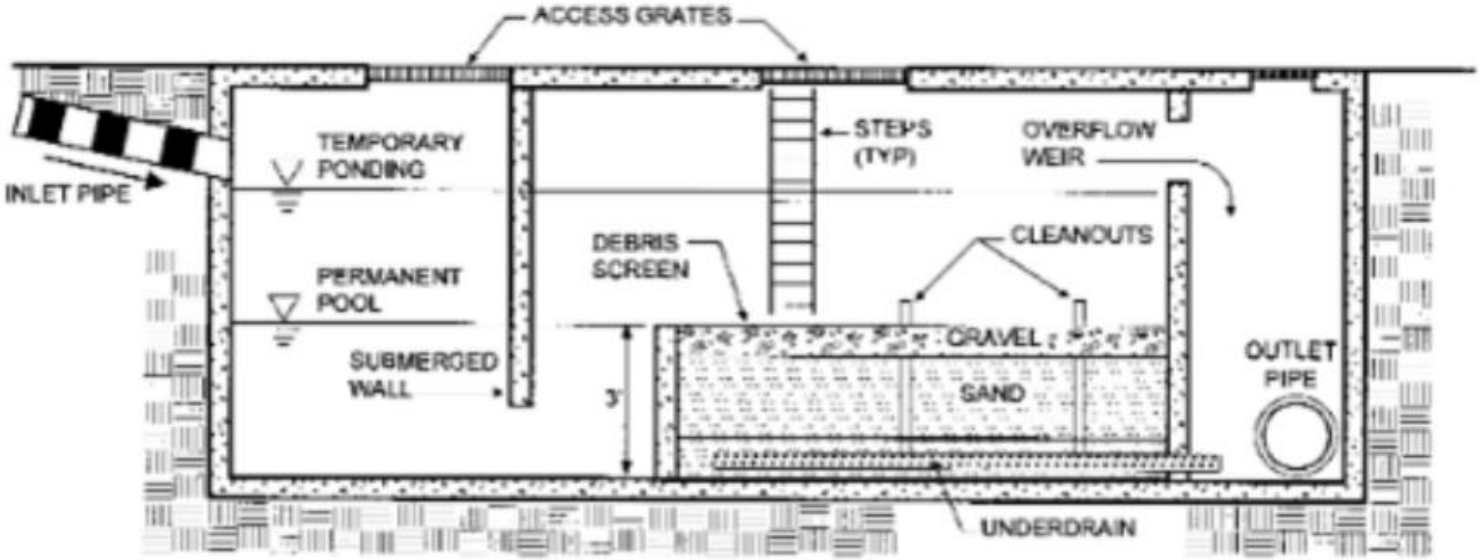
What Options do we have?

Solution

- Solution #1 - Subsurface Infiltration
- **A or B** Hydrologic Soil Group
- Isolator Row Pretreatment 0.006 cfs/SF

Solution

- Solution #2 – Subsurface Filtration
- **C or D** Hydrologic Soil Group
- WQ Treatment
- Hotspot Redundant Pretreatment



What is NYSDEC Approved?

Verified Proprietary Practices for New Development

The evaluation and verification reports/studies for following proprietary practices have been reviewed by the Department. Based on the information provided, the Department has determined that the practice is acceptable for use on new development (Note: RRv sizing criteria must be addressed first).

Practice	Manufacturer
ZPG Media Filter	Contech
Jellyfish Filter	Contech
Bayfilter	Bay Saver
FloGard Perk Filter	Old Castle Precast
Filterra Bioretention	Contech
MWS - Linear Modular Wetland	Bio Clean Environmental Services, Inc.
FocalPoint High-Rate Biofiltration System	ACF Environmental - Convergent Alliance
StormFilter with PhosphoSorb Media	Contech

Enhanced Spiral Filter Design

- Maximized flow rates
- 90 square feet of filtration surface area
- **83.1% TSS removal** (NJCAT, 2016).
- **65% TP removal** (WDOE)
- Smaller footprint
- Reduced maintenance/replacement costs

