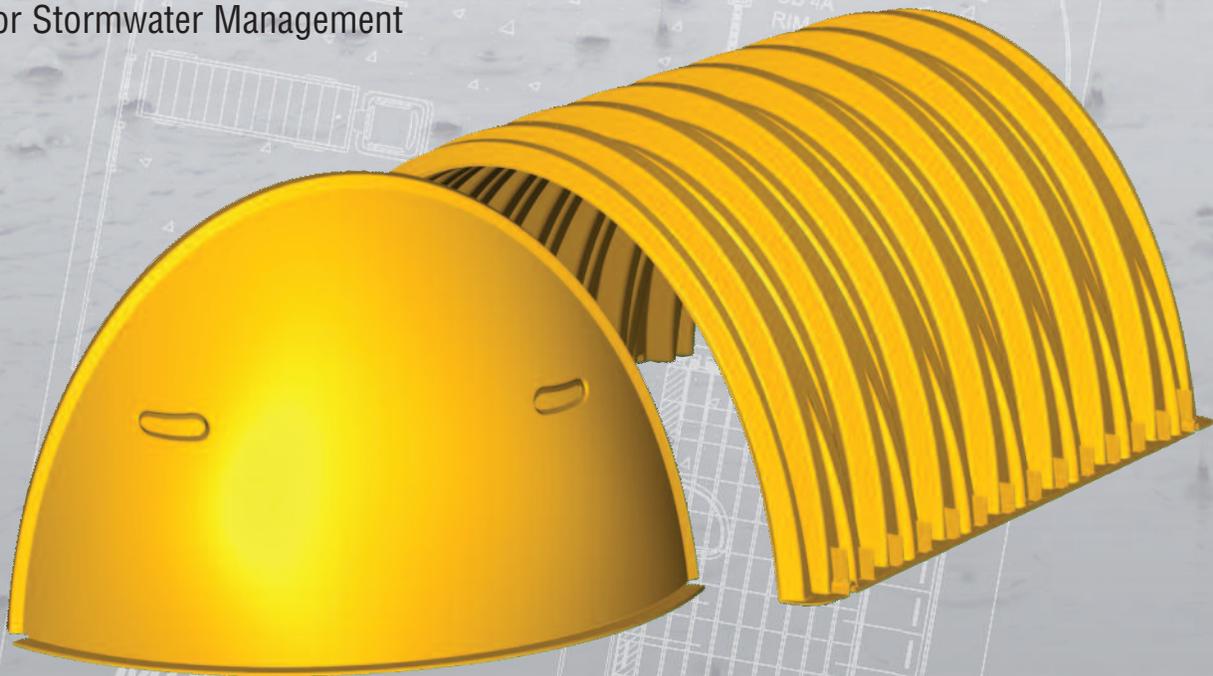




MC-3500 Installation Instructions

StormTech[®] Chamber Systems
for Stormwater Management



MIXED USE
DEVELOPMENT
F.F.E. - 106.1



W INVERT - 99.6
NE INVERT - 99.0
E INVERT - 99.0

CB 2B
RIM - 107.2
S INVERT - 101.4



Before You Begin

REQUIRED MATERIALS AND EQUIPMENT LIST

- Acceptable foundation and embedment material: nominal $\frac{3}{4}$ " – 2" (19-51 mm) clean, crushed, angular stone per **Tables 4 & 5** on page 10
- Acceptable fill materials per **Table 5** on page 10
- StormTech solid end caps
- StormTech pre-cored end caps
- StormTech chambers
- 2½" (64 mm) coarse thread screws (3 per end cap)
- Appropriate compaction equipment

IMPORTANT: Chamber pallets are 75" x 90" (1.9 m x 2.3 m) and weigh approximately 1950 lbs. (884 kg). Unloading chambers requires 72" (1.8 m) (min.) forks.

Requirements for System Installation

1 StormTech requires installing contractors to use and understand StormTech's most current installation instructions prior to beginning system installation.

