

Grading Practices

Description

Grading is reshaping the ground surface to planned grades determined by engineering survey evaluation and layout. This BMP includes basic grading concepts, as well as specific types of grading practices that can be used to reduce erosion. Grading plans are discussed in the BMP Guidebook.

Other Terms Used to Describe

Rough Grading
Contour Grading
Special Grading Practices
Land Smoothing

Pollutants Controlled and Impacts

Proper grading practices help to improve surface drainage and reduce the amount of soil which erodes from a site.

Application

Land Use

Construction sites

Soil/Topography/Climate

Grading should compliment the natural configuration of the landscape. Where possible, the depth of grading should be controlled to prevent exposing extensive amounts of subsoil. Topsoil should be removed, stockpiled and re-spread over the graded area.

When to Apply

Apply whenever earth moving or construction activities produce grades which may increase erosive velocities or off-site sedimentation.

Where to Apply

This practice applies on any areas which require grading.

Relationship With Other BMPs

Diversions should be considered to prevent runoff from causing erosion on the exposed soil. To prevent off-site sedimentation, control measures such as Filters (filter fences), Grade Stabilization Structures and Sediment Basins may need to be installed at the lower perimeter of the site. Staging should be done to reduce the size of the area being exposed. (See the Staging and Scheduling BMP).

Specifications

The following is modified from the "North Carolina Erosion and Sediment Control Planning and Design Manual."

Planning Considerations:

1. Develop a **grading plan** to help establish drainage areas, direct drainage patterns, and decrease runoff velocities. The grading plan should follow the guidance in the BMP Guidebook, including coordinating the grading plan with the soil erosion/sedimentation control plan and the stormwater plan.
2. Slopes which will be mowed should not be steeper than 3:1.
3. Grading should be done in stages according to the implementation schedule. See the Staging and Scheduling BMP.
4. Protect spoil piles following specifications in the Spoil Piles BMP.
5. To ensure even settling, any fill to be used should be free of objectionable material such as logs, rocks and stumps. Do not use frozen or mucky material for fill.
6. Do not place fill adjacent to a channel bank where it can create bank failure or result in deposition of sediment downstream.
7. The exposed area should be stabilized with vegetation, crushed stone, riprap or other ground cover as soon as grading is completed or when work is interrupted for 30 working days or more. Use mulch (see Mulching BMP) to stabilize areas temporarily where final grading must be delayed. Slopes in excess of 2:1 should be stabilized following the specifications in the Critical Area Stabilization BMP.

During Grading:

1. Following the grading plan, construct all erosion and sedimentation control practices.
2. Remove vegetative matter in accordance with Land Clearing specifications. Remove topsoil and store in temporary Spoil Piles until final grading. Temporary spoil piles adjacent to wetlands or streams should be protected to prevent erosion.
3. Do not grade to the edge of watercourses. If a natural Buffer/Filter Strip cannot be left, construct a berm or place filter fencing adjacent to the watercourse/wetland. (See Filters BMP).
4. Divert runoff to stabilized areas, according to the grading plan.
5. Where possible, contour the grade to follow the natural contour of the land.
6. Finish grade and compact according to the intended use of the area. See the appropriate BMP for additional information on the finish grading procedures and the degree of compaction needed.

7. Except on roadway side slopes, use one of the surface roughening techniques described below to retain water, increase infiltration and facilitate vegetative growth. See Exhibit 1.

Stair-step grading. This method should be done on slopes steeper than 3:1 which have material soft enough to be bulldozed and which will not be mowed. The vertical cut should be less than the horizontal distance and should not exceed 2 feet in soft material and 3 feet in rocky material. The horizontal position of the "step" should be sloped toward the vertical up-hill wall.

Grooving. This method can be done on any area which can safely accommodate disks, tillers, spring harrow, or the teeth of a front-end loader bucket. In areas which will not be mowed, use equipment to create grooves perpendicular to the slope. Grooves should not be less than 3 inches deep, nor more than 15 inches apart. In cuts, fills, and areas that will be mowed, grooves should be less than 10 inches apart and not less than 1 inch deep.

Tracking. This method is done by running tracked machinery (such as bulldozers) up and down slopes to leave horizontal depressions in the soil. To avoid undue compaction of the soil, this method should only be done on sandy soils. Back-blading should not be done during the final grading operation.

8. Use proper Tree Protection techniques to maintain the health and integrity of the trees. Excavate as far away from the drip line as possible.

When **raising the grade** around an existing tree:

1. A well can be created around the tree(s) just outside the drip line to retain the natural soil in the area of the feeder roots
2. A dry well can be constructed around the trunk with space to allow the trunk to grow. The well should be designed to allow drainage within the well and around the root system inside the drip line. See exhibit 2.

