

## EROSION CONTROL MEASURES ALONG C-Z ROAD, NAGALAND, INDIA

**CHAKABAMA-ZUNHEBOTO (C-Z) ROAD -CH: 00+000KM TO CH: 25+760KM, NAGALAND, INDIA**

### Slope Protection

#### Problem

The slope application area from CH: 00+000km to CH: 25+760km along Chakabama-Zunheboto section of road is on a mountain passage situated in Nagaland, India. As part of the road development works, excavations are done along the stretch and the exposed cut slope was at risk of erosion due to reasons such as heavy precipitation during the rainy season, gradient, absence of vegetation cover, drainage issues, etc. Denudation of vegetation from soil slopes or the lack of vegetative cover on cut slopes is often responsible for formation of rills and rain-cuts which eventually leads to a surficial slide that can be dangerous and pose harm to the people and infrastructure.

Hence, it is pertinent to address the need for protecting the slope in order to control the erosion by growing sustainable vegetation.

#### Solution

To protect the slope, hydraulically applied erosion control measures comprising of MacFlex HP FGM (HECP), and other agronomic amendments are applied on identified application area. Agronomic soil tests have been conducted to determine the soil nutrients inherent condition so as to recommend the suitable amendments as per requirement to improve the soil and to ensure appropriate plant species selection.

The seed species are selected based on the soil type present at site, pH, climate, type of planting, availability of local seeds and discussions with a horticulturist. The quantities of various components are finalized before mixing in a hydroseeder along with seeds and water in a two step process. The mixed slurry has been sprayed over the slope surface and maintenance has been done by spraying water on the slope to avoid drying of the material. Soon after the application of erosion control measures at site, the applied systems have started showing the performance with respect to erosion control of the embankment slope (i.e. vegetation coverage). Germination has started within some days and vegetation development is visible on the treated slope. Proper maintenance of the treated areas is mandatory to ensure the sustenance of the system.

**Client:** National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)

**Designer / Consultant:** MACCAFERRI ENVIRONMENTAL SOLUTIONS PVT. LTD.

**Contractor:** Shivalaya Construction Co. Pvt. Ltd.

#### Products used (Qty.)

- Geosynthetic Accessories 58710 sq.m (MacFlex)

**Date of construction:** 12/2021 - 05/2022



Figure 1-Slope applied with MacFlex



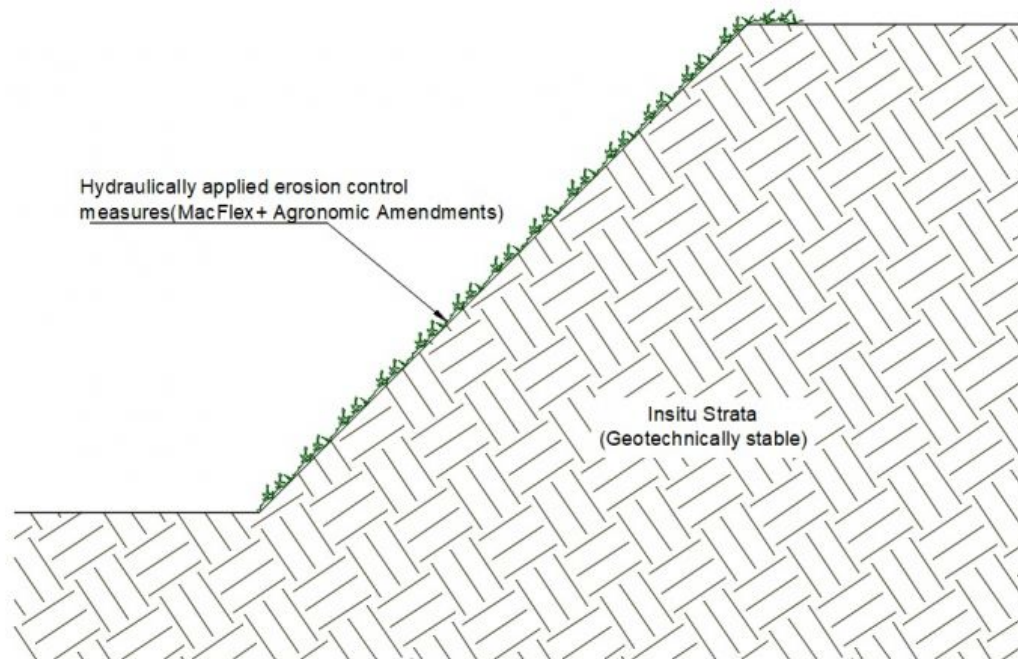
Figure 2-Slope applied with MacFlex



Figure 3-Germination observed after some days



Figure 4- Slopes after vegetation establishment



Typical Cross-section