Part 8

MECHANICALLY STABILIZED EMBANKMENTS

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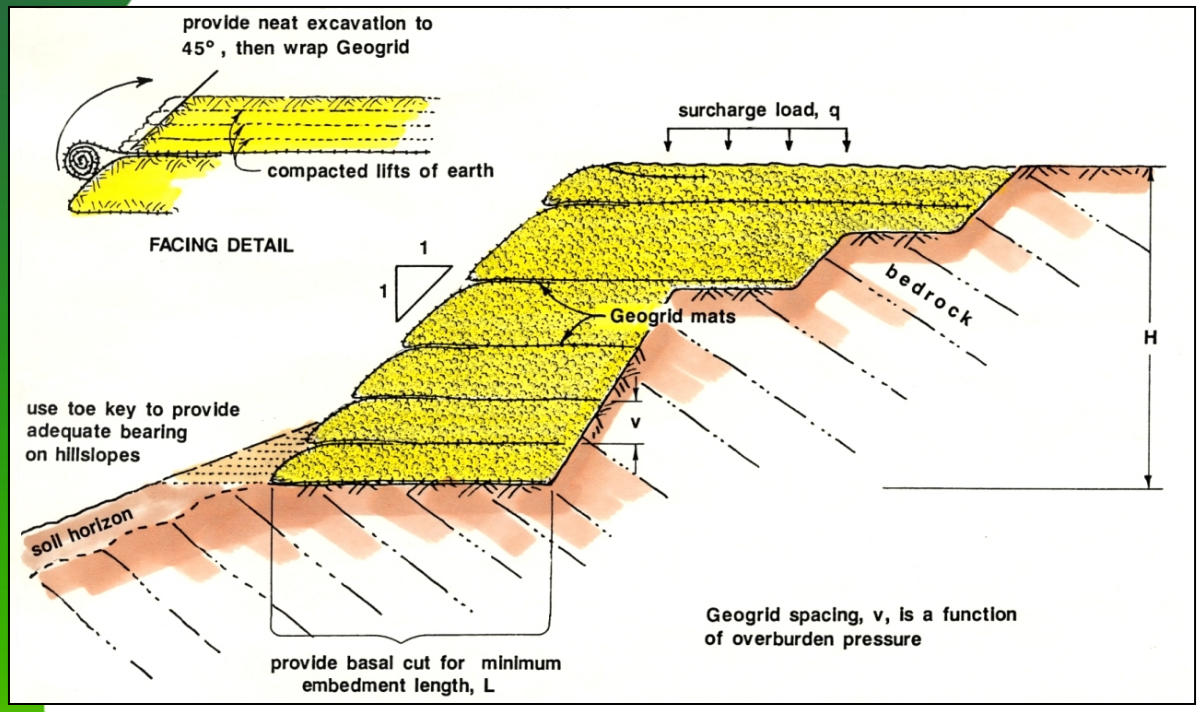
First Reinforced Earth wall in USA -1969

Reinforced Earth wall on US 50

Mechanically Stabilized Embankments (MSEs) utilize tensile reinforcement in many different forms: from galvanized metal strips or ribbons, to HDPE geotextile mats, like that shown above. This reinforcement increases the shear strength and bearing capacity of the backfill.



Geotextiles can be layered in compacted fill embankments to engender additional shear strength. Face wrapping allows slopes steeper than 1:1 to be constructed with relative ease

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A variety of facing elements may be used with MSEs. The above photo illustrates the use of hay bales while that at left uses galvanized welded wire mesh

