Firestone

GEO PROFILES

WATER FEATURE SERIES
Project Profile #2

Project
Profiles
Featuring
PondGard
EPDM
Rubber
Liners

Firestone PondGard EPDM RUBBER LINERS

GIVING NATURE A HELPING HAND

Creating water features with PondGard EPDM Rubber Liners helps landscape design company overcome installation challenges to blend three dynamic waterfalls into natural environment.

Firestone PondGard EPDM RUBBER LINERS

Waterfalls Lined With EPDM Blend Into Natural Environment

Just by looking at the waterfalls in Crystal Springs Rhododendron Garden, Portland, Oregon, a visitor would be unable to discern their origin. Although each of the three gracefully tumbling waterfalls in the garden appears to have formed naturally over time, the water features were built less than a decade ago using PondGard EPDM Rubber Liners from Firestone Building Products Co., Carmel, Indiana.

The waterfalls were designed to blend with their environment and recirculate water from the garden's natural spring. Eamonn Hughes, owner of Hughes Water Gardens, a Portland-based landscape design and contracting company, created and strategically placed the water features. "We work hard to create water features that appear to have formed naturally, taking our design cues from nature," explained Hughes.

Peak Liner Performance Essential in all Seasons

Crystal Springs Rhododendron Garden is a seven-acre park established in 1950 by Portland's Bureau of Parks and Recreation and the Portland Chapter of the American Rhododendron Society. The internationally recognized garden features a collection of rare species and hybrid rhododendrons and azaleas, as well as a wide assortment of conifers and deciduous trees.

"The garden draws visitors throughout the year," said Hughes. "In addition to designing the water features to maximize seasonal appearance, we needed a liner capable of delivering peak performance in a wide range of temperatures. I specified 45-mil PondGard EPDM for its outstanding physical properties and proven seasonal performance."

Firestone's PondGard liners are durable geomembranes based on EPDM rubber, which remains flexible in ambient temperatures ranging from -40°F to 175°F. "Liner flexibility is critical," explained Hughes. "Differential settling of the soil can cause roots and rocks that were previously buried to come in contact with the liner. PondGard's excellent expansion and contraction characteristics enable it to stretch and conform to these objects in the subgrade."

Creating Waterfalls with PondGard Simplifies Installation

Access to the water feature sites at Crystal Springs Rhododendron Garden was a challenge during the installation process. The garden is situated between a busy street, a golf course and a college. Steep terrain surrounded the water feature sites. Plus, at the time of construction, the garden infrastructure was limited and would not accommodate heavy machinery typically used for excavation.

The water features were completed in phases, each taking between two and three weeks from excavation to completion. "The first waterfall we installed was the tallest of the three, measuring 40 feet tall by 20 feet wide," said Hughes. "It was also the steepest and most challenging due to the severe incline of the surrounding terrain." According to Hughes, the slope of the waterfall is 0.4:1, with 2:1 or 3:1 representing an average water feature slope.

The crew from Hughes Water Gardens compensated for difficult site access by performing the excavation manually, carving a series of angled steps out of the steep hillside to form the waterfall spillway. The support soil was then smoothed and compacted.

"Installing the liner was simple – the material is lightweight and easy to position," said Hughes. "Plus, it's available in widths of 20 to 50 feet and lengths up to 200 feet. PondGard's large roll size allows us to create sizable water features out of a single sheet of material, which speeds the installation process. On site, we simply placed the pre-cut EPDM liner into the excavated hole and anchored it around the perimeter."

Adding the Finishing Touches

Boulders and smaller stones were used to hold the liner securely in place and create the structure of the water features. Hughes used volcanic rock found on site, as well as 200 tons of river rock and weathered basalt rock procured specifically for the project.

According to Hughes, the adjacent street was temporarily closed and a crane was used to lift 40 boulders ranging in weight from 500 to 8,000 pounds over the fence surrounding the garden. The boulders and smaller moss-covered basalt stones were carefully selected, positioned in horizontal layers and anchored in place with thick mortar.

