# StormPrism®

Stormwater Management System

# Installation Guide

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**April 2024**

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## 1. PURPOSE

This guide provides a list of recommended tools for installation of a StormPrism storm water storage system and details the foundation preparation, lifting equipment selection, handling, and placement of StormPrism components into an excavation, including component alignment, sealing, and backfilling. Weights and dimensions of typical StormPrism are provided at the end of the guide.

This guide is not intended to provide all-inclusive information. Project plans and specifications should be followed as they may contain details that differ from the information provided in this guide.

Comply with all federal, state, & local regulations and industry best practices.

## 2. TOOL CHECKLIST

- ☐ Lifting rigging equipment
- ☐ Rope for taglines
- ☐ Ladders (2 or more recommended)
- ☐ Knives or box cutters
- ☐ Pry bars
- ☐ Spacer shims
- ☐ 6ft (or longer) spirit level
- ☐ Transit laser level
- ☐ String line
- ☐ Stakes
- ☐ Hammer
- ☐ Wrench, impact drill or ratchet with 1- 1/8” socket
- ☐ Tape measure
- ☐ Rakes and shovels
- ☐ Broom

## 3. FOUNDATION PREPARATION

StormPrism requires a flat (level or sloped up to 1%), compacted foundation. StormPrism can be installed on a precast foundation, a poured concrete foundation, a compacted subbase, or a compacted gravel layer for infiltration systems. Aggregate base layer and thickness are typically based on an underlying soil (subgrade) bearing pressure of at least 3,000 psf. Project specific conditions may require a higher bearing pressure. Bearing pressure should be tested and verified by the geotechnical engineer prior to placing the aggregate subbase or base.

Subgrade, subbase and base preparation will be in accordance with project specifications and any available geotechnical report prepared for the project. Refer to project plans and specifications if StormPrism components will be placed on a poured concrete foundation.

### 3.1. Detention and Retention (Closed Bottom) Systems

The subgrade at the bottom of the system should be scarified to a depth of 8 inches, uniformly moisture conditioned to above optimum moisture content, and compacted to achieve a relative compaction of 90 percent of the ASTM D 1557 maximum dry density. Field density tests should be taken to verify the compaction of the prepared subgrade meets project requirements.

**Fig. 1 – Roller compacting the subgrade of a detention system**

Place a minimum of 6-inches of CMB (typically ¾" crushed stone but recycled concrete may be suitable) above the compacted subgrade for seating of the system components. The base material shall be graded to a tolerance of ¼" of the plan elevation and extend a minimum of 12-inches (18-inches recommended) beyond the perimeter of the StormPrism system.

**Fig. 2 – Using a skid steer with laser grader to level the base of a large detention system.**

### 3.2. Infiltration (Open Bottom) Systems

The infiltration system should not be placed on areas of recent fill or compacted fill. Before construction of the infiltration system, the area of the infiltration system should be roped off to prevent heavy equipment from compacting the underlying soils.

Excavation and construction of the infiltration system must be performed using equipment placed outside the limits of the infiltration system. Use lightweight equipment when excavating to protect the permeability of the underlying soil. Place excavated material downslope from the infiltration system in a stable location to avoid washing material back into the excavation should a runoff event occur.

The subgrade at the bottom of the system should **NOT** be compacted or subject to excessive construction traffic prior to installation of the aggregate. To improve the infiltration of the subgrade soils, the bottom of the excavation may be scarified prior to placement of the aggregate.

The bottom of the system should be flat to provide uniform infiltration across the surface area of the infiltration system.

Place a geotextile fabric between the aggregate subbase and the native subgrade to reduce sediment migration into the infiltration system. This should extend the effective life of the infiltration system and reduce the need to rebuild a clogged system. The geotextile should be wrapped around the sides and over the perimeter stone, extending up the StormPrism walls units. The geotextile shall consist of needled, non-woven polypropylene fibers and meet the following properties:

a) Grab Tensile Strength (ASTM-D4632) - 120lbs

b) Mullen Burst Strength (ASTM-D3786) - 225psi
c) Flow Rate (ASTM-D4491) - 95 gal/min/ft²
d) UV Resistance after 500 hrs (ASTM-D4355) - 70%
e) Heat-set or heat-calendared fabrics are not permitted

Acceptable geotextiles include Mirafi 140N, Amoco 4547, and Geotex 451.