All illustrations and photographs are examples of typical situations. Actual designs may vary. Be sure to follow the engineer's drawings.

2 StormTech offers installation consultations to installing contractors. Contact StormTech at least 30 days prior to system installation to arrange a pre-installation consultation. Our representatives can answer questions, address comments and provide information about the StormTech chamber system's installation requirements. Call **1-888-892-2694** or visit www.stormtech.com to receive the most current version of our installation instructions.

3 Contact local underground utility companies prior to construction.

4 StormTech's requirements for systems with a pavement design (asphalt, concrete pavers, etc.): Minimum cover is 24" (610 mm) not including pavement; maximum cover is 6.5' (1.98 m) including pavement design. For installations that do not include pavement, where rutting from vehicles may occur, minimum required cover is 30" (762 mm), maximum cover is 6.5' (1.98 m).

5 The contractor must report any discrepancies with the system subgrade soil bearing capacity to the design engineer.

6 Check chambers for shipping damage prior to installation. Units that have been damaged must not be installed. Contact StormTech immediately upon discovery of any damage.

7 Geotextile must be used as indicated in the engineer's drawings.

8 IMPORTANT: End caps must be fastened to the chambers with 3 screws prior to placing initial backfill.

9 IMPORTANT: Initial embedment shall be spotted along the centerline of the chamber evenly anchoring the lower portion of the chamber. After anchoring, continue backfilling evenly between rows across the width of the bed. This will minimize chamber movement and the potential for distortion.

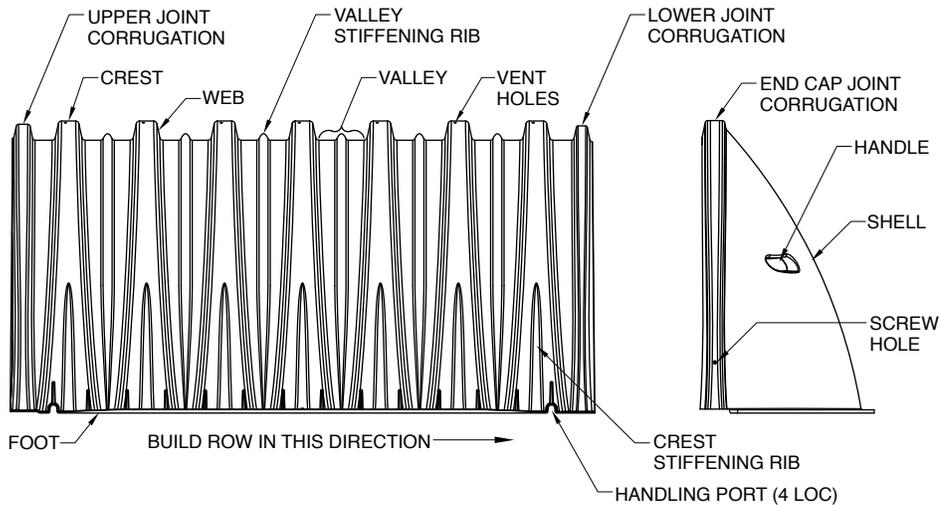
10 The contractor must refer to StormTech's Installation Instructions for Tables of Acceptable Vehicle Loads at various depths of cover. This information is also available at www.stormtech.com. The contractor is responsible for preventing vehicles that exceed StormTech's requirements from traveling across or parking over the stormwater system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from traveling over the stormwater system.

11 The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.

12 StormTech products must be designed and installed in accordance with StormTech's minimum requirements as noted in the StormTech Design Manual. Failure to do so will void the limited warranty.

13 STORMTECH PRODUCT WARRANTY IS LIMITED. Contact StormTech for warranty information.

Figure 1 – Chamber and End Cap Components



Requirements for Excavating and Preparing the Site



Filter fabric and underdrains installed.

