Functional Grading BMP 2

Description

Subtle and inexpensive landform alterations such as swales, berms, and depressions are carefully fitted to the topography and site soils and guide or slow the flow of runoff. Specific concepts range in scale and application from micro site-by-site terraformed saucers to use of subtle earthen berms placed in zones of existing vegetation.

General Information

When grading is unavoidable it should follow regional landforms, a technique called landform grading. The concept of landform grading is construction of landforms based on natural patterns. Landform grading mimics stable natural slopes. Landformed slopes offer a diversity of concave and convex, shaded and sunny, exposed and sheltered habitats. The resulting slopes are carefully engineered but look natural. Landform grading (Schor 1992; Schor and Gray, 1995) entails modifying surface topography and drainage so that slopes are stable against erosion and mass wasting. Landform grading has been shown to decrease erosion and respects geomorphologic processes of natural slopes (Thompson and Sorvig, 2000).

Vegetation is selected and planted in such a way that it is compatible with hillside hydrogeology. Grasses and groundcovers are planted in drier, convex-shaped slopes or interfluves, while trees and shrubs are planted in wetter, concave-shaped valleys, swales, and depressions. Careful attention is applied to drainage, which follows natural drop lines on a slope in a manner that minimizes gradients.

There are other instances where grading can be used to create forms that provide hydrologic functions. Terraforming is a term for a careful grading process that is suited to the scale of the site and the development. It can result in subtle, sometimes nearly imperceptible depressions or saucers to receive residential rooftop runoff or stormwater from the driveway and turnaround. It can be replicated lot by lot, possibly relying on several signature concepts in a particular development to facilitate both installation and ongoing maintenance or integrated into a large site, such as an office park (Delaware, 1997). Examples are the use of rear yard depressions or the use of the driveway or elevated roadway to create subtle upslope dams.

Berming is another grading technique used to block the passage of runoff, retain it, and allow it to infiltrate naturally into vegetated areas upslope. Berms can be incorporated with individual driveways, lot by lot, in order to capture and infiltrate runoff from roads and driveways. Such berm systems may intersect the vegetated swale, with the berms extending along the contours into the respective lot and providing volume control as necessary. Berming can be carefully integrated into total site development by taking advantage of zones of existing vegetation.

Another effective approach that avoids some problems of conventional grading is terracing. Terracing is used to grade long slopes in steps or small horizontal benches. This “stepped slope” method is a modern version of the terraced slopes used for centuries by traditional societies that practice agriculture on hillsides. Stepped slopes are small horizontal benches that are constructed as the slope is being graded. Each step dissipates the energy of water from above, allowing more time for infiltration to occur. While some erosion does occur, this eroded material can provide a rooting medium for seeds. The terraces should be level or slope back into the hillside, or erosion may occur faster than the step can be stabilized by revegetation.

Sensitive site resources should be protected when functional grading is used and erosion and sediment control practices should be used until disturbed areas are stabilized.

Additional Resources

Schor, H. 1980. "Landform Grading: Building Nature's Slopes." *Pacific Coast Builder,* pp. 80-83.

Schor, H., March 1992. "Hills Like Nature Makes Them." *Urban Land,* pp. 40-43.

Schor, H. and D.H. Gray. "Landform Grading and Slope Evolution." *ASCE Journal of Geotechnical and Geoenvironmental Engineering,*

Thompson, J.W. and K. Sorvig, 2000. Sustainable Landscape Construction: A Guide to Green Building Outdoors, Island Press.