545 cartridge

45 gpm

2,500 cf

34” drop

530 cartridge

30 gpm

2,500 cf

32” drop

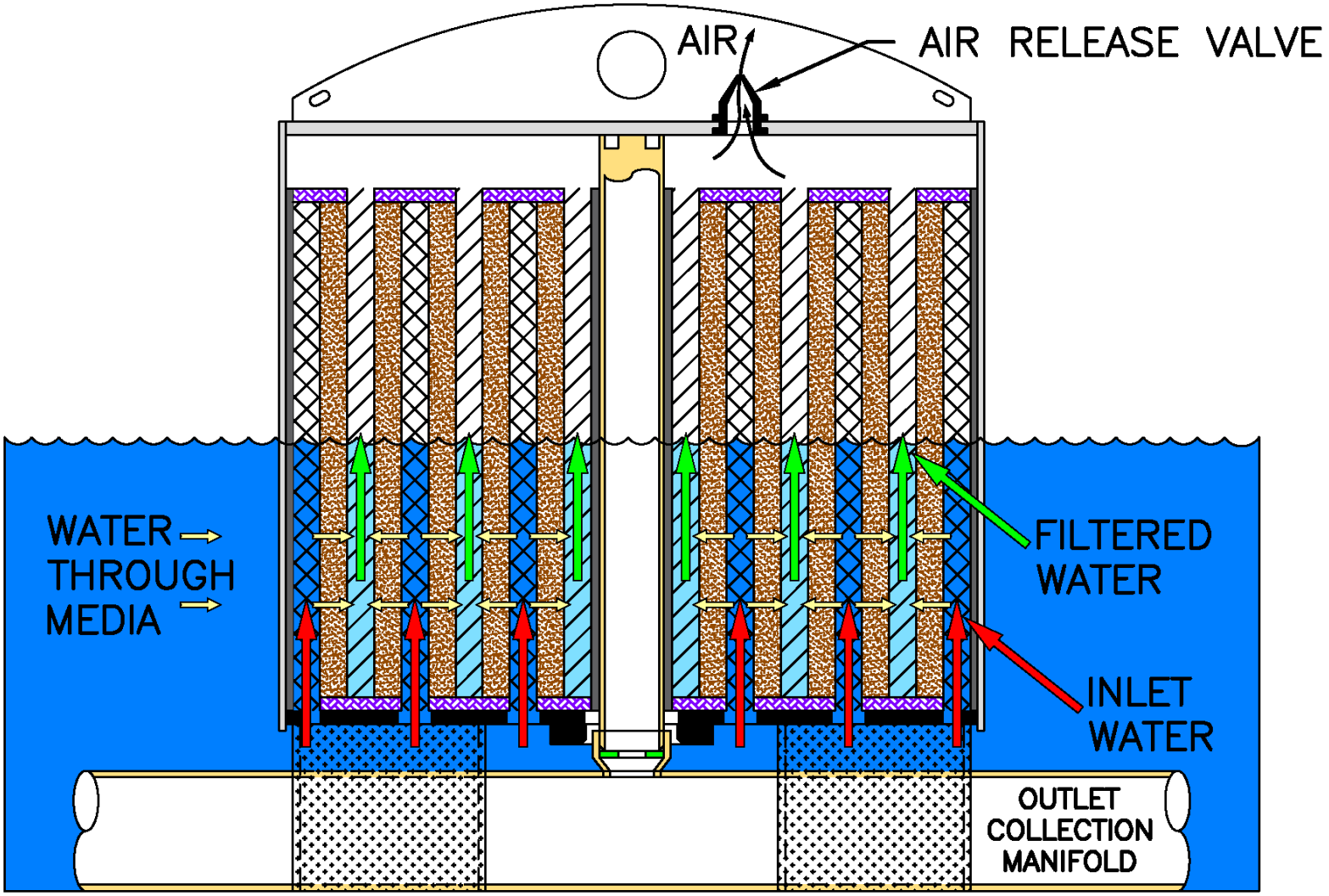
545L cartridge

22.5 gpm

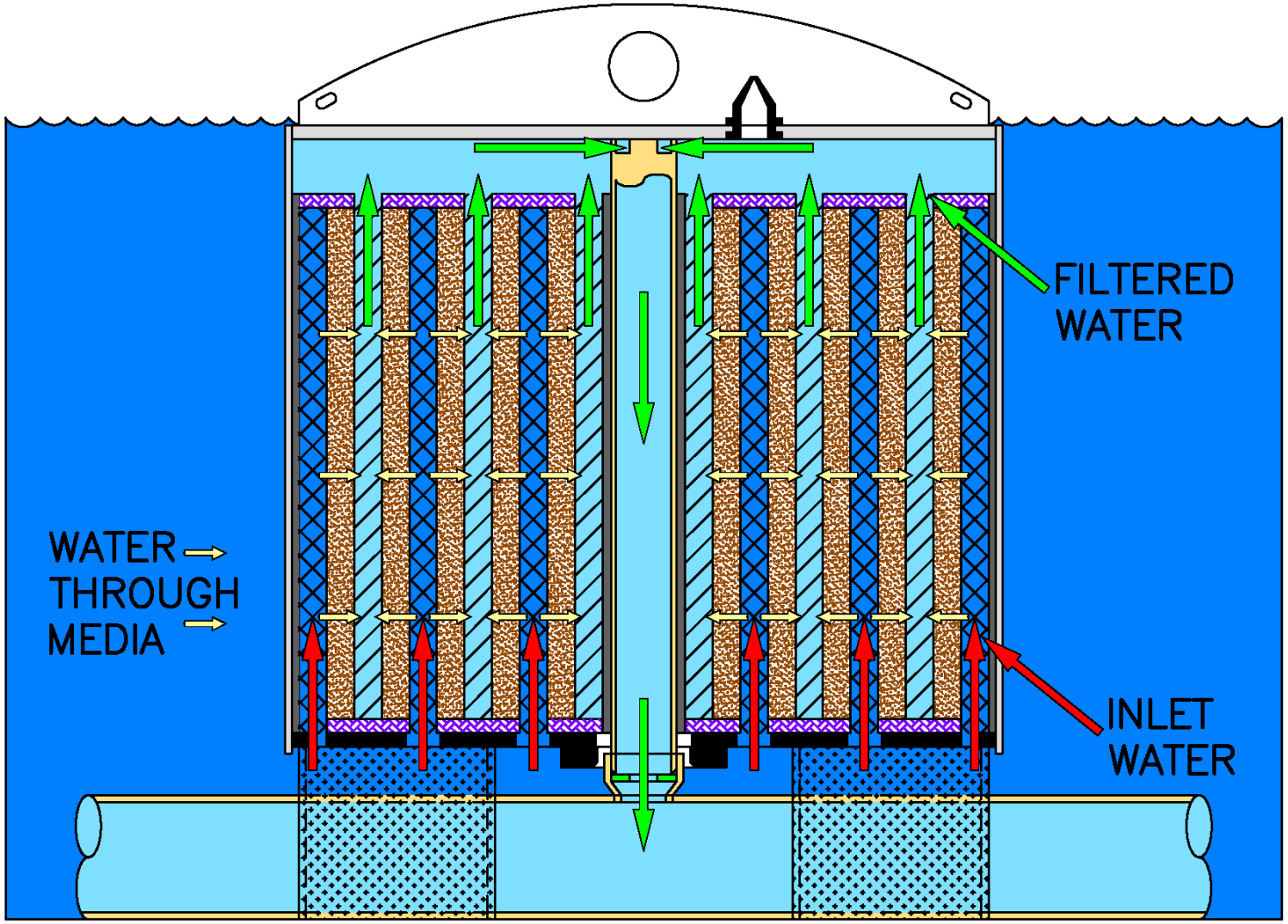
1,250 cf

20” drop

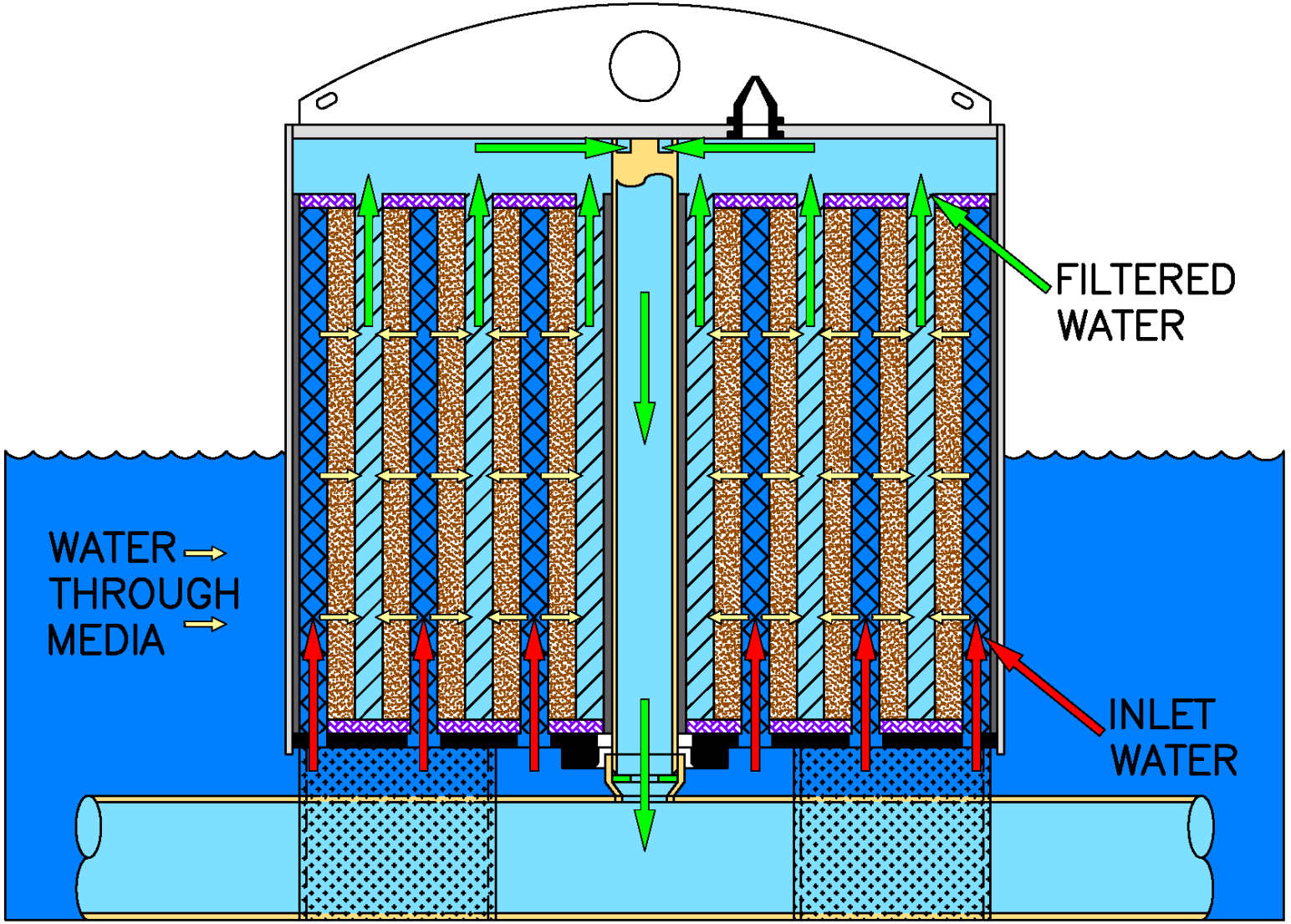
Cartridge Filling



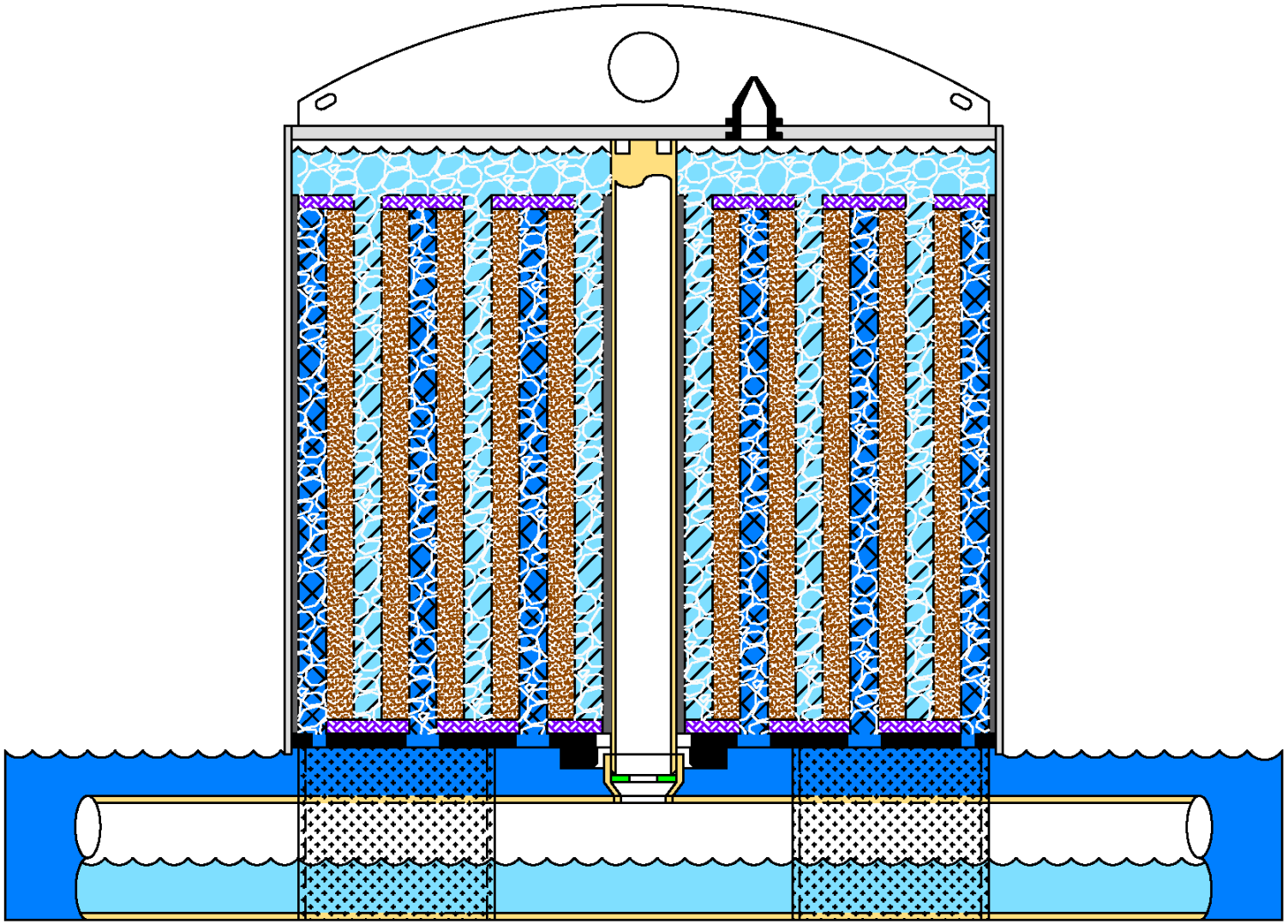
Normal Operation



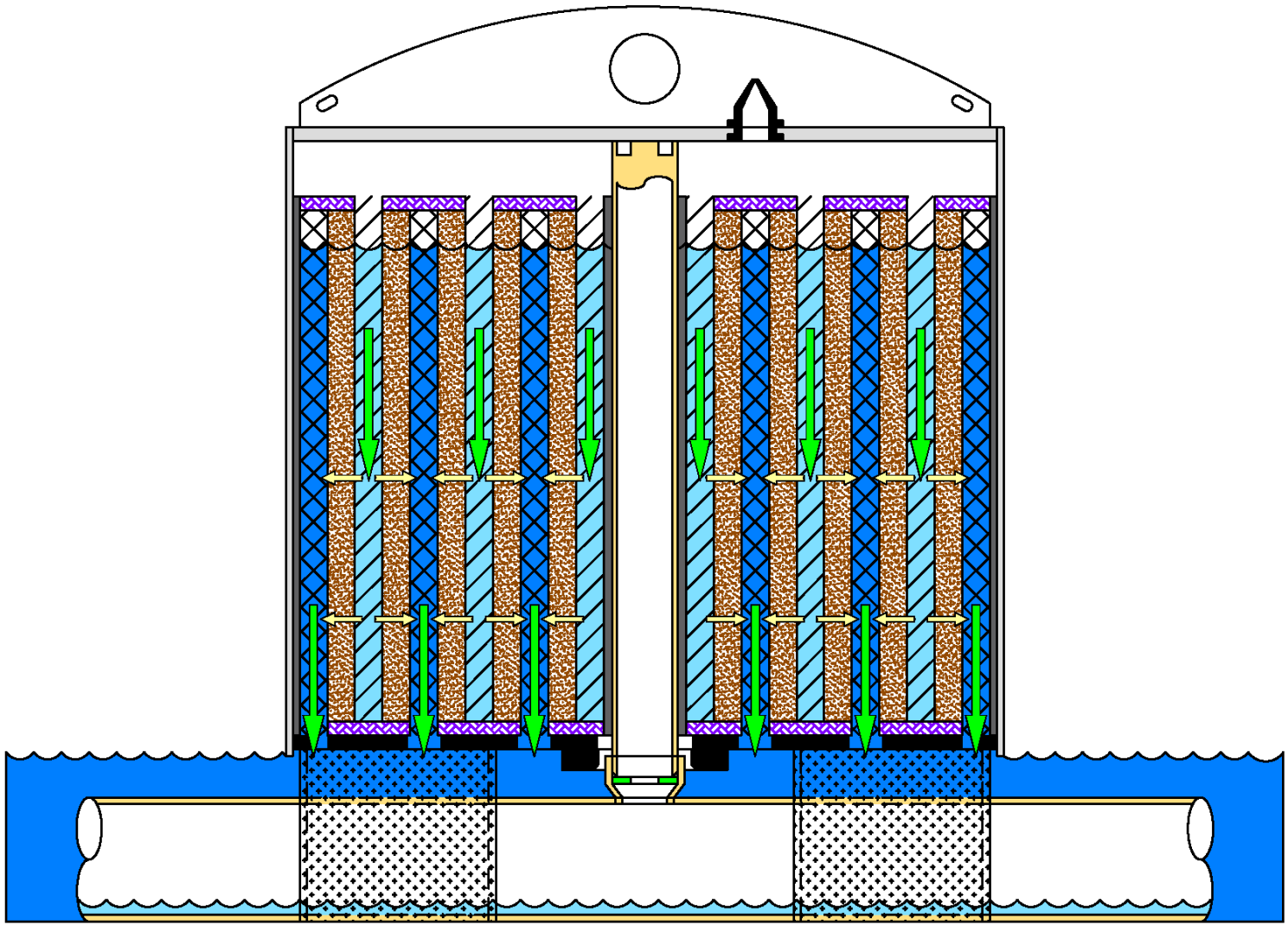
Siphon Filtration



Siphon Break



Backwash



NJCAT Summary- Dec 2016

Device	Test System	Total System Flow Rate	Flow Rate Per Unit	Total Sediment Captured	Sediment Captured Per Unit	NJDEP Sediment Requirement- Units Per Acre[1]
BayFilter 545	1 Cartridge	45 GPM	45 GPM	262 lbs	262 lbs	3 cartridges