When **lowering the grade**:

Protect trees by constructing a tree wall made of large stones, brick, building tile, or concrete block or cinder block. The wall should be designed to provide for drainage through the wall. See exhibit 3.

See the Tree Protection BMP for specifications on how to repair damaged tree roots and limbs.

After Construction:

Stabilize all areas with vegetation (See vegetative BMPs) or Slope/Shoreline Stabilization structures, where appropriate.

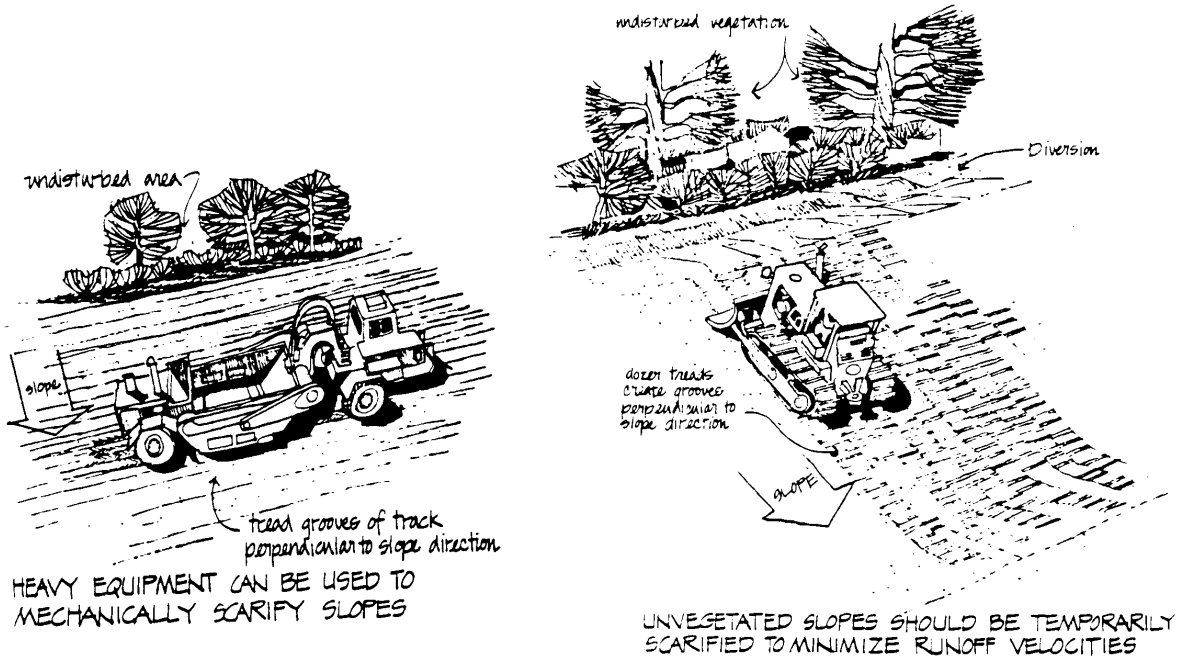
Maintenance

Desired gradients will have to be maintained until the proposed land use is established with a structure, pavement, or vegetation. In addition, maintenance should be done on any BMPs installed in association with the grading.

