

Chapter 4 - BEST MANAGEMENT PRACTICE STANDARDS

LAND GRADING

(Permanent Practice)

Definition

Reshaping the ground surface to planned grades as determined by engineering survey evaluation and layout.

Purpose

To provide more suitable topography for buildings, facilities, and other land uses, to control surface runoff, and to minimize soil erosion and sedimentation both during and after construction.

Conditions Where Practice Applies

This practice is applicable where grading to a planned elevation is necessary and practical for the proposed development of a site and for proper operation of sediment control practices.

Planning Considerations

Fitting a proposed development to the natural configurations of an existing landscape reduces the erosion potential of the site and the cost of installing erosion and sediment control measures. It may also result in a more desirable and less costly development.

Before grading begins, decisions must be made on the steepness of cut-and-fill slopes, how they will be protected from runoff, how they will be stabilized, and how they will be maintained. The grading plan establishes drainage areas, directs drainage patterns, and affects runoff velocities.

The grading plan forms the basis of the erosion and sediment control plan. Key considerations that affect erosion and sediment include deciding which slopes are to be graded, when the work will start and stop, the degree and length of finished slopes, where and how excess material will be wasted, and where borrow is needed. Early completion of grading work quickly provides for topsoiling and vegetation for erosion control and would eliminate temporary seeding expense.

Leaving undisturbed temporary and permanent buffer zones in the grading operation may provide an effective and low-cost erosion control measure that will help reduce runoff velocity and volume and off-site sediment. In developing the grading plan, always consider how to take advantage of undisturbed water disposal outlets before storm drains or other constructed outlets are installed.

Design Criteria

Base the grading plan and installation upon adequate surveys and soil investigations. In the plan, show disturbed areas, cuts, fills, and

finished elevations of the surface to be graded. Include in the plan all practices necessary for controlling erosion on the graded site and minimizing sediment downstream. Such practices may include, but are limited to, sediment basins, diversions, mulching, seeding, grassed waterway, lined waterway or outlet, grade stabilization structures, and subsurface drains. The practices may be temporary or permanent, depending upon the need during construction and after construction is completed.

In the grading plan consider the following as a minimum:

1. Make provision to intercept and conduct all surface runoff to storm drains, protected outlets, or to stable watercourses to minimize erosion on newly graded slopes.
2. Use slope breaks, such as diversions or benches, as appropriate, to reduce the length of cut or fill slope to limit sheet and rill erosion and prevent gullying. A spacing guide is shown in Table 4-103.

Table 4-103 Spacing guide for slope breaks.

| | <u>Slope</u> | <u>Spacing</u> |
|--------------|--------------|----------------|
| Steep Slopes | 2:1 | 20 |
| | 3:1 | 35 |
| | 4:1 | 45 |
| Long Slopes | 15-25% | 50 |
| | 10-15% | 80 |
| | 6-10% | 125 |
| | 3-6% | 200 |
| | <3% | 300 |

3. Stabilize all graded areas with vegetation, crushed stone, riprap, or other ground cover as soon as grading is completed or work is interrupted for 30 working days or more. Use mulch to stabilize areas temporarily where final grading must be delayed. The finished cut or fill slope, which is to be vegetated with grass and legumes, should not be steeper than 2:1. Slopes to be maintained by tractor or other equipment should not be steeper than 3:1. Slopes steeper than 2:1 may warrant vines, special vegetation, or retaining walls. Roughen the surface of all slopes during the construction operation to retain water, increase infiltration, and facilitate vegetation.
4. Do not place cuts or fills so close to property lines as to endanger adjoining property without adequately protecting such properties from erosion, sedimentation, slippage, subsidence, or other damages.
5. Provide subsurface drainage to intercept seepage in areas with high water tables that would affect slope stability or bearing strength or create undesirable wetness.

6. Do not place fill adjacent to a channel bank where it can create bank instability and failure or result in deposition of sediment downstream.
7. Show all borrow and disposal areas in the grading plan, and ensure they are adequately drained and stabilized.
8. Provide stable channels and floodways to convey all runoff from the developed area to an adequate outlet without causing increased erosion or off-site sedimentation.

Maintenance

Periodically check all graded areas and the supporting erosion and sediment control practices, especially after heavy rainfalls. Promptly remove all sediment from diversions and other water-disposal practices. If washouts or breaks occur, repair them immediately. Prompt maintenance of small eroded areas before they become significant gullies is an essential part of an effective erosion and sediment control plan.

Plans and Specifications

Plans for installing land grading shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve the intended purpose.

Specifications for constructing and installing the land grading shall use or be in conformance with the following. Any variation from these specifications shall be approved by an engineer.

1. Construct and maintain all erosion and sediment control practices and measures in accordance with the approved sediment control plan and construction schedule.
2. Remove good topsoil from areas to be graded and filled, and preserve it for use in finishing the grading of all critical areas.
3. Scarify areas to be topsoiled to a minimum depth of 2 inches before placing topsoil.
4. Clear and grub areas to be filled to remove trees, vegetation, roots, or other objectionable material that would affect the planned stability of the fill.
5. Ensure that fill material is free of brush, rubbish, rocks, logs, stumps, building debris, and other materials inappropriate for constructing stable fills.
6. Place all fill in layers not to exceed 9 inches in thickness, and compact the layers as required to reduce erosion, slippage, settlement, or other related problems. Fill under buildings and roads should be in accordance with their respective construction specifications.
7. Do not incorporate soft, mucky, or highly compressible materials into fill slopes.

8. Keep diversions and other water conveyance measures free of sediment during all phases of development and until vegetation is established.
9. Handle seeps or springs encountered during construction in accordance with subsurface drain practice or other approved methods.
10. Permanently stabilize all graded areas immediately after final grading is completed on each area in the grading plan. Apply temporary stabilization measures on all graded areas when work is to be interrupted or delayed for 30 calendar days or longer.
11. Show topsoil stockpiles, borrow areas, and spoil areas on the plans, and make sure they are adequately protected from erosion. Include final stabilization of these areas in the plan.