



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026
Erosion Prevention and Sediment Control Handbook

4.3.8 Surface Roughening



Source: TNWRRC

Definition and Purpose

Surface roughening is a temporary measure that involves mechanically creating horizontal depressions, furrows, or irregularities up and down a slope. Using methods such as stair-stepping, contour tracking, grooving, etc., with heavy machinery, surface roughening disrupts the flow of runoff traversing down a slope, thereby reducing its velocity and erosion potential. Furthermore, these horizontal roughenings can entrap sediment and improve the microenvironment by enhancing moisture retention, moderating temperature fluctuations, and providing mechanical protection for seed, lime, and fertilizer applications. Surface roughening is often performed in conjunction with grade controls (Section 4.2.4).

Appropriate Applications

Broadly, surface roughening is applicable to most any slope. Ideally, surface roughening can be used in conjunction with stabilization practices such as hydroseeding (Section 4.2.6.5), mulching (Section 4.2.6.9), and seeding (Sections 4.2.6.11 and 4.2.6.12) (KTC, 2015; USEPA, 2021). However, surface roughening is not intended to be used in conjunction with rolled erosion control products (Section 4.2.6.6).

Limitations and Maintenance

Avoid surface roughening on rocky, densely compacted, or clayey soils, where equipment may not be able to create adequate surface depressions, or where the soil composition



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

prohibits sufficient infiltration. The (over)use of tracked equipment can lead to excessive soil compaction, which may hinder seed germination and infiltration capacities (USEPA, 2021). Always ensure the equipment used to roughen surfaces traverses up and down the slope.

Traversing across the slope creates depressions that run along the slope, thereby creating small rills or pathways for water to freely travel downslope and gain velocity (example shown to the right). Surface roughening is also limited to smaller precipitation events, as large events may excessively damage or wash away such depressions. After heavy rainfalls, inspect slopes for signs of erosion. Any such features should be repaired promptly by filling the eroded areas slightly above the original grade, re-roughened, and reseeded (or mulched).



Continued monitoring is essential, especially on seeded slopes, to ensure vegetation is taking hold and that the roughened surface remains effective. For slopes 3H:1V or steeper, highly erodible slopes, or slopes where surface roughening may not provide adequate protection for other reasons, benching or terracing (Section 4.3.1) may be a more ideal measure.

Planning and Design Considerations

Though smooth, hard surfaces may be aesthetically pleasing on slopes, such surfaces increase erosion potential. Thus, rough slope surfaces are preferred. Rough and loose surfaces promote water infiltration, speed up the establishment of vegetation, and decrease runoff velocity while also providing natural coverage for lime, fertilizer, and seeds. Various roughening options exist, including grooving, tracking, and ripping. When selecting a surface roughening technique, consider cost, slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

Cut slopes for areas that will not be mowed

- Grooving may be implemented when stair-stepping is not necessary. Use machinery to create a series of ridges and depressions that run along the slope contour. Grooves may be constructed with discs, tillers, spring harrows, or the teeth on a front-end loader bucket. Such grooves should not be less than 3 inches deep or further than 15 inches apart (Figure 4.3.8-A).



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

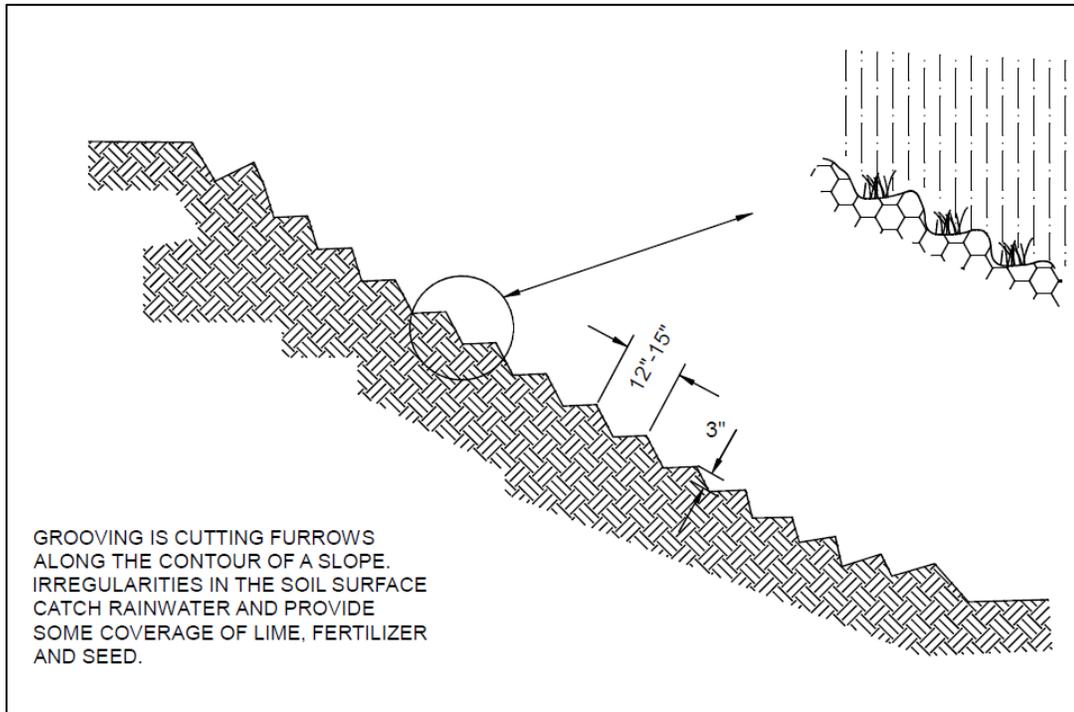


Figure 4.3.8-A: Grooving details. Adapted from VDEQ (2024).