Place clean, washed, uniformly graded aggregate with a diameter of 1 to 2-inches, such as AASHTO No. 3 aggregate, over the subgrade. This aggregate size should provide a void space of at least 40 percent as measured by ASTM-C29. The aggregate should be lightly compacted, with construction equipment kept off the subgrade as much as possible. Typical depth of the stone subbase is 8 to 12-inches but refer to the project specifications for the depth of stone required to provide the required storm water storage volume. The aggregate should extend a minimum of 12-inches (18-inches recommended) beyond the perimeter of the StormPrism system.

**Fig. 3 – Completed subbase of an infiltration system**

Place 4-inches of ¾" angular gravel above the compacted aggregate for fine grading and seating of the system components. The gravel should be graded to a tolerance of ¼" of the plan elevation and extend a minimum of 12-inches beyond the perimeter of the StormPrism system.

**Fig. 4 – Hand screeding the base of a small infiltration system**

## 4. LIFTING EQUIPMENT SELECTION

Lifting equipment shall be properly rated for the heaviest pick and longest reach. Undersized equipment or rigging can be dangerous and cause damage to the product. Each StormPrism component shall be labeled with the unit weight. Proper rigging is essential to ensure safety and ease of installation. StormPrism components are typically manufactured with A-anchor inserts for easy lifting, although some manufacturing locations may use different lifting hardware. Refer to project specific StormPrism component drawings or verify required lifting hardware with a Foley Product Company representative prior to scheduling product delivery. Foley Products Company recommends the lifting configuration shown in Fig. 5.

**Fig. 5 – Recommended rigging**

## 5. HANDLING STORMPRISM

Each StormPrism component will have at least four lift points. Wall units have six lift points which allow the wall units to be rotated on-site from a horizontal (shipping) orientation to a vertical (installed) orientation.

**Fig. 6 – Wall components stored on-site in horizontal orientation**

Proper rigging must be used to ensure even pressure is applied to each pick point. **DO NOT ATTEMPT TO LIFT A STORMPRISM COMPONENT** (including horizontal walls) **WITH ANY LESS THAN FOUR PICK POINTS AND PROPERLY RATED LIFTING EQUIPMENT**. Doing so could overstress a lifter causing it to break or pullout, resulting in damage to the product, injury, or death.

Wall units may be lifted with the two lifters at the top edge of the wall **ONCE THE WALL HAS BEEN COMPLETELY ROTATED TO THE VERTICAL ORIENTATION** as shown in Fig. 7.

**Fig. 7 – Placing a wall componenet using the lifters at the top edge**

Use an L-bracket, as shown in Fig. 13, to temporarily support walls after placement.

### 5.1. Rigging

A four-leg chain sling can be used for lifting StormPrism components. The legs should be of sufficient length so that the sling angle is 60-degrees or less. Rigging should be adjusted so that each module lifts relatively level. Using a cable roller block on at least two legs to balance loads is preferable.

STORMPRISM is supplied with Swift Lift anchors and clutches. Clutches will be shipped with the initial modules. Foley Products takes no responsibility for the use of the clutches once the StormPrism modules have been unloaded and placed.

INSTALLING STORMPRISM

StormPrism components are placed on prepared bedding or a poured concrete foundation using a crane. In most cases these will be in an excavation although installations in fill areas are not uncommon.