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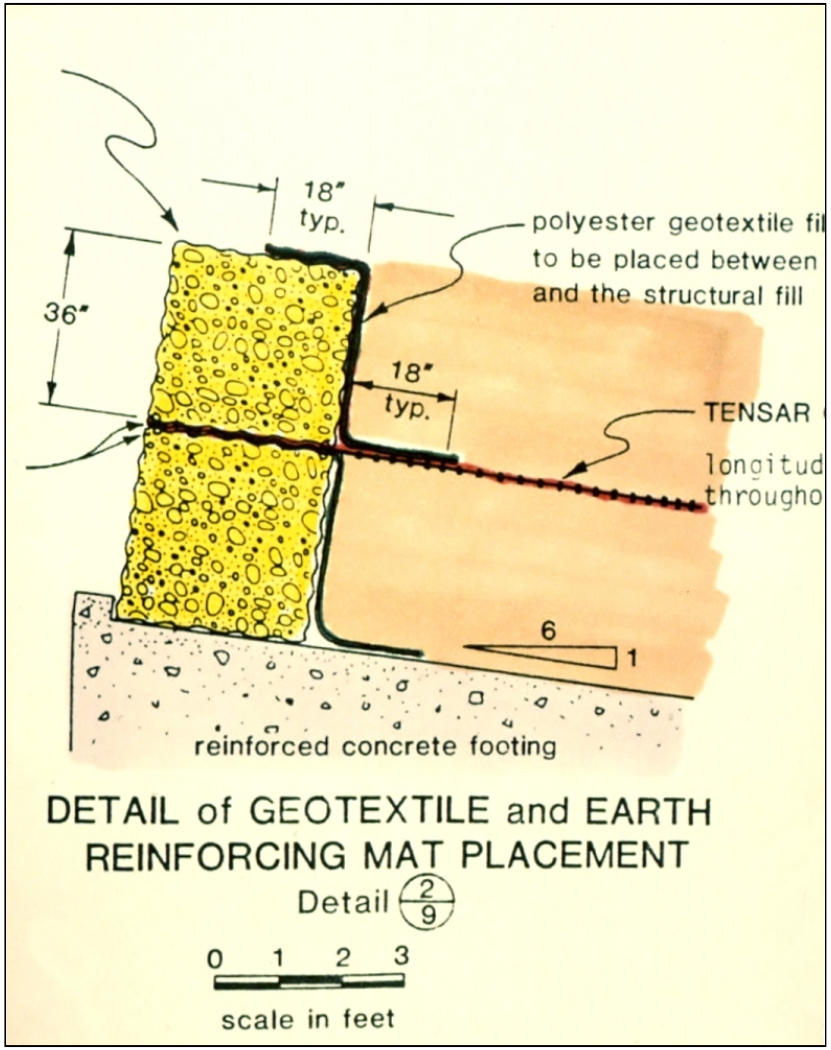

HDPE geotextiles can be used as wrapping elements, as shown at left above, or attached to conventional gravity retention elements, such as rock-filled gabion baskets, sketched at right.

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Welded wire mesh walls are constructed using the same design methodology for MSE structures, but use galvanized wire mesh as the geotextile

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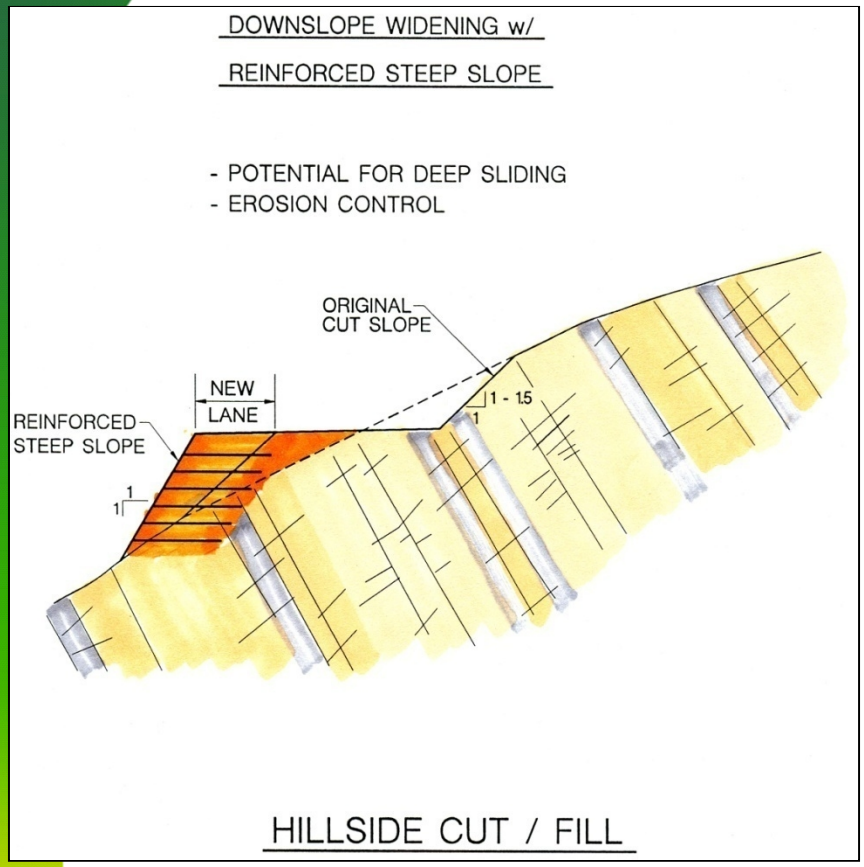

