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CASE HISTORY

Ref: CH-INT-RF055B-IT Rev01 Sep12

COGNE ROCKFALL EMBANKMENT - Pt. 2 (MAINTENANCE)

CRETAZ, VALLE D'AOSTA

ROCKFALL PROTECTION - 3 YEAR MAINTENANCE VISIT

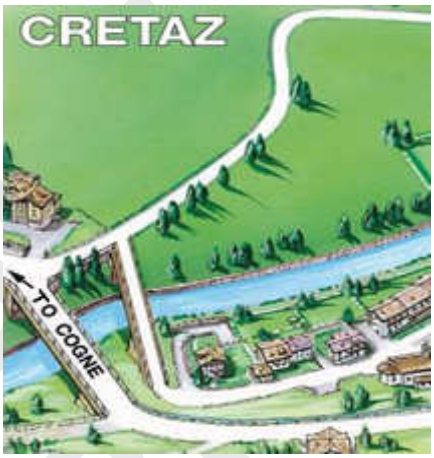
Product: Reinforced Soil Embankment System

Introduction

The aim of this report is to indicate the design principles which have led to the solution described below for construction of a reinforced soil rockfall embankment - near the town of Cogne (Val d'Aosta).

On the morning of 5 June 2007 a significant landslide of large blocks (of up to 30 m^3) occurred, which caused the closure of regional highway 47 in Cogne. The landslide occurred from the rocky outcrop on the left-hand side near the town of Cretaz (Pont di Laval), just a few kilometres from the municipality of Cogne.

Following three winter seasons, which included numerous large rockfall events and avalanche impacts, scheduled maintenance was performed on the Cogne embankments in summer 2011.



The Pont di Laval case

Following the landslide on 5/06/2007, and after the initial operations for removal of loose material using explosives, the unstable situation made further safety and protective measures necessary. The technical department of Servizio Sistemazioni Idrauliche e Dissesti di Versante, in collaboration with Maccaferri S.p.A., prepared the design for construction of two reinforced soil rockfall embankments, the first 291 metres long with a height above ground level of approx. 11.5 m and the second 50 metres long with a height above ground level of approx. 11.5 m, to be located on the site of the Pont di Laval municipal quarry-disposal area. The construction time for the embankments was 4 months and the total cost for the works was approx. 2.6 million euros.

Fig 1. One of the rock masses that fell onto the road

Fig 2. The situation in the area, viewed from above

The July 2008 landslide on the Pont di Laval Reinforced Soil Rockfall Embankment

Fig 3. General view of the two embankments in July 2008 after the collapse of a cascade of blocks (>1000 tons)

Fig 4. Close-ups of some of the blocks which struck the embankments

Fig 5. The up-slope embankment showing accumulated rockfall and avalanche debris material, viewed before maintenance works

Fig 6. The up-slope embankment showing accumulated rockfall and avalanche debris material, viewed before maintenance works

Fig 7. Source zone high on mountain (rocks < 10m x 6m x 4m)

Fig 8. View showing maintenance works in progress (2011)

Fig 9. View of final stages of maintenance works (clearance and light repair) to the up-slope embankment.

Fig 10. Close up view showing the up-slope or impact face of the up-slope embankment following the completion of the maintenance works. The maintenance works comprised removal of the rock fall material (rocks, soil and trees transported down by avalanches) and then repairs to the face of the embankment. Repairs were of minor nature and included insertion of new soil into the deeper impact craters and then splicing in and anchoring of additional facing materials (including mesh products and biomat) to restore the impact face to the original condition.

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The Pont di Laval Reinforced Soil Rockfall Embankment Maintenance - Post Works

Fig 11. View of the both embankments showing the excellent condition of the structures following the maintenance work and the successful establishment of vegetation, even on the up-slope (shady side) ~70 degree face of the embankment.

Fig 12. Far view of the main/down-slope embankment showing the discrete vegetated front face of the 11.5m high structure.

Fig 13. View of up-slope embankment showing the undeformed condition following the completion of maintenance works.

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