

PC-31 SERRATIONS AND ROUGHENING

Refer to: ITD Standard Specifications, Section 205.
ITD Design Manual, Section 5.6.

**BMP Objectives**

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|-------------------------------------|-----------------------|
| <input type="checkbox"/> | Perimeter Control |
| <input checked="" type="checkbox"/> | Slope Protection |
| <input type="checkbox"/> | Borrow and Stockpiles |
| <input checked="" type="checkbox"/> | Drainage Areas |
| <input checked="" type="checkbox"/> | Sediment Trapping |
| <input type="checkbox"/> | Stream Protection |
| <input checked="" type="checkbox"/> | Temporary Stabilizing |
| <input checked="" type="checkbox"/> | Permanent Stabilizing |

Definition and Purpose

A rough surface is added to a slope by serrations, horizontal grooves, furrows, or depressions running parallel to the slope contour over the entire face of a slope.

Appropriate Applications

- Serration or roughening reduces the velocity of surface runoff, increases infiltration, traps sediment, and provides simple, inexpensive, and immediate erosion control for bare soil where vegetative cover is not yet established. Serrating or roughening a smooth slope prior to application of topsoil will assist in retaining the topsoil in place. In some cases, leaving the slope in a roughened condition will help control erosion and provide suitable rooting areas for plant seedlings.
- Serration or roughening is appropriate for most slopes, although different methods are used depending on the steepness of the slope, the type of slope (cut or fill), soil and rock characteristics, and future maintenance requirements.

Limitations

- When serration or roughening is improperly applied, erosion may increase rather than be reduced.
- Serration shall be limited to slopes in medium to highly cohesive soils (i.e., clays) or in soft rock that can be excavated without ripping.
- Slope angle must be 2H:1V or flatter to allow access by heavy equipment.
- If the serration or roughening is damaged, the surface must be reworked and roughened.

- Serration or roughening alone is not a sufficient control measure for some locations. For these areas, this measure must be implemented in conjunction with other soil stabilization measures.

Design Parameters

- Different methods can be used to roughen the slope surface, including grooving, tracking, or ripping. The selection of an appropriate method depends upon the grade of the slope, soil type, and whether the slope is a cut or fill slope.
- Slopes 2H:1V or steeper should be constructed to include a roughened surface of the embankment or cut materials, in conjunction with additional appropriate measures. Slopes with a gradient steeper than 3H:1V but flatter than 2H:1V should be roughened or serrated prior to placing topsoil.
- Surface roughening or serrating can be done by any equipment that can be safely operated on the slope. Grooves should not be less than 4 inches deep or more than 16 inches apart.
- Excessive compacting of the topsoil surface must be avoided, because soil compaction inhibits vegetation growth and causes higher runoff velocity.
- Cut or fill slopes that may require mowing should have a gradient 3H:1V or flatter. Such a slope can be roughened with shallow grooves parallel to the slope contour by using normal tilling. Grooves should be close together, less than 10 inches wide and not less than 1 inch deep.

Construction Guidelines

- Apply surface roughening after grading activities have ceased in an area. Equipment of various kinds (disks, harrows, or teeth) can be successfully used for slope roughening and serration. Ripper shanks or scarifiers can be used to roughen the slope surface. For rippers and scarifiers, serration intervals should be at 3-foot spacing and 12 inches in depth.
- Operate a crawler tractor up and down the slope to make cleat imprints parallel to the slope contour.
- Construct the serrations approximately horizontal or parallel to the roadway grade if its profile grade is less than 4 percent.
- Construct each series of serrations in the opposite direction from the preceding series to minimize buildup of loose material.
- Remove loose material collected at the ends of the slope and blend the slope ends into the natural ground surface.
- If rock that is too hard to roughen is encountered, blend the serrations into the rock.
- Remove materials that fall into the roadway ditch or roadway.

Maintenance and Inspection

- Conduct inspections as required by the NPDES permit or contract specifications during construction.
- Periodic inspection and maintenance will be required based on post-construction site conditions.
- Make any repairs necessary to ensure the measure is operating properly.
- Any rills or gullies that appear should be promptly filled, and the slope should be re-roughened or serrated and adequately protected.