

B-3 STANDARDS AND SPECIFICATIONS

LAND GRADING

Reshaping the existing land surface to provide suitable topography for building facilities and other site improvements.

Provide erosion control and vegetative establishment for extreme changes in grade.

Earth disturbances or extreme grade modifications on steep or long slopes.

The grading plan should be based on the incorporation of building designs and street layouts that fit and utilize existing topography and desirable natural surroundings to avoid extreme grade modifications.

Many jurisdictions have regulations and design procedures already established for land grading that must be followed. The plan must show existing and proposed contours for the area(s) to be graded including

Provisions to safely convey surface runoff to storm drains, protected outlets or stable water courses to ensure that surface runoff will not damage slopes or other graded areas.

Cut and fill slopes, stabilized with grasses, no steeper than 2:1. (Where the slope is to be moved, the slope must be no steeper than 3:1, but 4:1 is preferred because of safety factors related to moving steep slopes.) Slopes steeper than 2:1 require special design and stabilization considerations to be shown on the plans.

Benching per Detail B-3.1 whenever the vertical interval (height) of any 21 slope exceeds 20 feet, for 31 slopes, when it exceeds 30 feet, and for 4:1 slopes, when it exceeds 40 feet. Locate benches to divide the slope face as equally as possible and to convey the water to a stable outlet. Sols, seeps, rock outcrops, etc. are to be taken into consideration when designing benches.

Design benches with a minimum width of six feet for ease of maintenance.

Design benches with a reverse slope of 6:1 or flatter to the toe of the upper bench and with a minimum of one foot in depth. Grade the longitudinal slopes of the bench between 2 percent and 3 percent, unless accompanied by appropriate design and computations.

The maximum allowable flow length within a bench is 800 feet unless accompanied by appropriate design and computations.

Diversion of surface water from the face of all cut and fill slopes using earth dikes or swales. Convey surface water down slope using a designed structure, and

Protect the face of all graded slopes from surface runoff until they are stabilized.

Do not subject the slope's face to any concentrated flow of surface water such as from natural drainage ways, graded swales, downslopes, etc.

Protect the face of the slope by special erosion control materials to include, but not be limited to, approved vegetative stabilization practices, riprap or other approved stabilization methods.

Serrated slopes as shown in Detail B-3.2. The steepest allowable slope for ripable rock is 1.5:1. For non rock surfaces, the slopes are to be 2:1 or flatter. These slopes will weather and act to maintain, line, fertilizer and seed thus producing a much quicker and longer lived vegetative cover and better slope stabilization.

Subsurface drainage provisions. Provide subsurface drainage where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.

Proximity to adjacent property. Slopes must not be created close to property lines without adequate protection against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.

Quality of fill material. Fill material must be free of brush, rubbish, logs, stumps, building debris, and other objectionable material. Do not place frozen materials in the fill nor place the fill material on a frozen foundation.

Stabilization. Stabilize all disturbed areas structurally or vegetatively in compliance with Section B-4 Standards and Specifications for Stabilization Practices.

The line, grade, and cross section of benching and serrated slopes must be maintained. Benches and serrated slopes must continuously meet the requirements for Adequate Vegetative Establishment in accordance with Section B-4 Vegetative Stabilization.

FOR VEGETATIVE STABILIZATION

Using vegetation as cover to protect exposed soil from erosion.

To promote the establishment of vegetation on exposed soil.

On all disturbed areas not stabilized by other methods. This specification is divided into sections on incremental stabilization, soil preparation, soil amendments and topsoiling, seeding and mulching, temporary stabilization, and permanent stabilization.

Effects on Water Quality and Quantity

Stabilization practices are used to promote the establishment of vegetation on exposed soil. When soil is stabilized with vegetation, the soil is less likely to erode and more likely to allow infiltration of rainfall, thereby reducing sediment loads and runoff to downstream areas.

Planting vegetation in disturbed areas will have an effect on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, percolation, and groundwater recharge. Over time, vegetation will increase organic matter content and improve the water holding capacity of the soil and subsequent plant growth.

Vegetation will help reduce the movement of sediment, nutrients, and other chemicals carried by runoff to receiving waters. Plants will also help protect groundwater supplies by assimilating those substances present within the root zone.

Sediment control practices must remain in place during grading, seedbed preparation, seeding, mulching, and vegetative establishment.

Adequate Vegetative Establishment

Impact seeded areas for vegetative establishment and make necessary repairs, replacements, and seedings within the planting season.

Adequate vegetative stabilization requires 95 percent groundcover.

If an area has less than 40 percent groundcover, restabilize following the original recommendations for time, fertilizer, seedbed preparation, and seeding.