45 degree embankment slope along San Pedro Boulevard in San Rafael, CA

Geotextile soil reinforcement allows almost unlimited latitude in designing earth support systems with minimal corridor disturbance and right-of-way impact

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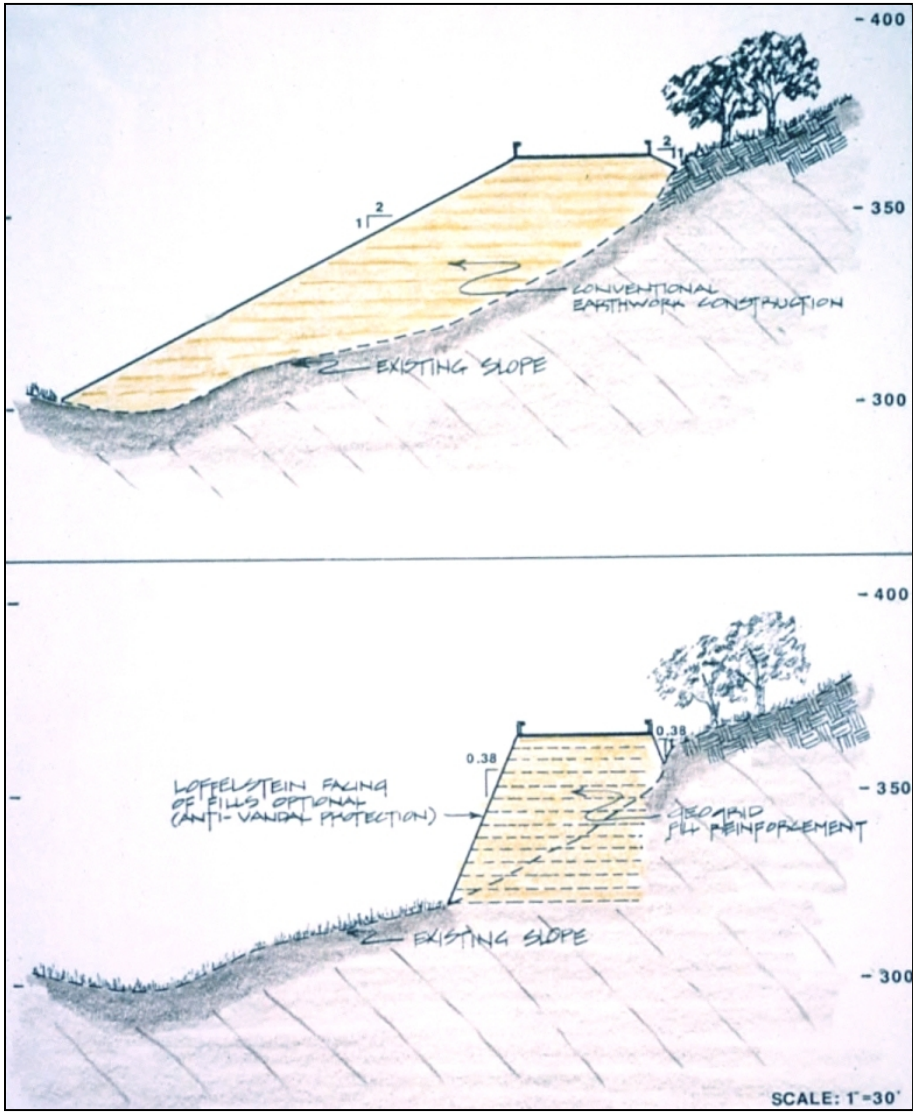

MSEs also allow roads to be constructed in steep terrain with a minimal corridor of disturbance as compared to using conventional 2:1 cut and fill slopes

