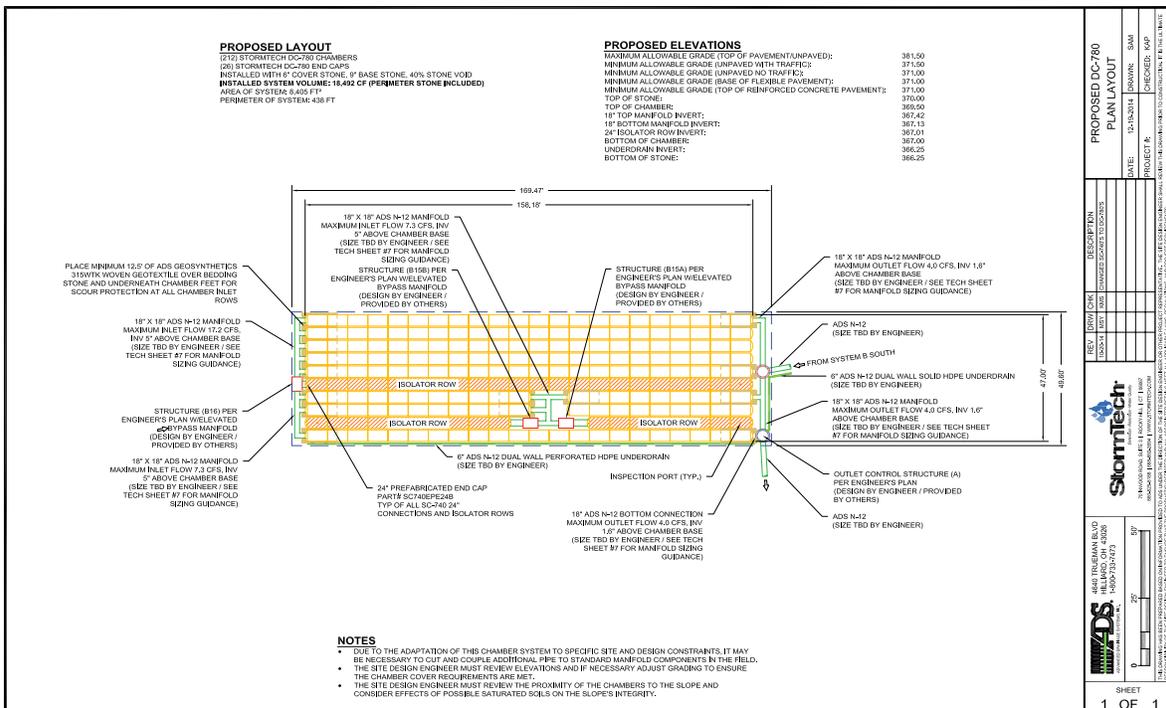


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\* For MC-3500 and MC-4500 designs, please refer to the MC-3500/MC-4500 Design Manual.

The StormTech Technical Services Department assists design professionals in specifying StormTech storm water systems. This assistance includes the layout of chambers to meet the engineer's volume requirements and the connections to and from the chambers. The Technical Department can also assist converting and cost engineering projects currently specified with ponds, pipe, concrete and other manufactured storm water detention/retention products. Please note that it is the responsibility of the design engineer to ensure that the chamber bed layout meets all design requirements and is in compliance with applicable laws and regulations governing this project.



This manual is exclusively intended to assist engineers in the design of subsurface stormwater systems using StormTech chambers.

# 1.0 Introduction

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## 1.1 INTRODUCTION

StormTech stormwater management systems allow storm water professionals to create more profitable, environmentally sound developments. Compared with other subsurface systems, StormTech systems offer lower overall installed cost, superior design flexibility and enhanced performance. Applications include commercial, residential, agricultural and highway drainage.

StormTech has invested over \$10 million and many years in the development of StormTech chambers. These innovative products exceed the rigorous requirements of the standards governing the design of thermoplastic structures.

## 1.2 THE GOLD STANDARD IN STORMWATER MANAGEMENT

The advanced designs of StormTech chambers were created by implementing an aggressive research, development, design and manufacturing protocol. StormTech chamber products establish the new gold standard in stormwater management through:

- Collaborations with experts in the field of buried plastic structures and polyolefin materials
- The development and utilization of new testing methods and proprietary test methods
- The use of thermoformed prototypes to verify engineering models, perform in-ground testing and install observation sites
- The investment in custom-designed, injection molding equipment
- The utilization of polypropylene and polyethylene as manufacturing materials
- The design of molded-in features not possible with traditional thermoformed chambers

Section 3.0 of this design manual, Structural Capabilities, provides a detailed description of the research, development and design process.

