

## Description

Soil roughening is a technique used for creating unevenness on bare soil. The primary function of surface roughening is to reduce erosion potential by decreasing runoff velocities, trapping sediment, and increasing infiltration of water into the soil. It should be used as a permanent measure to prepare slopes for permanent vegetation.

## Selection Criteria

Surface roughening is applicable in the following situations:

- On all construction slopes where seeding, planting, and mulching to stabilize exposed soils will benefit from surface roughening.
- Graded areas with smooth, hard surfaces, and the potential for erosion of clay, silt or sand sized particles.

## Design Considerations

Roughening methods may include tilling, disking or harrowing, which must be done across the slope along the contour. Tracking, by contrast, must be done up and down the slope. Factors to be considered in choosing a method are slope steepness, mowing requirements, type of soil, and whether the slope is formed by cutting or filling. Generally, a slope cannot be mowed if it is steeper than 3:1 (H:V). Roughening is performed after the slopes have been graded and dressed. Steep slopes may require the techniques discussed in ES-04, Gradient Terraces.

### **Cut Slope Roughening**

Consider the use of stepped slopes or terraced slopes. Tilling, disking, and harrowing are acceptable methods of roughening a cut slope. Groove the slope using machinery to create a series of ridges and depressions that run across the slope and on the contour. Make grooves less than 10 inches apart and not less than 1 inch deep. Excessive roughness is undesirable where mowing is planned.

There are special attachments to equipment specifically for aerating soils, particularly for prepared lawns for houses, parks, golf courses, etc. These attachments should be used as directed by the manufacturer's directions.

Roughening with tracked machinery should preferably be limited to soils with a sandy textural component to avoid undue compaction of the soil surface. Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Each pass should move across the slope gradually. Do not backblade during the final grading operation. Seed and mulch roughened areas to obtain optimum seed germination and growth.

### **Fill Slope Roughening**

Place fill slopes in lifts not to exceed 8 inches and make sure each lift is properly compacted. Fill slopes are not as stable as cut slopes, no matter how much compaction is applied. Therefore, slopes which are steeper than 3:1 (H:V) should be avoided. The face of the slope should consist of loose non-compacted fill 4 to 6 inches deep.

Use grooving or tracking to roughen the face of the slopes as necessary. Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Each pass should move across the slope gradually. Apply fertilizer, mulch, or other soil amendments as necessary prior to grooving or tracking. Do not blade or scrape the final slope face. Seed and mulch roughened areas to obtain optimum seed germination and growth.

### Maintenance

Periodically check the seeded or planted slopes for rills and washes, particularly after significant storm events greater than 0.5 inches. Fill rills and washes slightly above the original grade, then reseed and mulch as soon as possible.

### Limitations

Surface roughening may result in sloughing in certain soil types. Surface roughening and/or stepped slopes may not be practical for sandy, steep, or shallow soils.

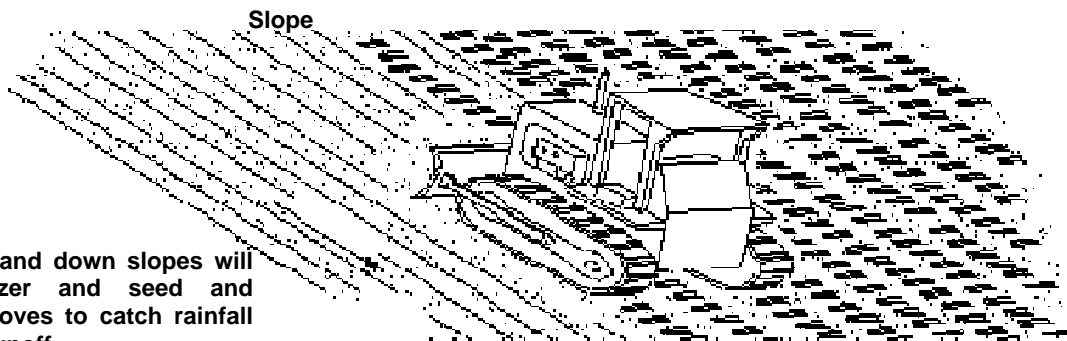
Use equipment that will not rollover on steep slopes. Keep blades and other attachments in the lowered position. Rollover bars must be installed.

Roughening alone as an erosion control measure is of limited effectiveness in intense rainfall events. If roughening effects are washed away in a heavy storm, the surface will have to be roughened again and new seed and mulch applied.

### References

Camp Dresser & McKee, Woodward-Clyde, Aguilar Engineering, Psomas & Associates, MK Centennial. 1997. *Construction Staff Guide. Caltrans Storm Water Quality Handbooks*. prepared for the California Department of Transportation.

Diagram 1 Surfacing Roughening- Equipment Tracking



#### **NOTE:**

Tracking up and down slopes will catch fertilizer and seed and provides grooves to catch rainfall and reduce runoff.

Photo                      Surfacing Roughening

