

# Summary of Testing

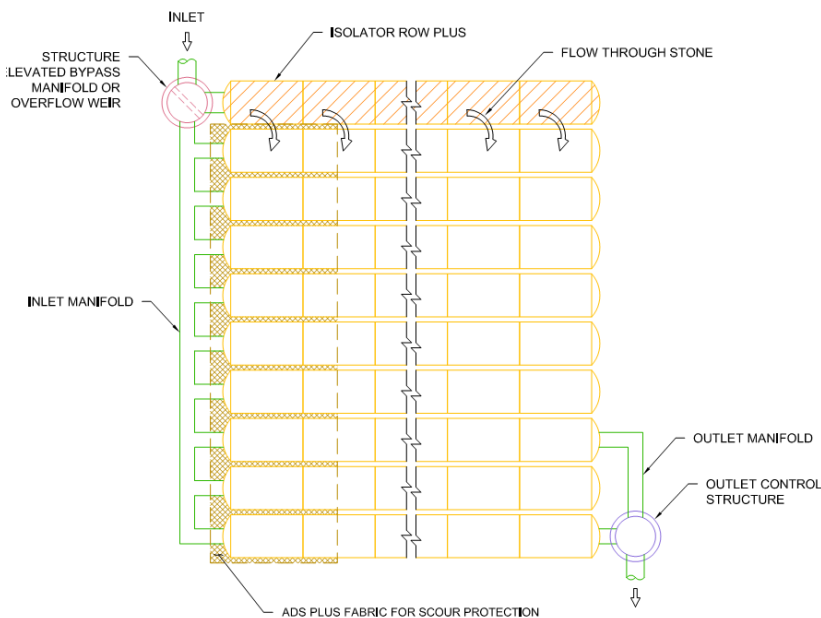
## StormTech® Isolator® Row Plus – Pollutant Removal

The following information is intended to provide a general overview of the pollutant removal capability of the StormTech Isolator Row Plus, which is a patented filtration type BMP manufactured by StormTech, LLC. The StormTech Isolator Row Plus is covered under several US and International patents.

### I. Description:

The StormTech Isolator Row Plus is a row or rows of thermoplastic chambers that sit on a layer of ADS Plus fabric and are connected to a closely located structure for easy access. The chambers provide for settling and filtration of sediment and other contaminants as stormwater rises in the Isolator Row Plus and ultimately passes through the fabric. The open-bottom chambers allow stormwater to flow out of the chambers. Sediment is captured in the Isolator Row Plus, protecting the storage areas of the adjacent stone and chambers from sediment accumulation. The StormTech Isolator Row Plus is designed to capture the “first flush” and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator Row but includes a high low/concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row bypass through a manifold to the other chambers. This is achieved with either a high-flow weir or an elevated manifold. This creates a differential between the Isolator Row Plus and the manifold, thus allowing for settlement time in the Isolator Row Plus.

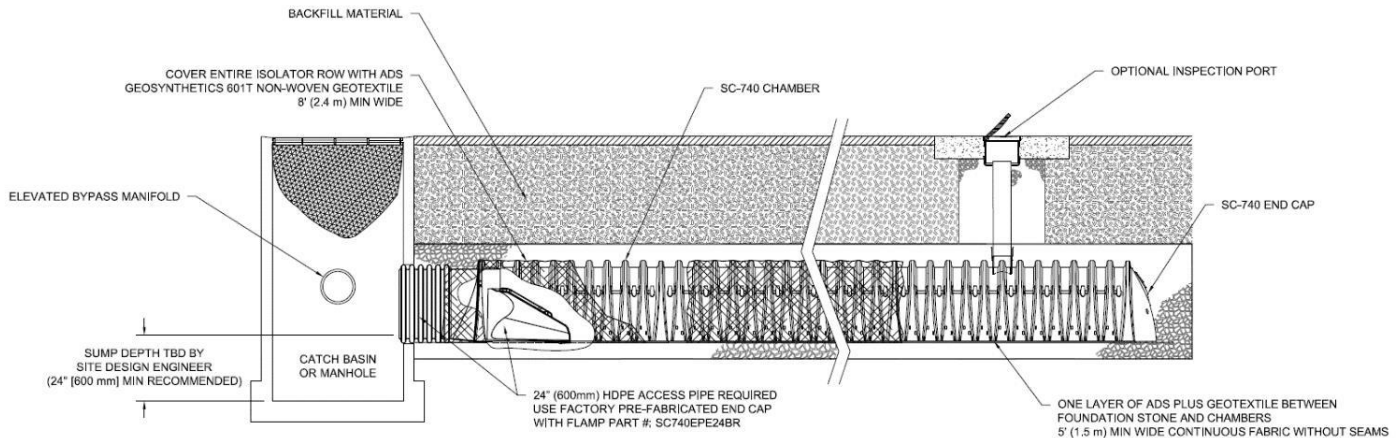
**Figure 1: Schematic of the StormTech Isolator Row Plus System**



