



FRENO ™

Modular Rain Garden



NATURAL  
HABITATS



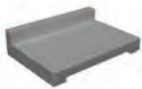


# FRENO™ Modular Rain Garden

Unlimited Design Options • Rapid Construction • Stormwater Solutions Made Easy.



T MODULE



N MODULE



S MODULE



T-2 MODULE



T-R10 MODULE



T-R5 MODULE



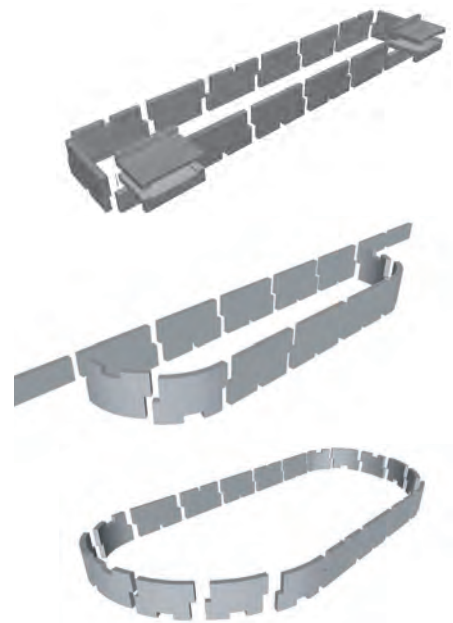
S-R5 MODULE



S-R10 MODULE

## Unlimited Design Options

- A great way to accomplish recognized Best Management Practices to control stormwater runoff on any site.
- Installed with light equipment and limited crew.
- Modular precast concrete system installs rapidly for quality results every time.
- Typical installation requires less than a day of construction time.
- Suitable for stormwater planters, curb extensions, bio-retention areas, vegetated swales, green gutters or rain gardens.
- Works equally well for filtration or infiltration based systems.
- Multiple attractive color and finish options.
- Vertical walls maximize stormwater storage capacity.
- Kit of Parts design philosophy offers unlimited design flexibility.
- Available with recycled content.



# Installation of Freno™

## Modular Rain Garden



### Site Preparation, Demolition and Excavation

Locate and mark utilities. Place safety barriers. Remove existing pavements, plant material or structures from the area to be excavated. Excavate the trench to plan dimensions.

If you are building a filtration system, install the under-drain system. The under-drain will need to be inspected before it is covered.



### Install Base Leveling Pad

Place and compact base material for leveling pad. Use easily compacted crushed stone material.

Compact to soil density of 95% Standard Proctor.



### Place Freno Modules

Freno modules have threaded connection inserts and allow rapid and safe attachment to lifting equipment. Using these inserts, attach the Freno Module to the lifting equipment, and place on the leveling pad. Adjust alignment and elevation and level the modules as they are placed. Place temporary braces using the connection inserts. The sequence of panel placement will depend on the configuration of the structure design. Install any observation wells before backfilling.



### Backfill and Add Engineered Bio-retention Materials

Backfill the inside and outside of the structure in alternating lifts. Use self-compacting angular crushed stone for the exterior of the structure and the aggregates, sand and engineered planting soils called for in the plan for the interior. Do not compact the interior materials and plan to overfill the interior in an amount sufficient to allow for settlement to reach plan elevations. Add plant materials per plan and monitor / water plants as required until they are fully established.



### Repair or Install Paving

Finish the surfaces surrounding the Freno™ structure per plan.





# FRENO<sup>TM</sup>

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# Where Does the Rain Go?

**Precast concrete filtration planters provide an effective, long-term solution for stormwater runoff.**

**By Claude Goguen, P.E., LEED AP**





Using precast concrete allows contractors to install filtration planters quickly.

**AS HENRY WADSWORTH LONGFELLOW ONCE SAID,** “Into each life, some rain must fall.” This is especially true for Little Port Walter on Baranof Island in southeast Alaska, where average precipitation amounts to 237 in. per year. Longfellow’s words aren’t so true in Death Valley, California, where not a single drop of rain has fallen in three years.

Where you live, you’re probably somewhere between these extremes. Regardless, the process of stormwater runoff remains the same. When rain falls on undeveloped areas, water is absorbed and filtered by plants and soil. However, when rain falls on streets, parking lots, roofs and other hardscapes, water does not soak into the ground. Instead, it carries pollutants through collection systems to nearby bodies of water.

