

**DEBRIS FLOW BARRIERS FOR “DEL SOL HIGHWAY”  
KM 32+00, GUERRO, MEXICO**

**ROCKFALL PROTECTION**

**Product: DF Series Debris flow barriers**

**Problem**

Climate change and other factors seem to be increasingly contributing to unusual or more extreme natural phenomena. These phenomena are regularly exceeding the capacity of infrastructure that was designed and built to suit historically more benign climatic conditions.

Hurricanes Ingrid and Manuel strongly impacted the states of Guerrero and Oaxaca in mid-September, 2013. They caused heavy and unusual rains which generated serious damage to the infrastructure of these states. Run-off, excessive erosion and debris flow phenomena were commonplace.

Solid materials and debris such as soils, rocks and vegetation washed off vulnerable slopes and then clogged up drainage infrastructure, compounding the problems. Subsequent storms were not drained from the area as they should have been.

As the drainage channels and sewers were completely blocked, rainwater runoff full of debris began to accumulate alongside the highway, creating further damage to the road embankment and the closure of the highway.

**Solution**

Following site visits and analysis work, Maccaferri Mexico proposed an innovative solution using debris flow barriers. These barriers, were to be located in the chutes, gulleys and paths followed by the debris flow events.

In the affected area, five flexible DF Series barriers were installed with a total area of more than 400m<sup>2</sup>. These barriers were designed to resist a debris flow with pressure of up to 80 kPa.

DF Series barriers can accommodate the topography of the sites whether on open slopes or difficult terrain.

The debris flow barriers are dynamic, in that they accommodate the increasing pressure applied to them by the debris flow. The barrier serves to contain the flow, halting its advance before it can block the highway drainage systems. The debris is typically trapped on the up-stream side of the barrier, where it can be cleared out by highway authority operatives.

The components of DF Series barriers are built to reduce damage after the impact, minimizing maintenance operations.

**Client:**

CAMINOS Y PUENTES FEDERALES

**Main contractor:**

CONSTRUCCIONES Y DESARROLLO ACRE

**Designer:**

ING. ARTURO ORTEGA

**Products used:**

DEBRIS FLOW FLEXIBLE BARRIERS

**Date of construction**

FEBRUARY 2015



Situation during the emergency



Secondary effects caused by clogged highway drainage



Detail of the ringnet panel of the DF Series barrier



Installation of the support cables on either side of the chute



Installation of the ring-net



Debris flow flexible barrier installed