Building Soil Berms

Berm

[1]A narrow raised ring of soil around a tree, used to hold water so it will be directed to the root zone.

[2]A designed raised planting area often in front of a house or building.

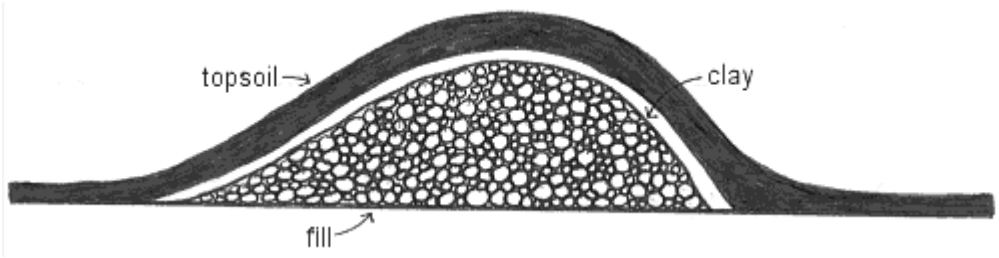
[3]A barrier adjacent to a facility to intercept and deflect water and noise; can also provide visual screening.

Description/Purpose:
A berm is a mound of earth with sloping sides that is located between areas of approximately the same elevation. Berms or mounds may serve one or a combination of the following functions:

- Add interest to a flat landscape
- Create a noise barrier
- Separate areas of conflicting uses
- Create additional soil depth for unfavorable subsurface soil conditions
- Screen undesirable views
- Create a private, enclosed area
- Direct foot traffic
- Direct drainage
- Provide wind protection
- Provide an elevated area to view smaller plants more clearly
- Enhance or emphasize a landscape design
- Serve as a solar collector mounting area

Amounts, Specifications, and Supplies:

Soil
Berms of any significant size will require large quantities of soil. Consequently, a berm may be rather expensive to create. However, skimping on size will result in what appears to be just a leftover heap of soil. A berm may consist solely of high quality topsoil; as a cheaper alternative, only the top foot needs to consist of high quality topsoil with well-drained soil making up the remainder of the berm. Using gravel in the layers directly underneath the topsoil is not recommended because of the tendency of the soil to wash through the gravel. In some municipalities, ordinances or specification codes require that clay make up the majority of the bottom layer because of its cohesive quality. Still in many areas it is possible to use a fill material such as rubble, asphalt, or gravel for the bulk of the berm if the material is capable of retaining stability without deteriorating or eroding and will compact well. The advantage of using a coarser fill over a clay substrate is that it will be much more cost effective in most cases. The best combination of materials is illustrated in the diagram below. It consists of a bottom layer of fill material (whichever type is more readily available and affordable) followed by an impervious layer of clay at least 1' 0" thick, and finally the surface layer of good quality topsoil. The slope and shape of the clay layer should be correct before the topsoil layer is added.



ideal substrate layers for a berm

Slope

The angle of repose for the soil used in the berm should determine the maximum slope of the berm with consideration to aesthetic, drainage, and maintenance needs. Angle of repose refers to the steepest grade at which a particular type of soil will remain in place. Slope is another term commonly used when referring to elevation changes. It is defined as the vertical distance over the horizontal distance of an elevation, rise over run. If a berm is to be mowed, the slope probably should be less than the maximum possible steepness for that berm. Moreover, berms with steep slopes are more difficult to mow without "scalping". Scalping occurs when the mower blade strikes the ground. For easy and safe mowing, the slope should not exceed a 4:1 ratio of rise over run. This means that for every one foot vertical drop in elevation four feet of horizontal distance must be covered. Other sources, however, recommend a more gradual slope in the range of 5:1.

As a natural element in the landscape, berms should be visually compatible with the surrounding environment. One way to help encourage the natural appearance of the berm in the landscape is to vary the slopes used within a berm by applying gradual transitions in elevation. Trees should be planted on a shallower slope of 5:1 to 7:1. Other types of plantings may tolerate the gradient (slope) of 3:1, but water will run off steeper slopes more quickly. As a result the water may not be absorbed in sufficient quantities to support plants with slopes steeper than 3:1. Although mulch may help to slow down the water on a 3:1 gradient, a 4:1 to 5.1 gradient is preferable. A 5:1 ratio may still encourage wood chips to wash down the berm. On slopes, shredded or elongated wood chips are recommended, as they will slide less easily than the round pieces of wood mulch. If rock mulch is used, irregular, elongated rock will not move as easily as washed or rounded rock and is therefore recommended.

Drainage

A designer should consider drainage in the entire area around the proposed berm. Construction of a berm may affect drainage patterns of surface water. By acting as a dam or by redirecting runoff to other areas, a berm may encourage undesirable ponding and flooding of surface water runoff, particularly after a rainstorm. A berm may also affect the normal flow of surface water across a landscape, which in turn, could lead to changes in the groundwater conditions of the site. The key to incorporating a functional berm into the landscape is to alter the existing drainage as little as possible. The only time you want to alter drainage patterns of surface water flow or runoff is when that alteration will positively affect the site. In areas where it is impossible to avoid damming surface water runoff, installation of a culvert through the berm is a hopeful remedy. In most cases where extensive regrading of a site is necessary it is wise to hire a qualified professional, such as a civil engineer or landscape architect, to prepare a grading plan. They will be able to evaluate the site and make sure that underground utilities, surface and ground water flow, and mature trees are not adversely affected by the desired grading changes.

Supplies

Soil, mulch, and drainage supplies for residential uses are available at most nurseries and garden centers. Fill can be obtained from many larger nurseries. Various fill materials can also be obtained from construction and mining refuse sources such as road repair sites, mining spoils, and rubble from building demolition sites for much lower costs.

