

Soil Reinforcement

Syntex[®] (GHS 70/70) High Strength Geotextile - highway repair Takaka Hill, Nelson

Client: Transit NZ

Due to the heavy rainfall and blockage of the culvert, a whole area was washed out which caused a slope failure along a 50 meter section of SH 60 on the Takaka Hill west of Nelson. Water caused the slope that supported the state highway to give way and become hazardous to road users.

Attempts to stabilise the slope and roadway using a combination of backfill, gabions and rock facing across the steepest and narrowest 20 m section of the washout were unsuccessful.



After thorough discussion with the Contractors, Syntex GHS 35/35 (35 kN x 35 kN) and GHS 70/70 (70 kN x 70 kN) High Strength Woven Geotextiles were approved for use in the construction of the Mechanical Stabilised Earth (MSE) wall.

Syntex High Strength Woven Geotextiles are designed for soil reinforcement. The heavy individual yarns are woven into a unique twill pattern forming a durable geotextile with superior hydraulic characteristics. These properties are considered ideal for the reinforcement of soft soils, steepened slopes, retaining walls, lagoon closures and lining support systems.

Syntex HS is manufactured in an ISO 9001 facility which maintains highest quality with its product tested by a GRI (Geosynthetics Research Institute) laboratory.

The area was first graded and smoothed, removing any rocks and debris. Two layers of AP 65 aggregate was placed using Syntex GHS 70/70 geotextiles to a depth of 150 mm. Then the first layer of Syntex GHS 35/35 geotextile was placed.

Once backfill was placed to the height required by the design (600 mm), Syntex 2x2 was laid over the compacted Onekaka Schist Sandy soil. The sequence was repeated until the wall reached its total height of 6 m.

Hydroseeding the wrapped face of the wall was suggested and a row of Poplar Poles was placed at the base to give additional protection from the UV exposure to the wrap around geotextile face.

The combination of the geotextile reinforcement and the hydroseeding of the face permanently repaired the slope, making SH 60 safe again. This project not only demonstrated equivalent performance to other solutions but was done at a much lower cost.

Philip Drummond, project Engineer, Excell Corporation Ltd, was pleased with the solution offered by Permathene Ltd.

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**(GHS 70/70) Boat Ramp
Beachlands, New Zealand**

Client: Manukau City Council

The site for Beachland boat ramp was a low lying sandy area on the seacoast as part of the Sunkist Bay Reserve. The site subgrade was very weak with CBR values of less than one. There was a recent slope failure and because of the weak subgrade, low tyre pressure vehicles were used to clear the site.

An access road was required to be built and it was determined by a Permathene engineer that geosynthetic reinforcement would be needed to prevent sand waving and subgrade failure. The geosynthetic would need to resist separation during fill placement and have a high strength at low strain to prevent excessive subgrade deformation.



The contractor selected Syntex GHS 70/70 (70 kN x 70 kN) Woven High Strength Geotextiles based upon its excellent performance on similar projects.

Placement of the geotextile was made after the area was cleared and was placed directly over the sandy soil. 50 mm of GAP 40 fill was then placed over the geotextile and overlaid with 350 mm of GAP 100 using an 8 tonne digger. The result is that the site subgrade was successfully stabilised which allowed the movement of 22 Tonne trucks on this access road to do slip repair work.

Where soft subgrades are encountered, high performance geotextiles have proven to be a cost effective and technically appropriate construction method. The contractor, Roger Earthmoving Ltd was very satisfied with the results. The excess road was 4 m wide and 140 m long and was ready in a day to carry out the slip repair on site.

Sand Filter

Syntex® (GHS 35/35) Water supply project Apia, Samoa

Client: Samoa Water Authority

Samoa Water Authority (SWA) operates three treatment plants with slow sand filters as the final treatment step. These filters have been operational for about 10 years, but maintenance has been carried out at a rather poor standard leading to silting up of the sand and gravel layers at the bottom of the filters.

The pre-treatment units, sedimentation and up stream roughing filters of the treatment plants have already been improved in their performance through higher frequencies in sludge withdrawal and back washing procedures, but the sand filter performance was yet to achieve design performance.



For rehabilitation of the filters, it was suggested by engineers to remove sand and wash it and prevent further infiltration of fine silt material into the lower gravel layers. To achieve this, Syntex GHS 35/35 high strength woven geotextile was recommended to be placed on top of the gravel layer because of its high strength and superior hydraulic properties.

Syntex yarns are woven in a unique twill pattern to form a strong geotextile with excellent filtration properties. The geotextile is resistant to ultraviolet degradation and to biological and chemical environments normally found in soils.

Syntex GHS is manufactured in an ISO 9001 facility and tested by a GRI (Geosynthetics Research Institute) laboratory. In total, five Syntex sand filters of 28 meter diameter each were fabricated by Permathene Ltd in Auckland and installed at Alaoa treatment plant in Apia to prevent sand particles of < 0.15 mm infiltrating into the bottom gravel layer of the water treatment plant.

The filters are working as designed and has improved the filter performance considerably, but the real effect of this measure can only be seen on long term by the reduction of clogging of the bottom gravel layer.