Some of the unique features of the Isolator Row that contribute to its effectiveness and practicality include:

- Vast filtration surface area
- Large sediment storage volume
- Easily maintainable by most pipe and sewer maintenance companies
- Large network of ADS personnel that can help with designs and provide onsite guidance
- A state-of-the-art structural design that meets ASTM standards and incorporates AASHTO safety factors for both live loads and permanent dead loads

**Figure 2: Isolator Row Plus Cross Section Detail**



## II. Applicable Sites:

The Isolator Row Plus can be effectively used for essentially all developed sites. The most common applications are highly impervious sites such as paved parking areas, roads as well as developed sites that include grassy or other landscaped areas. It is not intended to be used for construction sediments.

## III. StormTech System & Isolator Row Testing:

**October 2006** – Tennessee Tech University’s Civil and Environmental Department prepared the “Performance Evaluation of Sediment Removal Efficiency – StormTech Isolator Row”. Testing on a full-scale Isolator Row in a laboratory was done to determine the sediment removal efficiency with two different silica-water slurries in accordance with NJCAT protocols. In August of 2007, the technology was verified by NJCAT. Results are shown in Table 1.

**September 2010** – The University of New Hampshire Stormwater Center released the “Final Report on Field Verification Testing of the StormTech Isolator Row Treatment Unit”. Testing consisted of determining the water quality performance for multiple stormwater pollutants in accordance with TARP Tier II protocol. Testing was done for a system only consisting of the StormTech Isolator Row. Data was recorded for 23 storm events. Results are shown in Table 1.

**January 2020** – BaySaver Technologies prepared the “NJCAT Technology Verification of Isolator Row Plus”. Testing on a full-scale Isolator Row Plus in a laboratory was done to determine the sediment removal efficiency with a silica-water slurry in accordance with the updated NJCAT protocols. In July of 2020, the technology was verified by NJCAT. Results are shown in Table 1.

**June 2020** – North Carolina State University Department of Biological and Agricultural Engineering prepared the technical report “An Evaluation of the StormTech Isolator Row and Subsurface Stormwater Management System at Capital Oaks Retirement Resort, Raleigh, North Carolina”. 14 months of monitoring and over 73 precipitation events were completed to study the hydrologic and water quality performance of a StormTech MC-4500 system in Raleigh, NC. Results are shown in Table 1.

**Table 1: StormTech Isolator Row 3<sup>rd</sup> Party Pollutant Removal Efficiency Data**

Pollutant	University of New Hampshire (Isolator Row Only) Median	Raleigh, North Carolina (StormTech system with Isolator Row)	Tennessee Tech University (Isolator Row Only)	NJCAT Verification (Isolator Row Plus only)
Total Suspended Solids	83%*	91%*	84%*	81%**
Total Phosphorus	33%	68%	Not Tested	Not Tested
Total Nitrogen	Not Tested	35%	Not Tested	Not Tested
Total Zinc	81%	Not Tested	Not Tested	Not Tested
Total Petroleum Hydrocarbons	91%	Not Tested	Not Tested	Not Tested

\*Based on a flow rate of 2.5 gpm/sf (1.70 L/s/m<sup>2</sup>) (Isolator Row)

\*\* Based on a flow rate of 4.1 gpm/sf (2.78 L/s/m<sup>2</sup>) (Isolator Row Plus)

## IV. Product Performance and Design:

Minimum 80% TSS removal is achieved by sizing the Isolator Row PLUS to treat the water quality at a specific flow rate per chamber floor area using a single layer of ADS Plus fabric. The design flow rates for each chamber size are listed below.