Site Considerations:

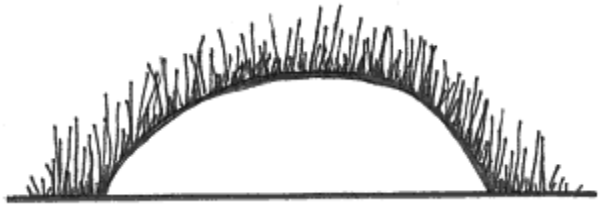
Microclimates

Even a small berm may have its own microclimate. A microclimate is an environment with different conditions, such as temperature, wind speed, and drainage from the larger more predominant surrounding conditions. Slopes facing south and west will generally have warmer temperatures throughout the year, whereas slopes facing north and east will have cooler temperatures. Even grass on berms 4-5 feet in height will become green more quickly on the south and west sides than it will on the north or east sides. Since water will tend to drain off the top of the berm more quickly, plants that are more tolerant of drier conditions should be planted towards the top of the berm. The designer can use the slight change in microclimate around a berm to plant a wider variety of plants. A designer should also consider that berms may alter wind patterns in the microclimate. Berms may block the cold north winds by acting as a buffer. The designer may also want to consider how and where the wind may deposit snow on the side of a berm. This will vary with other site conditions as well as with the size of the berm.

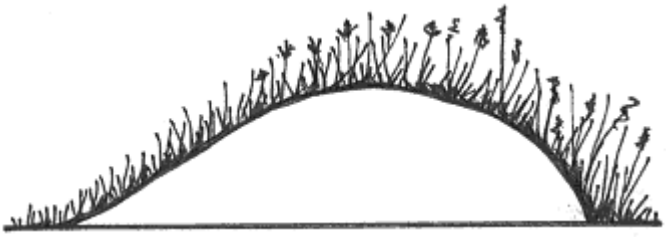
Design

Berms, like any landscape element, should enhance and blend into the overall design. For example, a berm could emphasize the lines in a curvilinear design. If possible, berms should imitate the surrounding landscape. The gradient in the berm should undulate to imitate natural mounds found in the immediate landscape. Consistently uniform berm shapes are boring and look out of place. Consider alternatives such as grading the top of the berm to be smoothly convex and the toes of the berm, at the base, to be smoothly concave.

Asymmetrical berms are usually more effective than symmetrical berms. The peak of the berm should be located near one end of the berm rather than in the middle. Creating slopes with varying angles will avoid the "burial mound" effect. Varying the slope, height, and width of the berm will add to the asymmetrical effect. If possible, one should install more than one berm. Berms can be varying sizes and can have more than one crown.



undesirable shape for a berm



desirable shape for a berm

The transition between the existing grade and the slope of the berm should be gradual. Soft contouring should make the berm appear as a natural part of the landscape. Berms should appear to be gradually emerging from the original grade rather than rising as an abrupt bump. Extra soil may need to be added at the base or the height of the berm to get a more natural effect. The tops of the berms should also be softly contoured rather than having a sharp peak. Moreover, grass berms with flatter crowns are easier to mow. Mowing grass on slopes that are too steep may result in an undesirable "scalped" look.

Plant Materials

It is important to use plants that will emphasize the berm's form. If using a number of trees, plant them across or along the berm in a pattern that will accentuate its form. Planting trees in an isolated pattern on top of the berm, however, would appear unnatural. In addition, a designer may want to consider trees from a rolling prairie or upland forest habitat such as white and bur oaks, cottonwoods, crabapples, hawthorns, or hackberries.

If there is turf along with woody or herbaceous plants, the turf should be placed to allow for easy maneuverability while mowing. Generally, shrubs should be planted in masses that move gracefully around or across the berms. Any edging between turf and mulched areas should also consider the berm's form.

Berms also make lovely sites for rock and alpine gardens. Such plantings can be installed in many different climates and conditions with the use of naturally low growing alpine plants, groundcovers and dwarf varieties of common nursery plants. One should always use plant material that is suitable for the particular conditions of the micro and macro conditions of the site. For information on planting over a mound-type septic system go to http://www.extension.umn.edu/distribution/horticulture/DG6986.html

It is also possible to incorporate plant materials that vary in height and style. Taller grasses can be planted on the backside of a berm with shorter varieties and perennials planted on the top and cascading part way down the front and sides. On the lower front and sides smaller more delicate plants can be installed where they will be noticed and appreciated most. This makes for an interesting and diverse planting and, with the incorporation of ornamental grasses, leads to more fall and winter season interest for the berm.

For more information on planting designs go to http://www.sustland.umn.edu/plant

Tools and Equipment:

- Surveying tools to determine elevations
- Shovel to move soil and build up berm
- Bobcat to move soils and fill materials for larger berms
- Rake to level out soil on berm

Step-by-Step Process:

1. Remove soil from area where berm will be placed.
2. Dig up soil lightly to break surface crust before bringing in soil to create berm.
3. Bring in fill and/or clay soil using a bobcat or shovel to make up the major portion of berm. The slope and shape of the clay layer should be corrected before the topsoil layer is added.
4. Spread out layer of topsoil on top of clay layer. The layers should be parallel.
5. Mix the two topmost layers of soil together 2-3 inches.
6. Tamp soil down lightly and smooth sides with back of rake.
7. Plant berm with turf, and/or trees, shrubs, or other plants.

8. Use guidelines provided in the detailed discussions above for the proper considerations and techniques while following the step-by-step processes.

A well thought-out and constructed berm will bring interest to your site and is a wonderful option for solving a variety of issues in the residential landscape. Enjoy!

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