Berms and Retentive Grading

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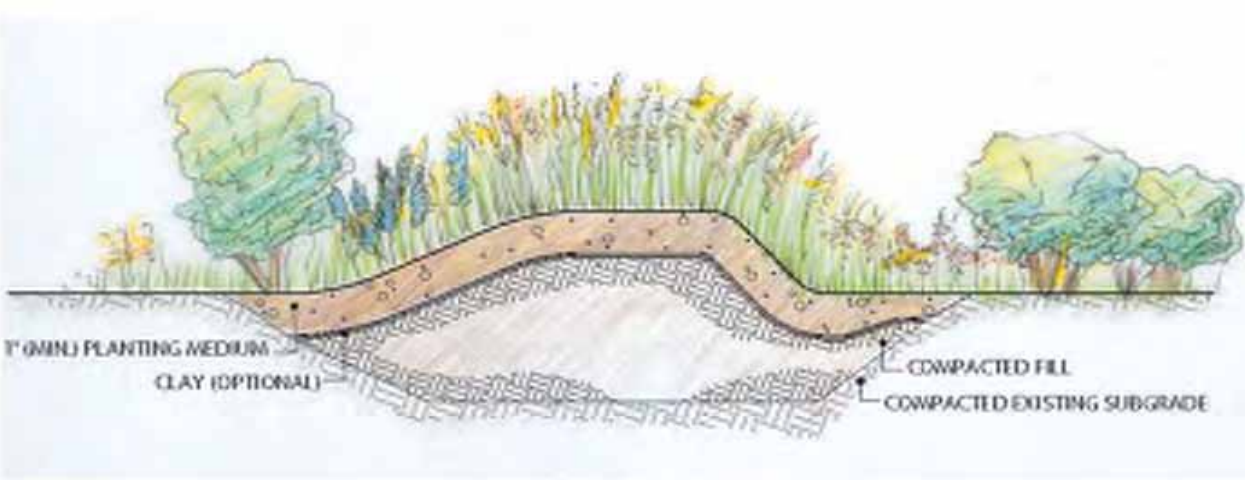
What is a Berm?

A berm is physically a mound of earth with sloping sides that is located between areas of approximately the same elevation.



The use of berms and retentive grading techniques use a site's topography to manage stormwater by promoting infiltration, mitigating run-off, avoiding erosion.

What do berms do?

- Retain stormwater via detention
- Provide infiltration
- Direct flow and drainage
- Create additional soil depth for unfavorable subsurface soil conditions
- Create a noise barrier
- Separate areas of conflicting uses
- Screen undesirable views
- Create a private, enclosed area
- Screen undesirable views
- Direct foot traffic
- Provide wind protection
- Add interest to a flat landscape

Key Elements of a Berm

- Topsoil
- Fill
- Vegetation
- Weir or Bypass Mechanism

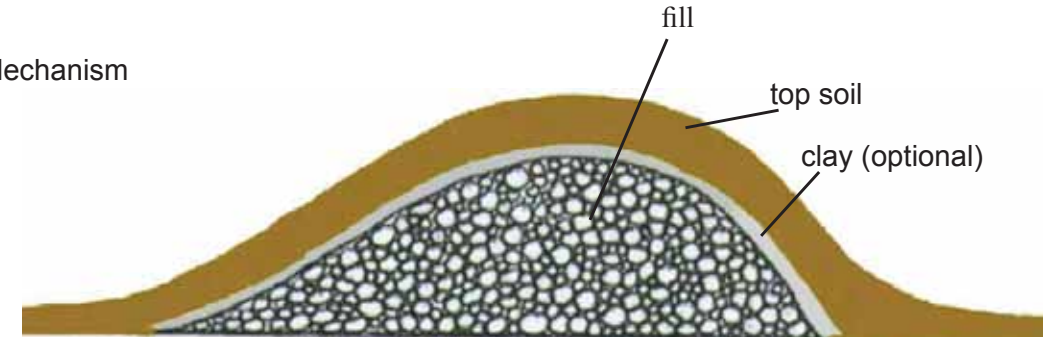


Figure 7.24: Ideal substrate components of a berm Pennsylvania Stormwater BMP Manual

Topsoil

The outter portion of the berm should consist of high quality top soil to privide a barrier to flow and act as a growing medium for plants.

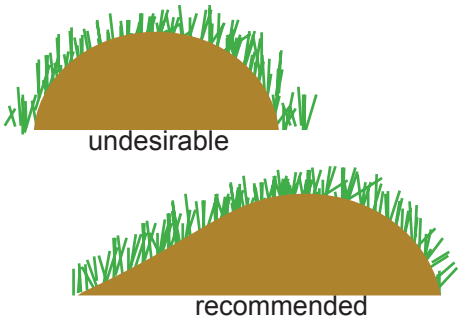
Fill

A berm may consist entirely of high quality top soil, but costs can be reduced by constructing the inner portion of the berm from a stable fill material. Soil may be reused from elsewhere on the site.