Contech StormFilter w/ Perlite	1 18” Cartridge	15 GPM	15 GPM	54.5 lbs	54.5 lbs	11 cartridges
Upflow Filter	6 Upflow Ribbon Cartridges	90 GPM	15 GPM	50 lbs	8.33 lbs	73 cartridges
BioClean Kraken	16 Kraken Filters	136 GPM	8.5 GPM	434 lbs	27.13 lbs	23 cartridges
Filterra Tree Box	4’x4’ Unit	23 GPM	23 GPM	384 lbs	384 lbs	(2) 4’x4’ Units

Note 1: NJDEP assumes 600 lbs of sediment per acre

Higher Sediment Load = Fewer Cartridges

Annual Sediment Load, Simple Method	BayFilter	Competitor	
Average Annual Rainfall (in)	42	42	
Water Quality Runoff Depth (in)	1.25	1.25	
Pollutant Concentration, C (mg/L)	74	74	
Total Area, A (acres)	1.0	1.0	
Impervious Area (acres)	1.0	1.0	
Volumetric Runoff Coefficient, Rv	0.95	0.95	
Percent Yearly Rainfall Captured	0.9	0.9	
Sediment removed (lbs/cartridge)=	262	54.5	81.8
Flow per Cartridge (gpm)=	45	15	22.5
Annual Volume Treated (cubic ft)=	130,353	130,353	
Yearly Load (lbs)=	600	600	
Number of Cartridges Required	3	12	8
Precast Structure Required	72" MH	8’x11’	96" MH

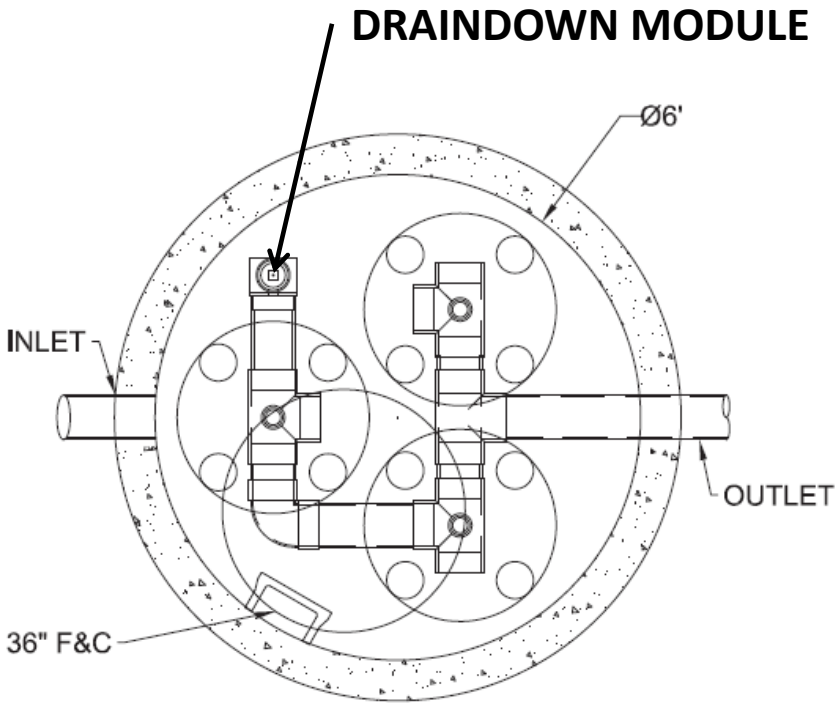
Higher Treatment Flow = Fewer Cartridges

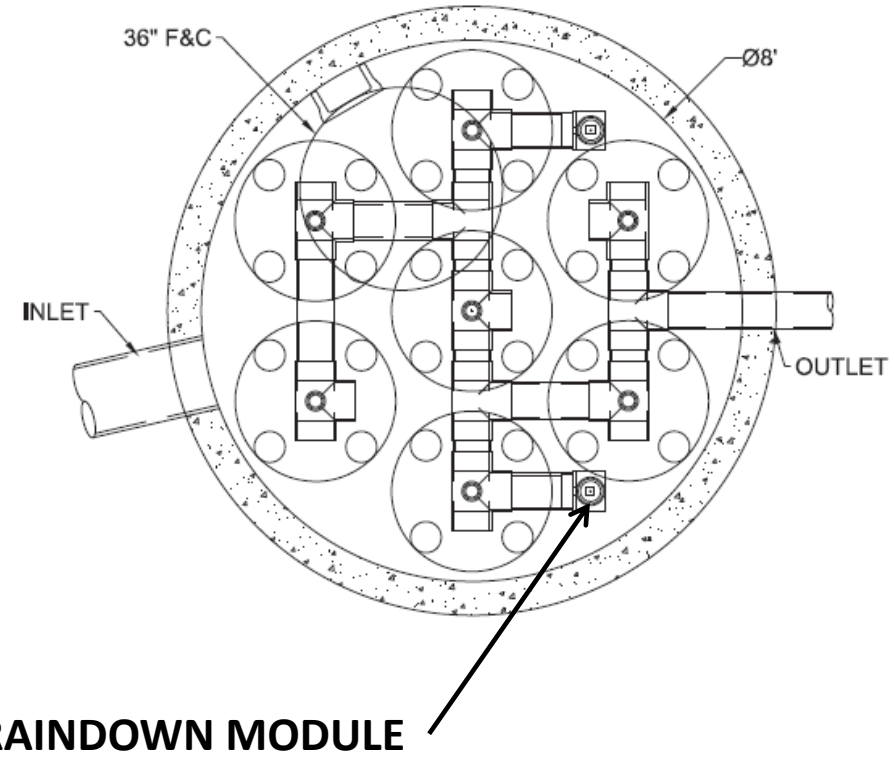
Flow Based Sizing Calculator	BayFilter	Competitor	
Computed Treatment Flow (cfs)	1.0	1.0	
Flow Rate Per Cartridge (gpm)	45	15	22.5
Number of Cartridges Required	10	30	20
Precast Structure Required	8x10	8x14	8x11