Many of StormTech's unique chamber features can benefit a site developer, stormwater system designer, and installer. Where applicable, StormTech Product Specifications are referenced throughout this design manual. If StormTech's unique product benefits are important to a stormwater system design, consider including the applicable StormTech Product Specifications on the site plans. This can prevent substitutions with inferior products. Refer to Section 14.0, *StormTech Product Specifications*.

## 1.3 PRODUCT QUALITY AND DESIGN TO INTERNATIONAL STANDARDS

StormTech chambers are designed to meet the full scope of design requirements of Section 12.12 of the AASHTO

LRFD Bridge Design Specifications and produced to the requirements of the American Society of Testing Materials (ASTM) International specifications F2418 (polypropylene chambers) and F2922 (polyethylene chambers).

StormTech chambers provide the full AASHTO safety factors for live loads and permanent earth loads. The two ASTM standards mentioned previously are linked to the AASHTO LRFD Bridge Design Specifications Section 12.12 design standard. Both ASTM standards require that the safety factors included in the AASHTO guidance are achieved as a prerequisite to meeting either ASTM F2418 or ASTM F2922. StormTech chambers are also designed in accordance with ASTM F2787, "Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers" which provides specific guidance on how to design thermoplastic chambers in accordance with AASHTO Section 12.12. These standards provide both the assurance of product quality and safe structural design.

For non-proprietary specifications for public bids that ensure high product quality and safe design, consider including the specification in Section 15.0 Chamber Specifications for Contract Documents.

## 1.4 TECHNICAL SUPPORT FOR PLAN REVIEWS

StormTech's in-house technical support staff is available to review proposed plans that incorporate StormTech chamber systems. They are also available to assist with plan conversions from existing products to StormTech. Not all plan sheets are necessary for StormTech's review. Required sheets include plan view sheet(s) with design contours, cross sections of the stormwater system including catch basins and drainage details.

When specifying StormTech chambers it is recommended that the following items are included in project plans: StormTech chamber system General Notes, applicable StormTech chamber illustrations and StormTech chamber system Product Specifications. These items are available in various formats and can be obtained by contacting StormTech at **1-860-529-8188** or may be downloaded at **[www.stormtech.com](http://www.stormtech.com)**.

StormTech's plan review is limited to the sole purpose of determining whether plans meet StormTech chamber systems' minimum requirements. **It is the ultimate responsibility of the design engineer to assure that the stormwater system's design is in full compliance with all applicable laws and regulations.** StormTech products must be designed and installed in accordance with StormTech's minimum requirements.

## SEND PLANS TO:

E-mail: [info@stormtech.com](mailto:info@stormtech.com).

### 2.1 PRODUCT APPLICATIONS

StormTech chamber systems may function as stormwater detention, retention, first-flush storage, or some combination of these. The StormTech chambers can be used for commercial, municipal, industrial, recreational, and residential applications especially for installations under parking lots and commercial roadways.

One of the key advantages of the StormTech chamber system is its design flexibility. Chambers may be configured into beds or trenches of various sizes or shapes. They can be centralized or decentralized, and fit on nearly all sites. Chamber lengths enhance the ability to develop on both existing and pre-developed projects. The systems can be designed easily and efficiently around utilities, natural or man-made structures and any other limiting boundaries.

### 2.2 CHAMBERS FOR STORMWATER DETENTION

Chamber systems have been used effectively for storm water detention for over 15 years. A detention system temporarily holds water while it is released at a defined rate through an outlet. While some infiltration may occur in a detention system, it is often considered an environmental benefit and a storage safety factor. Over 70% of StormTech's installations are non-watertight detention systems. There are only a few uncommon situations where a detention system might need to limit infiltration: the subgrade soil's bearing capacity is significantly affected by saturation such as with expansive clays or karst soils, and; in sensitive aquifer areas where the depth to groundwater does not meet local guidelines. Adequate pretreatment could eliminate concerns for the latter case. A thermoplastic liner may be considered for both situations to limit infiltration.

