

Thermoplastic Liners For StormTech® Detention Systems



StormTech Versatility

StormTech chambers offer the versatility to be designed as open bottom detention systems, retention systems or watertight detention systems. Although the vast majority of StormTech systems are unlined detention systems, by incorporating a continuous membrane liner, StormTech chambers can be effectively used for separation applications.

Maximize infiltration area with StormTech retention systems

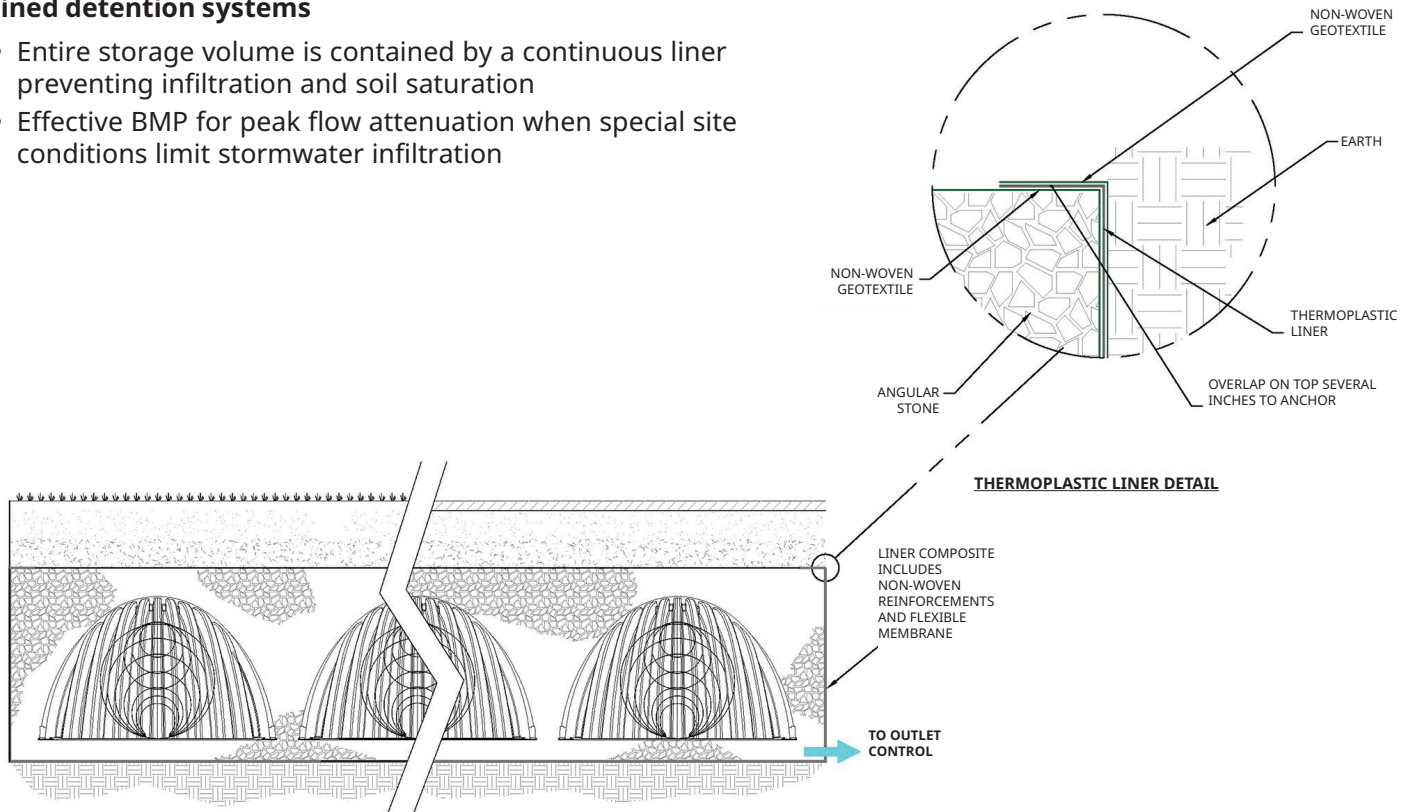
- Entire storage volume infiltrates - there is no outlet pipe
- Very effective BMP (Best Management Practice) for ground water recharge

Design safety factor added with StormTech open bottom detention systems

- Primary discharge is conveyed to an outlet control structure (OCS)
- The infiltration component may range from being a significant component to being a minimal component
- Enables retention/detention combination where a water quality volume can be infiltrated and peak flows can be attenuated by the use of detention

Controlled discharges with StormTech lined detention systems

- Entire storage volume is contained by a continuous liner preventing infiltration and soil saturation
- Effective BMP for peak flow attenuation when special site conditions limit stormwater infiltration



Benefits of StormTech detention systems

- Offers all the advantages of a closed system, while utilizing the full storage capacity of the excavation
- System integrity is based on a continuous thermoplastic membrane
- Can be used to reduce separation distance to groundwater
- Protects ground water quality from pollutant sources found in stormwater runoff
- The combined volume of the chambers and stone voids results in a cost-competitive detention system

Design of StormTech systems

The key components of a lined chamber system design are membrane integrity and control of maximum water surface elevation.

