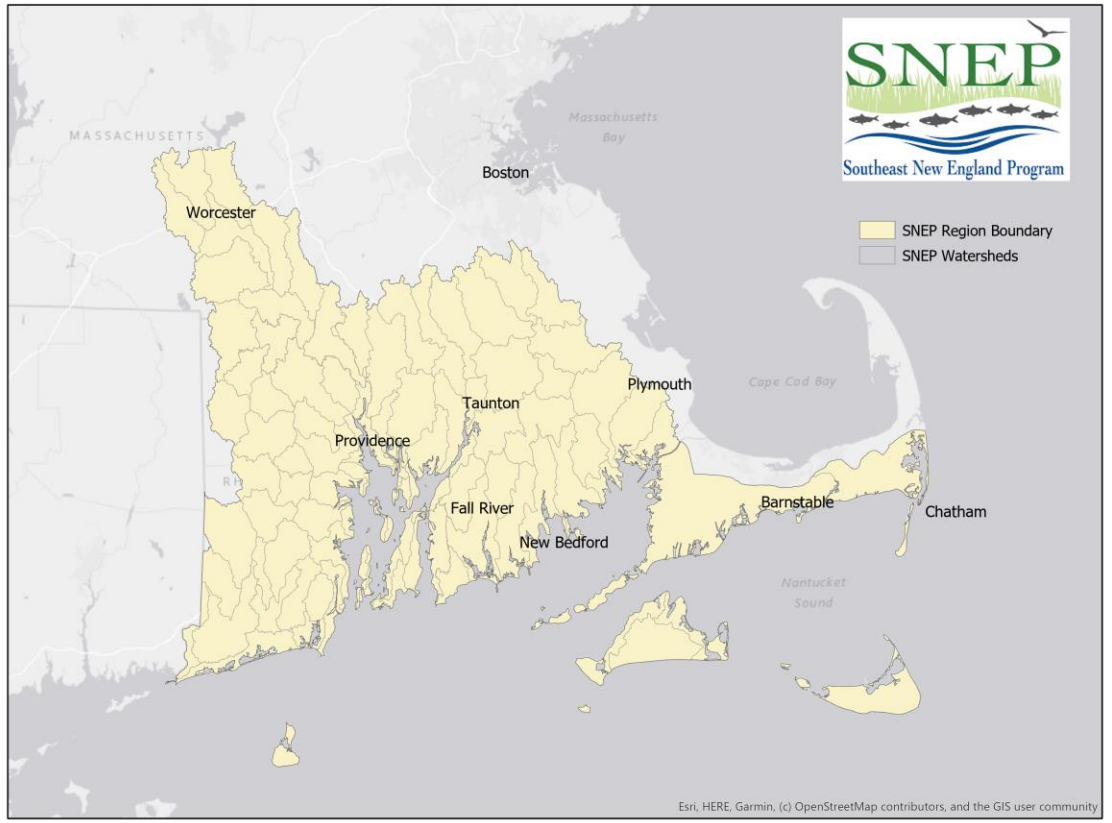
Emerging Stormwater Technologies in Rhode Island: Cultec Separator Row & StormTech Isolator Row PLUS

Hosted by the SNEP Network and the
Stormwater Innovation Center

The SNEP Network

SOUTHEAST NEW ENGLAND PROGRAM NETWORK

Training and Technical Assistance for Stormwater/Watershed Management



Boundary of the Southeast New England Program Region

New England neefc Environmental Finance Center

LOGISTICS

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Toggle between full screen/window screen view

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Audio: please choose between computer audio or phone call

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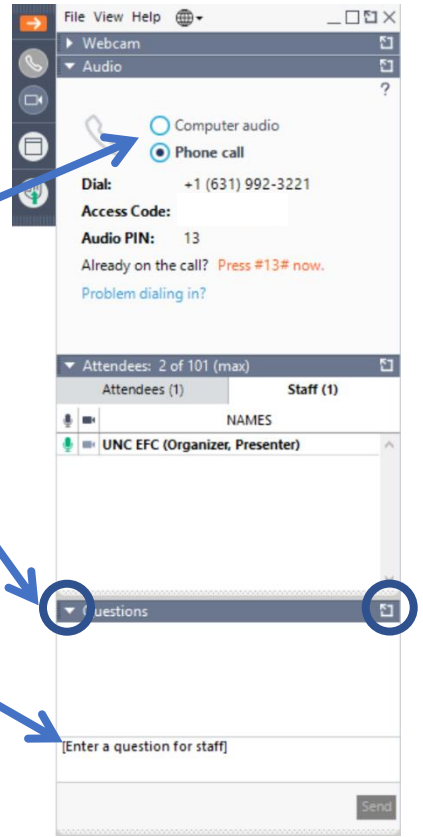
Click to open in Control Panel

Submit **questions** in the Questions box at any time, and press [Send]



Click to open in separate box and resize



Stormwater Innovation Center



Monitoring – Training – Community Engagement – Collaboration







Emerging Stormwater Technologies Webinar

Cultec Separator Row & ADS StormTech Isolator Row PLUS





Full presenter bios, along with a recording of this presentation, can be found at:
stormwaterinnovation.org/cultec-ads-webinar

Christopher Dill, Rhode Island Department of Environmental Management
Aaron Cheever, Advanced Drainage Systems, Inc.
Kyle Smiley, CULTEC, Inc.
Brian Giroux, Diprete Engineering



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Proprietary Stormwater Treatment Technologies in Rhode Island







RIDEM, RIDOT & CRMC

March, 2024

R.I. Technology Review Committee

RIDEM

- Eric Beck, PE: Administrator - Groundwater & Freshwater Wetlands Protection
- Nicholas Pisani, PE: Environmental Engineer IV - Stormwater Engineering & 401 Permitting
- Chris Dill, EIT: Environmental Engineer II - Stormwater Engineering & 401 Permitting
  - Christopher.dill@dem.ri.gov 401-537-4219

RIDOT

- Alisa Richardson, MS, PE, PMP: Administrator - Environmental Division

CRMC

- Ross Singer: Environmental Engineer III - Permitting Staff



3 Types of STW Technology Certifications in RI

Retrofit device

- Improvements to source controls and stormwater treatment for old sites that were designed an/or maintained poorly
- RIDEM offers flexibility on minimum standards and BMP performance. Ideally capture/treat at least 50% of WQV

Pre-treatment

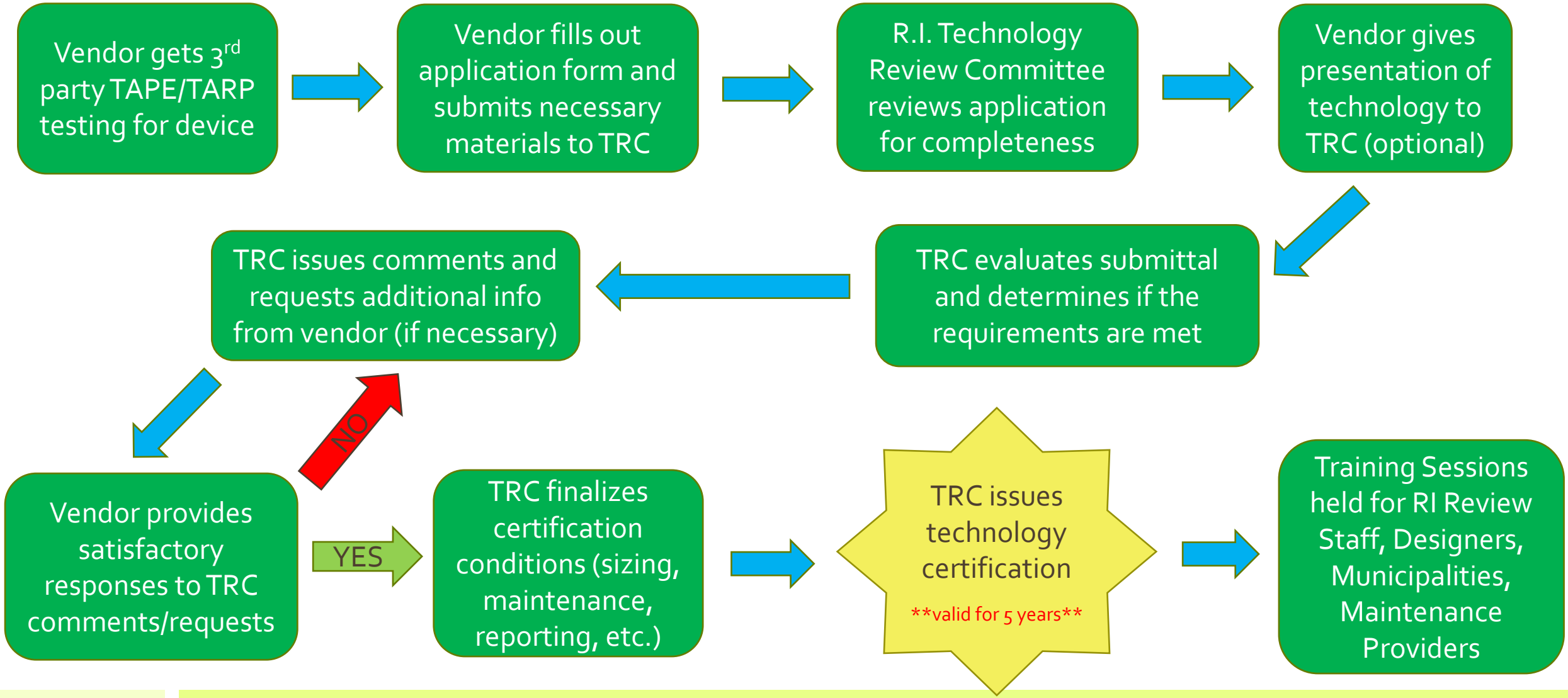
- Used to protect WQ BMPs
- Provides ≥ 25% TSS removal
- Can be used as a retrofit device

