# SURFACE ROUGHENING

## GENERAL

Surface roughening is a practice that abrades the soil surface with horizontal ridges and depressions across the slope, decreasing erosion by reducing runoff velocities. In addition, this practice also increases infiltration and fosters the establishment of vegetation.

Surface roughening may be performed by tracking, grooving, or stair-stepping and is applicable on a wide variety of sites. It is especially effective on slopes with grades steeper than 3:1. To mitigate raindrop impact, it is used in conjunction with other best management practices, such as mulching and seeding (refer to Mulching, pg. I.M-2, Seeding, Temporary, pg. I.S-4, or Seeding, Permanent, pg. I.S-3).

### ADVANTAGES

- Cost-effective
- Promotes the establishment of vegetation
- Widely applicable

### DISADVANTAGES

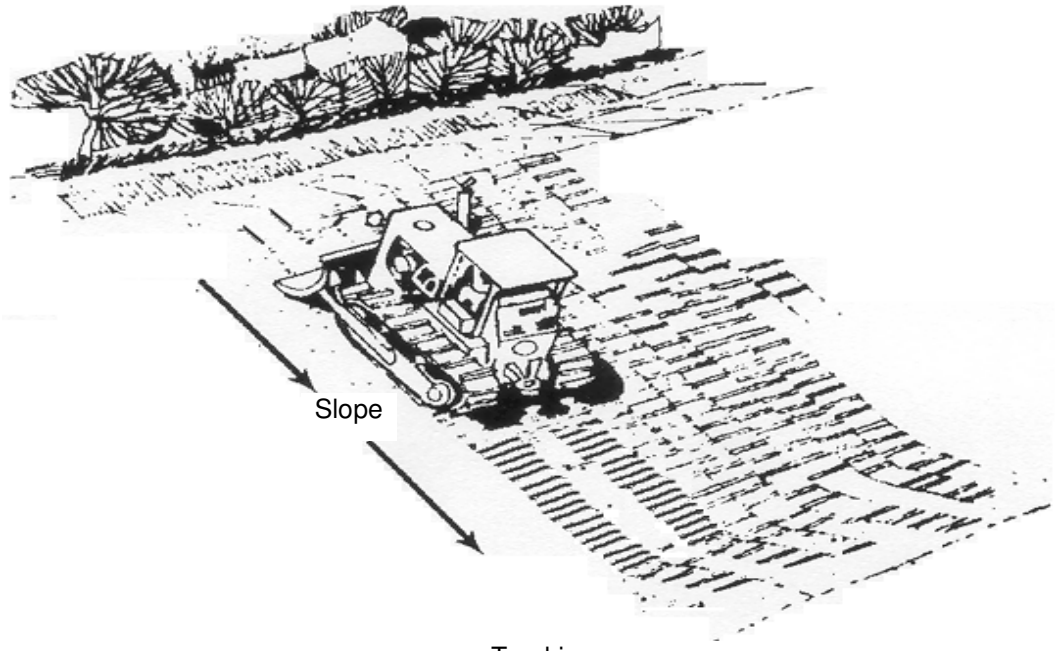
- May result in soil compaction
- May make maintenance activities (such as mowing) difficult

## METHODS

### TRACKING

Tracking is a method that utilizes the depressions formed by the tracks from bulldozers and other construction vehicles. The vehicle is operated up and down the slope and leaves behind horizontal depressions in the soil. These depressions interrupt the runoff's flow, reducing its velocity and erosive capacity.

Tracking is generally not as effective as other surface roughening methods. To improve efficiency, tracking should be performed on slopes with gradients that are 3:1 or flatter, as its use on steeper slopes may not prevent concentrated flow from developing. Soil compaction is also a concern due to the weight of the tracking equipment, and as a result,




Tracking

Source: Virginia Department of Conservation and Recreation

tracking should only be performed on sites with sandy soils.