The site conditions, module weights, crane capacity and required crane reach should be evaluated and verified before excavation begins. Delivery truck routing, unloading and crane location must be considered when deciding excavation limits. The crane must be positioned at a sufficient distance from the edge of the excavation to prevent cave-in. It is best if the crane and crane operator are positioned in clear view of the StormPrism module final position. In some cases, such as congested sites or sites with poor soil conditions, the excavation may require vertical shoring. If vertical shoring is used the delivery truck and crane surcharge must be considered in evaluating shoring requirements and set back.

Starting with a side module and working towards the crane is recommended for smaller systems so that the crane operator's view is not obstructed as modules are placed. Larger systems may require relocation of the crane so starting in the middle and working outwards may be preferable.

**Fig. 8 – Installation sequence of a large single level system**

Storm Prism modules should be placed on line and on grade. Refer to sections 6.1 & 6.2 for information on alignment. Each module should be spaced at ½" with a tolerance of plus ½" or minus ¼". If the base aggregate or concrete foundation is level, proper spacing of the bottom component should result in the correct spacing at the top of the module. It is VERY important that the base modules are plumb within ¼" to avoid the top modules from conflicting (binding).

Rubber bearing pads are placed between the floor & bottom of the leg for single level systems and between the bottom & top legs for double level systems The bearing pads for single level systems are glued to the legs at the factory but may become dislodged during handling. Bearing pads for double level systems are shipped loose. Check to ensure the bearing pads are in place before lowering components into place.

**Fig. 9 – Rubber bearing pad placement for double level systems**

Check that all four legs of top components are in contact with the bottom when the tension in the rigging is released but with the rigging still connected to the component. Place plastic shims under the rubber pads if necessary to achieve complete contact.

### 5.2. Alignment

StormPrism alignment is critical for a successful installation. Alignment of the first component is most important as it will establish the line for the remaining components. Proper care in placing the first component on line and grade will eliminate the need to make adjustments later. Once the first component is set to the required line, the subsequent StormPrism components are lowered into place and guided by hand. Use of bars to align the modules is not recommended as doing so disturbs the bedding and should be avoided if possible. Alignment should occur while the StormPrism component is being installed and is still attached to the lifting equipment.

**Fig. 10 – Hand guiding a floor slab of a single level system into position**

Spacers made from plastic or foam (such as Fastflex or Nomaflex) should be used to properly establish the spacing between modules. Nomaflex foam strips can be glued to the vertical face of floors while Fastflex is glued to top decks and ends of walls to ensure proper spacing between modules and provide a cushion from concrete-to-concrete impact during placement. Proper spacing will ensure proper alignment with adjacent modules. Refer to Fig. 11 and to project drawings for details on placement of spacers. Use 3M High Strength 90 Contact Spray Adhesive to adhere foam spacers to the vertical edge of upper or lower decks and ends of walls.

**Fig. 11 – Fastflex spacer glued to top deck and Nomaflex glued to floor of a single level system**

Metal guides, shown in Fig. 12, placed over the bottom legs of a double level system and "shoehorns", placed along the edges of adjacent top decks, allow placement of the top component without the need for crew members to stand under a suspended load.

**Fig. 12 – Double level system with metal guides at legs and shoehorns at top deck**

## 5.3. Troubleshooting Alignment Issues

| Issue | Solution |
|---|---|
| StormPrism more than ¼" out of level and sitting firmly on base | Re-level base layer to within ¼" of level |
| **Issue** | **Solution** |

| | |
|---|---|
| StormPrism level but not fully supported by aggregate | Re-level base layer to within ¼” of level |
| **Issue** | **Solution** |
| StormPrism is not fully supported by aggregate and not level | The StormPrism component could be binding on adjacent components or modules. Make sure the floor slab is properly spaced from the adjacent module(s). |
| **Issue** | **Solution** |
| StormPrism top component is binding on adjacent module. | Make sure the bottom component is properly spaced from the adjacent module |

| Issue | Solution |
|---|---|
| StormPrism appears level but when lowered into place the top deck moves away from the adjacent deck | Make sure the bottom component is properly spaced from the adjacent module. The bottom support should be pulled toward the adjacent modules to the proper spacing. Base aggregate should be level to within ¼” |

## 6. STORMPRISM SEALING

Storm Prism systems are designed to be soil-tight using a polymer wrap. All exterior joints between adjacent components are sealed using a preformed, cold applied, self-adhering, polymer wrap conforming to ASTM E-1745, C-877, C-990, and AASHTO M198 Type B specifications. Fig. 13 shows a StormPrism system sealed using polymer wrap. Note the L-brackets supporting the walls.