Water Quality BMP

- Device must remove at least 85% TSS, 60% pathogens, 30% TN & 30% TP
- Vendors can also provide adequate testing to demonstrate higher pollutant removal rates (and removal of other pollutants such as metals)

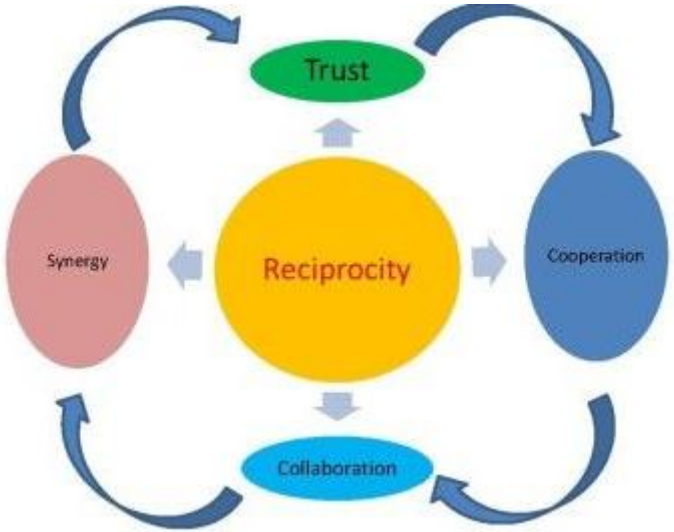
Application Form: http://www.dem.ri.gov/programs/benviron/water/permits/swcoord/pdf/swtekapp.pdf

R.I. Technology Certification Process



TAPE/TARP Reciprocity

- Reciprocity is allowed in RI for technologies with a currently valid TAPE/TARP certification (NJDEP certification is valid for pre-treatment applications)
- Applicants without TAPE/TARP certification must submit 3rd party verified testing that is essentially on par with TAPE requirements (see RI Stormwater Rules 250-RICR-150-10 Sections 8.39 and 8.40)



TAPE = Technology Assessment Protocol – Ecology
TARP = Technology Acceptance Reciprocity Partnership

Re-Certification

- Re-certification application requires:
  - Adequate reporting from previous 5 years
  - Additional studies/testing or certifications
- Device must still meet pollutant removal requirements
  - Any expired or revoked TAPE/TARP certifications from other agencies may affect ability to get re-certified in RI





RIDEM Proprietary Stormwater BMP Certification List

- Go to RI DEM's Stormwater Management Rules & Guidance Webpage:
- https://dem.ri.gov/environmental-protection-bureau/water-resources/permitting/stormwater-permitting/stormwater-rules
  - Click on the "Stormwater Analysis & Design Guidance Documents" drop-down menu
    - 4th item down is the "Stormwater Proprietary Technologies List & Application Form"





Questions?

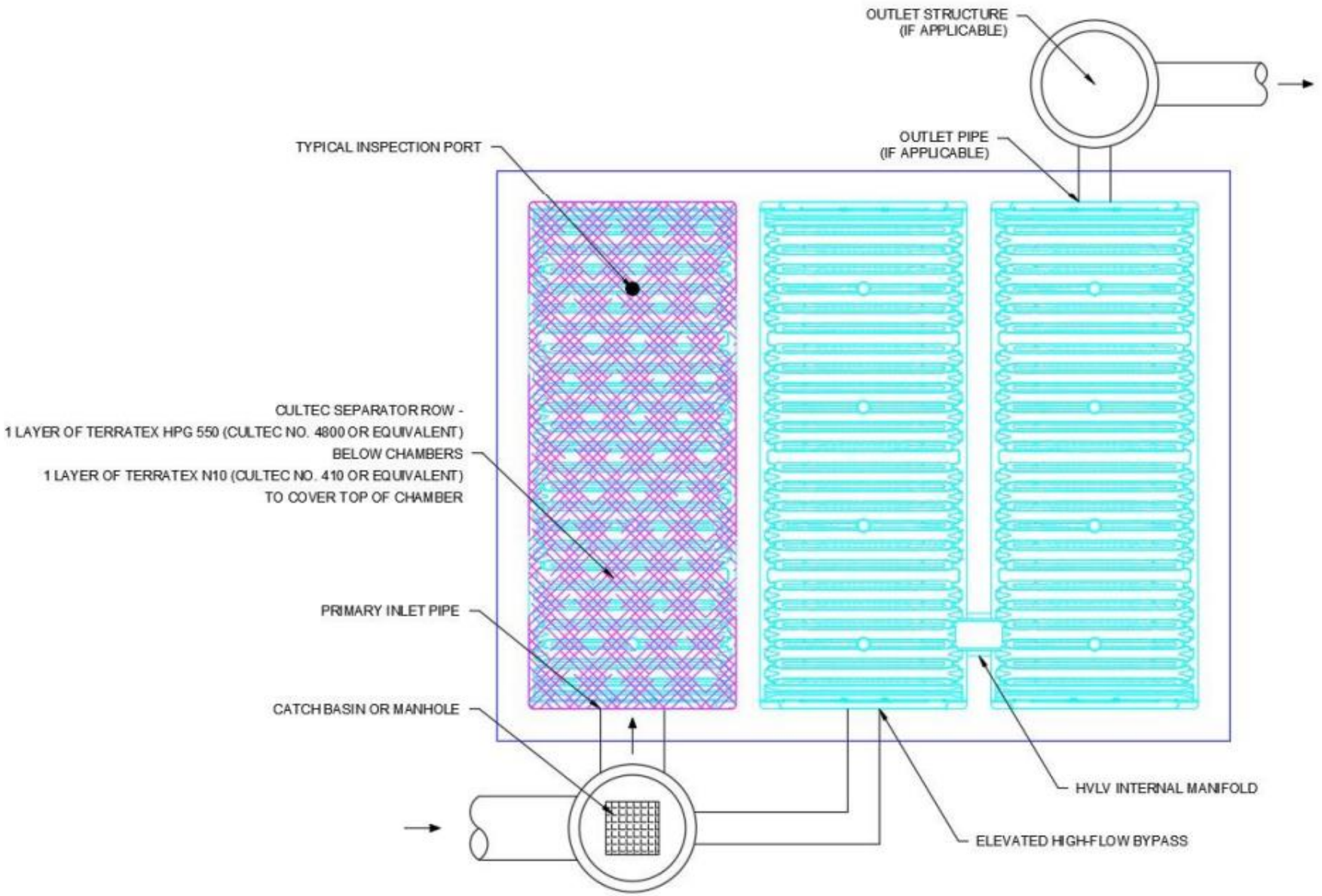
Please forward all questions and correspondence regarding proprietary stormwater treatment technologies to Chris Dill at Christopher.dill@dem.ri.gov or 401-537-4219