- 1** Excavate and level the designated area. Excavated area should allow for at least one extra foot (305 mm) for perimeter stone parallel to chamber rows and a minimum 6" (152 mm) of perimeter stone measured from the base of end caps to allow for proper fit and adequate compaction.
- 2** Excavation must be free of standing water. Dewatering measures must be taken if required. Positive drainage of the excavation must be maintained.
- 3** Prepare the chamber bed subgrade soil as outlined in the engineer's drawings.
- 4** Place AASHTO M288 Class 2 non-woven geotextile over the prepared subgrade soils and up the excavated walls. **Table 3** lists suitable geotextiles.

The geotextile must overlap at least 24" (610 mm) where the edges meet.

- 5** Place AASHTO M288 Class 2 non-woven geotextile around the perimeter of the excavated bed including the manifold system as specified in the engineering drawing.

NOTE: (Geotextile is required over the top of the entire chamber system after the 6" (152 mm) of stone is placed over chambers.)

- 6** Install perforated underdrains as required by the engineer's drawings. Underdrains may be located around the perimeter of the bed or under the chambers with proper separation from the foot of the chamber to the top of the underdrain pipe.
- 7** Place acceptable nominal $\frac{3}{4}$ - 2" (19-51 mm) clean, crushed, angular stone foundation material over the entire bottom surface of the bed (see **Tables 4 & 5** for stone requirements). Refer to the engineer's drawings for subgrade soil preparation and required stone foundation thickness.
- 8** Compact the stone using a vibratory roller with its full dynamic force applied to achieve a flat surface.

Requirements for Assembling Inlet Pipes

NOTE: Depending on the system design, it may be advantageous to lay out the inlet and outlet pipe systems prior to forming the bed of chambers.



Scour protection fabric at inlet manifold.



MC-3500 end caps are available solid or pre-cored for pipe connections.

- 1** Temporarily layout the header/manifold system according to the engineer's drawings.
- 2** Place a minimum 17.5 feet (5.33 m) AASHTO M288 Class I geotextile beginning at each inlet end cap. See standard detail. Check the engineer's drawings to determine if additional scour control measures are required.
- 3** Set first chamber of each row aligned with respective inlet pipes if applicable. For row layout purposes, use the center to center (C-C) dimension of 81" (2.06 m) unless a wider spacing is indicated on the engineer's drawings.

NOTE: Prefabricated manifold spacing may exceed 81" (2.06 m) C-C row spacing. Chambers away from the manifold should be positioned to maintain 81" C-C (2.06 m).

- 4** Insert the distribution pipes into the associated pre-cored end caps.

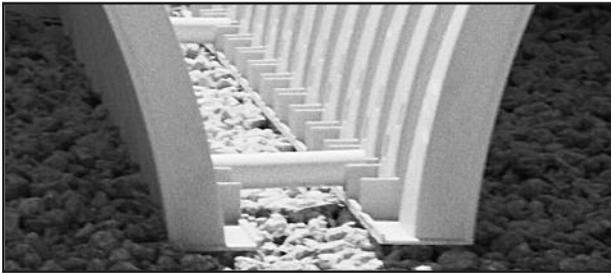
NOTE: End caps with pre-cored 18" & 24" bottom connections and 15" top connections are standard inventoried parts. Other pre-cored end cap configurations are available by special order.

NOTE: All top connections 10" and larger require a Nyloplast bell by spigot adapter. See StormTech for details.

- 5** Pipe connections into and out of the system must be through end caps except as shown in StormTech details for 4" inspection ports, 4" vents and 4" minor connections.
- 6** Once chamber spacing requirements are met, the header/manifold system may be permanently assembled.

NOTE: If Isolator Rows are specified on the engineer's plans, see page 11 for installation instruction.

Requirements for Installing the Chambers



6" (152 mm) minimum installed spacing between chamber feet.

- 1** To begin building the chamber bed, orient the chambers so the end labeled "Build This Direction

/ Upper Joint" is closest to the edge of the bed and the arrows point in the direction of the build.