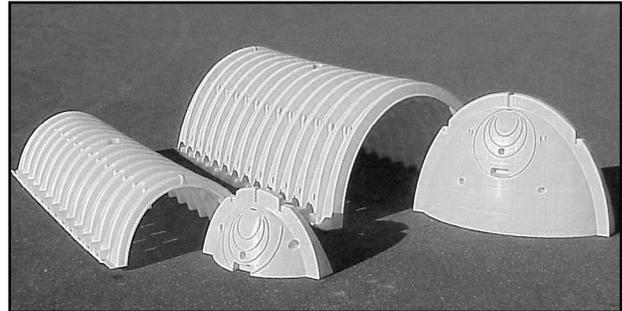
### 2.3 STONE POROSITY ASSUMPTION

A StormTech chamber system requires the application of clean, crushed, angular stone below, between and above the chambers. This stone serves as a structural component while allowing conveyance and storage of stormwater. Storage volume examples throughout this Design Manual are calculated with an assumption that the stone has an industry standard porosity of 40%. Actual stone porosity may vary. Contact StormTech for information on calculating storm water volumes with varying stone porosity assumptions.

### 2.4 CHAMBER SELECTION

Primary considerations when selecting between the SC-160LP, SC-310, SC-740 and DC-780 chambers are the depth to restrictive layer, available area for subsurface storage, cover height and outfall restrictions.

The StormTech SC-160LP chamber shown on page 4 is the smallest of the chamber family and has been optimized to fit in the shallowest of applications. This extra low profile chamber allows for storage of 1.01 ft<sup>3</sup>/ft<sup>2</sup> (0.3m<sup>3</sup>/m<sup>2</sup>) [minimum] of storage.



The SC-310 and SC-740 chambers and end plates.



StormTech systems can be integrated into retrofit and new construction projects.

The StormTech SC-310 chamber shown on page 6 is ideal for systems requiring low-rise and wide-span solutions. This low profile chamber allows the storage of large volumes, 1.3 ft<sup>3</sup>/ft<sup>2</sup> (0.40 m<sup>3</sup>/m<sup>2</sup>) [minimum], at minimum depths.

Like the Stormtech SC-310, the StormTech SC-310-3 found on page 8 allows for a design option for sites with both limited cover and limited space. With only 3" of spacing between the chambers, the SC-310-3 still provides 1.3 ft<sup>3</sup>/ft<sup>2</sup> (0.40 m<sup>3</sup>/m<sup>2</sup>) [minimum] of storage.

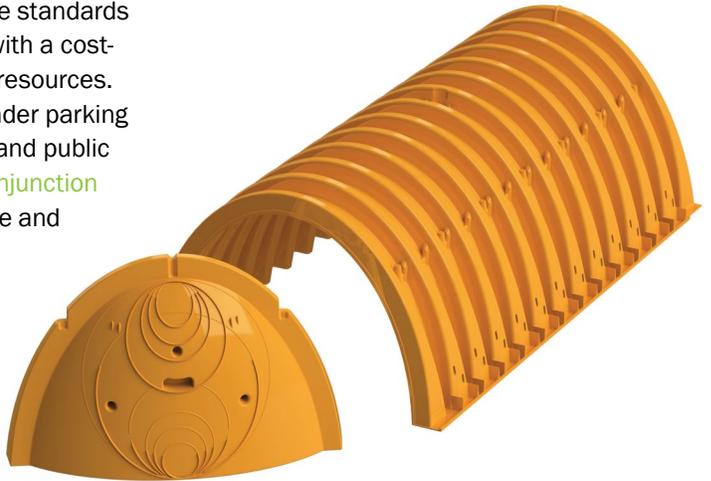
The StormTech SC-740 chamber shown on page 10 optimizes storage volumes in relatively small footprints. By providing 2.2 ft<sup>3</sup>/ft<sup>2</sup> (0.67 m<sup>3</sup>/m<sup>2</sup>) [minimum] of storage, the SC-740 chambers can minimize excavation, backfill and associated costs.