CULTEC

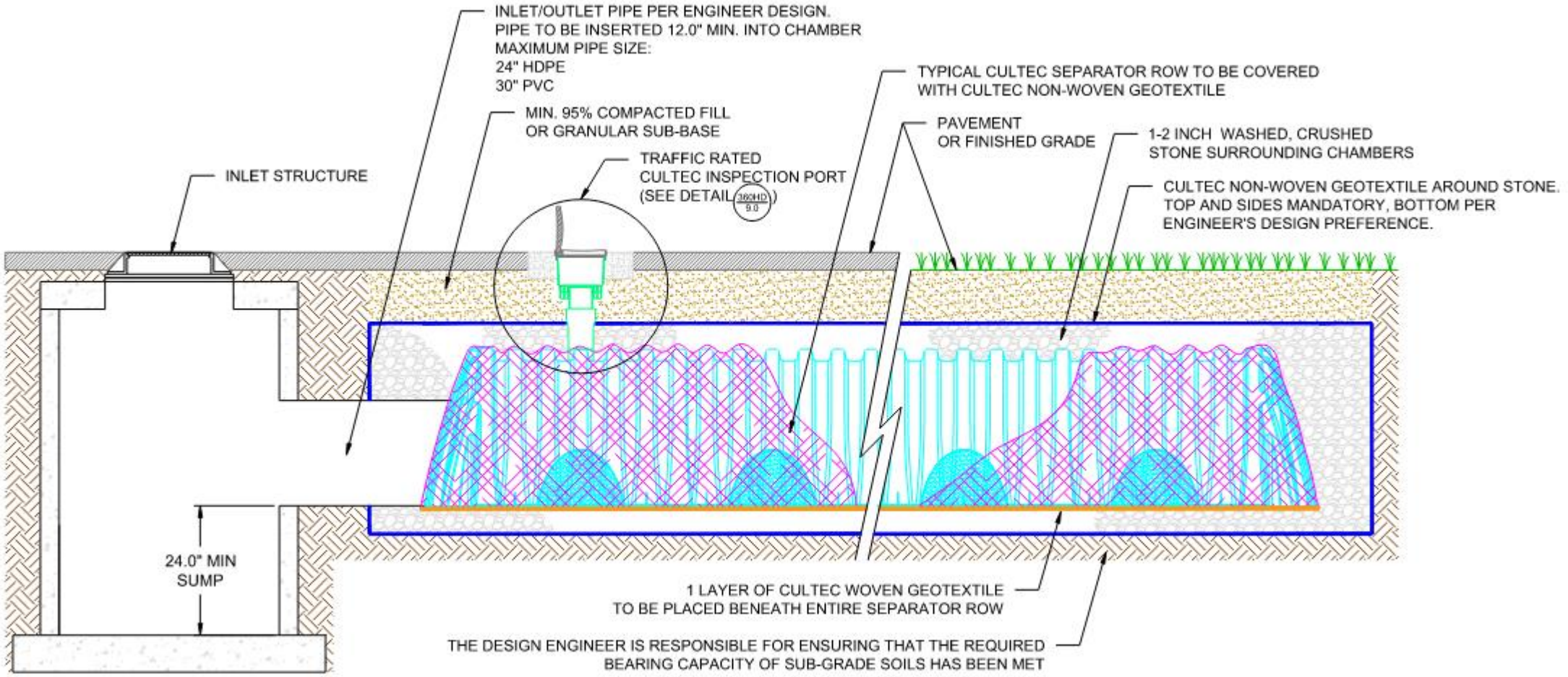
SEPARATOR ROW



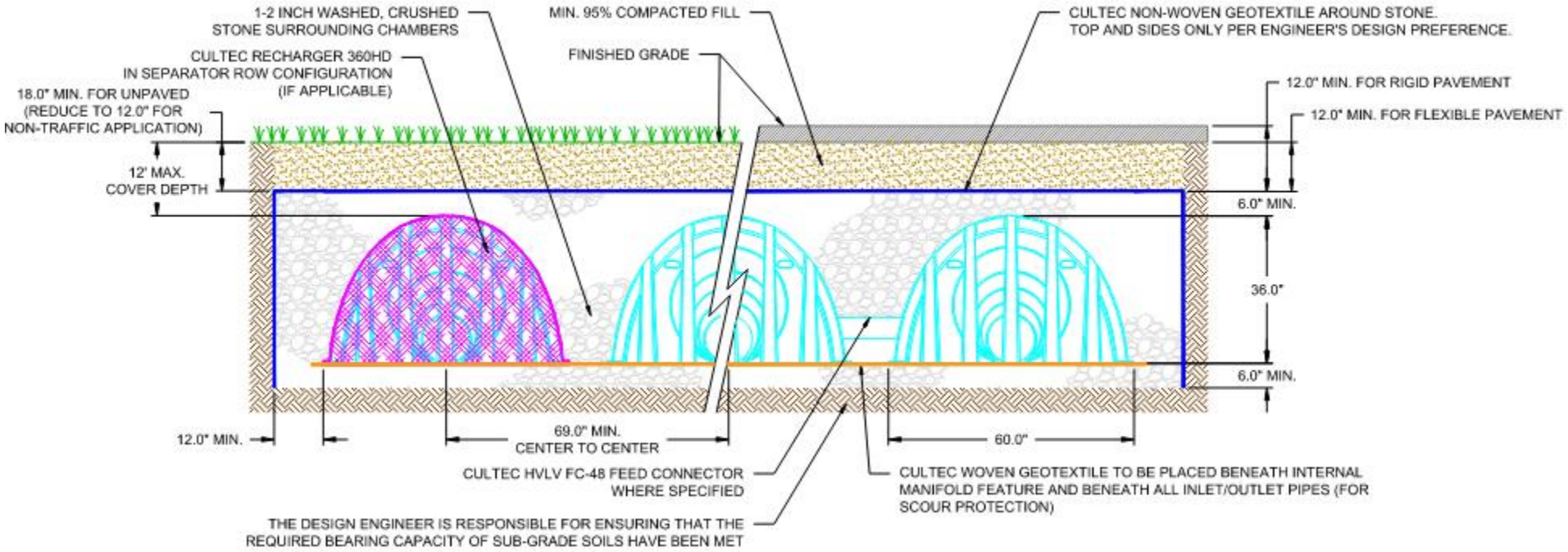
SEPARATOR ROW PLAN VIEW



SEPARATOR ROW CROSS SECTION



SEPARATOR ROW PLAN VIEW



SEPARATOR ROW DESIGN

Model #	Chamber Dimensions (H x W x L)	Chamber Bottom Surface Area (ft^2)	Maximum Treatment Flow Rate per Chamber (cfs)	Approximate Maximum Impervious Treatment Area (acres)
Contactor® 100HD	12.5” x 36” x 8’	22.5	0.11	0.095
Recharger® 150XLHD	18.5” x 33” x 11’	24.0	0.11	0.105
Recharger® 180HD	20.5” x 36” x 7.33’	19.0	0.09	0.083
Recharger® 280HD	26.5” x 47” x 8’	27.4	0.13	0.114
Recharger® 330XLHD	30.5” x 52” x 8.5’	31.3	0.15	0.130
Recharger® 360HD	36” x 60” x 4.17’	18.4	0.09	0.077
Recharger® 902HD	48” x 78” x 4.25’	23.9	0.1	0.102

SEPARATOR ROW DESIGN

MAINTENANCE ACCESS PIPING

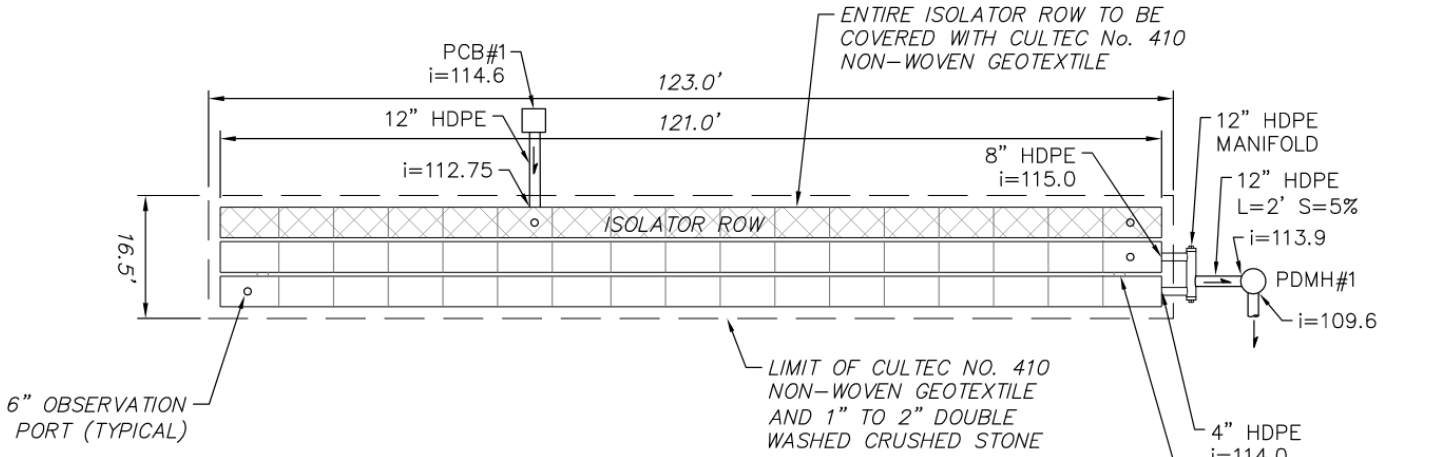
Chamber Model	Access Pipe Size (Corrugated HDPE)
C-100HD	10” (250mm)
R-150XLHD	12” (300mm)
R-180HD	15” (375mm
R-280HD	18” (450mm)
R-330XLHD	24” (600mm)
R-360HD	24” (600mm)
R-902HD	30” (750mm)

Recharger 360HD End Cap	
Size (L x W x H)	18" x 60" x 36.5" 458 mm x 1525 mm x 927 mm
Installed Length	15" 381 mm
End Cap Storage	5.17 ft³/ft 0.48 m³/m 6.46 ft³/unit (interlocked) 0.183 m³/unit (interlocked)
Min. Installed Storage	12.40 ft³/ft 1.15 m³/m 15.50 ft³/unit 0.44 m³/unit
End Cap Weight	22.0 lbs 9.98 kg
Shipping	20 end caps/skid 565 lbs/skid 11 skids/48' flatbed
Max. Inlet Opening in End Cap	24" HDPE, 30" PVC 600 mm HDPE, 750 mm PVC

SEPARATOR ROW DESIGN

ACCESS PIPING DONT'S

- No outlet on Separator Row
- Access cannot be from side port entry
- No feed connectors to non-treatment rows



PROVIDE 51 CULTEC RECHARGER 330XL UNITS

(PLAN VIEW)

SUBSURFACE INFILTRATION FACILITY #1

(NOT TO SCALE)