- 2** The minimum installed spacing between parallel rows after backfilling is 6" (152 mm) (measurement taken between the outside edges of the feet). This can be accomplished by laying out rows of chambers at 81" (2.06 m) center to center. This will result in an installed condition that meets StormTech's spacing requirements. Spacers may be used for layout convenience.
- 3** When beds are laid perpendicular to each other, a minimum installed spacing of 36" (914 mm) between beds is required.



Requirements for Joining the Chambers



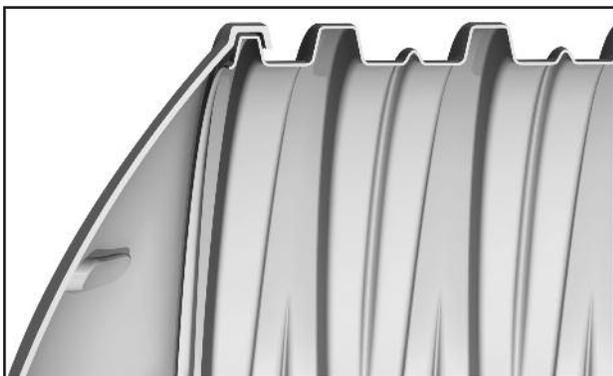
Construct the chamber bed by overlapping the chamber end corrugations (joints).

NOTE: Chambers cannot be field cut. The end corrugations (joints) of the chamber are sized differently to allow for an overlapping joint. Chambers cannot be field cut and joined.

1 Construct the chamber bed by overlapping the chambers lengthwise in rows. Attach chambers by overlapping the upper joint of one chamber onto the lower joint of the last chamber in the row. Be sure that chamber placement does not exceed the reach of the construction equipment used to place the stone.

NOTE: Do not overlap more than one corrugation. A manhole cover pick tool can be inserted into handling ports located on the bottom four corners of each chamber for lifting.

Requirements for Attaching the End Caps



Overlay end cap joint on top of the end chamber joint.

1 End Caps Must be installed before placing stone around the end chambers.

2 Overlay end cap on top of the chamber joint. End caps are designed to be installed on either end corrugation of the chamber.

3 Secure end cap to the chamber with (3) 2½" (64 mm) coarse thread screws. Holes are predrilled into the end cap on the top and approximately 6" (152 mm) off the bottom.

NOTE: Chambers cannot be field cut. End caps fit over end corrugations only.

Requirements for Placing Stone Over the Chambers



A minimum of 36" (914 mm) cover is required for trucks to dump stone. (See page 7)

Clean, crushed, angular stone meeting the specifications in **Tables 4 & 5** and **Figure 1** on page 10 may be placed over the chambers with an excavator, pushed with a dozer or walked in with a stone conveyer boom. Each method has benefits and limitations. These three processes will be explained separately, however there are some common requirements for each: the 6" (152 mm) minimum installed spacing between parallel rows, the 36" (914 mm) installed spacing between perpendicular beds and construction vehicle loads must not exceed the requirements of **Tables 1 & 2** on page 9.

Requirements for Placing Stone with an Excavator



Carefully ladle nominal 3/4-2" (19-51 mm) clean, crushed, angular stone over the centerline of the chamber row.

Placing stone with an excavator is a common method of placing stone over StormTech's chambers. Its biggest limitation is the reach of the excavator arm. For larger beds it is common practice to work across a bed by joining only a few rows of chambers and placing the crushed, angular stone embedment, the geotextile and soil fill before moving onto the next few rows.

A bed may be built either parallel to or perpendicular to the chamber row's direction with this process. The excavator typically works inside the excavation, leading the way across the bed. It is also possible for the excavator to work at grade over the recently placed chambers following the build across. It is required that the depth of cover between tops of chambers and the excavator's tracks be the minimum required by **Tables 1 & 2** on page 9.

1 Initial embedment shall be spotted along the centerline of the chamber evenly anchoring the lower portion of the chamber. After anchoring continue backfilling evenly between rows across the width of the bed. This will minimize chamber movement and the potential for distortion.