Vegetation

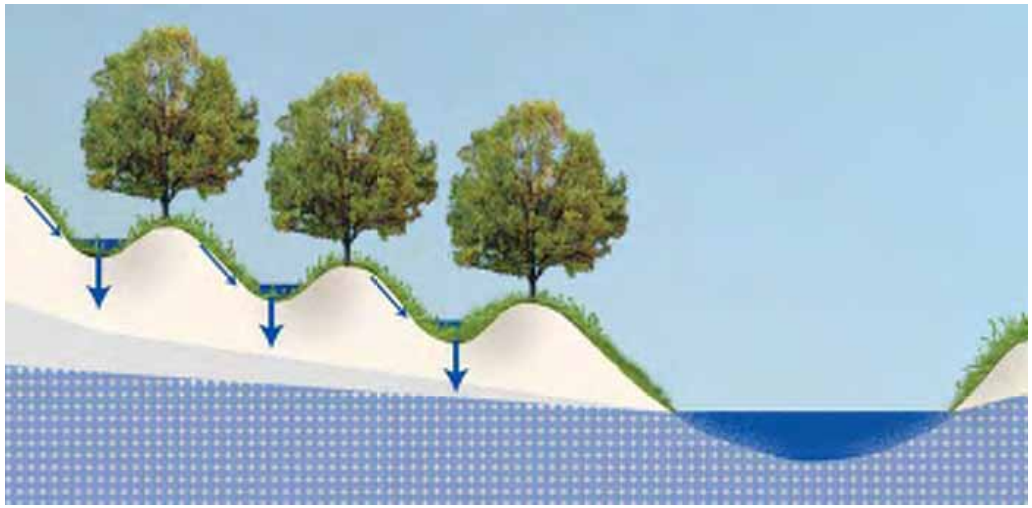
Vegetation stablizes and prevents erosion of the soil. Native trees and shrubery are encouraged for aesthetic reasons because of their deeper root systems, but turf is acceptable. It is critical that plant materials are appropriate for soil, hydrologic, light, and other site conditions.

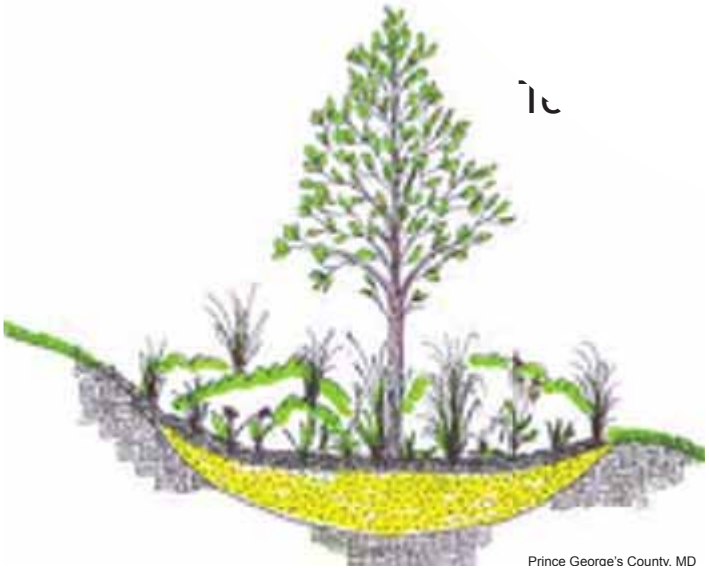
Recommended Berm Shape



Different Types of Berms

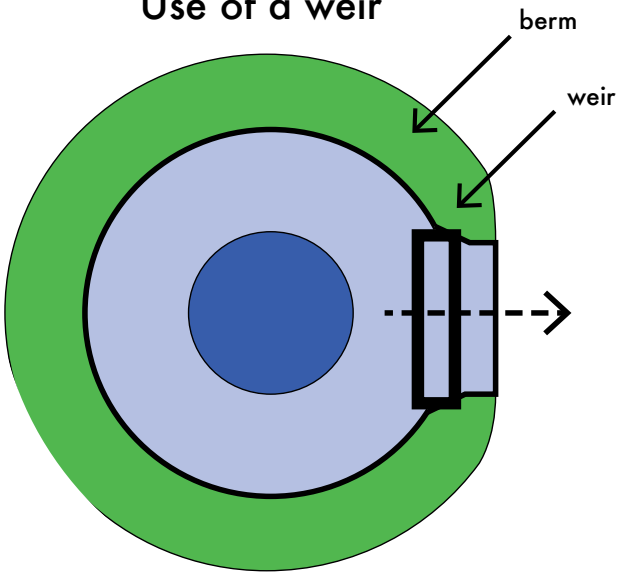
Woodland infiltration berms in a series





Example of retentive grading used to create a small bioretention basin which can be vegetated to various extents

Water flow in large storms:
Use of a weir



Guildines for Berm Areas and Depths

Average Ponding Depth	6 – 12 inches
Berm Height	6 – 24 inches

Berm Usage and Example

Berms are applicable in many urban settings such as parking, commercial and light industrial facilities, roads and highways, residential developments, and vacant lots.

Seattle's pilot Street Edge Alternatives Project
Completed: 2001

This berm was constructed using mostly non-invasive native Pacfic Northwest plants and soils that were selected to survive on little mantainence to slow, filter, and infiltrate stormwater run off. Smaller rooted trees were used and fit more easily thrive in the wetlands were placed in more moist areas of the stormwater ponds. Initially over 100 deciduous and evergreen trees and 1100 shrubs were planted here. Nearly 100% of these plants have survived over the 4 year life of the project.

Effectiveness

Berms and shallow depressions are well suited for both small and large projects. It can be an inexpensive method of reusing soil on site to manage stormwater.

Its effectiveness is based on how berms how built.

Retention Pond ~ Berm

ELEMENT MEASURED	EFFECTIVENESS (% Volume Reduction)
CHLORIDE, TOTAL (MG/L)	56%
COPPER, TOTAL (UG/L AS CU)	56%
LEAD, TOTAL (UG/L AS PB)	56%
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	56%
SOLIDS, TOTAL SUSPENDED (MG/L)	56%

Further Comments and Questions

- Relatively not complex ⟶ ease for implmentation

- Reuse soil

- No real way to analyze berms themselves but in looking at other BMPs like rention ponds one can get a better idea

- Why effectiveness all 56%?

- Difficulty in finding pictures of berms in urban settings

- Berm Video - http://www.my-gardening-and-landscaping-makeover.com/berms.html

- Overall simple idea that seems to bear high effectiveness if done well