



VERRAND EMBANKMENT

Italy, 1993

PROJECT CHARACTERISTICS

Works: High reinforced soil slope with vegetated (green) face and deep drainage provisions

Purpose: landslide containment and slope protection

Dimensions:

- *height:* 31 ÷ 37 m
- *fill volume:* 120 000 m³
- *length:* 150 m
- *slope angles:* 60°

Materials:

- *foundation:* alluvial gravel and fine moraine materials,
- *embankment:* gravel as structural fill, 3 types of non-woven Polyester geotextiles with different tensile reinforcement, lattice woven geotextile, as slope protection.



PROFESSIONAL SERVICES PERFORMED

Conceptual and construction design, assistance during construction and analysis of the embankment's displacements and internal deformations.

Verrand embankment, designed in 1993 and built in 1996, is located downstream from Courmayeur, and covers the lower third part of a slope reaching 100 m in height.

The lower part of the embankment is a reinforced soil structure, composed by 3 blocks, each 9 m high, with outer slope 60° steep on the horizontal, which are reinforced with non-woven Polyester geotextiles of different tensile strengths, lengths and spacing.

The blocks are divided by 5 m wide berms running parallel to the valley bottom. A service and maintenance ramp, 5 m wide, cuts the embankment slope.

The upper part of the embankment is a conventional fill, 4 - 10 m high, with a 2H/1V outer slope.

The fill is connected to the underlying reinforced soil structure with some geotextile lengths. Ground waters are collected by a drainage system composed of drainage holes, geodrains, trenches and collectors pipes.

The total amount of nonwoven geotextile used as reinforcement exceeds 135000 m². A special technology allowed obtaining a grassed regular surface over the 4150 m² of the face.