**Fig. 13 – System sealed with polymer wrap and L-brackets**

In cases where modules are misaligned such that the space between modules exceeds 1” but is less than 2” use a double layer of polymer joint wrap.

Contact Foley Products Company if the space between modules exceeds 2”.

Water-tight sealing is available. Contact Foley Products Company for more information.

## 7. BACKFILLING

Excavated soil may be used for engineered fill on the sides of the infiltration system provided the soil meets the requirements of Section 10 of ASTM C1675. The compacted in-place density of the fill material shall not exceed 120 PCF.

Engineered fill should be placed in a series of horizontal layers not exceeding 8-inches in loose thickness, uniformly moisture-conditioned to above optimum moisture content, and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D 1557 maximum dry density. The backfill shall be mechanically compacted (no jetting).

The engineered fill should be brought up in vertical increments evenly around the perimeter of the infiltration system.

Special care should be taken when compacting near the polymer sealing tape seal in order to prevent disruption of the seal.

At no time shall machinery or vehicles exceeding HS-20 loading travel over the StormPrism system. The system can support HS-20 loads once the minimum fill shown on the project drawings has been placed over the system. A small bulldozer or skid steer loader can be used to spread the fill material over the top of the StormPrism deck.

Remember to remove the L-brackets supporting the walls before placing fill over the StormPrism.

## 8. WEIGHTS & DIMENSIONS

The weight and dimensions of typical StormPrism modules and component units (with no openings or other customizations) is shown in Table 1 below. All modules measure 16’ long by 8’ wide.

**Table 1 – Typical StormPrism Weights & Dimensions**

| Module Inside Height (feet) | Top Unit Height (feet) | Bottom Unit Height (feet) | Floor Thickness (inches) | Top Thickness (inches) | Total Height (feet) | Module Storage Volume (C.F.) | Top Section Weight (lb) | Bottom Section Weight (lb) | Floor Weight (lb) | Total Module Weight (lb) |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 4 | - | 8 | 8 | 5.33 | 491.59 | 16,438 | - | 12,800 | 29,238 |
| 5 | 5 | - | 8 | 8 | 6.33 | 616.90 | 16,913 | - | 12,800 | 29,713 |
| 6 | 6 | - | 8 | 8 | 7.33 | 742.42 | 17,462 | - | 12,800 | 30,262 |
| 7 | 7 | - | 8 | 8 | 8.33 | 868.05 | 18,065 | - | 12,800 | 30,865 |
| 8 | 4 | 4 | 8 | 8 | 9.33 | 983.18 | 16,437 | 16,389 | - | 32,826 |
| 9 | 5 | 4 | 8 | 8 | 10.33 | 1,108.49 | 16,934 | 16,389 | - | 33,323 |
| 10 | 5 | 5 | 8 | 8 | 11.33 | 1,233.80 | 16,934 | 16,886 | - | 33,820 |
| 11 | 6 | 5 | 8 | 8 | 12.33 | 1,359.32 | 17,482 | 16,886 | - | 34,368 |
| 12 | 6 | 6 | 8 | 8 | 13.33 | 1,484.84 | 17,482 | 17,435 | - | 34,917 |
| 13 | 7 | 6 | 8 | 8 | 14.33 | 1,610.47 | 18,086 | 17,435 | - | 35,521 |
| 14 | 7 | 7 | 8 | 8 | 15.33 | 1,736.10 | 18,086 | 18,038 | - | 36,124 |

Wall units vary in height, length and thickness. Contact your Foley Products Company representative for weights of wall units.