



Standard Practice for Brushmattressing¹

This standard is issued under the fixed designation D6939; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the material, preparation and installation work required for brush-mattress construction used in soil bioengineering.

1.2 The values in this standard are in SI units and are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

1.3 This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace standard of care by which adequacy of a given professional service must be judged, nor should this document be applied without considerations of a project's many unique aspects. The word "standard" in the title of this document means only that the document has been approved through the ASTM consensus process.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

- 2.1 *ASTM Standards:*²
D6765 [Practice for Live Staking](#)

3. Terminology

3.1 Definitions:

3.1.1 *brushmattress, n*—a layer of live woody material anchored with stakes and ties installed to cover and stabilize stream banks and shorelines.

¹ This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.25 on Erosion and Sediment Control Technology.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

4. Summary of Practice

4.1 A brushmattress is a layer of live woody plant material installed to cover and stabilize stream banks. Dead Stout Stakes (and/or Live Stakes) and ties (wire, string, rope, bailing twine) are used to anchor the material. Brushmattressing is commonly used on stream banks, shorelines and other moist environments. Often, a live fascine and/or rock toe is used at the base. The branches collect sediment as well as provide immediate protection against surface erosion. The live cuttings eventually root and provide permanent reinforcement.

5. Significance and Use

5.1 A brushmattress is used to provide erosion and sedimentation control primarily by armoring the bank. In addition to shielding the surface, a brushmattress can increase infiltration, slow runoff, and trap seed and sediments. This method provides surface slope stabilization through vegetative growth and shallow soil reinforcement through root development. The ability of a brushmattress to function properly depends on the quality and choice of the materials used to construct the brushmattress, the means and methods of fabrication and installation, and proper consideration of site characteristics and time of year. For the brushmattress to function completely, it is important that the live material develops suitable growth. The brushmattress helps to control soil erosion while serving as habitat for birds, small mammals, invertebrates and other organisms that in turn, are fed upon by fish and other higher organisms. Once the vegetation matures, it can provide shade to the stream—lowering water temperatures, offering protection from predators, and generally improving fish habitat. **Figs. 1-3** show a brushmattress immediately after construction, in the first growing season, and in the 2nd season.

6. Materials

6.1 *Live Woody Plant Material*—Stem and branch cuttings of vegetatively self-propagating woody plant species. Typically, branches are harvested near the project site within the same climatic zone. The greatest success results from cutting and installing vegetation during the dormant season. Leave side branches intact and use only fresh or well-preserved viable cuttings. All material should be free of splits, rot, disease, and insect infestation. The stems or branches should be long enough to allow the placement of the basal ends below the lowest water level that occurs during the growing season and



FIG. 1 Brushmattress after Light Backfill of Soil



FIG. 2 Brushmattress in the First Growing Season



FIG. 3 Brushmattress during 2nd Growing Season

for the growing tips overlap the top of the slope. This is typically at least 0.6 m (2 ft) longer than the length of slope. The caliper (diameter) of cuttings generally range from 12 to 25 mm (0.5 to 1 in.).

6.2 Brush Cutting Implements—Cut live vegetation with tools such as pruning shears, loppers, machetes, clearing saws, chainsaws, and brush axes.

6.3 Ties—The brush is secured to the stakes with string, rope, bailing twine, or ungalvanized wire.

6.4 Anchors—Wooden stakes (dead stout stakes or live stakes) or metal rebar is used to anchor the brushmattress.

6.5 Dead Stout Stake—Untreated 5 by 10 cm (2 by 4 in.) lumber 45 cm to 1.2 m (1.5 to 4 ft) long, cut diagonally to produce two stakes (Fig. 4). Length is dependent on soil conditions.

6.6 Live Stake—An individual live woody plant cutting used in live staking.

7. Installation

7.1 Choose appropriate stable points to begin and end the brushmattress treatment. Divert any drainage away from the top of the mattress.

7.2 Remove loose, failed or failing soil from face of slope. Prepare the slope to 1V:2H or flatter. Typically the slope length is 10 ft but this measurement may be lengthened or shortened depending upon site conditions. Excavate a shallow trench at the toe of the slope that is below the lowest expected stream level during the growing season. The typical depth of this trench is 0.3 to 0.6 m (1 to 2 ft). Temporarily stockpile excavated material. The entire slope should be straight and a relatively smooth surface from the top of the slope to the invert of the trench.

7.3 Harvest live woody plant material using a sharp, clean brush-cutting implement. For most species that are used, the plant material should not be allowed to dry. The cuttings may be temporarily stored outdoors in water or in a moist, shaded environment for a maximum of 2 days when the outdoor temperature remains below 10°C (50°F). They may also be kept in refrigerated storage for up to two (2) months at 1 to 3°C (33 to 39°F), provided humidity levels are also maintained above 90 %.

7.4 Place the cuttings on the slope with their basal (bottom) end in the trench and growing tips upslope. The branches should overlap and form a criss-cross pattern. The layer of cuttings should be approximately 15 to 30 cm (6 to 12 in.) thick before they are secured to the slope face. Typically, 6 to 20 branches should be used per foot of stream bank depending on the branch material used.

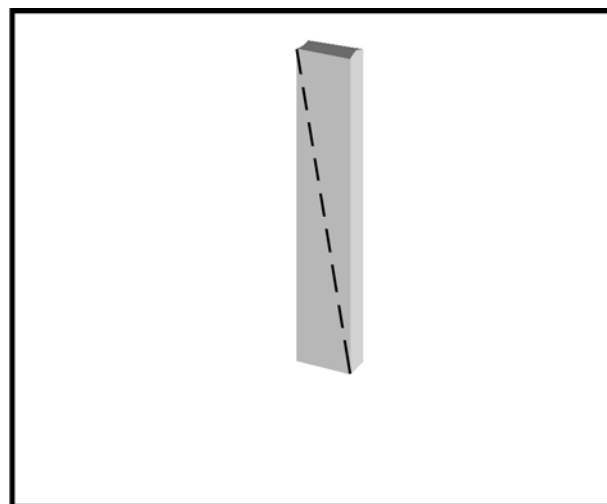


FIG. 4 Preparation of a Dead Stout Stake