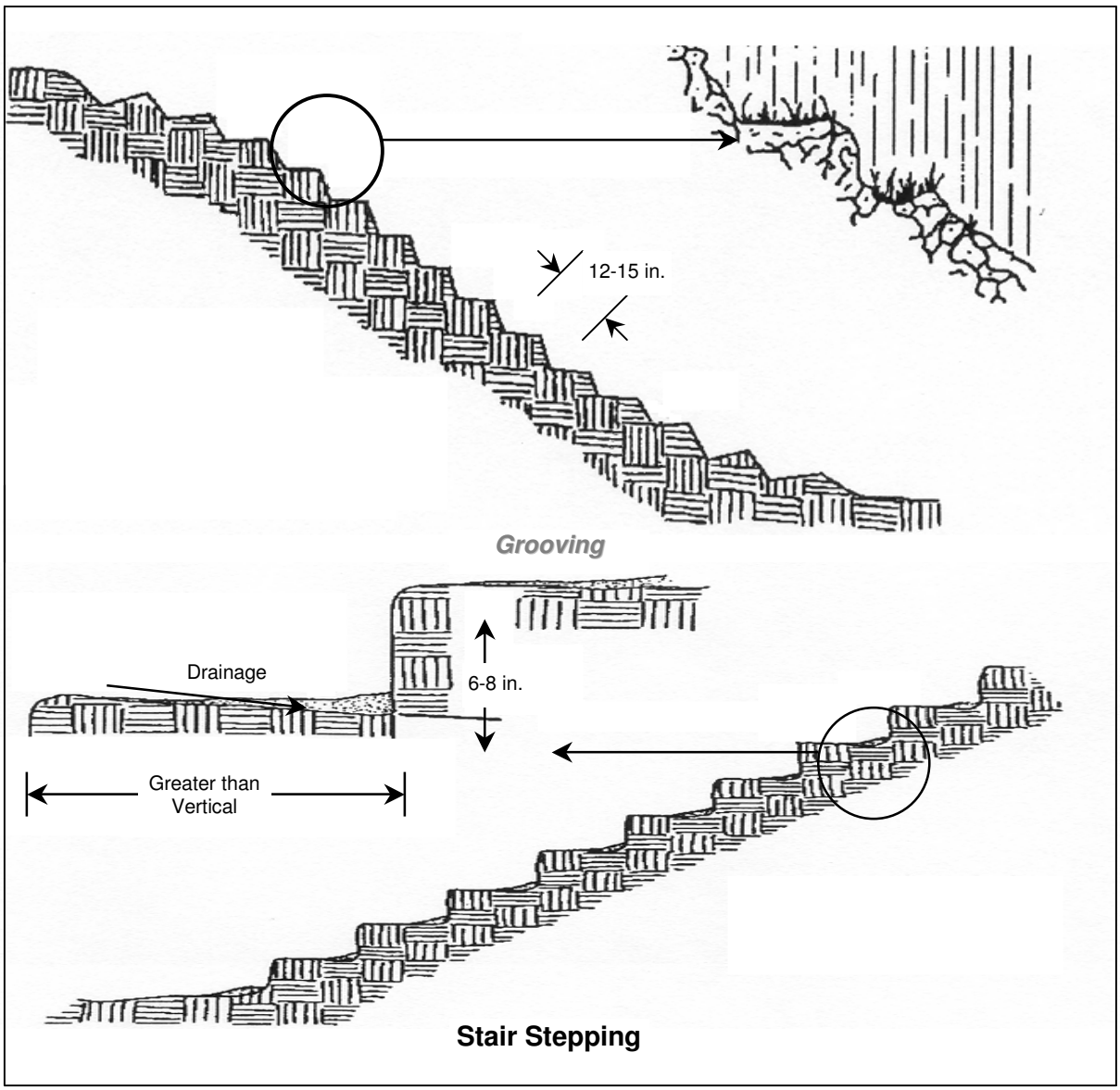
## GROOVING

Grooving is a method of surface roughening that creates a series of ridges and depressions across the slope on the contour and is generally used on steeper slopes. Grooving rippers, disks, spring harrows, chisel plows, or any equipment capable of operating safely on the slope may be used. Grooves shall be no more than 15 inches apart and should not measure less than twice the thickness of the topsoil.

## STAIR-STEPPING

Stair-stepping is a grading method that creates stair steps on slopes to reduce runoff velocity and increase sedimentation. It is used on steeper slopes with soil material that is composed of soft rock and some subsoil.

The size of the step will vary depending upon the individual characteristics of the site; however, vertical cuts should not exceed 1 foot, as larger cuts may decrease the practice's stability. Horizontal cuts should be longer than vertical cuts and should be sloped inward, toward the vertical face, to promote sedimentation.




Source: Adapted from Virginia Department of Conservation and Recreation

## CONSTRUCTION AND MAINTENANCE

- Perform surface roughening only after all cuts and fills have been graded to their final shape
- Inspect slopes weekly and after all storm events for rill and gully formation with all repairs made immediately

## METHOD TO DETERMINE PRACTICE EFFICIENCY

Surface roughening prevents soil loss by reducing the flow velocity of runoff. The efficiency of this practice is dependant upon site disturbance. Any disturbance that may disrupt the practice, such as vehicular traffic, greatly reduces the efficiency and requires that the practice be repeated. When properly performed, surface roughening yields an efficiency of up to 18%, which may be taken for the time period between the completion of the practice and the application of seed.

## SOURCES

1. *Indiana Handbook for Erosion Control in Developing Areas.* Indiana Department of Natural Resources, Division of Soil Conservation. Indianapolis. 1994.
2. *National Catalog of Erosion and Sediment Control and Stormwater Management. Guidelines for Community Assistance.* U.S. Department of Agriculture, Natural Resources Conservation Service. Washington D.C. 1996.
3. Natural Resources Conservation Service. 1994. *Natural Resources Conservation Service Planning and Design Manual. Planning and Design Manual for the Control of Erosion, Sediment, and Stormwater.* U.S. Department of Agriculture, Natural Resources Conservation Service and Mississippi Department of Environmental Quality. Washington, D.C. April 1994.
4. *Protecting Water Quality in Urban Areas, A Manual.* Minnesota Pollution Control Agency. St. Paul. 2000.
5. *Virginia Erosion and Sediment Control Handbook.* Virginia Department of Conservation and Recreation. Division of Soil and Water Conservation. Richmond. 1992.