The DC-780 chamber shown on page 12 has been developed for those applications which exceed the maximum 8 ft (2.44 m) burial depth of the SC-740 and SC-310 chambers. The DC-780 is a modified version of the SC-740 allowing it to reach a maximum burial depth of 12 ft (3.66 m). The design of the DC-780 chamber, like other StormTech chambers, is designed and manufactured in accordance with the AASHTO LRFD Bridge Design Specifications as well as ASTM F 2418 and ASTM F 2787 ensuring structural adequacy for deeper systems.

The end corrugations of the DC-780 chamber have not been modified in order to allow connections to the SC-740 chamber. This will allow hybrid systems utilizing both chambers in one system design.

# StormTech SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



## StormTech SC-740 Chamber (not to scale)

### Nominal Chamber Specifications

Size (L x W x H)	85.4" x 51.0" x 30.0" (2,170 x 1,295 x 762 mm)
Chamber Storage	45.9 ft <sup>3</sup> (1.30 m <sup>3</sup> )
Min. Installed Storage*	74.9 ft <sup>3</sup> (2.12 m <sup>3</sup> )
Weight	74.0 lbs (33.6 kg)

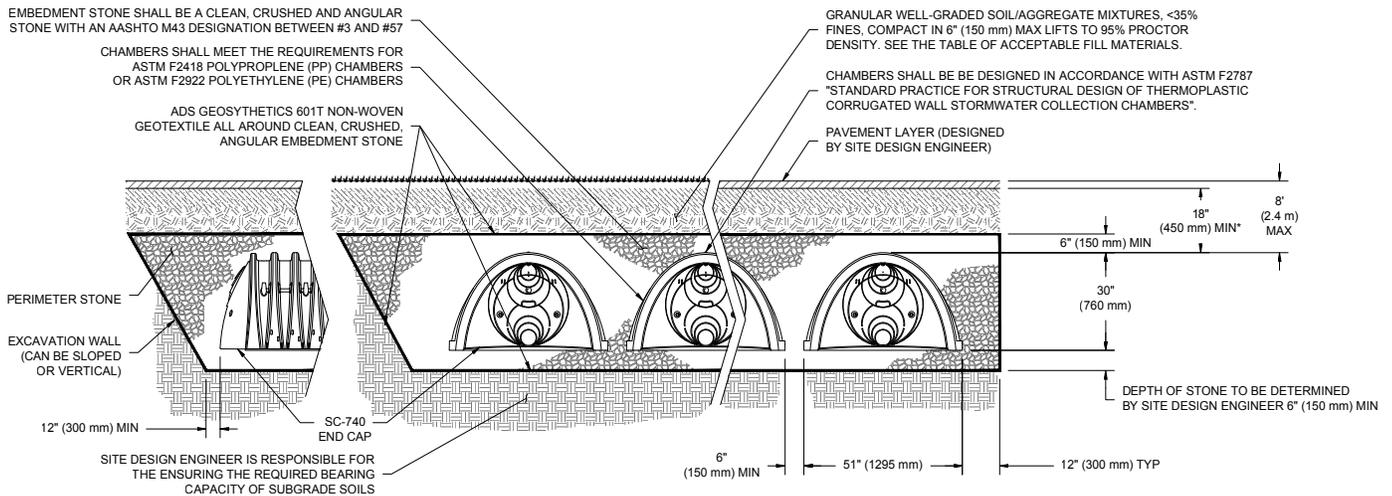
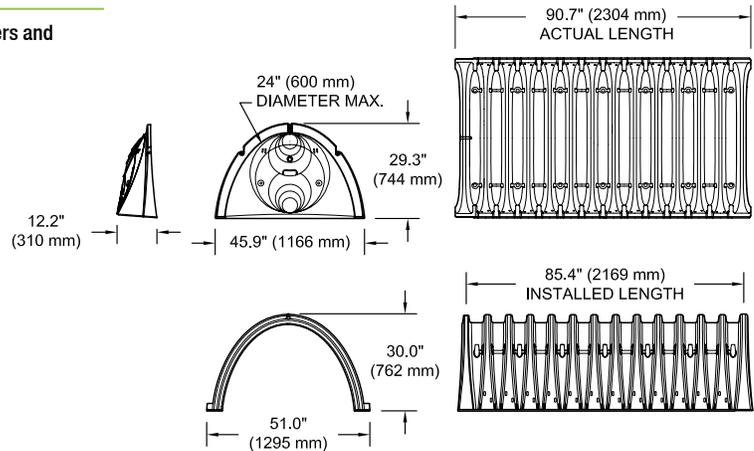
\*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.

