

NATURAL RESOURCES CONSERVATION SERVICE  
ILLINOIS URBAN MANUAL  
PRACTICE STANDARD

## LAND GRADING

(acre)  
CODE 865



(Source: NC Erosion and Sediment Control Planning and Design Manual)

### DEFINITION

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

### PURPOSE

The purposes of this practice are to provide 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 sedimentation control practices.

### CRITERIA

The grading plan and installation shall be based upon adequate surveys and

investigations. The plan is to show the location, slope, cut, fill, and finish elevations of surfaces to be graded. It will also show the auxiliary practices for safe conveyance of runoff water, slope stabilization, soil erosion and sediment control, and stormwater management. These practices may include but are not limited to retaining walls, grass-lined swales, grade stabilization structures, lined ditches, sediment basins, detention ponds, diversions and surface and subsurface drains. The practices may be temporary or permanent, depending upon the need after construction is completed.

The development and establishment of the plan shall incorporate the following, as appropriate:

1. The cut face of the excavation, which is to be vegetated, shall be two horizontal to one vertical (2:1) or flatter. Cut slopes of materials not to be vegetated shall be at or below the safe angle of repose for the materials encountered. For maintenance reasons 4:1 or flatter

- slopes are preferable. Slopes steeper than 2:1 shall require special design and stabilization considerations that shall be adequately shown on the plans.
2. The permanent exposed faces of fills shall be two horizontal to one vertical (2:1) or flatter. For slope maintenance, 4:1 or flatter is recommended. Slopes exceeding 2:1 shall require special design and stabilization considerations that shall be adequately shown on the plans.
  3. Provisions shall be made to safely conduct surface water to storm drains or to suitable natural water courses and to prevent surface runoff from damaging the cut faces and fill slopes.
  4. Subsurface drainage shall be provided in areas having a high water table to intercept seepage that would affect building foundations, slope stability, or create undesirable wetness.
  5. Excavations shall not be made so close to property lines as to endanger the adjoining property without supporting and protecting such property from erosion, sliding, settling, or cracking.
  6. No fill shall be placed where it will slide or wash upon the premises of another, or so placed adjacent to the bank of a channel as to create bank failure or decrease the natural carrying capacity of the stream. At a minimum, a setback of 25 feet should be provided as a buffer to sensitive areas.
  7. Fills shall consist of material from cut areas, borrow pits, or other approved sources. Fill material shall be free of brush, rubbish, rocks, logs, stumps, building debris, and other objectionable material. It should be free of stones over two inches in diameter where compacted by hand or mechanical tampers or over eight inches in diameter where compacted by rollers or other equipment. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.
  8. Diversions shall be provided whenever the vertical interval of any slope exceeds 20 feet. Diversions shall be located to divide the slope face as equally as possible and shall convey the water to a stable outlet. Soils, seeps, rock outcrops, etc., shall also be taken into consideration when designing diversions.
    - a. Diversions shall be a minimum bottom width of six feet to provide for maintenance.
    - b. Diversions shall be designed with cut slope of 6:1 or flatter to the toe of the upper slope and with a minimum of one foot in depth. The gradient to the outlet shall be between 2% and 3%, unless accompanied by appropriate design and computations.
    - c. The flow length within a diversion shall not exceed 800 feet unless accompanied by an appropriate design and computations. See practice standards DIVERSION 815, DIVERSION DIKE 820 or TEMPORARY DIVERSION 955.
  9. Surface water shall be diverted from the face of all cut and fill slopes by the use of diversions, ditches and waterways or conveyed downslope by the use of a designed structure, except where:
    - a. The face of the slope is or shall be stabilized and the face of all graded slopes shall be protected from surface runoff until they are stabilized.

- b. The face of the slope shall not be subject to any concentrated flows of surface water such as from natural drainageways, graded waterways, downspouts, etc.
  - c. The face of the slope shall be protected by special erosion control materials, sod, gravel, riprap, or other stabilization method.
10. Cut slopes occurring in ripable rock shall be serrated. These serrations shall be made with conventional equipment as the excavation is made. Each step or serration shall be constructed on the contour and will have steps cut at nominal two-foot intervals with nominal three-foot horizontal shelves. These steps will vary depending on the slope ratio or the cut slope. These steps will weather and act to hold moisture, lime, fertilizer and seed thus producing a much quicker and longer lived vegetative cover and better slope stabilization. Overland flow shall be diverted from the top of all serrated cut slopes and carried to a suitable outlet.
  11. Stockpiles, borrow areas, and spoil areas shall be shown on the plans and shall be subject to the provision of this standard.
  12. All disturbed areas shall be stabilized in accordance with the practice standards MULCHING 875, PERMANENT VEGETATION 880 or TEMPORARY SEEDING 965, as appropriate.
  13. Use slope breaks, such as diversions or benches, as appropriate, to reduce the length of cut-and-fill slope to limit sheet and rill erosion and prevent gully. A spacing guide follows.

		Horizontal Distance (ft.)
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

## CONSIDERATIONS

Fitting a proposed development to the natural configurations of an existing landscape reduces the need for some 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 sedimentation include deciding which slopes are to be graded, when the work will start and stop, the percent and length of finished slopes, where and how excess material will be disposed of, and where fill is needed.

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 sedimentation. 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.

## **PLANS AND SPECIFICATIONS**

Plans and specifications for land grading shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. At a minimum include the following items:

1. The finished land slope grade and direction of land slope.
2. Location of other related structures, e.g., drains, curbs, etc.
3. Topsoil stockpile location.
4. Borrow areas if needed.

All plans shall include the installation, inspection, and maintenance schedules with the responsible party identified.

## **OPERATION AND MAINTENANCE**

Periodically check all graded areas and the supporting erosion and sediment control practices, especially after heavy rainfalls. Promptly remove all sediment from diversions, sediment trapping practices 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.

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