Cartridges Last Longer

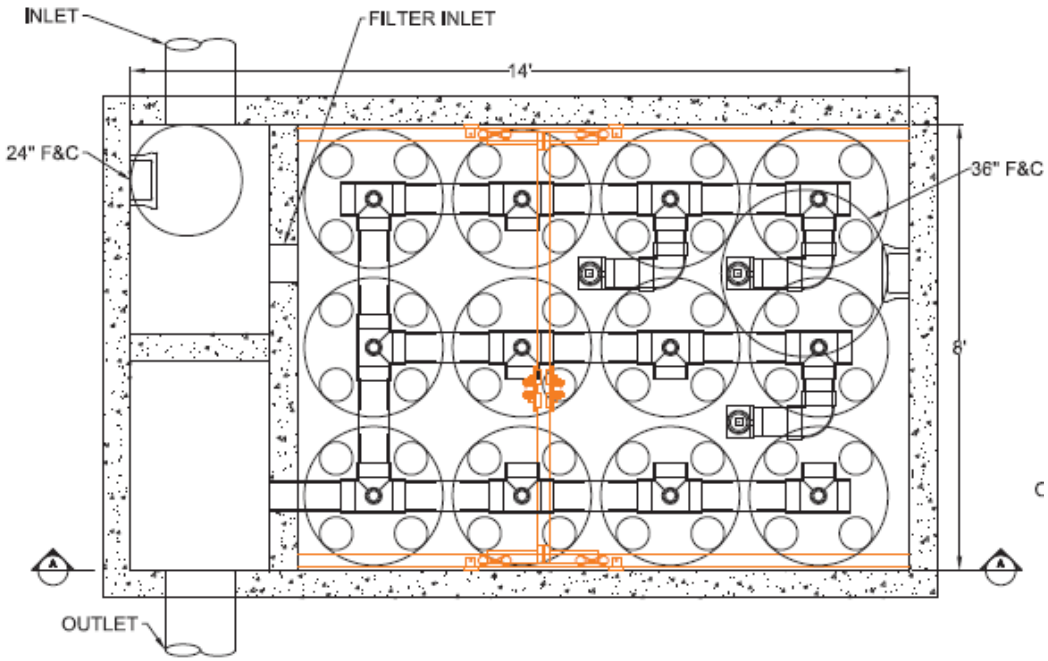
Cartridge Sediment Load (lbs)	262	54.5	81.8
Sediment Load Captured	2620	1635	1636
Annual Mass Load (lbs)	600	600	
Maintenance Cycle (yr)	4.4	2.7	2.7

