CASE STUDY

Rockfall Protection

Project: Transmission Tower Protection
Date: April 2016
Designer: GHD Ltd
Contractor: Solutions 2 Access Ltd
Location: Heathcote Valley, Christchurch

GEOFABRICS®

RB1500Plus (MEL > 1500kJ) Catch Fence

Pylon CY288, located in the Heathcote Valley above 92 Bridle Path Road was hit by boulders during the September 2010 earthquake in Christchurch. This pylon forms part of the main power-line route over the Port Hills providing electricity into Sumner area. It was therefore essential for the pylon to be protected from any future rockfall events to maintain continuity of supply.

The pylon is situated on sloping terrain approximately 75m above sea level. Outcrops of volcanic rocks from the Lyttelton Volcanic Group are located approximately 180m upslope of the pylon. Following on from the earthquake, the client engaged GHD to conduct a rockfall risk assessment to identify rock source zones upslope. Several risk mitigating strategies were considered by GHD including:

- Treatment at source
  - Deconstruction or scaling
  - Rock bolting
  - Reinforced concrete buttress
  - Rockfall mesh pinned drapery or simple drapery
- Protection Structure
  - Green Terramesh Rockfall Embankment
  - Rockfall catch fence

The recommended solution was one that combined two of the above strategies to arrive at an effective outcome. Some higher risk larger rock outcrops were removed through a scaling process; this minimises the risk considerably. However, it was not possible to remove all the boulders within the source area. The residual risk was then managed by installing a protection structure to intercept any potential falling rocks at the impact point near the pylon. The removal of the higher risk boulders has the effect of requiring a lower energy capacity fence having a shorter length.

Tubular Clutch for pipe micropile foundation (Not included in the kit set)

Base plate for the post

Front elevation view of fence

Geofabrics provided guidance to the engineer on the protection structure based on the design energy level and predicted rock trajectory. A **catch fence** with a maximum energy level of 1500kJ was identified as the most appropriate protection structure for this particular project. Typically, a rockfall simulation trajectory analysis will be performed by the engineer to determine the bounce height and estimated kinetic energy. Geofabrics supply the full range of **Maccaferri ETAG027 energy certified rockfall fences** starting from 100kJ up to 8,500kJ. The intercepting component (panels, posts, base plates, upper and lower ropes, energy dissipaters, up-slope and lateral ropes) used in the **rockfall fence** are fully tested against impact under the stringent ETAG 027 test procedure. The performance of the fence along with the measurements used to calculate the maximum energy rating are recorded after which a certificate is issued stating their energy level among others.

The up slope and lateral rope anchors are normally included as part of the 'kit set' in the fence. However, foundation elements are not an ETAG 027 requirement being site specific and their design (anchor type and length) can be adjusted if necessary to accommodate the soil conditions in the engineer's design. Loading requirements are provided to the engineer for the anchor design.

The total fence length was 30m with post spacing at 10m and post heights of 4.0m as shown in the image below of the completed structure.

Energy Dissipater

During an impact, the system ensures that the energy of the falling rock is dissipated evenly.

Energy dissipaters fitted to the ropes help absorb impact shock loads. These Patented energy dissipaters work by absorbing the applied energy by crushing deformation and not by friction, thereby guaranteeing a better and longer lasting performance. These modular elements are factory made, reducing the risk of installation error.