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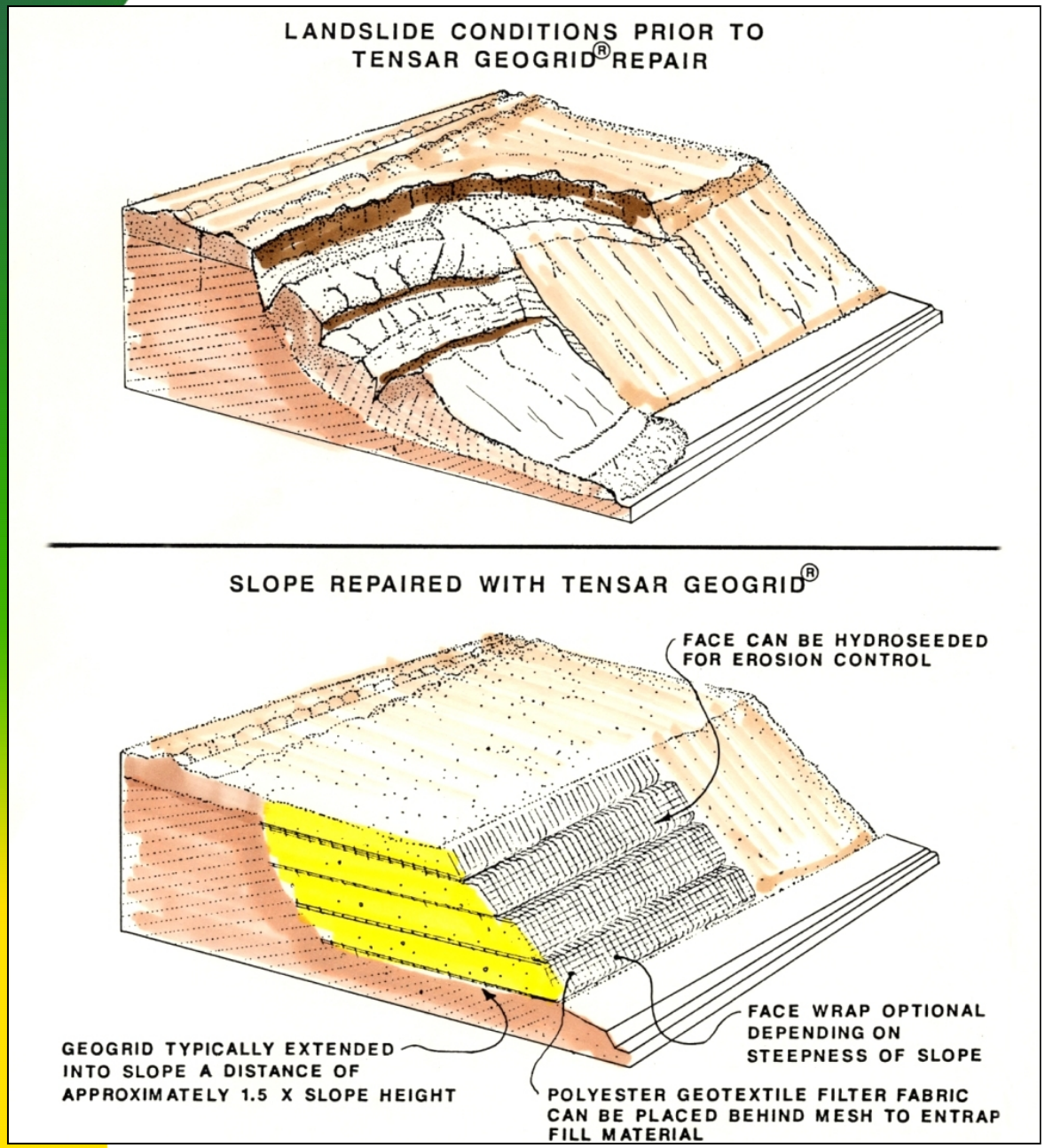
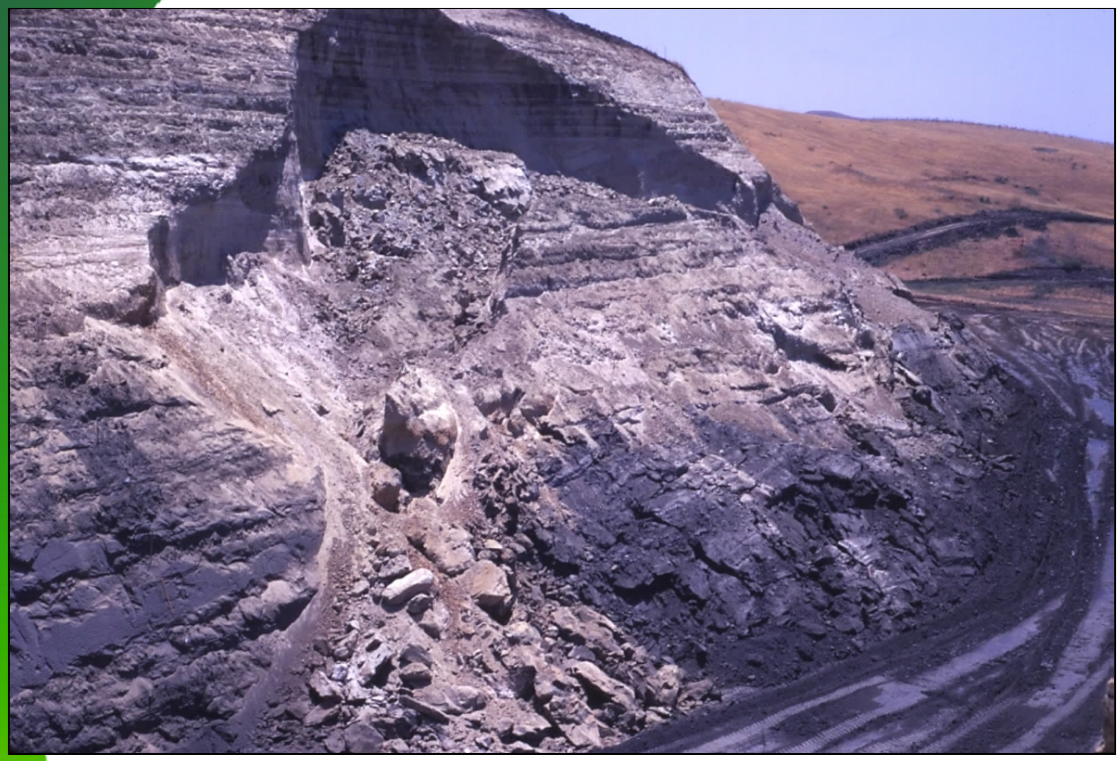