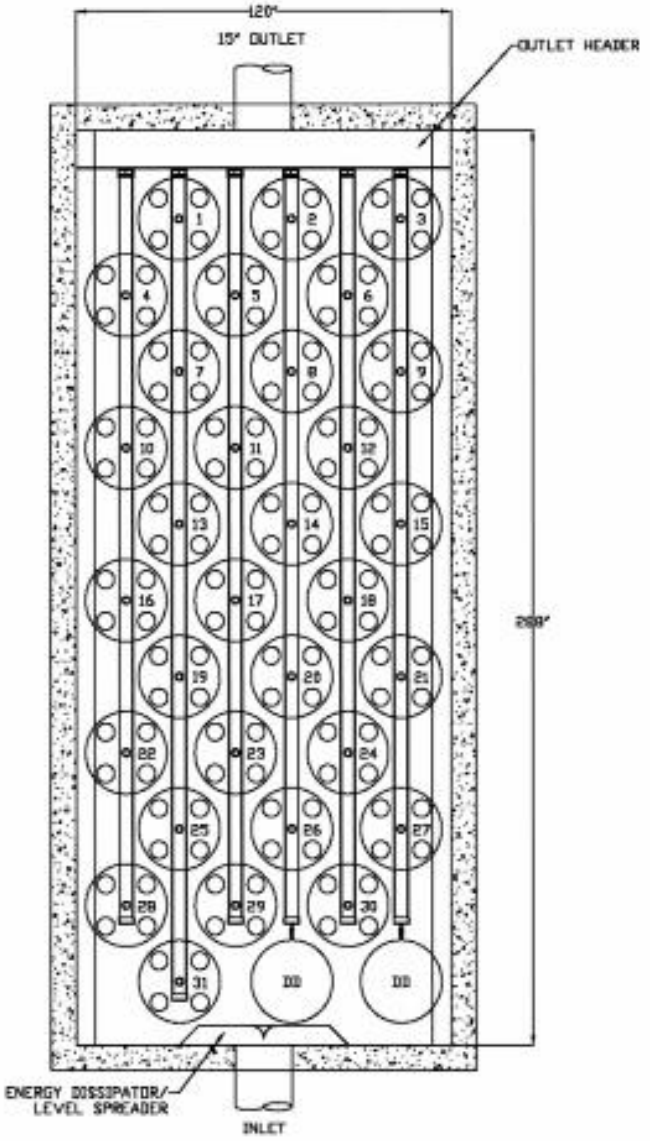
Manhole Configurations



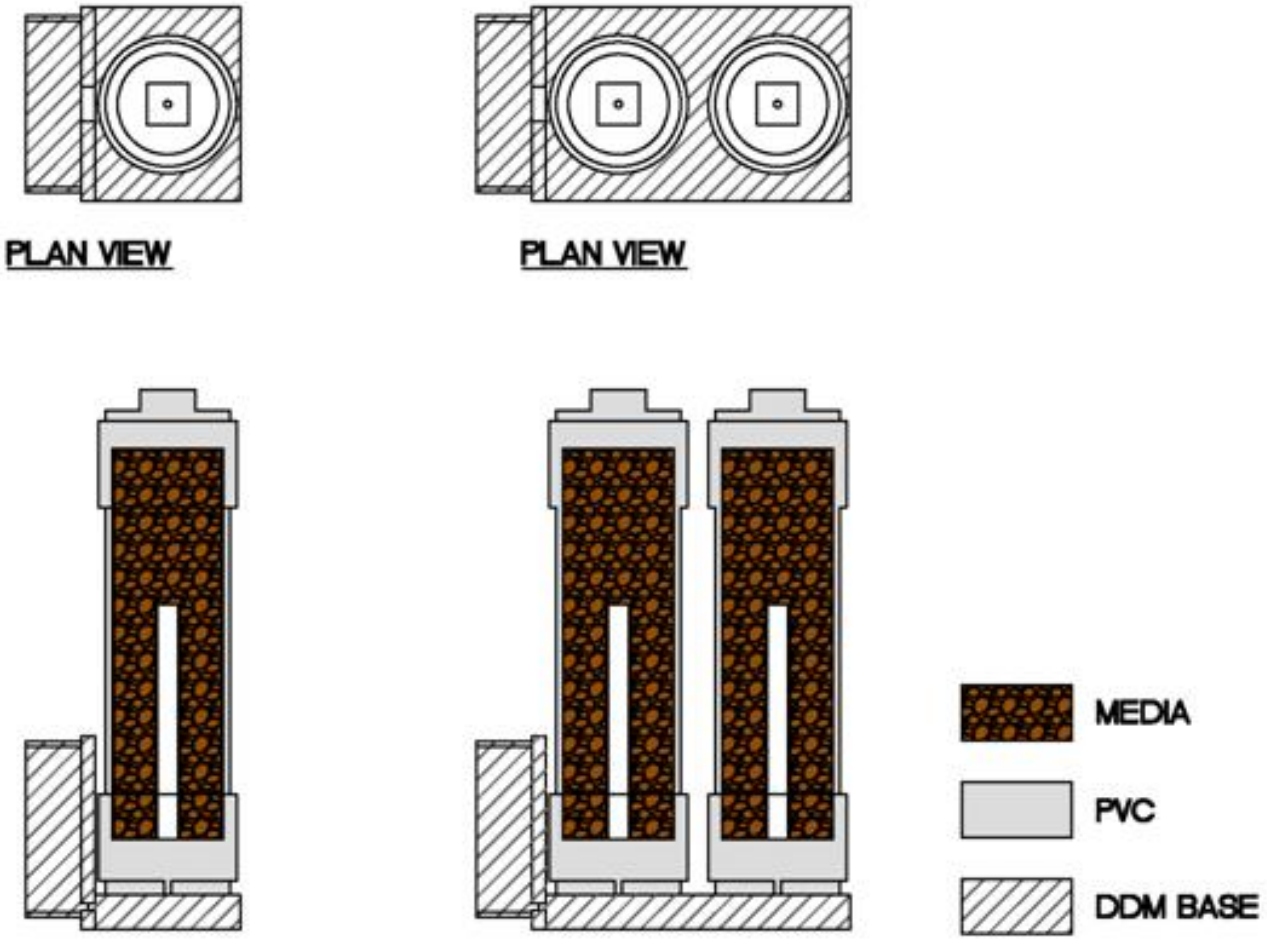


Vault Configurations





Operational Cycle- Draindown



BayFilter Maintenance

- Inspect at project completion, 6 months, then annually.

- Indicators that systems needs to be maintained:
  - Sediment covering PVC manifold.
  - Vault holding water 48-72 hours after last storm.

- Maintenance procedure:
  - Remove cartridges and manifold
  - Vac the vault
  - Reconfigure manifold and install new cartridges.

- Expected service interval: 2-4 years based on site.

Scenario #2 – reduced impervious area

- ***Redevelopment*** Performance Criteria
  - ✓ Chapter 9 of Stormwater Design Manual
  - ✓ Verified Hydrodynamic Separators
  - ✓ TSS Removal

What Options do we have?

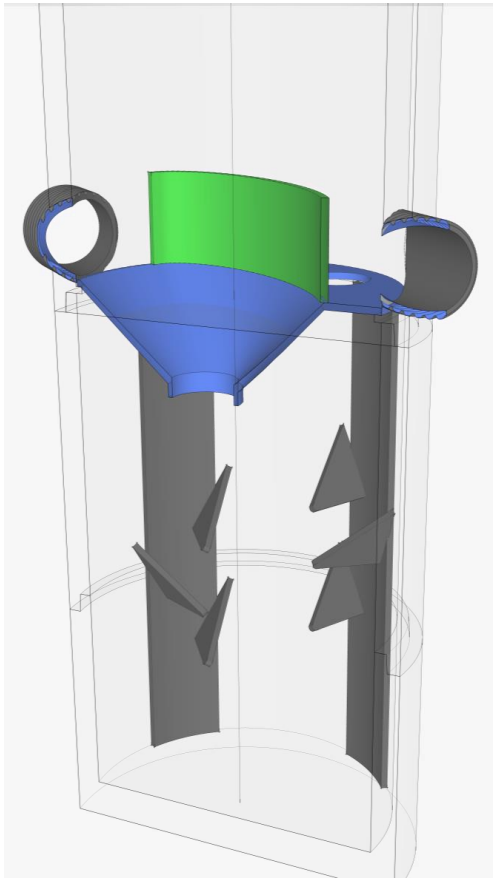
What Devices are Verified?

Criteria for Proprietary Practice Use - Redevelopment

Criteria for Proprietary Practice Use - Pretreatment

- State of Washington Technology Assessment Protocol - Ecology (TAPE)
- Technology Acceptance Reciprocity Partnership Protocol (TARP) (primarily New Jersey Corporation for Advanced Technology)
- State of Maryland Department of the Environment

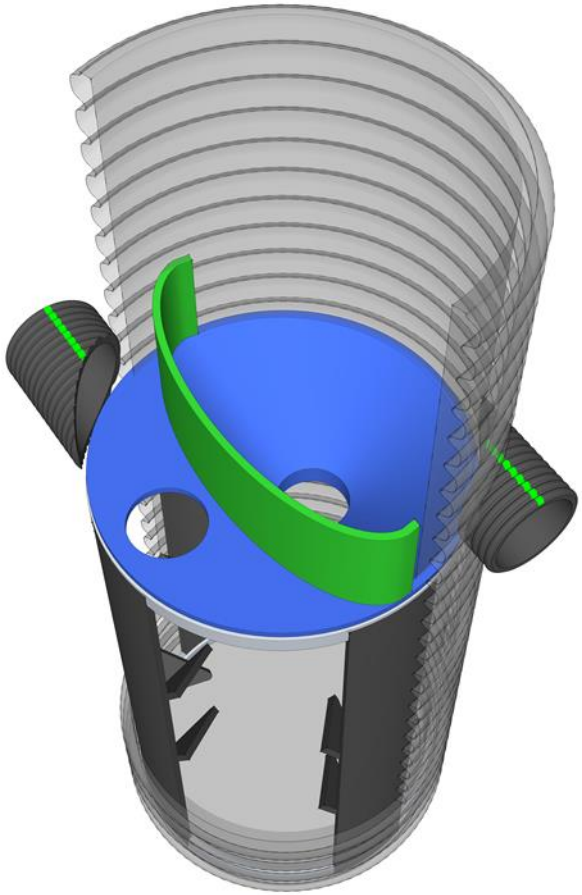
BaySaver **BARRACUDA** *S4*



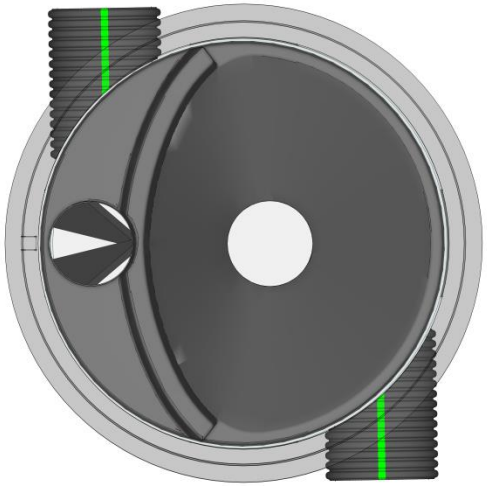
What is the Barracuda?