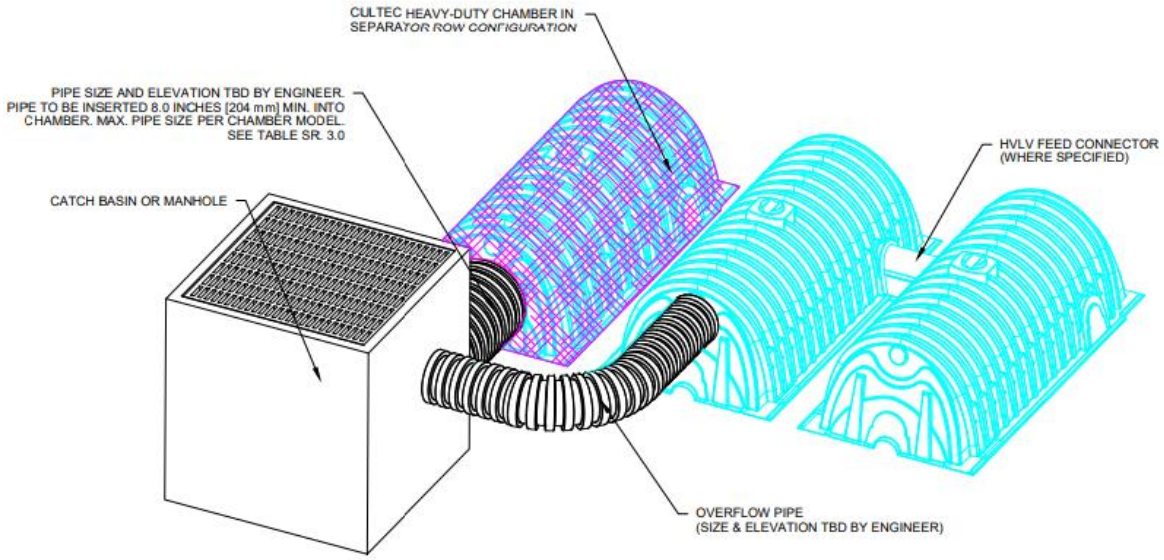
SEPARATOR ROW DESIGN

Bypass Pipe

- Elevated Bypass Pipe* - 9” raised invert

- Diversion Weir
- Crown-Match Tee Fitti

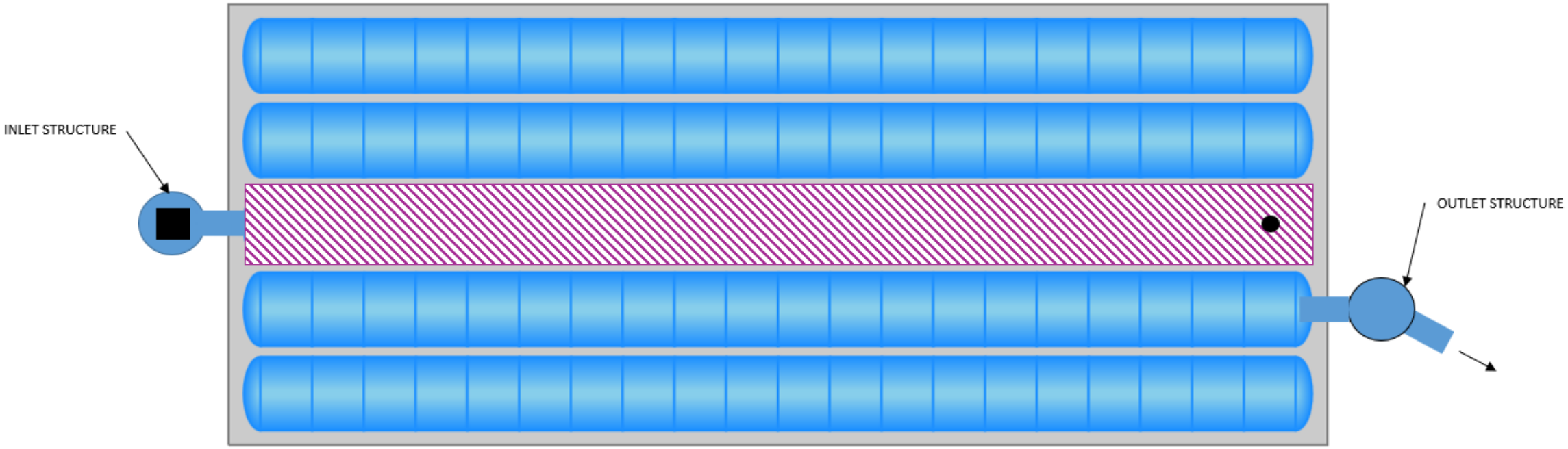
Chamber Model	Bypass Pipe Size (Corrugated HDPE)
C-100HD	6” (150mm)
R-150XLHD	8” (200mm)
R-180HD	10” (250mm)
R-280HD	12” (300mm)
R-330XLHD	18” (450mm)
R-360HD	18” (450mm)
R-902HD	24” (600mm)



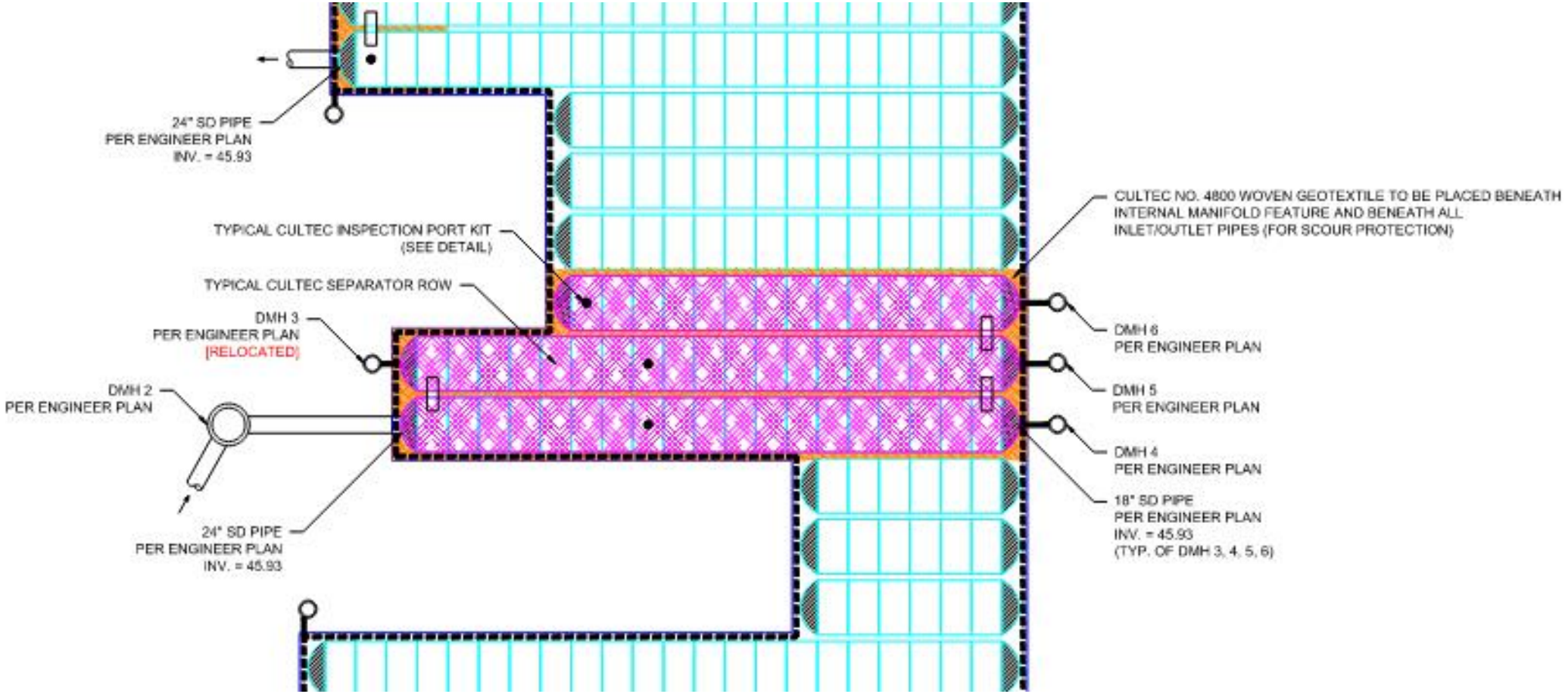
SEPARATOR ROW DESIGN

INSPECTION PORTS

- If only one inspection port, place at end of separator row
- If separator row exceeds 200', add additional ports at a maximum 200' spacing



SEPARATOR ROW DESIGN



SEPARATOR ROW MAINTENANCE

- Inspect twice per year (6 months)
- JetVac when sediment exceeds 3” as observed through the inspection port

Inspection and Maintenance Record

Date	Mode of Access	Frequency	Depth of Sediment	Actions	Expenses	Inspector	Notes
Ex.	Inspection Port	Semi-annually	2”	Measure sediment depth with stadia rod. Visually inspect	$100	DPG	Depth of Sediment was measured via Northeast Inspection Port Adjacent to MH-1. Sediment depth was found to be 2”. No further action required at this time.
Ex.	Access Manhole	Annually					

SEPARATOR ROW MAINTENANCE













SEPARATOR ROW



KEEP IN TOUCH

Kyle Smiley, P.E.