Model	Specific Flow Rate	Bottom Area	Flow Per Model
StormTech SC-160LP	4.1 gpm/sf (2.78 L/s/m <sup>2</sup> )	11.45 sf (1.06 m <sup>2</sup> )	0.11 cfs (3.11 L/s)
StormTech SC-310	4.1 gpm/sf (2.78 L/s/m <sup>2</sup> )	17.7 sf (1.64 m <sup>2</sup> )	0.16 cfs (4.53 L/s)
StormTech SC-740	4.1 gpm/sf (2.78 L/s/m <sup>2</sup> )	27.8 sf (2.58 m <sup>2</sup> )	0.26 cfs (7.36 L/s)
StormTech DC-780	4.1 gpm/sf (2.78 L/s/m <sup>2</sup> )	27.8 sf (2.58 m <sup>2</sup> )	0.26 cfs (7.36 L/s)
StormTech MC-3500	4.1 gpm/sf (2.78 L/s/m <sup>2</sup> )	42.9 sf (3.99 m <sup>2</sup> )	0.40 cfs (11.33 L/s)
StormTech MC-4500	4.1 gpm/sf (2.78 L/s/m <sup>2</sup> )	30.1 sf (2.80 m <sup>2</sup> )	0.28 cfs (7.93 L/s)
StormTech MC-7200	4.1 gpm/sf (2.78 L/s/m <sup>2</sup> )	50.0 sf (4.65 m <sup>2</sup> )	0.45 cfs (12.74 L/s)



## V. StormTech Isolator Row Approvals:

The StormTech Isolator Row and Isolator Row Plus have been approved on a project by project basis for tens of thousands of projects around the world. Following are some examples:

- The Isolator Row Plus is a verified filtration manufactured treatment device by the New Jersey Corporation for Advanced Testing (NJCAT) in accordance with NJDEP Filter Protocols.
- In Ohio, the Isolator Row is approved per the Ohio EPA as a pretreatment to underground storage and can be used for both storage volume and pretreatment as the water quality volume all passes through the Isolator Row.
- The Metropolitan St. Louis Sewer District (MSD) has approved the StormTech Isolator Row as a standalone post-construction stormwater Best Management Practice.
- In Massachusetts, approvals for the State DEP requirement of 80% TSS removal on an annual load basis are issued at the Conservation Commission level, and the Isolator Row is commonly used to meet these criteria.
- In Oregon, the Rogue Valley Storm Water Advisory Team (SWAT) has incorporated the StormTech Isolator Row into their Stormwater Design Manual as a pre-approved proprietary device for stormwater quality treatment.
- The Kansas City Metro Chapter of the American Public Works have included the StormTech Isolator Row with a value rating of 3.0 in their Manual of Best Management Practices for Stormwater Quality.
- Maine DEP has approved the Isolator Row pollutant removal efficiency based on laboratory testing of 110 micron (US Silica OK-110) particle size
- In Texas, the City of Houston PWE as well as Harris county, has recognized the Isolator Row as an official water quality device.
- Under the New Environmental Technology Evaluation program, the Ontario (Canada) Ministry of the Environment has evaluated the Isolator row and issued a Certificate of Technology Assessment
- The Isolator Row Plus has been evaluated and approved for Canadian Environment Technology Verification (ETV) by VerifiGlobal.

## V. Isolator Row Maintenance:

The frequency of Inspection and Maintenance varies by location. A routine inspection schedule needs to be established for each individual location, based upon site-specific variables. The type of land use (i.e. industrial, commercial, public, residential), anticipated pollutant load, percent imperviousness, climate, rainfall data, etc., all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection schedule should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If, upon visual inspection, it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

The Isolator Row was designed to reduce the cost of periodic maintenance. By “isolating” sediment to just one row, costs are dramatically reduced by eliminating the need to clean out



each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout.

Maintenance is accomplished with the jetvac process. The jetvac process utilizes a high-pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediment. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/jetvac combination vehicles. Selection of an appropriate jetvac nozzle will improve maintenance efficiency.

Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear-facing jets with an effective spread of at least 45" are best. Most jetvac reels have 200 feet of hose, allowing maintenance of an Isolator Row up to 50 chambers long. The jetvac process shall only be performed on StormTech Isolator Rows that have fabric specified by StormTech over their angular base stone.

Complete details of the design, operation, and maintenance of the Isolator Row Plus can be found in the StormTech Isolator Row and Isolator Row Plus O&M Manuals.