- Single Structure Hydrodynamic Separator
- Available now in 4’ diameter (1.25 cfs treatment rate, 6.25 cfs maximum). 6’ unit available Fall 2017.
- Extremely cost effective

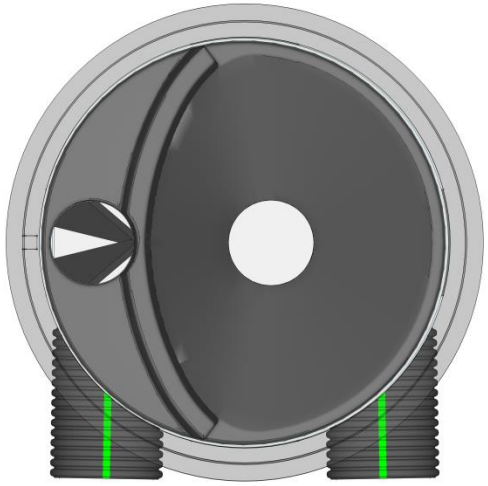
- Can be installed in a standard precast manhole.
- 4’ unit can be fabricated in a lightweight ADS HP manhole.
  - Quick turn around times – typically 2 weeks as opposed to 4-6 week industry standard



Configurations



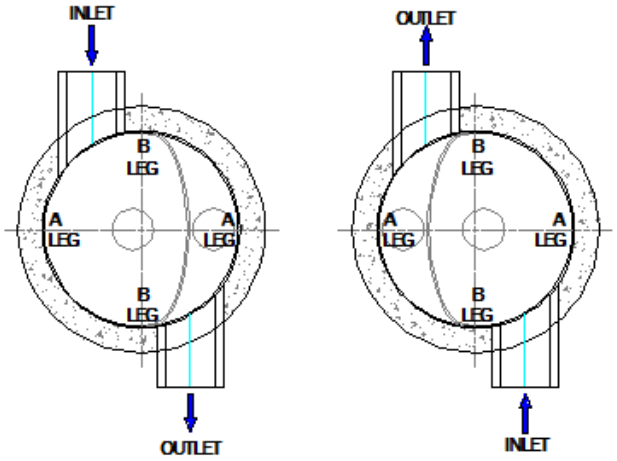
INLINE



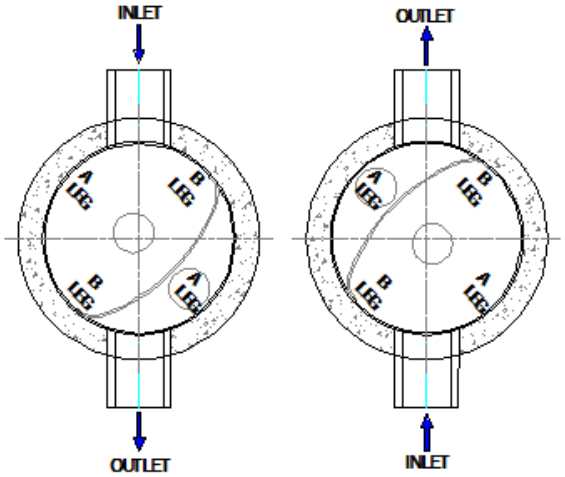
OFFLINE

Inline Configuration Options

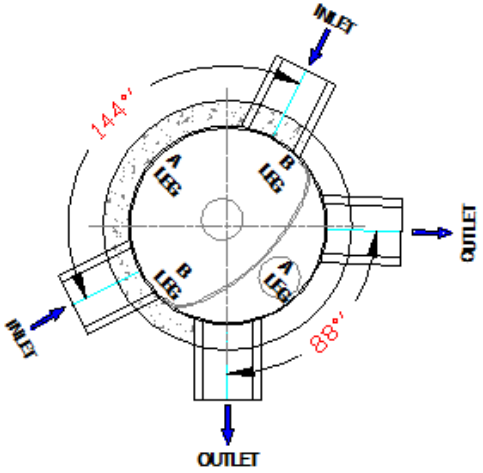
TANGENTAL CONFIGURATION



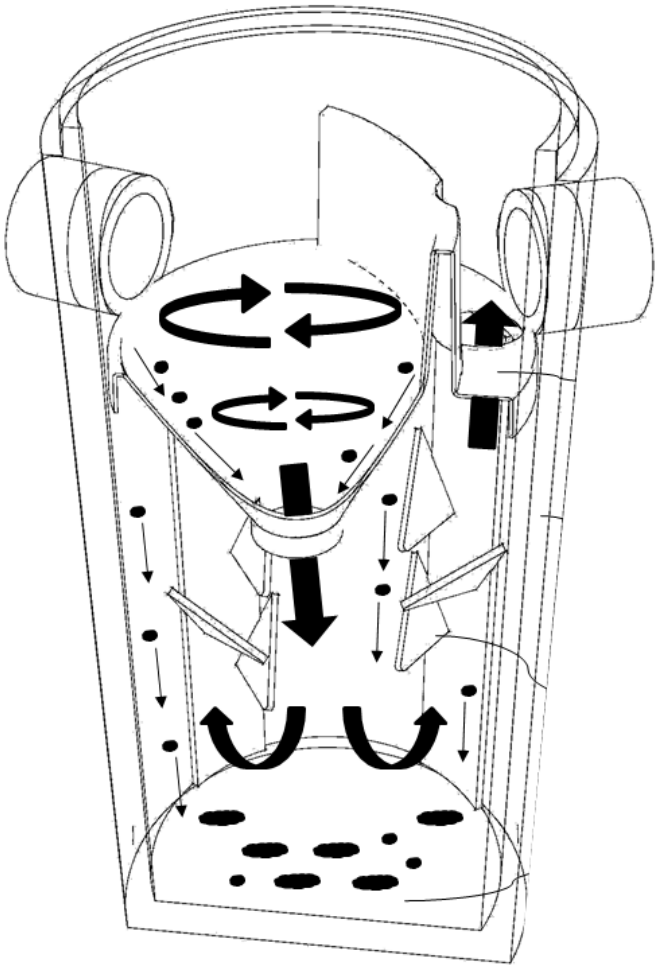
180 DEGREE CONFIGURATION



VARIABLE CONFIGURATION

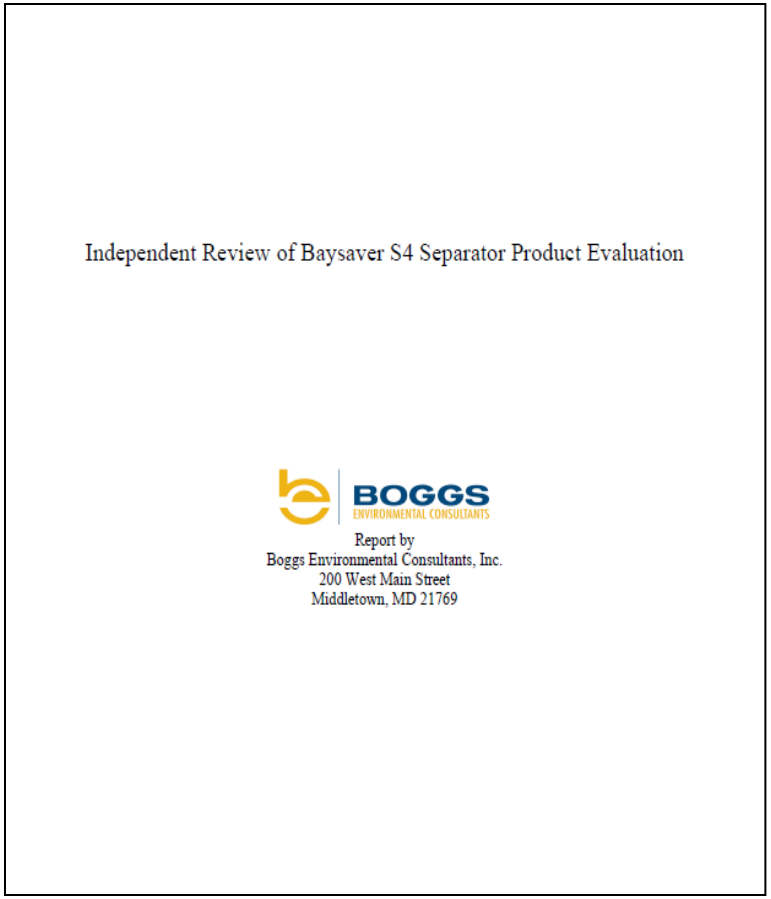


Why the “teeth”