New England Regional Engineer

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Emerging Stormwater Technologies in RI: StormTech Isolator Row PLUS

March 26, 2024

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New England Regional Engineer
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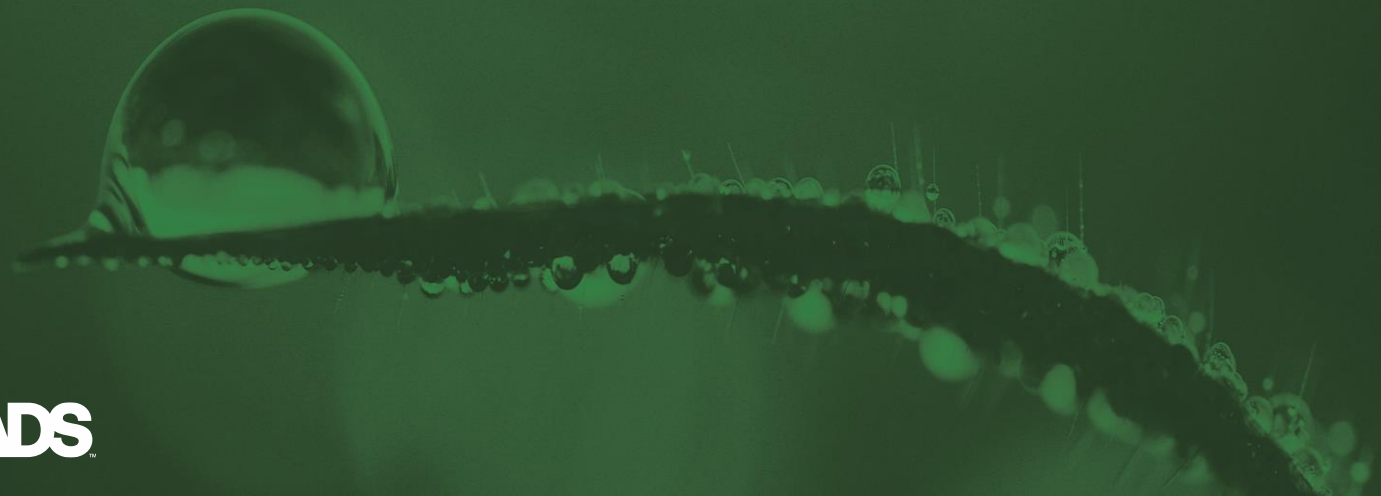
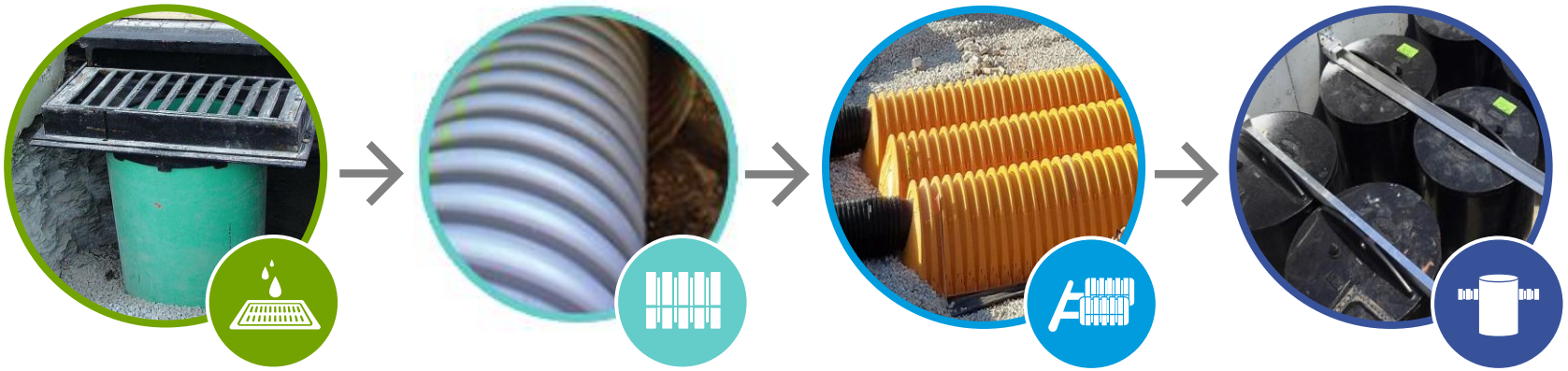
PUT SIMPLE /// OUR PROMISE

To protect and manage water, the world's most precious resource, safeguarding our environment and communities.



Lifecycle of a Raindrop



Capture Conveyance Storage Treatment


StormTech

Surface vs. Subsurface Stormwater Management

Surface Stormwater Management:

- Inefficient use of space
- Limit site development
- Safety hazard

Subsurface Stormwater Management:

- More parking
- Maximize buildable area
- May enable fit into tight ROW



Surface vs. Subsurface Stormwater Management

Surface Pond:



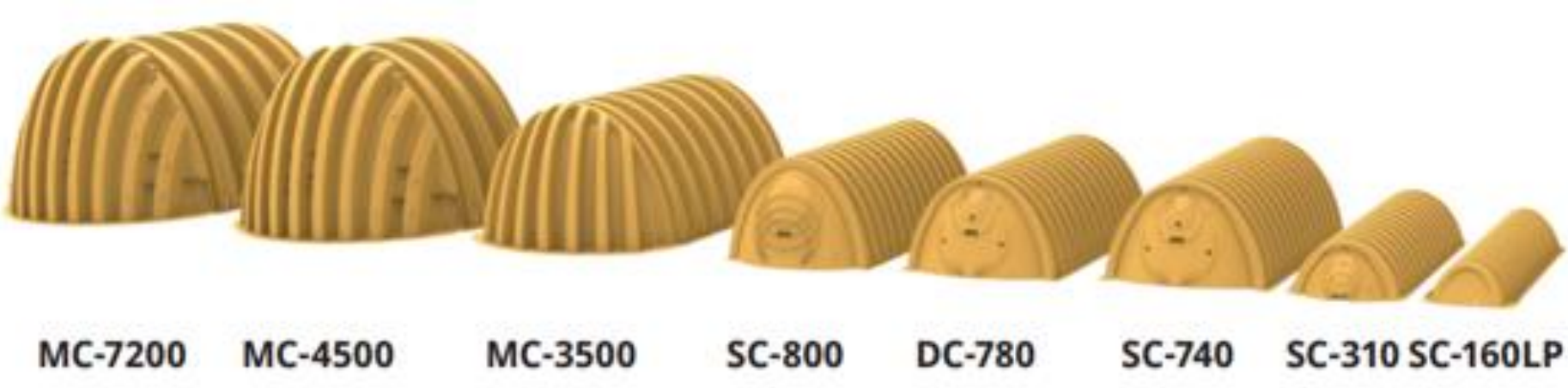
Unusable Land

Subsurface Storage:



Parking Demand Reached!

Meet the Chambers…

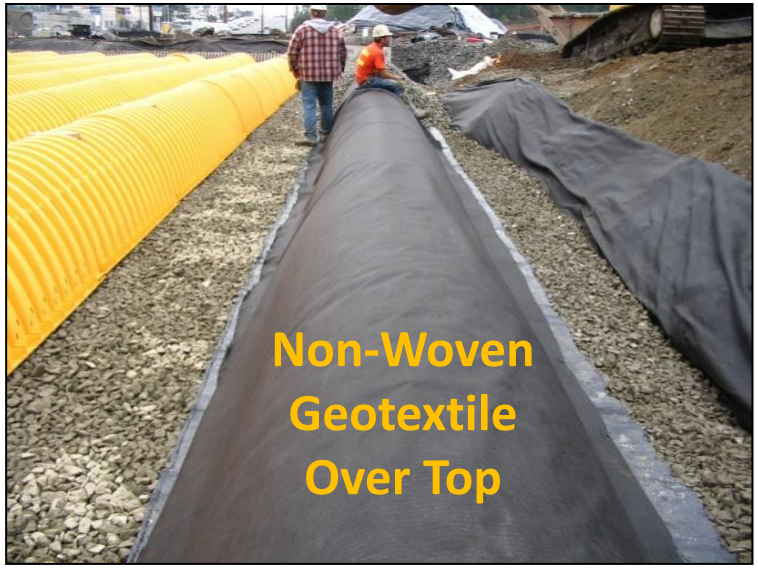


StormTech Chambers
ASTM F2418 and F2922

All StormTech Chambers conform to the design requirements of ASTM F2787: Ensuring Chamber Quality and Safe Structural Design


