

The Equipment & Techniques Committee

Eco anchor long term test report 13th October 2012

Location

Yordas Gorge NGR: SD705792. The block of limestone is in an area that has vegetation growing in close proximity, the whole area is very damp and subject to periodic flooding. In winter the anchors will be under ice and therefore subjected to cycles of freeze and thaw. The anchors were installed so that a test rig could be suspended beneath a tree and pulled into place by a transverse tensioned rope. This would also allow for the rig to remain suspended while the anchor was being extracted from the substrate.

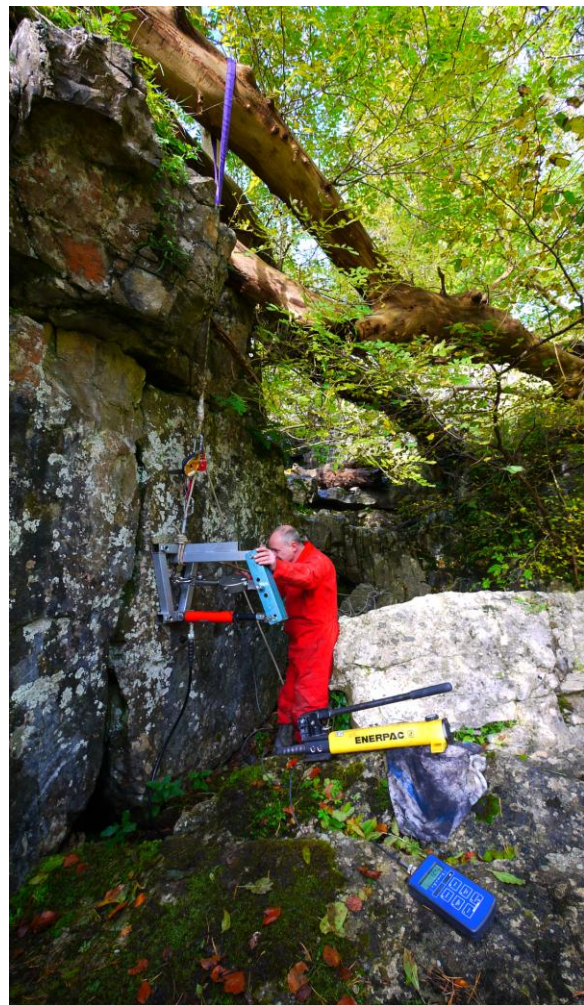


Introduction

This test report is for the Eco anchors that were installed as part of the long term testing for the possibility of degradation of the Resifix 3+ chemical anchor mortar due to the effects of freeze and thaw cycles.

Method

In March 1998 eight Eco anchors were installed horizontally into a block of mass limestone using Resifix 3+ chemical anchor mortar batch reference M277. The correct method of installation as defined in the document Permanent Resin Bonded Anchor Installation Guidelines 01.01.1998 was used. The placements were chosen at random as would be the case when installing anchors underground.



Test results

TB101

Peak load 24kN, required continuous 22kN for extraction. Cone fracture of the substrate.

TB102

Peak load 27kN, required continuous 20kN for extraction some ejection of resin during extraction.

After cleaning, this hole was inspected there no substrate abnormalities visible.

TB103

Peak load 24kN, required continuous 20kN for extraction.

After cleaning this hole was inspected and a small fissure radiating around the hole at about 50mm depth was visible.

TB104

Peak load 27kN, required continuous 20kN for extraction.

After cleaning, this hole was inspected there no substrate abnormalities visible.

TB105

Peak load 25kN, required continuous 20kN for extraction.

After cleaning this hole was inspected and a small fissure radiating around the hole at about 75mm depth was visible. There was also a very small horizontal surface fissure that was on the left hand side of the hole and entered the hole for about 20mm.

TB106

Peak load 29kN, required continuous 22kN for extraction.

After cleaning, this hole was inspected there no substrate abnormalities visible.

TB107

Peak load 22kN, required continuous 20kN for extraction.

After cleaning, this hole was inspected there no substrate abnormalities visible.

TB108

Peak load 26kN, required continuous 22kN for extraction.

Additional information

All the anchors had signs of light surface rust staining along the shafts of the anchors. Anchor placement TB105 was proud of the substrate by about 2mm; this protrusion affected both the resin plug and the anchor. As there were no



obvious signs that the anchor had been interfered with it may be that water ingress had occurred at some point in time and with freezing the placement moved outwards. The anchor does exhibit a discolouration the full length of its shaft. After extraction the holes was re-drilled, washed, brushed and dried. The hole was inspected using an inspection probe and the following observations were made; a small fissure radiating around the hole at about 75mm depth was visible. There was also a very small horizontal surface fissure that was on the left hand side of the hole and entered the hole for about 20mm. It may be possible that the fissure at 75mm depth may have allowed the ingress of moisture during the placement period of 14 years.

Conclusions

The Yordas long term anchor test bed has provided some vital information especially for anchors that are placed in wet location on the surface where they are exposed to the effects of weathering. The anchors in Yordas stream bed at NGR SD704792 will be tested when water levels are lower as they were too high on this test date.

Eco anchor Gorge test bed from left to right

TB101

TB102

TB103

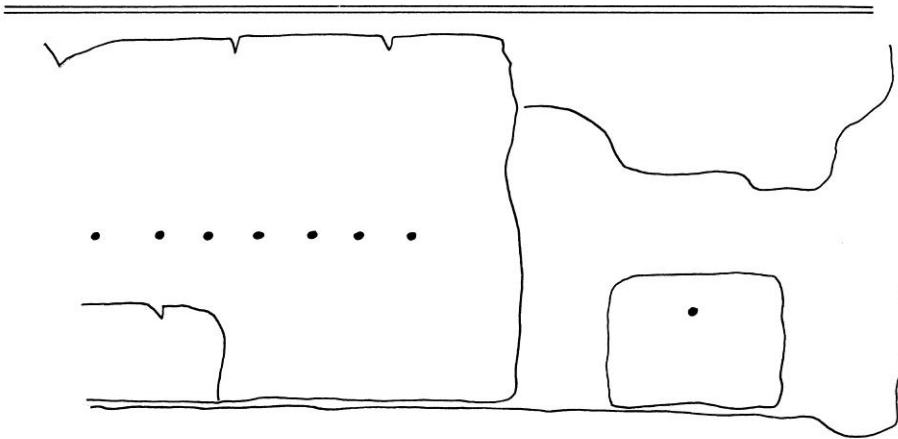
TB104

TB105

TB106

TB107

TB108



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