Test Results

- Third party test shows 80% removal of OK-110 particle at 1.25 cfs treatment flow rate.
- Testing per NJCAT shows 50% removal at 1.25 cfs (smaller particle size than OK-110, particle size is now 75 micron)
- NJCAT resuspension testing shows 1 mg/l of resuspension at flow 2 x maximum treated flow rate

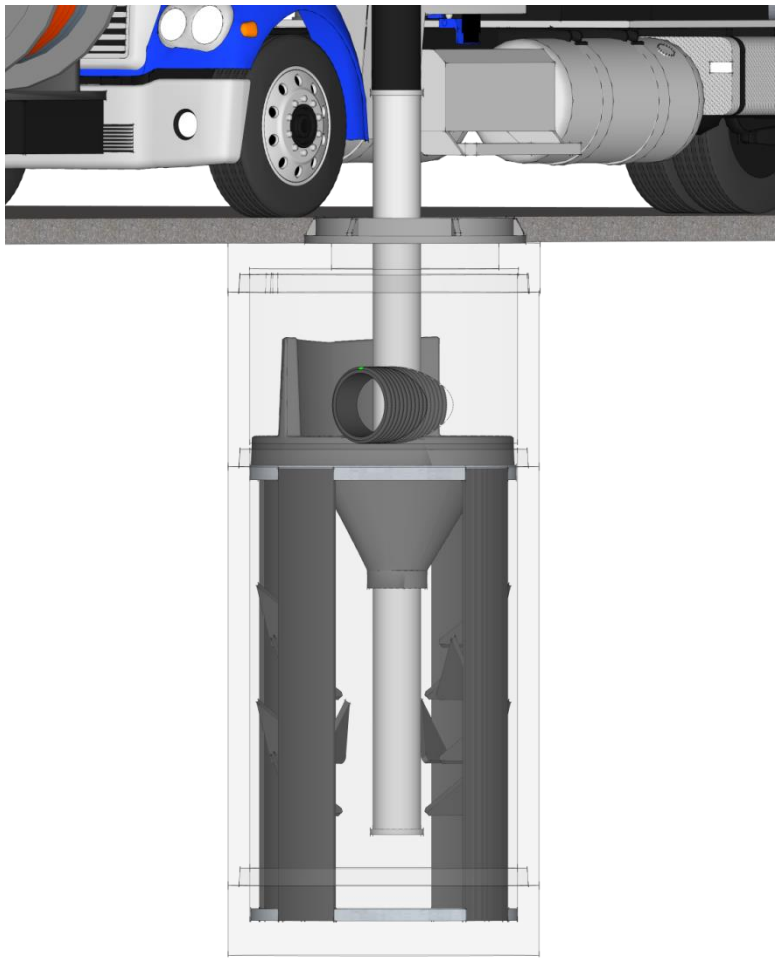

Independent Review of Baysaver S4 Separator Product Evaluation

BOGGS
ENVIRONMENTAL CONSULTANTS

Report by
Boggs Environmental Consultants, Inc.
200 West Main Street
Middletown, MD 21769

Maintenance

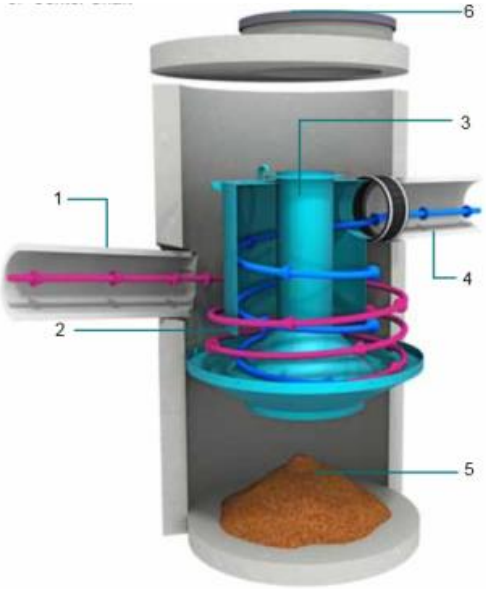
- Maintenance can be performed from the surface
- No parts to remove, no need to enter the structure
- Remove the frame and grate
- Vac hose is lowered through 10” opening at the bottom of the Bowl



Units and Sizing

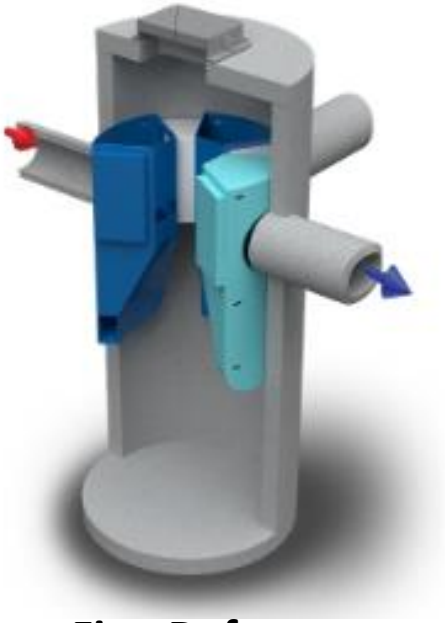
Model	MTFR (CFS)	Manhole Diameter (ft)	Total System Capacity (gallons)	Standard Sediment Capacity (20" depth) (cubic yards)	NJDEP Sediment Capacity (50% of standard depth) (cubic yards)	
S3	*0.7*	*36"*	*212*	*0.44*	*0.22*	*coming soon*
S4	**1.25**	**48"**	**564**	**0.78**	**0.39**	
S5	*1.95*	*60"*	*881*	*1.21*	*0.61*	*coming soon*
S6	*2.81*	*72"*	*1269*	*1.75*	*0.88*	*coming soon*

Water Quality Separators



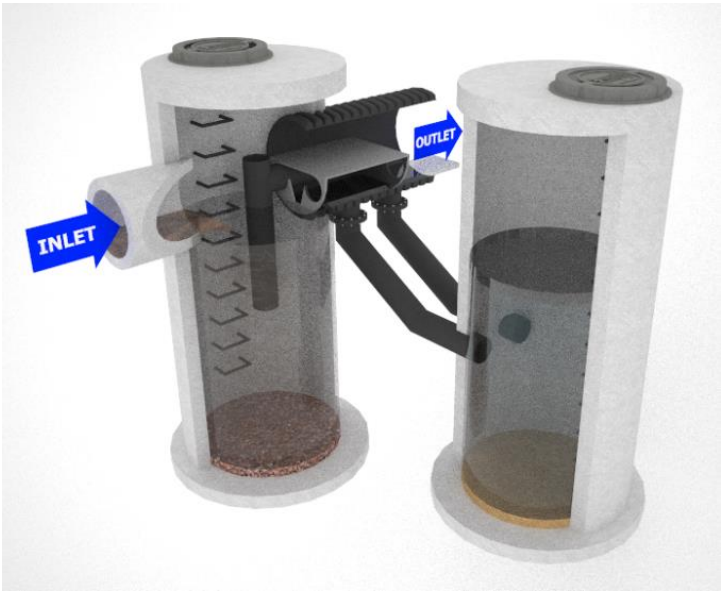
Downstream Defender

- 80% TSS Removal
- Hydrocarbon separation
- Low re-suspension



First Defense

- NJCAT Verified
- Economic for low-flows
- Increased bypass



BaySeparator

- 80% TSS Removal
- Hydrocarbon separation
- Low re-suspension
- Inlet grate option
- Highest treatment/bypass rates

Water Quality Solutions

Questions?