2 Continue to place the stone, surrounding the chambers and filling the perimeter areas to a minimum of 6" (152 mm) over the top of chambers and manifolds. **Do not drive equipment over the chambers without minimum cover required by Tables 1 & 2** on page 9.

3 Repeat steps 1 & 2 until all the chambers are backfilled.

Requirements for Pushing Stone with a Dozer



Tracked vehicle pushing stone parallel with rows.

A dozer may be used to push the stone embedment into place over the chambers. There are some strict requirements for this process.

1 All stone must be pushed in a direction parallel with the rows of chambers. Pushing stone perpendicular across chamber rows may cause the chambers to move reducing required separation distances.

2 Always maintain the required cover between the tops of chambers and the dozer tracks, per **Table 2** on page 9. The contractor must check **Table 2** on page 9 to determine if their construction vehicles can be used over the chamber bed.

Requirements for Pushing Stone with a Dozer (cont.)

3 The stone cover height should never differ by more than 24" (610 mm) over adjacent chambers unless there is a minimum cover of 36" (914 mm) over the chambers. Stone should be pushed in small piles and spread evenly to prevent movement of chamber rows.

4 Full dump trucks can often be the heaviest loads on a construction site. StormTech requires a minimum of 36" (914 mm) of cover during the initial installation of the chamber bed when large dump truck loads are present. The additional cover helps to offset affects from any wheel rutting that may

occur as well as increased loads induced during dumping.

During paving operations, dump truck axle loads on reduced cover may be necessary. Precautions should be taken to avoid rutting the road base layer, to ensure that proper compaction requirements have been met, and that a minimum of 24" (610 mm) cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.

Requirements for Placing Stone with a Telescoping Conveyor Boom



Placing stone with the conveyor boom extended.

Telescoping aggregate conveyer trucks are only limited by the range of the boom. Typical trucks have a boom range between 50' to 130' (15-40 m). Booms can convey up to 360 ft³ (10.2 m³) of stone per hour.

1 Anchor chambers by carefully ladling crushed, angular stone directly over the centerline of the chambers. Evenly distribute stone to minimize chamber movement and minimize potential for distortion.

2 After chambers are anchored, continue to place the stone evenly, surrounding the chambers and filling the perimeter areas including manifolds to a minimum of 6" (152 mm) over the top of chambers. **Do not drive equipment over the chambers without minimum cover required by Tables 1 & 2 on page 9.**

3 Repeat steps 1 & 2 until all the chambers are backfilled.

Requirements for Backfilling the System



Roll out geotextile over the clean, crushed, angular stone.



Backfill the bed using an acceptable fill material.



Continue to backfill the chamber bed.

1 Place the required clean, crushed, angular stone over the entire bed to a height of 6" (152 mm) over the top of the chambers as described in previous sections.

2 Lay the geotextile from the trench wall over the top of the stone. Cover the entire installation area with AASHTO M288 Class 2 non-woven geotextile. The geotextile must overlap at least 24" (610 mm) where edges meet.

3 The first 12" (305 mm) of fill material must meet the requirements of **Table 5** on page 10. Backfill material over the top of the geotextile in lifts that do not exceed 6" (152 mm). Distribute the fill with a construction vehicle that does not exceed the maximum wheel loads or ground pressure limits specified in **Table 1 & 2** on page 9.

4 Once a minimum of 12" (305 mm) of cover is reached over the chambers, compact each lift of backfill as specified in the engineer's drawings. StormTech requires compacting to a minimum of 95% of the Standard Proctor density. Use a walk-behind or vibratory roller not to exceed a maximum gross vehicle weight of 12,000 lbs (53 kN) and a maximum dynamic force of 20,000 lbs (89 kN).

5 Once StormTech's minimum cover requirements are met, continue to backfill over the chamber bed until the specified grade is achieved. StormTech's cover requirements are 24" (610 mm) minimum and 6.5' (1.98 m) maximum over the top of the chambers. For pavement subbase or special fill requirements, see engineer's drawings.