StormTech Isolator Row

StormTech Isolator Row

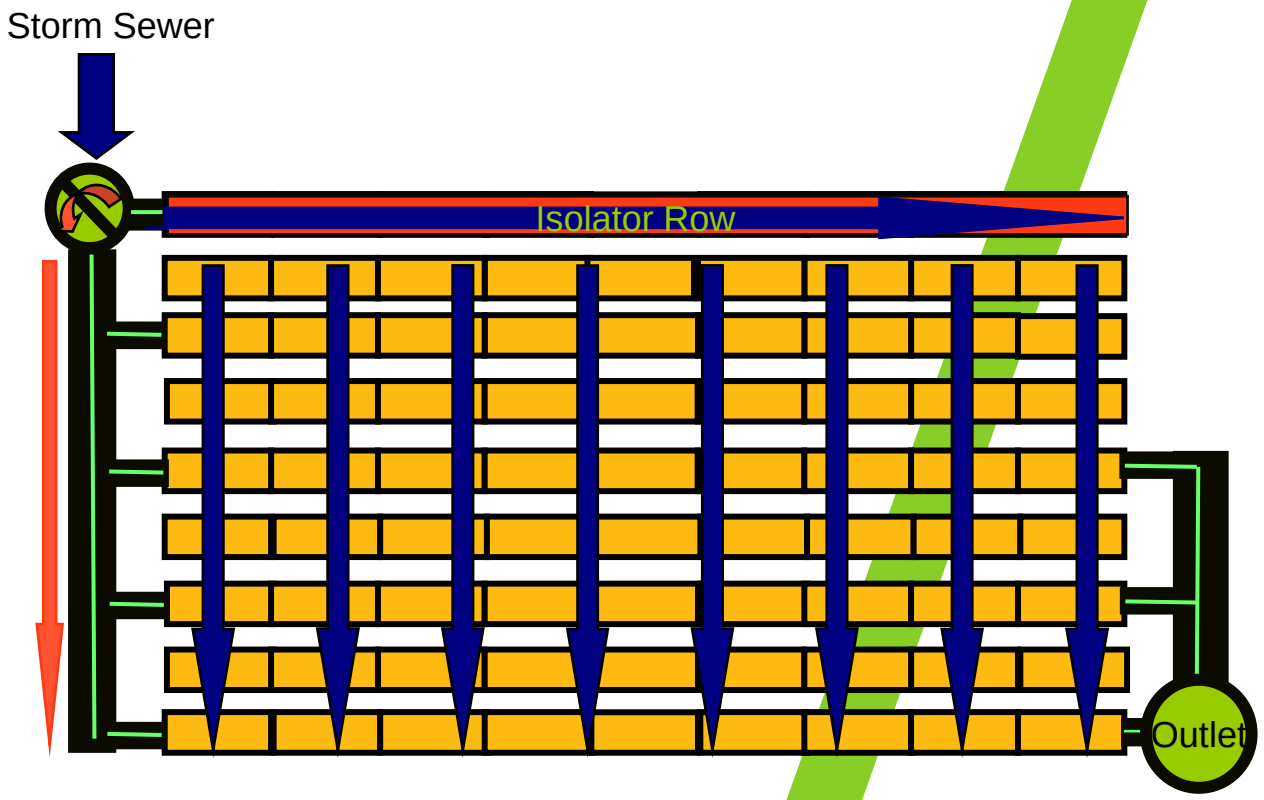




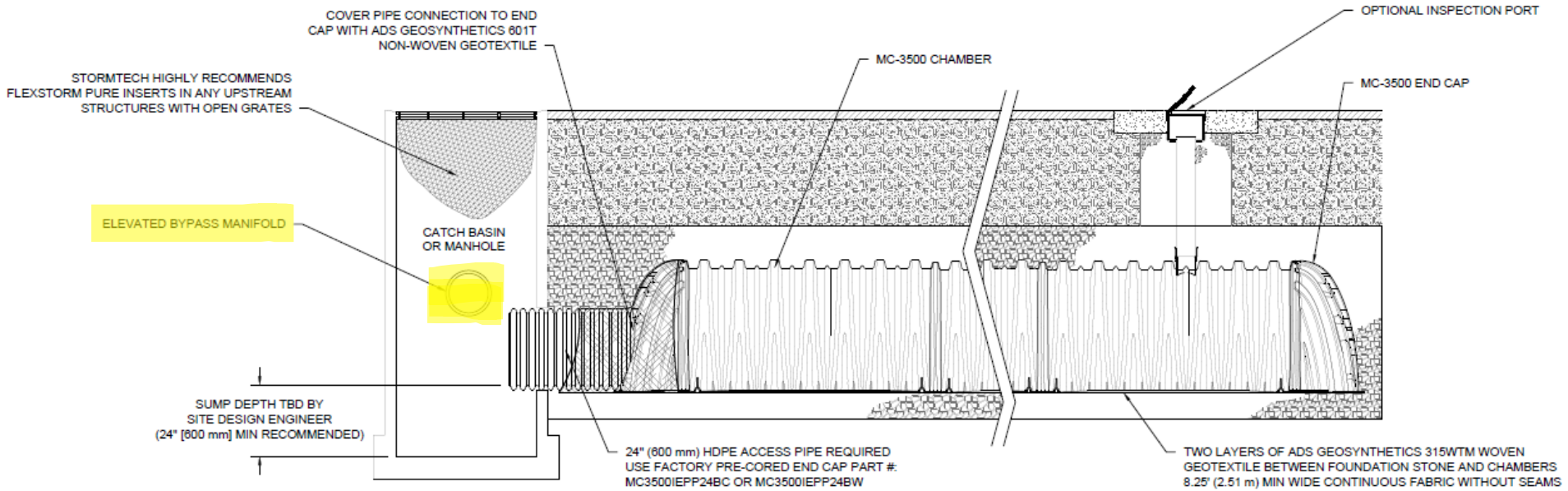




StormTech Isolator Row – How it works…



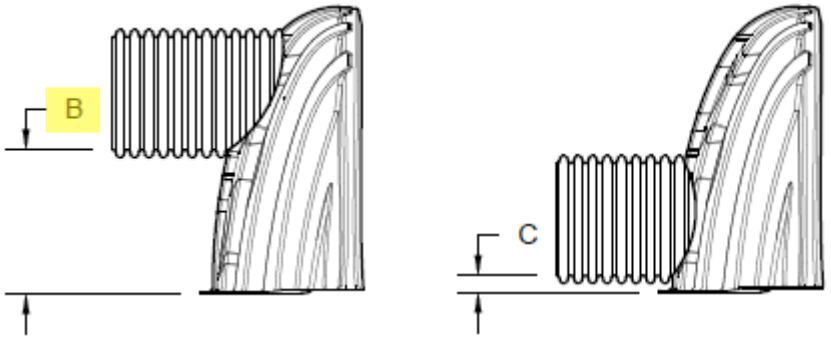
StormTech Isolator Row – How it works…



PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL

MC-3500 ISOLATOR ROW DETAIL
NTS



StormTech Isolator Row – Testing

June 2008 – The University of New Hampshire Stormwater Center



- TSS median removal efficiency – **80%**
- Petroleum Hydrocarbons median removal efficiency – **90%**
- Zinc median removal efficiency – **53%**
- Phosphorus median removal efficiency – **49%**

StormTech Isolator Row – Sizing

Product Performance Claim & Certification (Sizing Guidance):

80% TSS removal is achieved by sizing Isolator Row(s) to treat the WQf at a specific flow rate, not to exceed 2.5 gpm/sf of bottom area using two (2) layers of ADS geosynthetics 315WTK or approved equal woven geotextile.

Model	Specific Flow Rate	Bottom Area	Flow Per Model
StormTech SC-160LP	2.5 gpm/sf	11.45 sf	**0.06 cfs**
StormTech SC-310	2.5 gpm/sf	17.7 sf	**0.10 cfs**
StormTech SC-740	2.5 gpm/sf	27.8 sf	**0.15 cfs**
StormTech DC-780	2.5 gpm/sf	27.8 sf	**0.15 cfs**
StormTech SC-800	2.5 gpm/sf	27.3 sf	**0.15 cfs**
StormTech MC-3500	2.5 gpm/sf	42.9 sf	**0.24 cfs**
StormTech MC-4500	2.5 gpm/sf	30.1 sf	**0.16 cfs**
StormTech MC-7200	2.5 gpm/sf	50.0 sf	**0.28 cfs**

StormTech Isolator Row – Sizing Example

SC-740 StormTech System w/ a Water Quality Flow of 1.50 cfs:

1.50 cfs / 0.15 cfs per Chamber = 10 Chambers

Your Isolator Row(s) shall have a minimum of 10 Chambers

Model	Specific Flow Rate	Bottom Area	Flow Per Model
StormTech SC-160LP	2.5 gpm/sf	11.45 sf	**0.06 cfs**
StormTech SC-310	2.5 gpm/sf	17.7 sf	**0.10 cfs**
StormTech SC-740	2.5 gpm/sf	27.8 sf	**0.15 cfs**
StormTech DC-780	2.5 gpm/sf	27.8 sf	**0.15 cfs**
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StormTech MC-7200	2.5 gpm/sf	50.0 sf	**0.28 cfs**


StormTech Isolator Row PLUS

StormTech Isolator Row PLUS



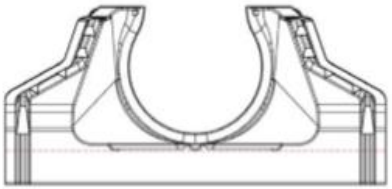






StormTech Isolator Row PLUS

PROVEN PERFORMANCE JUST GOT BETTER

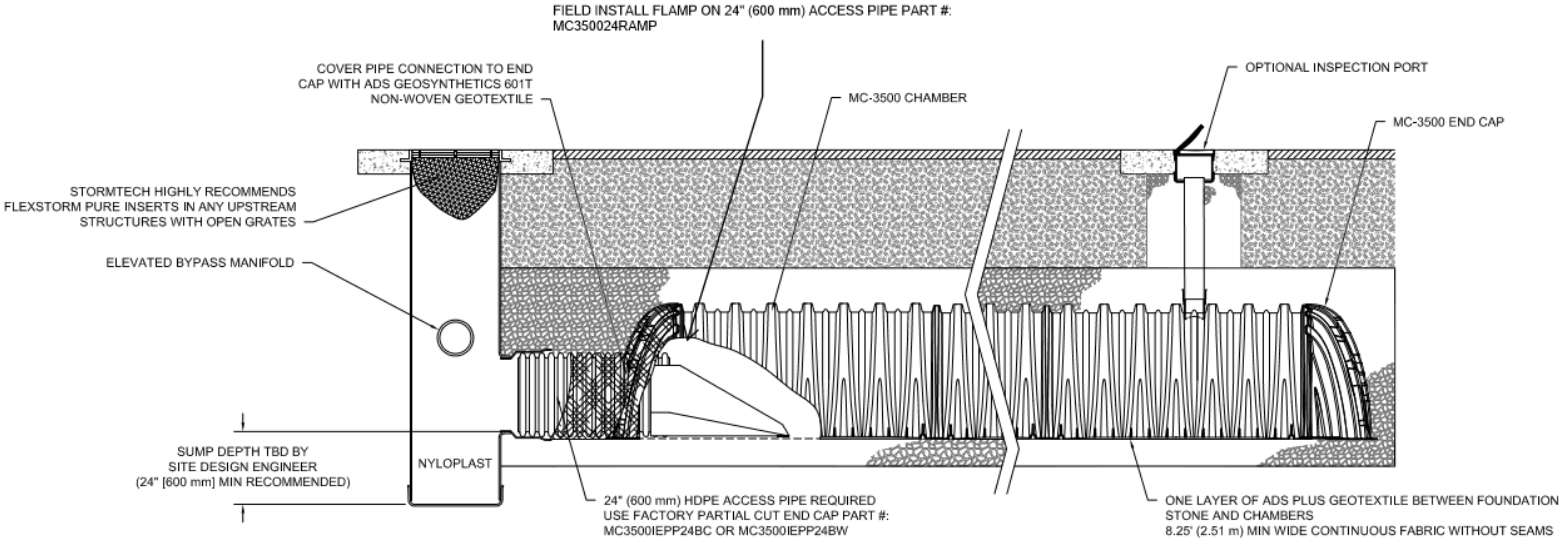




The Isolator Row PLUS is now NJCAT verified, achieving over 81% TSS removal with a loading rate of 4.1 GPM/SF

The FLAMP (Flared End Ramp) provides provides a smooth transition from pipe invert to fabric bottom

Proprietary ADS PLUS fabric maintains durability and sediment removal while allowing for higher water quality flow rates



StormTech Isolator Row PLUS – Sizing

Product Performance Claim & Certification (Sizing Guidance):

80% TSS removal is achieved by sizing Isolator Row PLUS(s) to treat the WQf at a specific flow rate, not to exceed 4.1 gpm/sf of bottom area using a single layer of ADS PLUS woven geotextile.

