

Project: SH73 Below Starvation Point  
Date: April 2016  
Designer: Opus International  
Contractor: Geotech Ltd  
Location: Otira Gorge, Arthur's Pass



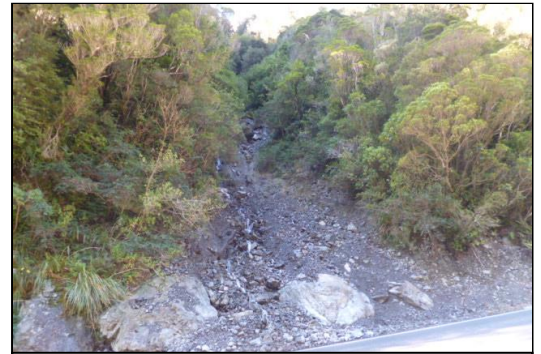
## Debris Flow Fence

State Highway 73 is a Regional State Highway forming the primary inter-regional link between Canterbury and the West Coast. SH73 provides access from Canterbury to many recreational activities used by both domestic and international visitors, including ski fields during the winter season. The route is recognised as being vital to the economic wellbeing of the West Coast, with increasing numbers of heavy vehicle movements and significant numbers of tourists travelling in campervans, buses or rental cars.

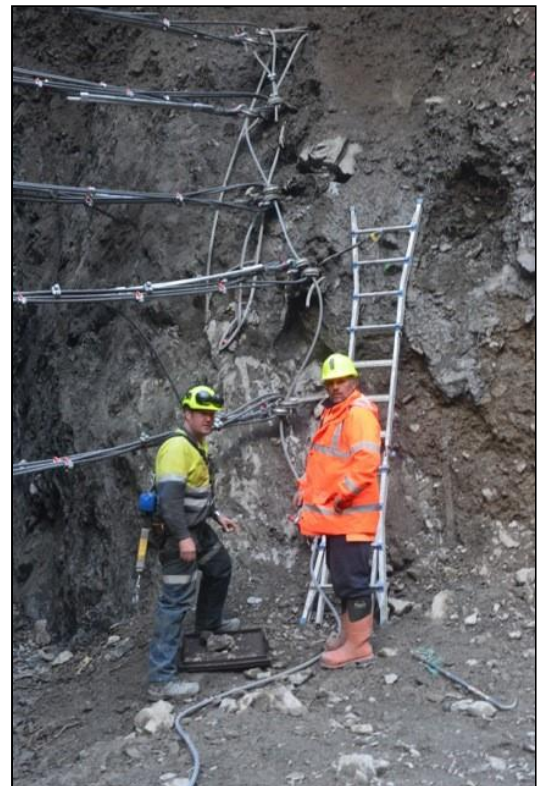
The site "Below Starvation Point" is located in the Otira Gorge on SH 73 from Route Position 151/3.67 to 3.70, approximately 8 km north of the Arthur's Pass township. The site is essentially a debris channel which produces large volume debris flows (50-100m<sup>3</sup>) during periods of high rainfall intensity. The debris could contain maximum rock sizes of between 400mm to 750mm diameter and occasionally up to 1000mm. The site scores high under the current NZTA Rockfall Hazard Rating system due to the height of the site, absence of an effective catch ditch and the volume and frequency of rockfall events that occur. This led to the client to issue a contract to install a debris flow fence to address the problem.

Geofabrics technical staff with technical advice from the manufacturer, Maccaferri submitted a technical proposal for a channel type (without posts) **debris flow fence** to meet the engineer's requirement. Some of the essential requirement among others is that the fence is able to capture up to 300m<sup>3</sup> of debris accumulated from consecutive rockfall events.

The solution considered both dynamic and static components of the imposed pressure by the impacting mass; these component loads are then distributed into the ring net panel which are in turn transmitted through the longitudinal cables into the energy dissipaters and lateral anchors. Double spiral rope anchors of 22mm diameter (ICAF 44) and up to 10.0m length were required to be drilled and installed.



Site before installation with dry weather flow



Installation of longitudinal cables (Photo courtesy of Geotech Ltd)



The specification of the barrier components used was tailored to offer maximum strength and durability whilst remaining easy to handle and practical to install. The primary interception mesh adopted (high strength ring nets); and the patented aluminium energy dissipaters adopted for this project are the same components used in the 5000kJ dynamic **Maccaferri impact protection fences**.



Debris Flow Fence near completion (Photo courtesy of Geotech Ltd)

## Debris Flow Fences

There are several different types of Debris Flow fences offered by Maccaferri. They can be broadly categorised by the **channel type** or the **open slope type**. Depending on the site topography, these fences are often custom made to suit the design and site conditions. Among others, the essential information to enable a preliminary assessment of a debris flow fence design includes:

- Density of mass
- Constant height of debris
- Impact velocity
- Up slope gradient

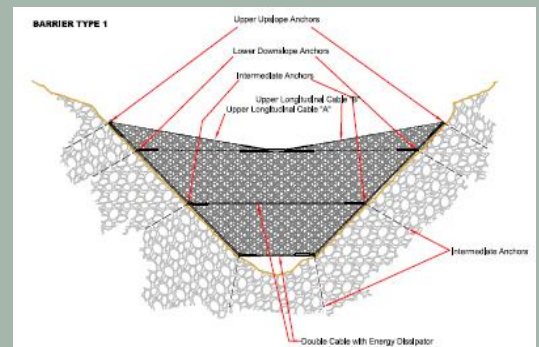


Figure 1: Channel Type Fence (without posts and upslope bracing cables)

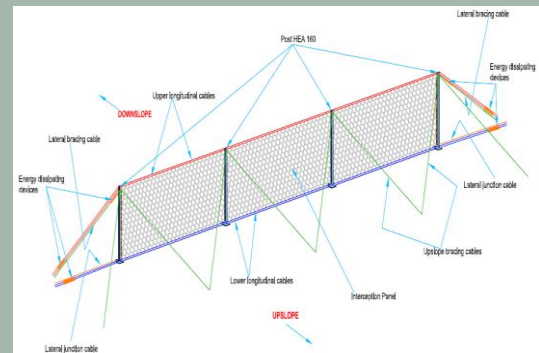


Figure 2: Open Slope Type Fence (With posts and upslope bracing cables derived from standard rockfall barrier)

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