The backfill height differential should never differ by more than 24" (610 mm) over adjacent chambers. Minimum cover heights must be met before vehicles are allowed on top of the system. Large rocks and organic matter such as roots, stumps, etc. must not be part of the backfill material. Refer to **Table 5** on page 10 for acceptable fill materials or contact the design engineer for approved fill types.

Acceptable Vehicle Loads

Table 1 – Maximum Allowable Axle Loads for Wheeled Vehicles at Various Cover Depths

Fill Depth (in. over chamber) [mm]	Max. Axle Load (lbs) [kN]
6 [152]	8,000 [35]
12 [305]	16,000 [71]
18 [457] with pavement	32,000 [142]
24+ [610] without pavement	32,000 [142]

NOTE: 36" (914 mm) of cover over the chambers is required for full dump truck travel and dumping. See instruction number 4 on page 7.

Table 2 – Maximum Allowable Ground Pressures for Various Vehicle Track Widths and Fill Depths

Fill Depth (in. over chamber) [mm]	Track Width (in.) [mm]	Max. Ground Pressure (PSF)* [kPa]
6 [152]	12 [305]	1070 [51]
	18 [457]	900 [43]
	24 [610]	800 [38]
	30 [762]	760 [36]
	36 [914]	720 [34]
12 [305]	12 [305]	1540 [74]
	18 [457]	1190 [57]
	24 [610]	1010 [48]
	30 [762]	910 [43]
	36 [914]	840 [40]
18 [457]	12 [305]	2010 [96]
	18 [457]	1480 [71]
	24 [610]	1220 [58]
	30 [762]	1060 [51]
	36 [914]	950 [45]

* Ground pressure is vehicle operating weight divided by total track contact area for both tracks.

Acceptable Geotextiles

Table 3 – Some Suitable Geotextiles

Manufacturer	AASHTO M288 Class 2 Non-Woven*	AASHTO M288 Class 1 Woven**
Belton Industries	—	Beltech 977
Carthage Mills	FX-60HS, FX-80HS	FX-66
GSE Lining Technology	NW6, NW8	—
Maccaferri	MacTex MX245, MacTex MX275	—
Pavco-Amanco	NT3000M, NT4000M	TR 4000
Propex	Geotex 651, Geotex 861, Geotex 601, Geotex 701, Geotex 801	Geotex 315ST, Geotex 2x2HF, Geotex 250ST
SKAPS Industries	GT 160NW, GT 180 NW	W315
Tencate Mirafi	Mirafi 160N, Mirafi 180N	Mirafi 600X, Filterweave 403, Filterweave 404, Geolon HP570, Geolon HP665, Geolon HP770
TNS Advanced Tech.	R060, R070, R080, R100	—
US Fabrics	US 205NW, US 160NW	US 315

*AASHTO M288 Class 2 Non-Woven Geotextile Application: 1. Separation layer between angular stone and surrounding soils to prevent fines intrusion. 2. Filter layer over the chambers of the StormTech Isolator™ Row to prevent fines migration out of row while maintaining adequate hydraulic flows.

**AASHTO M288 Class 1 Woven Geotextile Application: 1. Filtration/stabilization layer for the angular stone foundation of the StormTech Isolator™ Row to prevent scouring of the stone base during the JetVac maintenance procedure, modest hydraulic flows maintained. 2. At each inlet row to prevent scouring of the foundation stone.

Acceptable Fill Materials

Table 4 – Criteria for Acceptable Nominal 3/4 – 2" (19-51 mm) Clean, Crushed, Angular Stone

Clean Crushed Stone	Description	Criteria
Acceptable	Angular	Stones have sharp edges and relatively plane sides with unpolished surfaces
	Subangular	Stones are similar to angular description but have rounded edges
Unacceptable	Subrounded	Stones have nearly plane sides but have well-rounded corners and edges
	Rounded	Stones have smoothly curved sides and no edges

NOTE: See (A) & (B) of Table 5 for additional angular stone requirements.

