CASE HISTORY
Ref: UK / CH / RWSR — Rev:02, March 17

A93 CRAIGHALL GORGE
A93 PERTH TO BRAEMAR ROAD, PERTH & KINROSS

SOIL REINFORCEMENT
Product: Gabion Terramesh

Problem

On the southern fringes of Scotland’s Cairngorms, the A93 Perth to Braemar road runs through the twisting and steeply wooded Craighall Gorge, a mile or so north of Blairgowrie.

The need to carry out improvement works to the section of the A93 between Craighall Bridge and Middle Mause Farm was first identified in 1985 when a Bailey type bridge was used to replace a collapsed section of the existing retaining wall. Although installed as a temporary structure, this still carried over 3000 vehicle movements per day, to and from the Highlands.

Recently, engineering assessments of the area concluded that the slopes were not sufficiently stable to support new carriageway construction and the site was also too restricted to accommodate the works whilst keeping the existing road open to traffic. The Environment Services of Perth and Kinross therefore proposed that a completely new road be built to by-pass the bridge and on their instruction, Consulting Engineers Mouchel of Dundee, designed a 2.4km long single carriageway road running to the east of the gorge and broadly parallel to the existing route but at a higher level.

At the southern end of the works where the low-level old and higher level new carriageways join up, Mouchel conceived a 130m long reinforced earth wall which would create a smooth transition from old to new.

Solution

Maccaferri submitted a design comprising a hybrid reinforced earth geogrid wrap-around structure, in conjunction with a hard, stone-faced Gabion Terramesh wall, 2.5 – 7.0m high. Maccaferri Paragrid 80/15 uniaxial geogrid was chosen as the principal reinforcing element, sandwiched at 500mm and 1000mm vertical increments between layers of primarily site won, Class 6I compacted back fill. The Gabion Terramesh system creates a rigid outer face and provides additional mass gravity reinforcement to the structure.

Gabion Terramesh and Paragrid uniaxial Geogrid reinforcement have BBA Roads and Bridges Certification. The structure therefore satisfies the Scottish Executive requirement of a 120 year design life.

Client:
PERTH & KINROSS ENVIRONMENT SERVICES

Main contractor:
I & H BROWN, PERTH

Specialist sub-contractor:
JML CONTRACTS LTD, AUCHTERADER

Specialist element Designer:
MACCAFERRI LTD

Products used:
GABION TERRAMESH®

Date of construction
Summer 2008
Explaining the challenges involved in the design of the wall, Maccaferri Area Engineer Dr David Cheer said, "One of the main issues was that the existing road had to stay open throughout the construction process. Where the roads join, the footprint of old and new roads were very close together but with a big difference in vertical alignment in places. To get around the problem we were asked to design a steep wall with a face angle of 80° which also allowed the traffic to continue using single lane working".

Constructed by JML Contractors of Auchterarder, the work involved 3000 cu m of excavation behind a 150m length of the eastern gorge embankment to accommodate the geogrid reinforcement, up to 7m long in places.

Gabion Terramesh Units differ from conventional gabions in that they have a 4m or 6m long double twist PVC coated and galvanised steel wire tail, integral to the construction of the unit, extending from their bases. This tail allows them to be used as unitary components to form a gabion-faced reinforced soil structure. Having an integral geogrid tail as part of the system, removes any need for forming a connection between separate reinforcement and fascia elements on the jobsite. This simplifies and speeds up construction as well as providing a guaranteed connection strength offering reassurance for all parties.

Subsequently, pre-determined lengths of Maccaferri’s Paragrid uniaxial geogrid were placed between layers of compacted backfill. The geogrid was wrapped up the back face of the gabions and over the backfill to form a “wrapped face” structure. A 0.5 m thick layer of Class 6H, granular fill was placed behind the gabion wall face to assist drainage.

The single carriageway road construction was then undertaken by I & H Brown. Some 2000cu.m of site won material and 2000 cu.m of recycled concrete were placed and compacted followed by a conventional, hot rolled, multi layer, bound pavement with verge drainage.