Model	Specific Flow Rate	Bottom Area	Flow Per Model	Increase
StormTech SC-160LP	4.1 gpm/sf	11.45 sf	**0.11 cfs**	**+0.05 cfs**
StormTech SC-310	4.1 gpm/sf	17.7 sf	**0.16 cfs**	**+0.06 cfs**
StormTech SC-740	4.1 gpm/sf	27.8 sf	**0.26 cfs**	**+0.11 cfs**
StormTech DC-780	4.1 gpm/sf	27.8 sf	**0.26 cfs**	**+0.11 cfs**
StormTech SC-800	4.1 gpm/sf	27.3 sf	**0.25 cfs**	**+0.10 cfs**
StormTech MC-3500	4.1 gpm/sf	42.9 sf	**0.40 cfs**	**+0.16 cfs**
StormTech MC-4500	4.1 gpm/sf	30.1 sf	**0.28 cfs**	**+0.12 cfs**
StormTech MC-7200	4.1 gpm/sf	50.0 sf	**0.45 cfs**	**+0.17 cfs**

StormTech Isolator Row PLUS – Sizing Example

SC-740 StormTech System w/ a Water Quality Flow of 1.50 cfs:

1.50 cfs / 0.26 cfs per Chamber = 5.8 Chambers

Your Isolator Row(s) shall have a minimum of 6 Chambers

Model	Specific Flow Rate	Bottom Area	Flow Per Model	Increase
StormTech SC-160LP	4.1 gpm/sf	11.45 sf	**0.11 cfs**	**+0.05 cfs**
StormTech SC-310	4.1 gpm/sf	17.7 sf	**0.16 cfs**	**+0.06 cfs**
StormTech SC-740	4.1 gpm/sf	27.8 sf	**0.26 cfs**	**+0.11 cfs**
StormTech DC-780	4.1 gpm/sf	27.8 sf	**0.26 cfs**	**+0.11 cfs**
StormTech SC-800	4.1 gpm/sf	27.3 sf	**0.25 cfs**	**+0.10 cfs**
StormTech MC-3500	4.1 gpm/sf	42.9 sf	**0.40 cfs**	**+0.16 cfs**
StormTech MC-4500	4.1 gpm/sf	30.1 sf	**0.28 cfs**	**+0.12 cfs**
StormTech MC-7200	4.1 gpm/sf	50.0 sf	**0.45 cfs**	**+0.17 cfs**

StormTech Isolator Row PLUS – Maintenance



StormTech Isolator Row PLUS – Maintenance





Importance of Construction Sediment Control



No Inlet Protection



Sediment on Woven Geotextile prior to pavement



Adjacent Row protected by presence of Isolator Row

Importance of Construction Sediment Control



09-11-17 Isolator Row Cleanout - Lakeway Commons

Before Cleaning (1)



Before Cleaning (2)

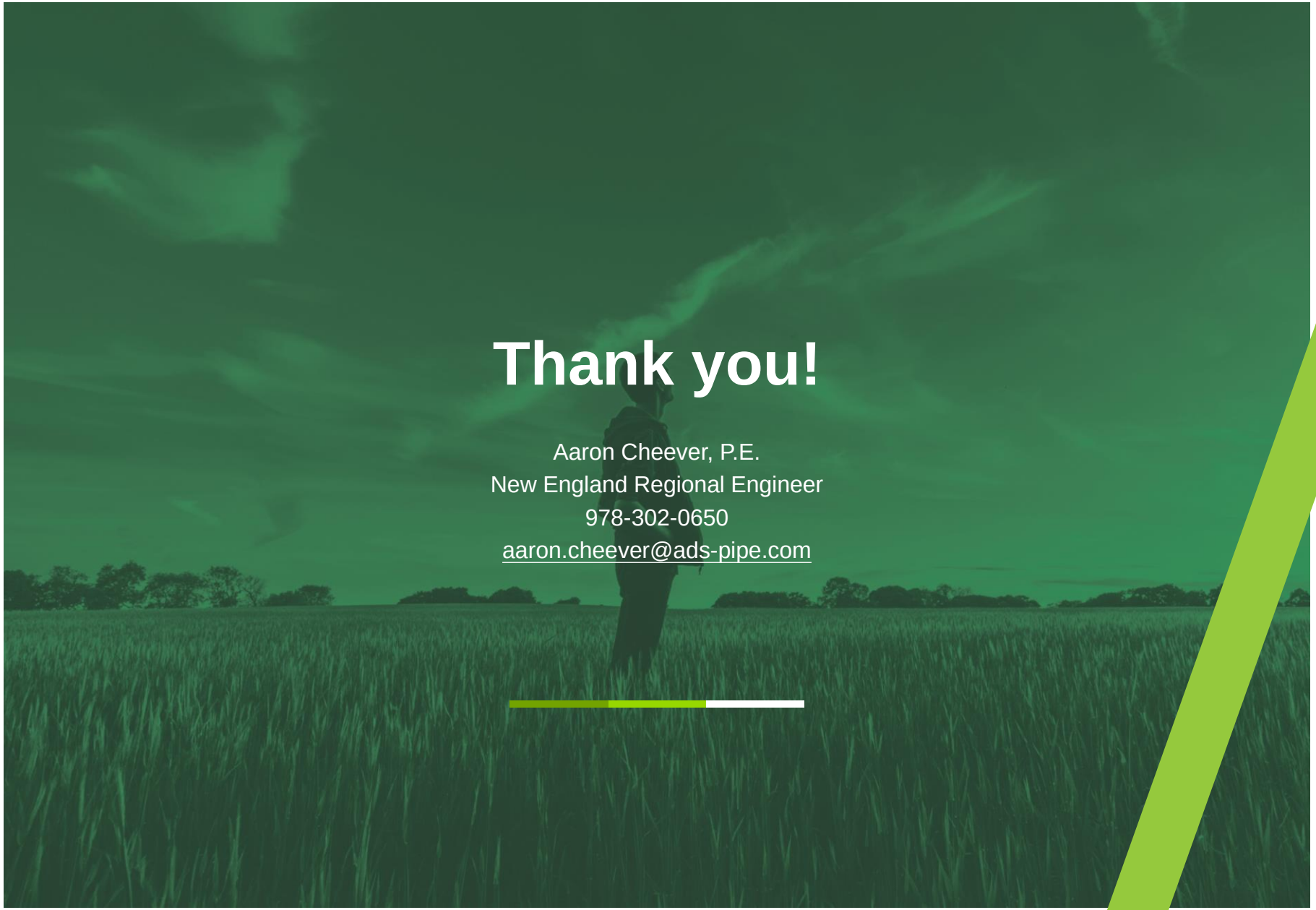
After Cleaning (1)



After Cleaning (2)

ADS


Questions?



Thank you!

Aaron Cheever, P.E.
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978-302-0650
aaron.cheever@ads-pipe.com



Stormwater Innovation Center:

Separator Row & Isolator Row

Why do we use it?



Maintenance, Maintenance, Maintenance!

What is a common cause of BMP failure? → Poor Maintenance

What can result in unexpected flooding? → Poor Maintenance

What can cost an owner dearly? → Poor Maintenance



Separator Row/ Isolator Row are a means of efficiently and easily maintaining the BMP system, providing TSS removal and protecting the overall health of the system as a whole.