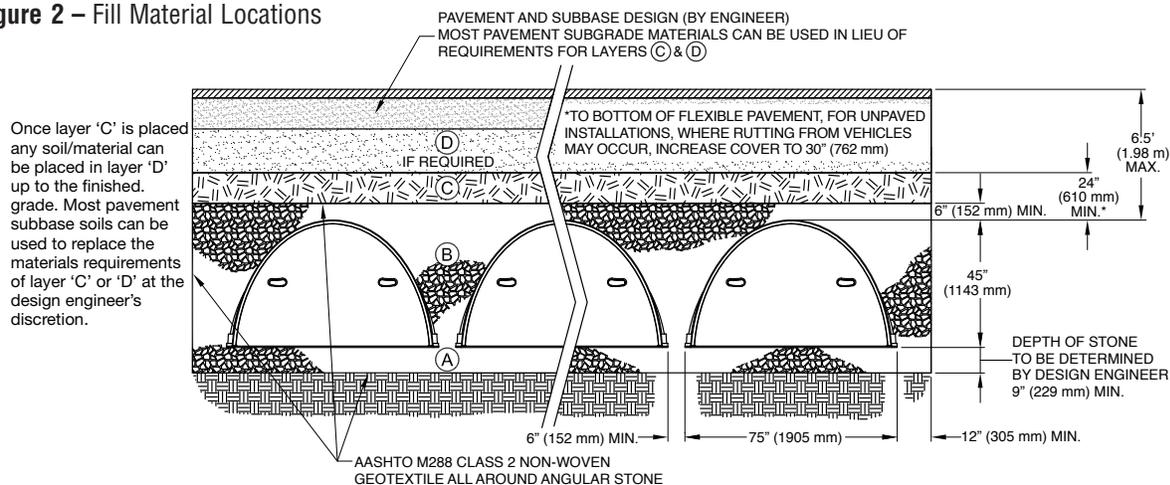
Table 5 – Acceptable Fill Materials

Material Location	Description	AASHTO M43 Designation ¹	Compaction/Density Requirement
(D) Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per engineer's plans. Paved installations may have stringent material and preparation requirements.
(C) Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 18" (457 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/aggregate mixtures, <35% fines. Most pavement subbase materials can be used in lieu of this layer.	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 12" (305 mm) of material over the chambers is reached. Compact additional layers in 6" (152 mm) max. lifts to a min. 95% Standard Proctor density. Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN). Dynamic force not to exceed 20,000 lbs (89 kN).
(B) Embedment Stone surrounding chambers from the foundation stone to the 'C' layer above.	Clean, crushed, angular stone nominal particle size distribution 3/4 - 2" (19 mm - 51 mm)	3, 357, 4, 467, 5, 56, 57	No compaction required.
(A) Foundation Stone below the chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone, nominal size distribution 3/4-2" (19 mm - 51 mm)	3, 357, 4, 467, 5, 56, 57	Plate compact or roll to achieve a 95% Standard Proctor Density. ²

PLEASE NOTE:

- The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone."
- As an alternate to Proctor Testing and field density measurements in the 'A' location, StormTech compaction requirements are met for 'A' location materials when placed and compacted in 9" (229 mm) (max.) lifts using two full passes with an appropriate compactor.