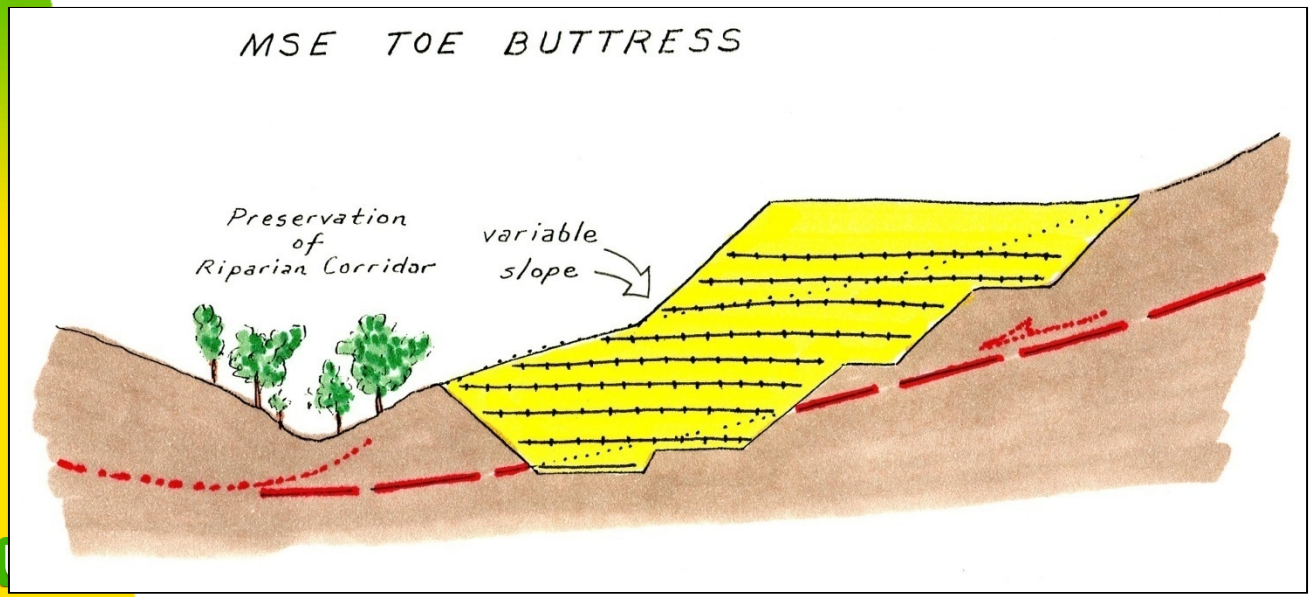
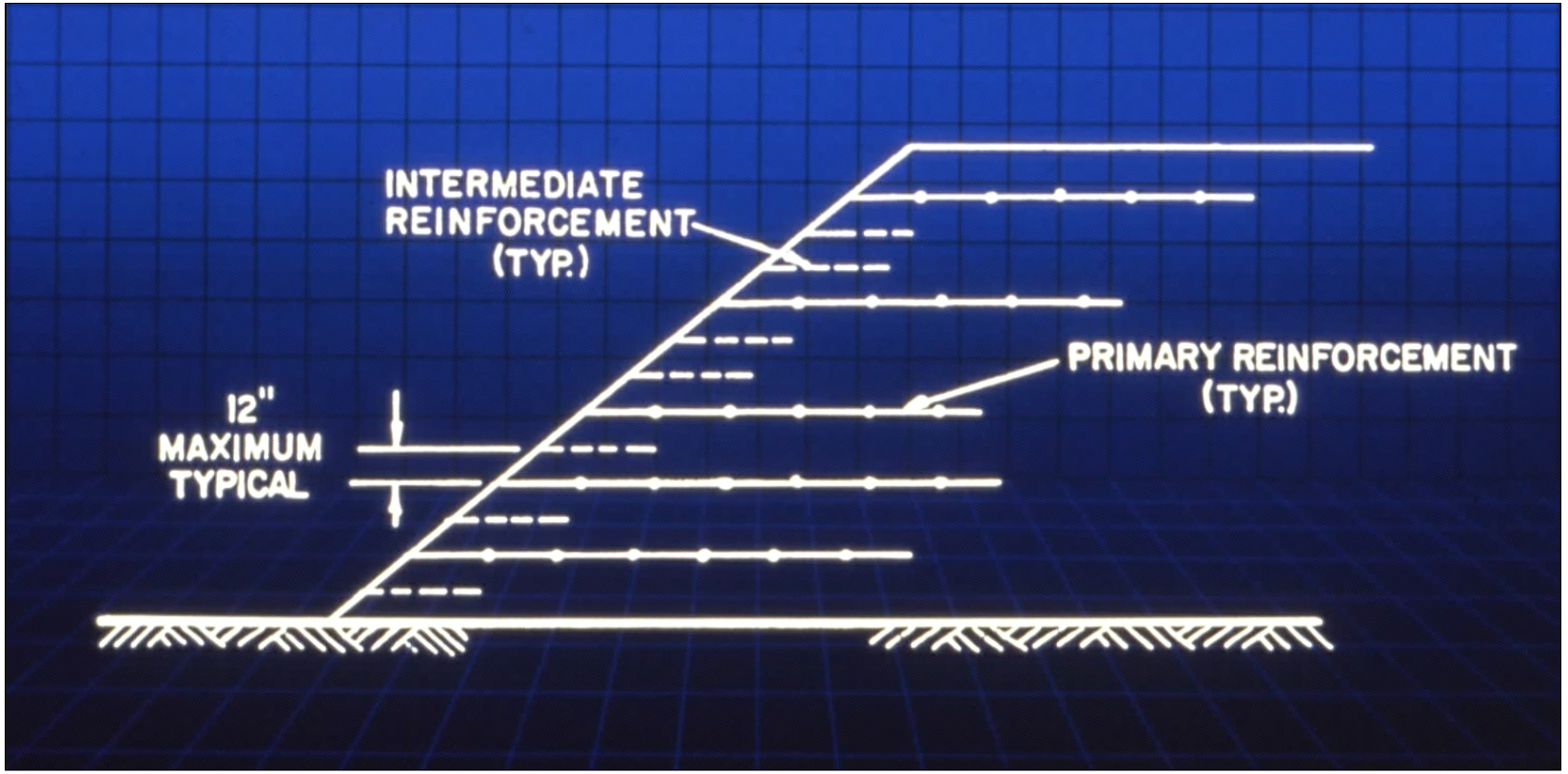