With many cities still operating on combined sewer systems, overflows during heavy rains – otherwise known as combined sewer overflows – can release millions of gallons of raw sewage into lakes and rivers. Higher flows can also cause erosion and flooding.

For these reasons, management of stormwater runoff continues to be a major challenge for cities across North America. Precast concrete plays a role in all of the solutions currently implemented, including larger collection and retention systems and green infrastructure.

Green infrastructure uses soils, vegetation and other processes to mimic nature by soaking up and storing water and creating healthier environments. A wide range of green infrastructure elements can be implemented, such as permeable pavements, green roofs and increasingly popular filtration planters.

## WHAT IS A FILTRATION PLANTER?

Filtration planters are shallow, vegetated basins also referred to as bioretention cells that collect and absorb stormwater runoff. They mimic natural hydrology by infiltrating and evapotranspiring runoff water. Through a variety of physical, biological and chemical processes, pollutants are removed from the stormwater before

returning to underground aquifers or surface waters. The planters act as temporary storage for runoff water, helping minimize discharge rates. A percentage of water captured also provides irrigation for the vegetation in the planters, further contributing to the overall reduction in the volume of stormwater runoff.

Versatile and efficient, filtration planters can be installed in almost any urban space. In addition to slowing down and soaking in stormwater, they enhance the aesthetics of any area.

The ability of the soil to absorb the water will dictate the size and type of planters. Some are bottomless, allowing

water to filter through. Others have a bottom, serving as treatment and retention of runoff water before discharge into the sewer system.

Filtration planters can be constructed from a variety of building materials, but factors in the decision should include:

- Is it durable?
- Can it withstand loads, especially near areas with traffic?
- Can it be installed quickly?
- Can it be installed in any climate?

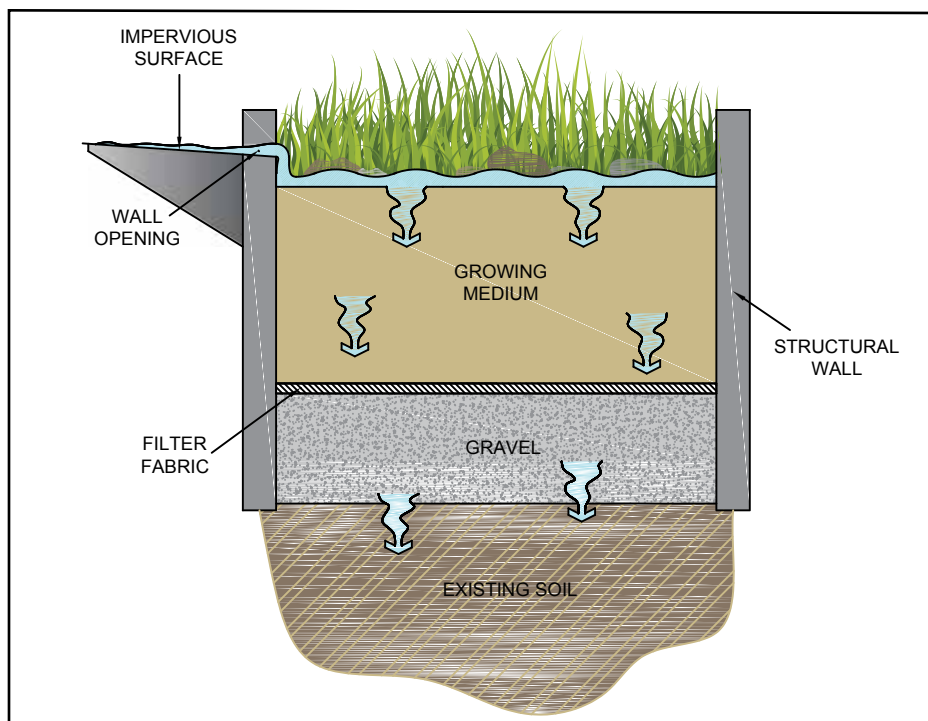
Precast concrete meets all of the above criteria, making it the material of choice for many authorities throughout North America. Specifiers have found precast to be a strong, reliable material that allows planters to be installed quickly and easily.

Thanks to precast’s versatility, planters can be manufactured modularly or as an entire unit. Additionally, units can be produced in any size or shape with any texture, finish or color.

