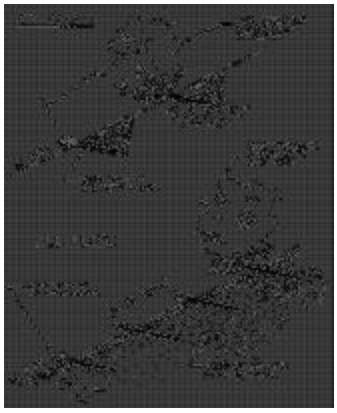
Erosion Control Practices Fact Sheet
Brush Layering

Caltrans
New Technology Report

Description:

Brush layering is placement of live brush perpendicular to a slope's contour on cut or fill benches that are then backfilled in compacted lifts. The tips of the brush extend just past the surface of the fill slope and act as sediment filters and slope breaks, reducing runoff velocities. Placing the brush horizontally on the constructed bench helps reinforce the slope's soils by creating a dense matrix of branches similar to geotextile fabrics used in engineered fill lifts. Brush layers also act as horizontal slope drains on saturated slopes.
Keywords: Bioengineering, upslope.



Brush Layering

Erosion Control Function:

Brush layering acts as a coarse sediment filter immediately after installation. With plant establishment, surface erosion (rain drop, sheet, and rill) is prevented by vegetative cover. Root structure mechanically reinforces the soil by increasing shear strength, which resists shallow slides.

Caltrans BMP ID
PSP

SWMP Category
IB: Permanent

Caltrans Slope Type
Fill
Cut

Status
Approved Case by Case

Design Elements:

Designed slope gradient. Geotechnical and hydrologic conditions must be evaluated. Cut or fill slope. Hedge layering is a variation on regular use of rooted plant material.

Effectiveness:

Unknown

Confidence Level in Effectiveness Rating
Low

Notes:

Brush layering has been used with success by John Haynes in Disrict 7 along Hwy. 33 in Ventura County and SHA 299 near Buckhorn Summit.

Ancillary Facilities:

Temporary sediment control facilities at bottom of slope during construction. Drip irrigation is required in some locations. Can be used with geotextiles or natural fiber mats (see FREF [Fabric reinforced earth fills] with brush layers). Temporary water-holding capability for storage of brush.

Specifications:

Climate Zone
Mountain
Coastal
Desert
Valley

Location
Rural
Urban

Soil Category
Not rocky

Aspect
N/A

Steepness
Max. 1v:2h

Cost: High

Issues and Concerns

Maintenance:

Requirements

Weeding and dry-season irrigation during plant establishment. Monitor weekly during winter and correct surface rilling. Typically, redirect water, fill rills, compact, and secure with erosion blanket.

Staffing/Equipment

Hand crew.

Project Development:

Construction

Heavy equipment, including excavator or dozer for earthwork, and loaders for fill. Hand crews for brush harvesting and installation. Water storage facility for submerging brush.

Construction Complexity High

Constraints

Not recommended for rocky slopes, slopes with extremely low soil moisture through the dry season, slopes with no equipment access, or slopes with concentrated or overland flow (i.e., culvert outfall). 1v:2h maximum slope.

Advantages

Provides immediate slope reinforcement from unrooted brush. As roots develop, slope stability and shear resistance are improved. Creates slope breaks that shorten slope length and reduce runoff velocities. Creates vegetative filters for debris. Increases infiltration rates on dry sites. Acts as horizontal drain on wet sites. Allows for vegetation establishment, cover, and natural recruitment.

Report Sources:

Haynes, John. Caltrans District 7. Personal communication, 2001. John_Haynes@dot.ca.gov.

Robbin Sotir and Associates.

Prunuske Chatham, Inc. Brush Layering Standard Detail. 2002.

Additional Information:

Schiechtl, H.M. Bioengineering for Land Reclamation and Conservation. 1980.

Gray, D.H., and R.B. Sotir. Biotechnical and Soil Bioengineering Slope Stabilization. 1996.

Sotir, Robbin B., and Donald H. Gray. “Soil Bioengineering for Upland Slope Protection and Erosion Reduction.” Engineering Field Handbook. Chapter 18. USDA Natural Resource Conservation Service. 1992.