- **Geotextile grids can be combined with low strength soils to engender additional shear strength; greatly enhancing repair options when space is tight**



Geotextile tensile soil reinforcement can also be applied to landslide repairs, allowing selective reinforcement of limited zones, as sketch below left





- **Short strips, or “false layers” of geotextiles can be incorporated between reinforcement layers of mechanically stabilized embankments (MSE) to restrict slope raveling and erosion**

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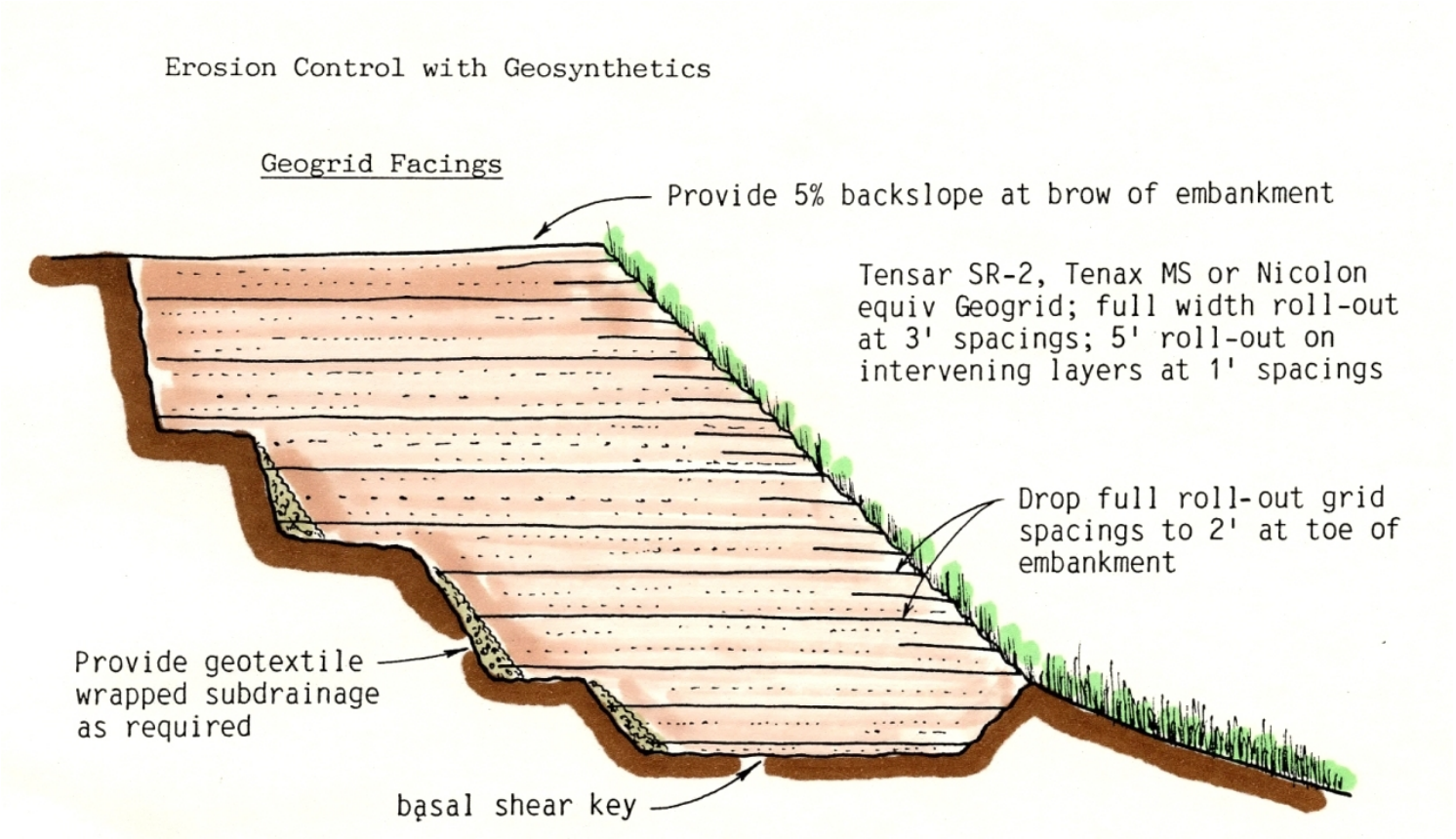

- **Section through a MSE embankment with a 1:1 (45 degree) finish face inclination. The embankment utilized false layers every 12 inches, extending just 5 feet into the slope**