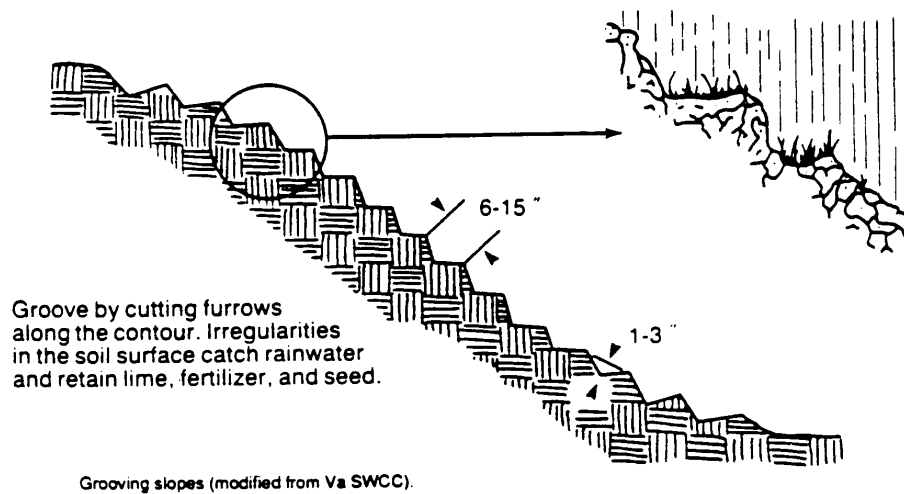
Exhibits

- Exhibit 1: Surface Roughening Techniques. Includes two diagrams from the Michigan Soil Erosion and Sedimentation Control Guidebook. Also, grooving, as modified from the Virginia SWCC (copied from the North Carolina Erosion and Sedimentation Control Planning and Design Manual).
- Exhibit 2: Tree Well. Adapted from the Virginia Erosion and Sediment Control Handbook. Copied from Connecticut Guidelines for Soil Erosion and Sediment Control.
- Exhibit 3: Tree Wall. Originally from the Virginia Erosion and Sediment Control Handbook. Copied from Connecticut Guidelines for Soil Erosion and Sediment Control.