## A RESILIENT, TIME-SAVING SOLUTION IN WEST VIRGINIA

A small city with a population of just under 5,000 residents, Ranson, West Virginia, was awarded federal funding from the U.S. Department of Transportation’s TIGER II Planning Grant Program as part of the “Green Corridor Revitalization” project. The project consists of improvements to a 1.5-mile stretch of Fairfax Boulevard, a two-lane road providing residential access and parking. The \$9.4 million job combines a two-lane, median-divided boulevard with on-street parking, new sidewalks, street trees, a wide center landscaped median with contemporary Chesapeake Bay stormwater approaches, LED lighting and street furniture. With an expected completion date of late 2015, the project scope includes the implementation of cost-effective and sustainable stormwater management techniques.

The project includes the installation of flow-through precast concrete filtration planters along the western edge of the



**Figure 1:** Elements of a filtration planter.

southbound lane along Fairfax Boulevard. Mark Wilhelms, vice president of architectural sales for panel supplier Midwest Block & Brick Inc., said the project originally called for a cast-in-place structure.

“The concern was controlling the quality of the casting of the product,” he said. “Going with a precast option gave officials assurance that quality would be closely monitored in a controlled environment and the structure would be done right.”

Due to residual soil conditions and underlying karst geology,<sup>1</sup> each planter is retrofitted with a geo-membrane liner to prevent concentrated infiltration points at the installation site. To accommodate large stormwater events that would otherwise wash out the planter, perforated underdrains and an overflow inlet are installed. Overflow water can then be transported to a separate collection cistern, another planter or be connected directly into the city’s main stormwater system.

Concrete Products Group provided the precast concrete planters, which are manufactured using the Freno System. Developed by architects at HOK, Freno consists of a segmental planter wall and curbing system. The modular aspect of the system will allow the filtration planters to expand and contract in size and shape based on block-by-block conditions and stormwater capture needs along Fairfax Boulevard.

According to Kevin Johnson, project manager for Jefferson Contracting, the Freno System proved to be an effective alternative to traditional cast-in-place walls.

“With this large streetscape project being constructed in phases over more than a year, we’ve been able to get the precast stormwater structures installed quickly in a variety of weather conditions and not lose any time waiting for concrete to cure and forms to be removed,” he said.

The capital cost to implement a modular system is roughly the same as a custom cast-in-place concrete system. However, using precast concrete allows for simple construction inspection

requirements. Additionally, a typical precast structure can be built in a day versus a week for a cast-in place concrete system.

In addition, the modular system can be removed and reused. If Fairfax Boulevard is redesigned to support additional adjacent redevelopment, the units can be reconfigured to accommodate

changes to size and shape, based on localized needs. The modular system can also be repaired with replacement units if accidental damage occurs.

## PITTER-PATTER

Hearing the pitter-patter of rain on the roof is soothing for some. Most of us don’t give much thought to the path raindrops take or what they accumulate on the way. The good news is, landscape architects, urban planners and designers are thinking about it and coming up with innovative ways to manage stormwater runoff while adding beautiful elements to the area. Precast concrete is manufactured from local and recycled materials and is installed quickly, minimizing impact during construction. It also has an exceptional life cycle, making it a sustainable choice for stormwater management.

To locate precast manufacturers in your area, please visit [precast.org/find](http://precast.org/find).

For questions on this or other precast concrete solutions, please contact Claude Goguen at [cgoguen@precast.org](mailto:cgoguen@precast.org) or at 800-366-7731. **PS**

*Claude Goguen, P.E., LEED AP, is NPCA’s director of Sustainability and Technical Education.*

Photo Credits:

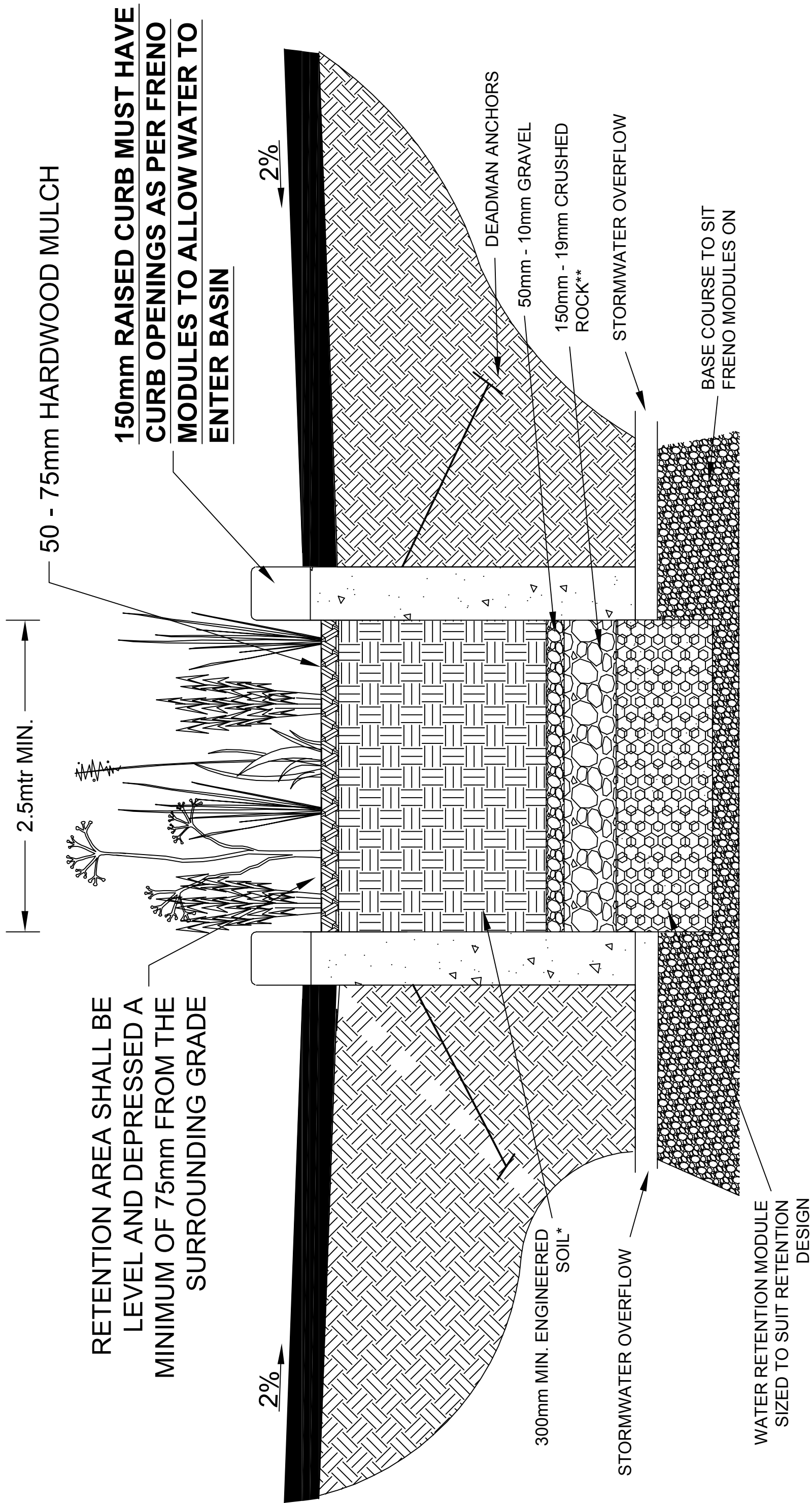
Page 24-25 – Midwest Block & Brick Inc.

Page 26 – Midwest Block & Brick Inc.

Page 27 – Figure created by Kayla Hanson, NPCA technical engineer. Foliage courtesy of © Rohitha Wijerathne | Dreamstime.com

(Endnotes)

<sup>1</sup> Karst is a “landscape formed from the dissolution of soluble rocks including limestone, dolomite and gypsum.” Learn more at <http://www.esi.utexas.edu/outreach/caves/karst.php>



\*BIORETENTION "ENGINEERED SOIL" LAYER SHALL BE MINIMUM 600mm DEEP "SANDY LOAM" SOIL MIX WITH NO MORE THAN 5% CLAY CONTENT. THE MIX SHALL CONTAIN 50-60% SAND, 20-30% COMPOST OR HARDWOOD MULCH, AND 20-30% TOPSOIL.

\*\*19mm CRUSHED ROCK LAYER SHALL BE A MINIMUM OF 300mm BUT MAY BE DEEPEENED TO INCREASE THE INFILTRATION AND STORAGE ABILITY OF THE BASIN.

THE EFFECTIVE AREA OF THE BASIN SHALL BE LEVEL AND SHALL BE SIZED BASED ON STORMWATER MANUAL CALCULATIONS. TYPICALLY, THE SURFACE AREA OF THE BIORETENTION BASIN IS 4% OF THE IMPERVIOUS AREA DRAINING TO IT.











