

Geological Risk Mitigation in Montserrat

MONISTROL DE MONTSERRAT - BARCELONA - Spain



TYPE OF PROJECT
**Dynamic Rockfall
Barriers**



YEAR OF CONSTRUCTION
2025



CLIENT
**Generalitat De
Catalunya**



PROD. RELATED
**Rockfall Barriers
(Undefined)**



CONTRACTOR
**GEOTÈCNICA
VERTICAL**



DESIGNER
**Institut Cartogràfic i
Geològic De Catalunya**

Challenge

The geological risk mitigation plan in Montserrat was developed following the rockfalls that occurred in 2007 and 2008, to improve the safety of the area through periodic actions. Among the main mitigation measures is the geological monitoring of the slopes, to identify potentially unstable blocks and anticipate rockfall events.

One of the critical areas is located at the rear of the Abat Marcet apartment building, where recurring impacts of clasts on façades and roofs have been recorded. The risk in the area is mainly due to the fracturing of the rock mass, the geometry of the discontinuities, and the lack of support for several blocks, which exhibit families of discontinuities favorable to their detachment. Due to the large extent of the source area, the complexity of the terrain, and the proximity of buildings at the foot of the slope, a combined solution with active and passive systems was designed.



View of the RB 3000 barrier and the slope



RB3000 barrier side view

Solution

In the lower area of the slope, unstable blocks were stabilized using active systems with flexible membranes made of 300x300 mm steel cable panels with a diameter of 8 mm. As for passive systems, dynamic barriers were installed on the slope to intercept falling blocks.

To protect both the street and the Montserrat Abat Marcet apartment building from rockfalls, a dynamic barrier RB3000 was installed, with an energy absorption capacity of 3000 kJ and a height of 7 meters. The barrier was dimensioned using a digital terrain model obtained from the ICGC, with a resolution of 2 meters. For the impact and trajectory analysis, two spherical-type blocks were considered, with volumes of 0.3 m³ and 4.05 m³.

The implemented solution includes 110 linear meters of dynamic barrier, distributed over two sections, following a layout at an elevation of 750 meters above sea level. Preliminary work included staking out, clearing, and cleaning before installing the systems, all of which are CE marked, certifying their quality and performance.



RB3000 barrier seen from the mountain side



Completed installation of the RB3000 barrier



Buildings protected by the barrier



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