If an area has between 40 and 94 percent groundcover, over-seed and fertilize using half of the rates originally specified.

Maintenance fertilizer rates for permanent seeding are shown in Table B.6.

B-4.1 STANDARDS AND SPECIFICATIONS FOR INCREMENTAL STABILIZATION

Establishment of vegetative cover on cut and fill slopes.

To provide timely vegetative cover on cut and fill slopes as work progresses.

Any cut or fill slope greater than 15 feet in height. This practice also applies to stockpiles.

Incremental Stabilization - Cut Slopes

Excavate and stabilize fill slopes in increments not to exceed 15 feet in height. Prepare seedbed and apply seed and mulch on all slopes as the work progresses.

Construction sequence example (Refer to Figure B.1):

Construct and stabilize all temporary swales or dikes that will be used to convey runoff around the excavation.

Perform Phase 1 fill, prepare seedbed, and stabilize.

Perform Phase 2 excavation, prepare seedbed, and stabilize. Overseed Phase 1 areas as necessary.

Perform final phase excavation, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Note: Once excavation has begun the operation should be continuous from grubbing through the completion of grading and placement of topsoil (if required) and permanent seed and mulch. Any interruptions in the operation or completing the operation out of the seeding season will necessitate the application of temporary stabilization.

Soil Amendments (Fertilizer and Lime Specifications)

Soil tests must be performed to determine the exact ratios and application rates for both lime and fertilizer on sites having disturbed areas of 5 acres or more. Soil analysis may be performed by a recognized private or commercial laboratory. Soil samples taken for engineering purposes may also

be used for chemical analyses.

Fertilizers must be uniform in composition, free flowing and suitable for accurate application by appropriate equipment. Manure may be substituted for fertilizer with prior approval from the appropriate approval authority. Fertilizers must all be delivered to the site fully labeled according to the applicable laws and must bear the name, trade name or trademark, and warranty of the producer.

Lime materials must be ground limestone (hydrated or burnt lime may be substituted except when hydrosedding) which contains at least 50 percent total oxides (calcium oxide plus magnesium oxide). Limestone must be ground to such fineness that at least 50 percent will pass through a #100 mesh sieve and 98 to 100 percent will pass through a #20 mesh sieve.

Lime and fertilizer are to be evenly distributed and incorporated into the top 3 to 5 inches of soil by diskling or other suitable method.

Where the subsoil is either highly acidic or composed of heavy clays, spread ground limestone at the rate of 4 to 8 tons/acre (200-400 pounds per 1,000 square feet) prior to the placement of topsoil.

At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.

Construction sequence example (Refer to Figure B.2):

Construct and stabilize all temporary swales or dikes that will be used to divert runoff around the fill. Construct all fence on low side of fill unless other methods shown on the plans address this area.

At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.

Place Phase 1 fill, prepare seedbed, and stabilize.

Place Phase 2 fill, prepare seedbed, and stabilize. Overseed previously seeded areas as necessary.

Protect the face of all graded slopes from surface runoff until they are stabilized.

Do not subject the slope's face to any concentrated flow of surface water such as from natural drainage ways, graded swales, downslopes, etc.

Protect the face of the slope by special erosion control materials to include, but not be limited to, approved vegetative stabilization practices, riprap or other approved stabilization methods.

Serrated slopes as shown in Detail B-3.2. The steepest allowable slope for ripable rock is 1.5:1. For non rock surfaces, the slopes are to be 2:1 or flatter. These slopes will weather and act to maintain, line, fertilizer and seed thus producing a much quicker and longer lived vegetative cover and better slope stabilization.

Subsurface drainage provisions. Provide subsurface drainage where necessary to intercept seepage that would otherwise adversely affect slope stability or create excessively wet site conditions.

Proximity to adjacent property. Slopes must not be created close to property lines without adequate protection against sedimentation, erosion, slippage, settlement, subsidence, or other related damages.

Quality of fill material. Fill material must be free of brush, rubbish, logs, stumps, building debris, and other objectionable material. Do not place frozen materials in the fill nor place the fill material on a frozen foundation.

Stabilization. Stabilize all disturbed areas structurally or vegetatively in compliance with Section B-4 Standards and Specifications for Stabilization Practices.

The line, grade, and cross section of benching and serrated slopes must be maintained. Benches and serrated slopes must continuously meet the requirements for Adequate Vegetative Establishment in accordance with Section B-4 Vegetative Stabilization.

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At the end of each day, install temporary water conveyance practice(s), as necessary, to intercept surface runoff and convey it down the slope in a non-erosive manner.

Construction sequence example (Refer to Figure B.2):

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