Fill slopes for areas that will not be mowed

- Place fill slopes with a gradient steeper than 3H:1V in lifts not to exceed nine inches, and make sure each lift is properly compacted. Ensure that the face of the slope consists of loose, uncompacted fill four to six inches deep; and
- Do not blade or scrape the final slope.

Cuts, fills, and graded areas that will be mowed

- Mowed areas should not exceed slopes of 3H:1V;
- Roughen areas to shallow grooves by normal tilling, disking, harrowing, or use of cultipacker-seeder. Make the final pass of any such tillage implement on the contour;
- Make grooves, formed by such implements, close together (less than 10 inches) and not less than one inch in depth; and
- Avoid excess roughness in mowed areas.

Roughening with tracked machinery

- In general, tracking is not as effective as the other roughening methods;
- Limit roughening with tracked machinery to sandy soils to avoid undue compaction of the soil surface;



DWR – NPDES-SOP – G – 16 –Erosion Prevention and Sediment Control Handbook – 01092026

Erosion Prevention and Sediment Control Handbook

- Operate tracked machinery up and down the slope to leave horizontal depressions in the soil perpendicular to drainage. Do not back-blade during the final grading operation (Figure 4.3.8-B); and
- Promptly seed and mulch roughened areas for quick seed germination and growth.

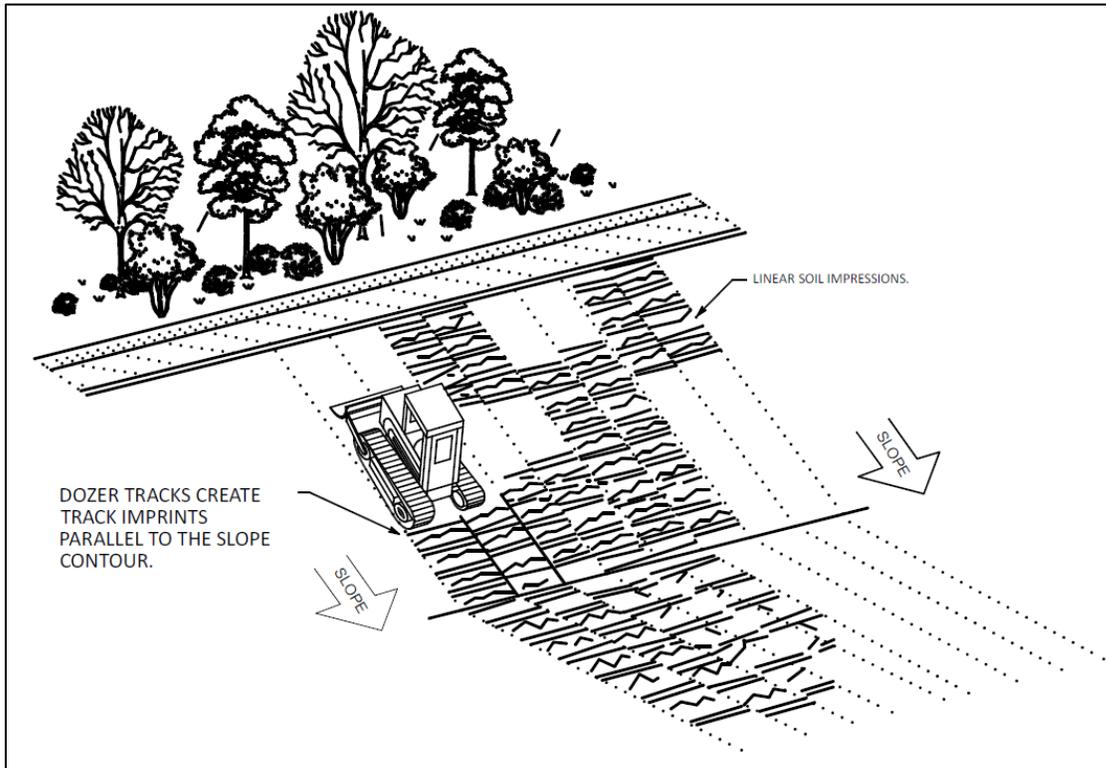


Figure 4.3.8-B: Tracking details. Adapted from VDEQ (2024).

Example Application

No formal design or quantities are required for this measure and therefore are not presented herein.

References

- KTC. (2015). *Best Management Practices (BMPs) for Controlling Erosions, Sediment, and Pollutant Runoff from Construction Sites*.
- NCDEQ. (2013). *Erosion and Sediment Control Planning and Design Manual*.
- USEPA. (2021). *Stormwater Best Management Practices: Soil Roughening*.
- VDEQ. (2024). *Virginia Stormwater Management Handbook*.