Figure 2 – Fill Material Locations



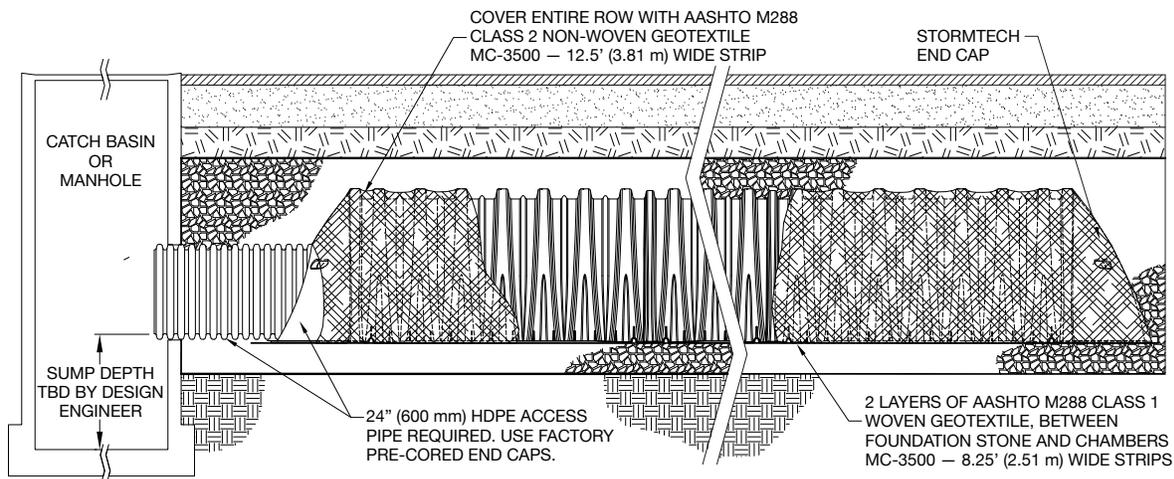
Requirements for Assembling the StormTech Isolator Row



- 1** The Isolator Row is designed with an access manhole just upstream of the Isolator Row inlet. It is recommended that the access manhole be installed prior to assembling the Isolator Row. The access manhole typically contains a high flow weir that diverts flows to the Isolator Row. Flows that exceed the design capacity of the Isolator Row overtop the bypass weir and discharge to the distribution manifold. For weir construction details, see the engineer's drawings.
- 2** Installation of the Isolator Row may begin after the stone foundation is laid and prepared per the engineer's drawings. See *Requirements for Excavating and Preparing the Site* on page 3.

- 3** Roll out a continuous, double layer strip of AASHTO M288 Class 1 woven geotextile filter over the clean, crushed, angular stone foundation so the area where the Isolator Row chambers will be placed will be completely covered. There must not be any seams in the woven geotextile. **Table 3** on page 9 lists acceptable woven geotextiles. See **Figure 3** for the width of the woven fabric strip required.
- 4** Form the Isolator Row by joining StormTech chambers centered over the woven geotextile. See *Requirements for Joining Chambers* on page 5.
- 5** A segment of 24" (600 mm) pipe is typically used to connect the manhole to the Isolator Row through a pre-cored StormTech Isolator Row end cap.
- 6** Drape a strip of AASHTO M288 Class 2 non-woven geotextile over the row of chambers. This is the same type of non-woven filter fabric used as a separation layer around the angular stone of a StormTech system. A single continuous piece is preferred. **Table 3** lists suitable non-woven geotextiles.
- 7** See requirements for placing stone and requirements for backfilling the system in this manual for directions on completing the Isolator Row installation.

Figure 3 – StormTech Isolator Row Detail



NOTE: For many applications, the non-woven geotextile over the MC-3500 chambers can be eliminated or substituted with the AASHTO Class I woven geotextile. Contact your StormTech representative for assistance.

A Family of Products and Services for the Stormwater Industry:



- MC-3500 Chambers and End Caps
- SC-310 Chambers and End Caps
- SC-740 Chambers and End Caps
- SC and MC Fabricated End Caps
- Fabricated Manifold Fittings
- Patented Isolator Row for Maintenance and Water Quality
- Chamber Separation Spacers
- In-House System Layout Assistance
- On-Site Educational Seminars
- Worldwide Technical Sales Group
- Centralized Product Applications Department
- Research and Development Team
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StormTech provides state of the art products and services that meet or exceed industry performance standards and expectations. We offer designers, regulators, owners and contractors the highest quality products and services for stormwater management that "Saves Valuable Land and Protects Water Resources."

Please contact one of our inside project application professionals or Regional Product Managers (RPMs) to discuss your particular application. A wide variety of technical support material is available in print, electronic media or from our website at www.stormtech.com. For any questions, please call StormTech at 888-892-2694.



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