### Shipping

30 chambers/pallet

60 end caps/pallet

12 pallets/truck



THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

## SC-740 CUMULATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft <sup>3</sup> (m <sup>3</sup> )	Total System Cumulative Storage ft <sup>3</sup> (m <sup>3</sup> )
42 (1067)	↑ 45.90 (1.300)	74.90 (2.121)
41 (1041)	↑ 45.90 (1.300)	73.77 (2.089)
40 (1016)	↑ 45.90 (1.300)	72.64 (2.057)
39 (991)	Stone Cover ↑ 45.90 (1.300)	71.52 (2.025)
38 (965)	↑ 45.90 (1.300)	70.39 (1.993)
37 (940)	↓ 45.90 (1.300)	69.26 (1.961)
36 (914)	↓ 45.90 (1.300)	68.14 (1.929)
35 (889)	↓ 45.85 (1.298)	66.98 (1.897)
34 (864)	↓ 45.69 (1.294)	65.75 (1.862)
33 (838)	↓ 45.41 (1.286)	64.46 (1.825)
32 (813)	↓ 44.81 (1.269)	62.97 (1.783)
31 (787)	↓ 44.01 (1.246)	61.36 (1.737)
30 (762)	↓ 43.06 (1.219)	59.66 (1.689)
29 (737)	↓ 41.98 (1.189)	57.89 (1.639)
28 (711)	↓ 40.80 (1.155)	56.05 (1.587)
27 (686)	↓ 39.54 (1.120)	54.17 (1.534)
26 (660)	↓ 38.18 (1.081)	52.23 (1.479)
25 (635)	↓ 36.74 (1.040)	50.23 (1.422)
24 (610)	↓ 35.22 (0.977)	48.19 (1.365)
23 (584)	↓ 33.64 (0.953)	46.11 (1.306)
22 (559)	↓ 31.99 (0.906)	44.00 (1.246)
21 (533)	↓ 30.29 (0.858)	41.85 (1.185)
20 (508)	↓ 28.54 (0.808)	39.67 (1.123)
19 (483)	↓ 26.74 (0.757)	37.47 (1.061)
18 (457)	↓ 24.89 (0.705)	35.23 (0.997)
17 (432)	↓ 23.00 (0.651)	32.96 (0.939)
16 (406)	↓ 21.06 (0.596)	30.68 (0.869)
15 (381)	↓ 19.09 (0.541)	28.36 (0.803)
14 (356)	↓ 17.08 (0.484)	26.03 (0.737)
13 (330)	↓ 15.04 (0.426)	23.68 (0.670)
12 (305)	↓ 12.97 (0.367)	21.31 (0.608)
11 (279)	↓ 10.87 (0.309)	18.92 (0.535)
10 (254)	↓ 8.74 (0.247)	16.51 (0.468)
9 (229)	↓ 6.58 (0.186)	14.09 (0.399)
8 (203)	↓ 4.41 (0.125)	11.66 (0.330)
7 (178)	↓ 2.21 (0.063)	9.21 (0.264)
6 (152)	↑ 0 (0)	6.76 (0.191)
5 (127)	↑ 0 (0)	5.63 (0.160)
4 (102)	Stone Foundation ↑ 0 (0)	4.51 (0.128)
3 (76)	↑ 0 (0)	3.38 (0.096)
2 (51)	↑ 0 (0)	2.25 (0.064)
1 (25)	↓ 0 (0)	1.13 (0.032)

Note: Add 1.13 ft<sup>3</sup> (0.032 m<sup>3</sup>) of storage for each additional inch (25 mm) of stone foundation.

## Storage Volume Per Chamber ft<sup>3</sup> (m<sup>3</sup>)

	Bare Chamber Storage ft <sup>3</sup> (m <sup>3</sup> )	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740 Chamber	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

## Amount of Stone Per Chamber

ENGLISH TONS (yds <sup>3</sup> )	Stone Foundation Depth		
	6"	12"	16"
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
METRIC KILOGRAMS (m <sup>3</sup> )	150 mm	300 mm	450 mm
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6" (150 mm) of stone above and between chambers.

## Volume Excavation Per Chamber yd<sup>3</sup> (m<sup>3</sup>)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as depth of cover increases.