Exhibit 1 Surface Roughening Techniques

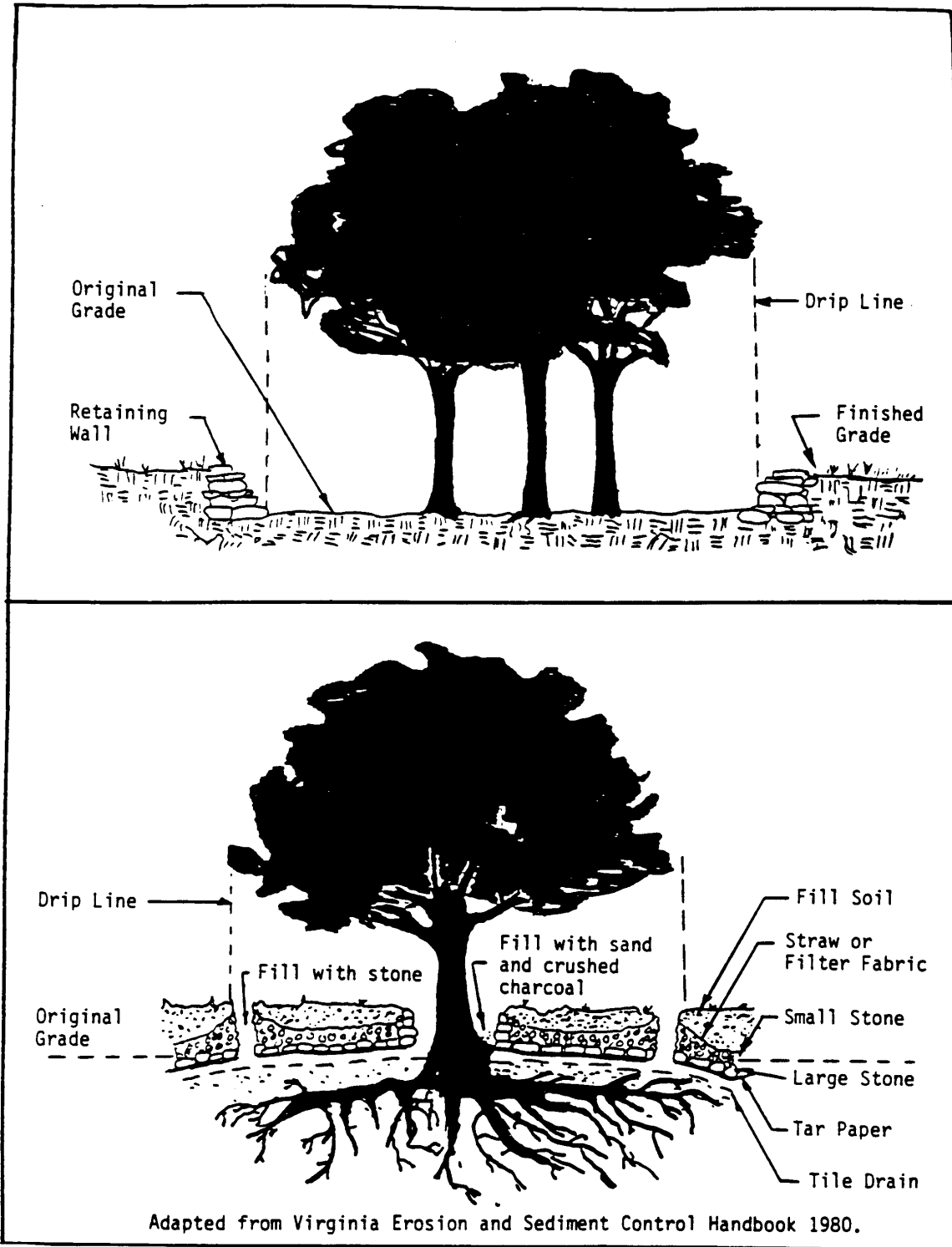


Source: Michigan Soil Erosion and Sedimentation Control Guidebook



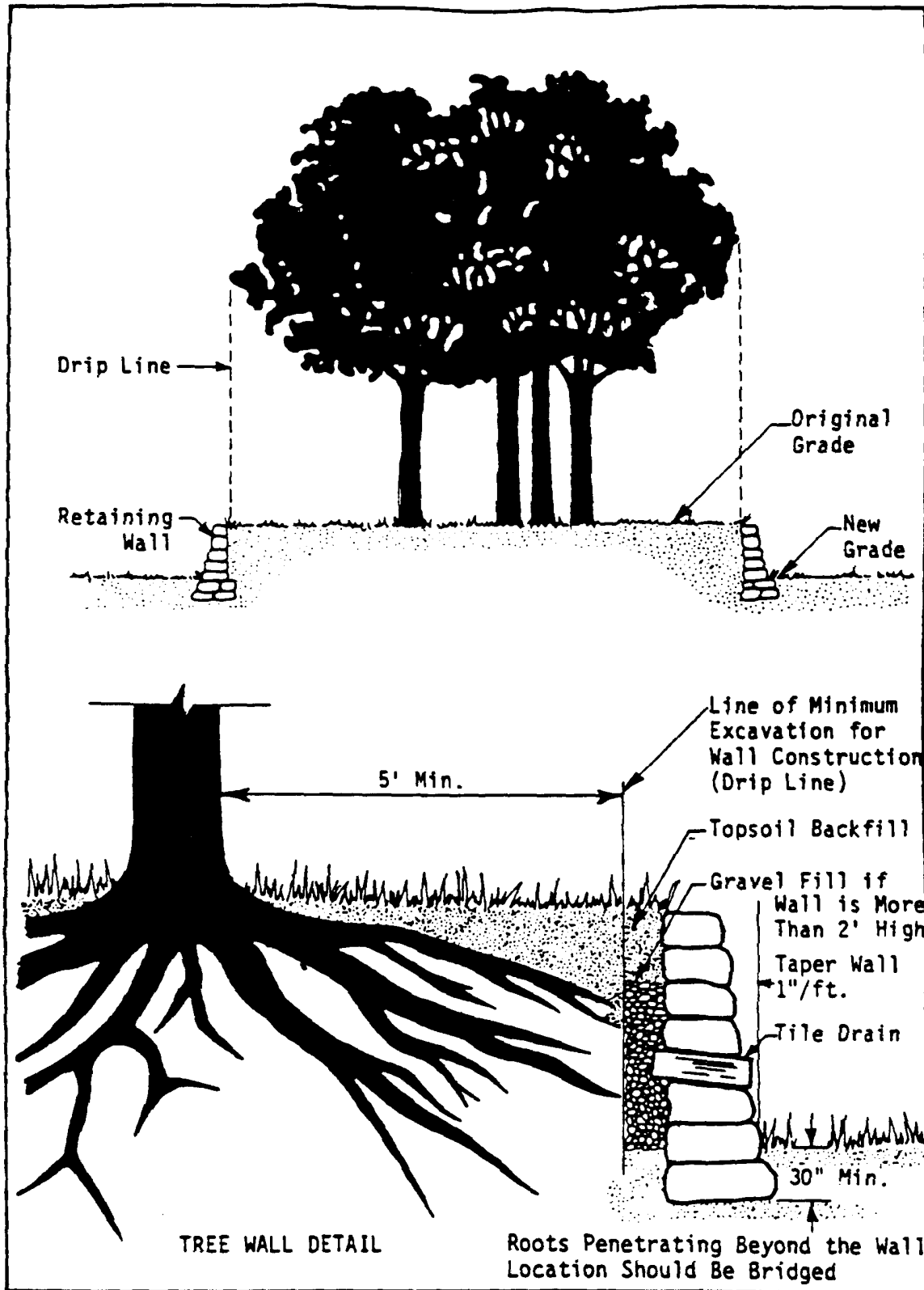
Source: North Carolina Erosion & Sediment Control Planning & Design Manual

Exhibit 2
Tree Well



Source: Connecticut Guidelines for Soil Erosion and Sediment Control

Exhibit 3
Tree Wall



Source: Virginia Erosion and Sediment Control Handbook, as copied from Connecticut Guidelines for Soil Erosion & Sediment Control.