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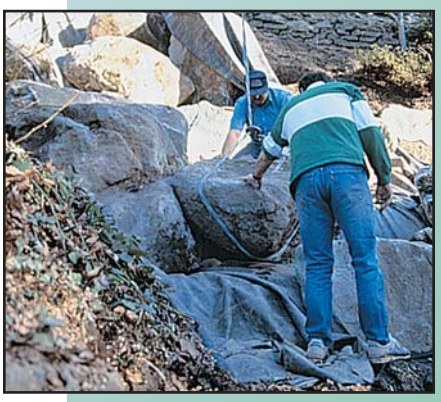
THE INSTALLATION PROCESS

Planning the Waterfalls

Before the design and construction of the water feature, a site inspection at Crystal Springs determined the nature of the soil, the depth and variation of the groundwater level, the risk of erosion or differential settling, and whether cavities or gases in the soil were present.

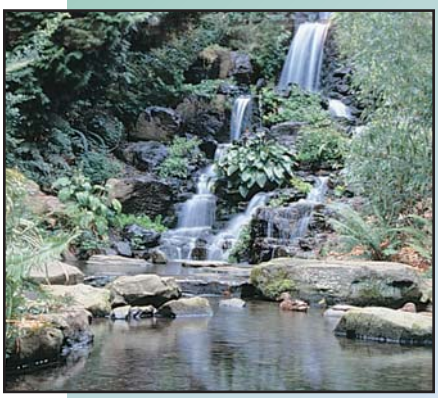


Installing the PondGard Liner

The support soil was graded and the excavated site was measured prior to liner installation. The PondGard liner was pre-cut off site, transported to the garden, then unrolled, positioned and smoothed into place. The durability of the material enabled many of the large moss-covered stones to be positioned directly over the liner.

Difficult Site Access

Steep terrain surrounded the waterfall sites, and the infrastructure would not accommodate heavy construction machinery. The crew manually excavated the sites to form the angled steps of each waterfall (seen here beneath the large sheet of PondGard EPDM). A street adjacent to the park was closed so a crane could lift and place the boulders over the liner.



Finishing Touches

The desired flow rate and sound were achieved with submersible pumps delivering water to the top and center of the features. Various plants were added to soften each feature's appearance. PondGard, a highly stable, inert material, is specially formulated to be safe for the garden's plant species and aquatic life.

"To park visitors, the waterfalls appear to have formed naturally," said Hughes. "We created this illusion by building gradually curving spillways and using alternating stone sizes and shapes to form natural sound variations. Because the lining material is durable, we were able to position the majority of the stones directly over the PondGard EPDM. We placed a geotextile mat between the liner and the larger boulders for an added layer of protection."

PondGard EPDM Rubber Liners' high resistance to microbial and algae attack provides dependable performance in underwater applications and in direct contact with the organic material growing on the basalt rock around the feature perimeter.

EPDM Liner Reduces Water Feature Maintenance

According to Hughes, the waterfalls at the garden were designed to be low maintenance. The park relies on volunteers to maintain the grounds, which made using PondGard EPDM an advantage. It has a proven performance record in exposed applications, exhibiting outstanding resistance to ultraviolet (UV) radiation and weathering — which is especially important along the waterline and feature perimeter where the membrane can be exposed to the forces of nature. It also requires minimal maintenance, and, should the need arise, it is easy to repair in place.

"The ability of Firestone's PondGard EPDM liners to resist the effects of UV radiation and weathering was a factor in our material selection," explained Hughes. "Occasionally, rocks can dislodge around the water feature perimeter, exposing the membrane. Although the volunteers who maintain the grounds do eventually replace the stones, a liner's ability to withstand prolonged exposure to UV rays is important."

Thriving Water Features Begin with PondGard Liners

The three waterfalls at Crystal Springs have been seamlessly integrated into the garden environment through a combination of effective material selection and an expert installation technique. The first waterfall built at the park was created in 1989. And, according to Hughes, its ability to withstand the test of time is due, in part, to the durability of the liner.

"I've used PondGard EPDM successfully in more than 400 projects in the Portland area," said Hughes. "PondGard's performance characteristics and large roll size allowed me the design flexibility to build dynamic water features within the park under even the most challenging site conditions."

PROJECT DETAILS FOR CRYSTAL SPRINGS

Three waterfalls using a total of 7,500 square feet of PondGard EPDM were installed in the Crystal Springs Rhododendron Garden between 1989 and 1995.

Waterfall Dimensions:	1) 40' long by 20' wide 2) 35' long by 30' wide 3) 35' long by 40' wide
Slope:	1) 0.4:1 2) 0.8:1 3) 1.7:1
Liner Material:	45-mil unreinforced PondGard EPDM
Water Feature Size:	1) 2,000 square feet 2) 2,500 square feet 3) 3,000 square feet

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