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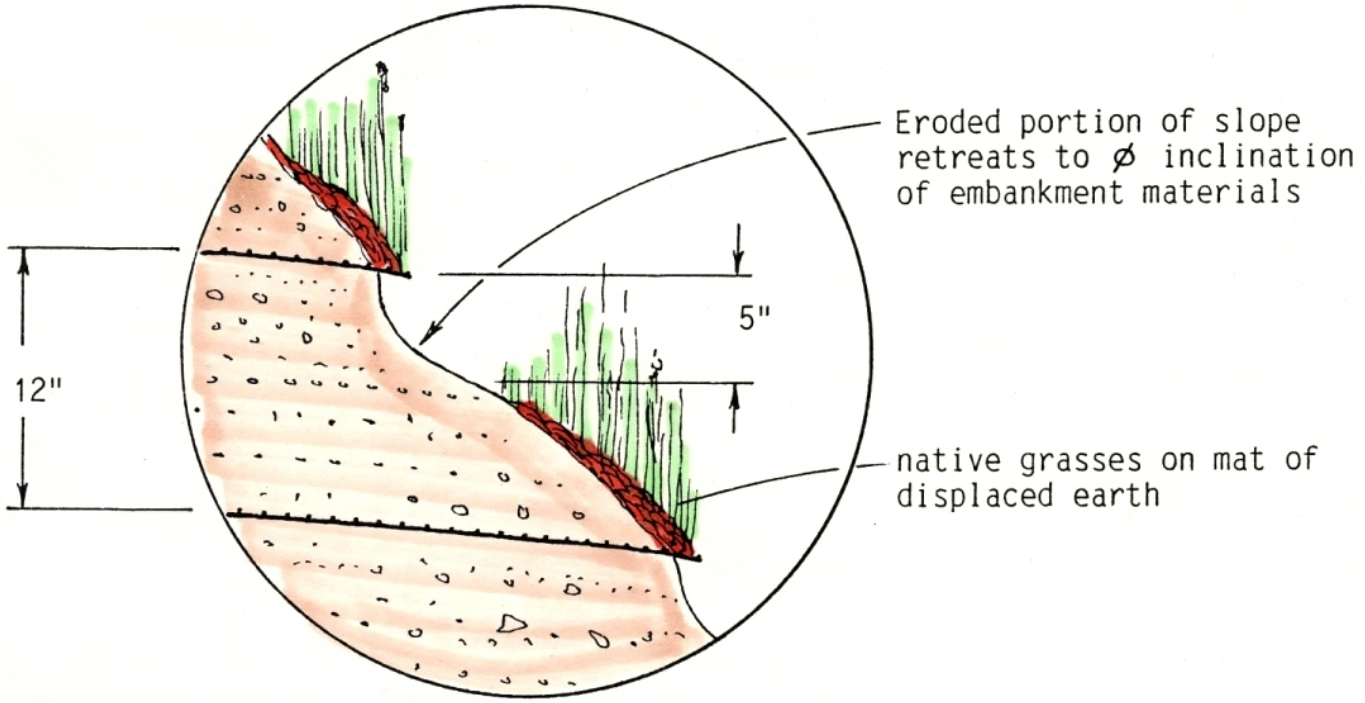

Detail view of the erosion which can be expected to occur between Geogrid layers. The effective slope height is reduced to 12" by embedment of the Geogrid.

- **Detail of geotextile “false layers”, placed every 12 inches to prevent rill erosion**

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- **Construction of 45 degree sidehill embankment for a road in steep terrain. False and full depth geotextile mats were incorporated into the fill, spaced every 12 inches**

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- **Same slope after hydroseeding and sprouting with a mix of wild mustard and other grasses.**

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About the Presenter

- Professor Rogers owned engineering consulting firms in Los Angeles and San Francisco and a general engineering contracting firm prior to entering academia.
- Professor Rogers served as Chair of the Building Codes Committee of the Association of Environmental & Engineering Geologists between 1990-97 and was AEG representative to the International Conference of Building Officials (ICBO) while the 1991, 1994 and 1997 UBC's and 2000 IBC were developed.
- Since 1984 he has taught short courses on grading and excavation codes for the Building Officials in CA, OR, WA, HI, International Conference of and Taiwan, as well as the University of Wisconsin, University of California, the Association of Bay Area Governments, and the City of Los Angeles.

J. David Rogers, Ph.D., P.E., P.G.
holds the Karl F. Hasselmann Chair in Geological Engineering at the Missouri University of Science & Technology. He can be contacted at rogersda@mst.edu