Membrane liner integrity

Membrane integrity is achieved by selecting an appropriate liner material and seaming techniques, by providing protection against puncture and limiting buoyant forces.

Several membrane materials are suitable for buried liners. The most cost-effective materials are polyvinyl chloride (PVC) and linear low density polyethylene (LLDPE). Both offer the chemical stability to resist contaminants normally found in storm water and offer the flexibility to resist puncturing when properly installed. The minimum recommended thickness for both materials is 30 mil. For applications where aggressive contaminants are expected, contact a membrane supplier for material selection advice.

Many membrane liners are pre-fabricated to eliminate or minimize the need for field seaming. However, for applications larger than 20,000 sq. ft. for PVC and 26,000 sq. ft. for LLDPE, field seaming may be required. PVC seams can be easily solvent cemented in the field. LLDPE, however, cannot be solvent welded and requires either thermal welding by a specialty crew or taping. Taped seams are completed in the field using 4-inch (100 mm) wide, single-sided moldable sealant equal to Titus Tapecoat Moldable Sealant.

Pipe “boots” are used to seal pipe penetrations through the liner. Boots can either be pre-fabricated or field fabricated. The boot is then solvent cemented, heat welded or taped to the liner. A pipe clamp is normally used to seal the boot around the pipe.

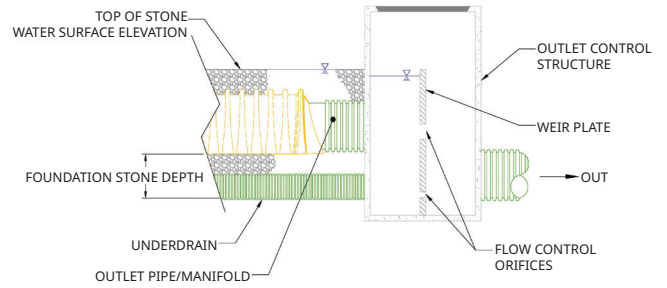
Puncture protection is provided by installing a non-woven fabric reinforcement on each side of the membrane. An 8-ounce (ADS 0801 or equal) nonwoven geotextile (see detail on page 1) should be used for both sides of a PVC membrane. The reinforcement thickness should be increased to 12-ounce (ADS 1201 or equal) for the stone/ chamber side of LLDPE membranes. A sand cushion may be substituted for the solid side reinforcement where cost effective. Where there is a potential for buoyant forces the engineer would need to design an underdrain system to relieve buoyant pressure. ADS does not recommend installing a lined chamber system in which the feet of the chambers are below the high water table elevation.



The membrane's flexibility is apparent by visible wrinkling. Flexibility enables the liner to conform to irregularities in the excavation and resist puncture.

Control of Maximum Water Surface Elevation

The watertight membrane for StormTech chamber systems does not cover the top of the bed. An outlet control structure or upstream high flow bypass is designed such that the maximum water surface elevation in the bed is below the top of the liner. This is a typical design approach for detention basins and easily accomplished with a high water weir. The crest elevation of the weir should be set to pass the peak design flow at the maximum water surface elevation to reach the top of the liner. In designing a high-flow bypass system for lined detention systems, the design should consider adding freeboard allowance to the height of the liner.



Installation of detention systems

Note: Contact the liner fabricator for more detailed installation recommendations.

1. Prepare the excavation by removing loose rocks and protrusions
2. Roll excavation with steel wheeled roller to knock down remaining minor protrusions
3. Prepare anchor trench around perimeter at top of side wall
4. Lay non-woven "soil side" reinforcement in excavation and into anchor trench
5. Lay prefabricated membrane liner over soil side reinforcement and into anchor trench
6. Lay non-woven "water side" reinforcement over membrane and into anchor trench
7. Place bedding stone over reinforcement to required depth based on geotech and storage criteria and compact
8. Determine location for pipe penetrations and seal pipe boots to liner and clamp pipe boots to pipe
9. Install chambers and aggregate backfill in accordance with StormTech installation instructions

(Note: In most cases, liners can be installed by the drainage contractor or a specialty liner installer. Contact StormTech for liner fabricators and installers.)

Please refer to the StormTech Design Manual for a complete explanation of the StormTech Limited Warranty.



Non-woven fabric is placed over PVC liner before placing angular bedding stone.



Angular stone backfill is placed around chambers.

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