Design

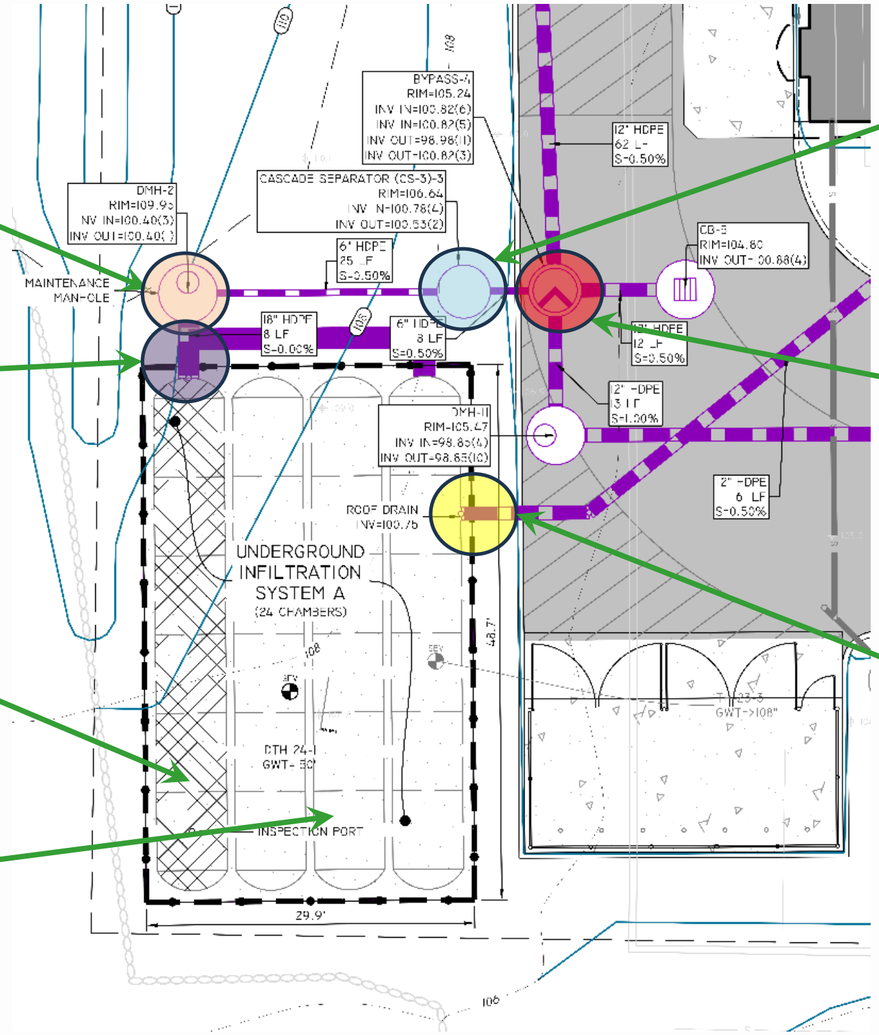
- Until now, Separator Row/ Isolator Row was not on the RIDEM Stormwater Proprietary Technologies List
    - Previously, we would design the system with a Hydrodynamic Separator (or equal), located upstream of the primary BMP, for pretreatment





- Separator/Row Isolator row was STILL used, in addition to the hydrodynamic separator, to “protect” the system.

Case Study 1



Maintenance Manhole

Separator/Isolator Row Set at Lower Elevation

Separator/Isolator Row

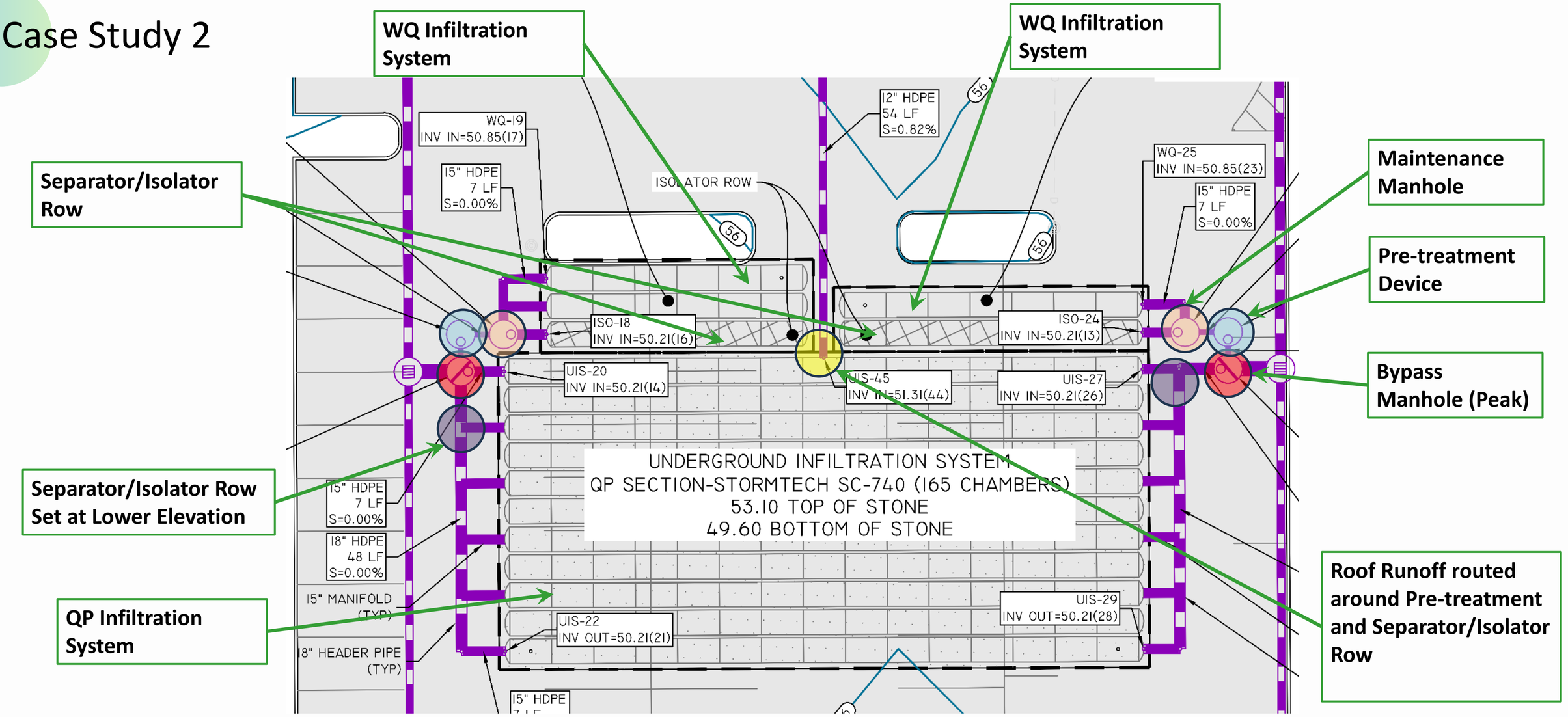
WQ Infiltration System

Pre-treatment Device

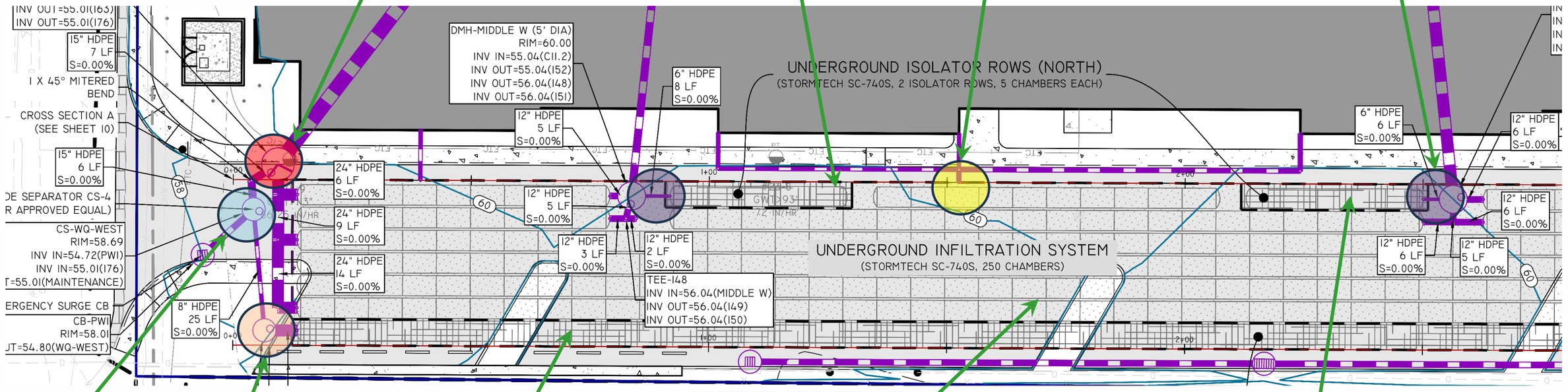
Bypass Manhole (Peak)

Roof Runoff routed around Pre-treatment and Separator/Isolator Row

Case Study 2


WQ Infiltration System
WQ Infiltration System
Separator/Isolator Row
Maintenance Manhole
Pre-treatment Device
Bypass Manhole (Peak)
Separator/Isolator Row Set at Lower Elevation
QP Infiltration System
Roof Runoff routed around Pre-treatment and Separator/Isolator Row
WQ-19
INV IN=50.85(17)
15" HDPE
7 LF
S=0.00%
12" HDPE
54 LF
S=0.82%
ISOLATOR ROW
WQ-25
INV IN=50.85(23)
15" HDPE
7 LF
S=0.00%
ISO-18
INV IN=50.21(16)
ISO-24
INV IN=50.21(13)
UIS-20
INV IN=50.21(14)
UIS-45
INV IN=51.31(44)
UIS-27
INV IN=50.21(26)
UNDERGROUND INFILTRATION SYSTEM
QP SECTION-STORMTECH SC-740 (165 CHAMBERS)
53.10 TOP OF STONE
49.60 BOTTOM OF STONE
15" HDPE
7 LF
S=0.00%
18" HDPE
48 LF
S=0.00%
15" MANIFOLD
(TYP)
UIS-22
INV OUT=50.21(21)
UIS-29
INV OUT=50.21(28)
18" HEADER PIPE
(TYP)
15" HDPE

Case Study 3



DiPrete Engineering

Thanks!

