

THERMOPLASTIC LINERS FOR DETENTION SYSTEMS



STORMTECH VERSATILITY

StormTech chambers offer the versatility to be designed as **1)** retention systems, **2)** open bottom detention or **3)** water-tight 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.

1. MAXIMIZE INFILTRATION AREA WITH STORMTECH RETENTION SYSTEMS

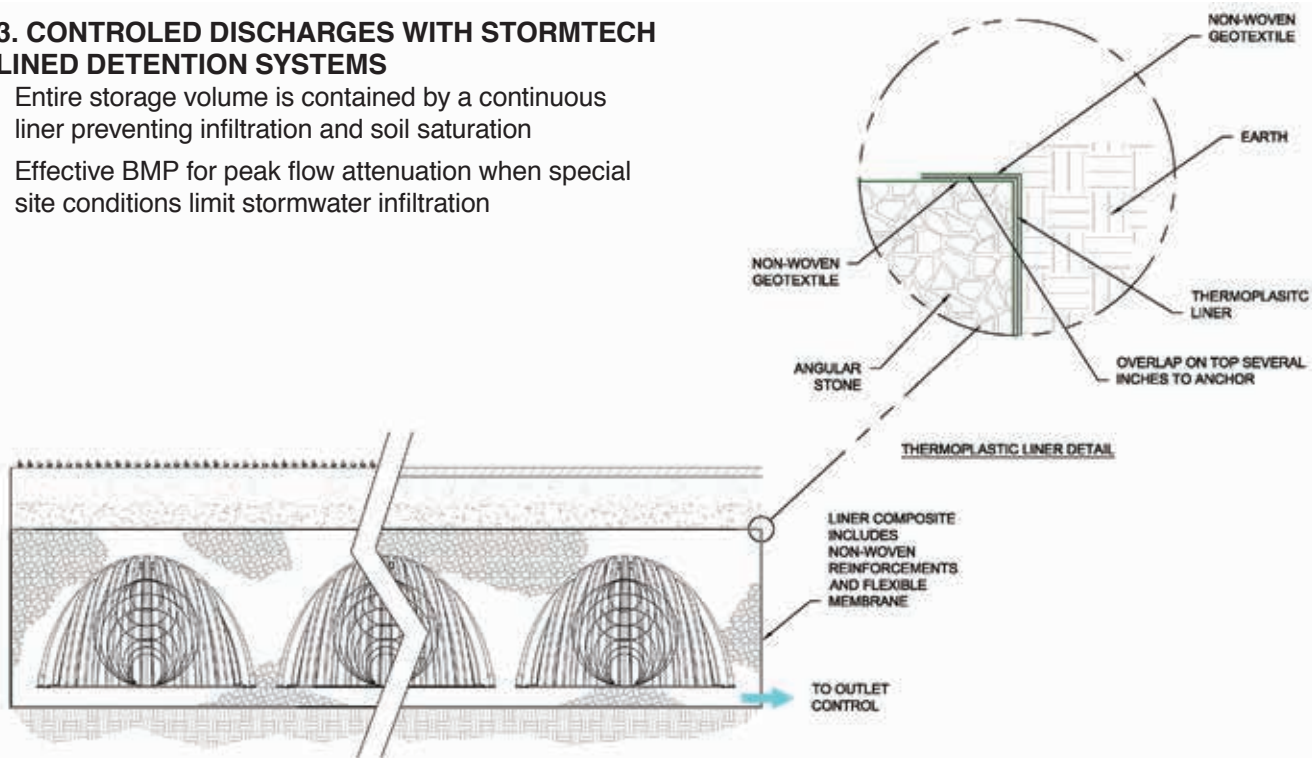
- Entire storage volume infiltrates—there is no outlet pipe
- Very effective “BMP” (Best Management Practice) for ground water recharge

2. ADD A DESIGN SAFETY FACTOR WITH STORMTECH OPEN BOTTOM DETENTION SYSTEMS

- Primary discharge is conveyed to an outlet control structure
- Infiltration may be minimal or a significant part of the design objective
- Enables retention-detention combination where water quality volume can be infiltrated and peak flows can be attenuated by detention formation, which create fish breaks

3. 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





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

BENEFITS OF STORMTECH WATER-TIGHT DETENTION SYSTEMS

1. Offers all the advantages of a closed system while utilizing the full storage capacity of the excavation.
2. System integrity is based on a continuous thermoplastic membrane.
3. Can be used to reduce separation distance to groundwater.
4. Protects ground water quality from sources of higher pollutant loads.
5. The combined volume of the chambers and stone voids results in a cost competitive detention system.



DESIGN OF STORMTECH WATER-TIGHT SYSTEMS

The key components of a lined chamber system design are 1) membrane integrity and 2) control of maximum water surface elevation.

1. MEMBRANE INTEGRITY

Membrane integrity is achieved by: 1) selecting an appropriate liner material and seaming techniques; 2) by providing protection against puncture; and 3) 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.

Membranes are prefabricated 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 wide single sided moldable sealant equal to Titus Tapecoat Moldable Sealant.



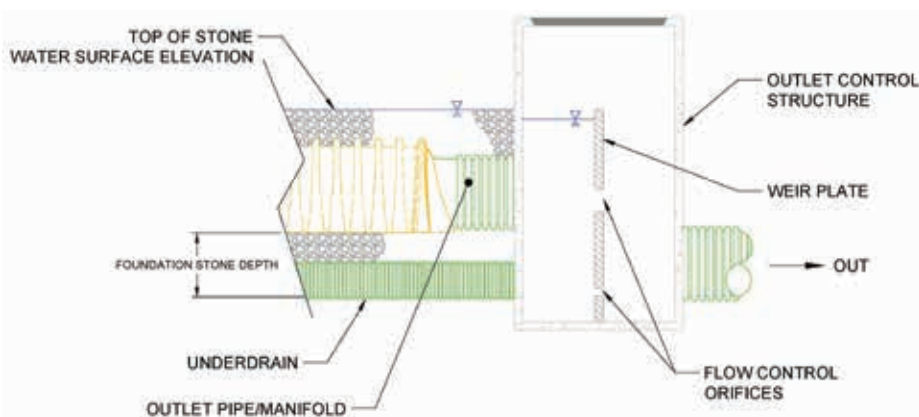
Pipe “boots” are used to seal pipe penetrations through the liner. Boots can either be prefabricated or field fabricated. The boot is then solvent cemented, heat welded or taped to the liner. A pipe clamp is normally used to seal the boot around the pipe.

Puncture protection is provided by installing a non-woven fabric reinforcement on each side of the membrane. An 8-ounce (ADS 0801 or equal) 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 soil 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.



2) CONTROL OF MAXIMUM WATER SURFACE ELEVATION

The water-tight 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 flow 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.





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



Angular stone backfill is placed around chambers

INSTALLATION OF WATER-TIGHT 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 sidewall
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 back fill 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.



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