

A40 CARMARTHEN EASTERN BY-PASS

SOUTH WALES, UK

BASAL PLATFORMS

Product: ParaLink

Problem

- Contractor Design and Build structure.
- Maximum height of embankment 7.0m.
- To provide a Geogrid reinforced Piled Platform for the A40 Carmarthen Eastern By-Pass.
- The embankment loads are to be transferred to settlement reducing piles by a flexible geosynthetic basal reinforced platform.
- The Design Life of the structure is 120 years.

Solution

The busy A40 was being redeveloped to bypass the historic town of Carmarthen in West Wales.

Where the new road had to bridge an existing highway, embankments were required to elevate the road from existing ground to bridge deck level.

The surcharge applied by these two high embankments was too great for the existing ground conditions. A piled embankment was selected with loads being transferred from the embankment into a grid of piles. Using high strength geogrids, a basal reinforced platform can be created. The grids reinforce the embankment, transferring the loads into the piles, by spanning between them. This reduces the number of expensive piles required, saving construction time and money.

BS8006 : 'Reinforced soils and other fills' details high strength grids being placed over the entire embankment area, which can be expensive.

The structure required a 120 year design life and the geosynthetic reinforcement had to be BBA certified.

BS8006 Section 8 details the method of design for geosynthetic reinforcement over piles, forming a basal reinforced platform (BRP). This method details equations by Marston for positive projection subsurface conduits.



Preparation of pile caps



ParaLink strip

Client:

THE WELSH OFFICE

Main contractor:

ALFRED McALPINE CONSTRUCTION

Designer:

MACCAFERRI LTD

Products used:

PARALINK STRIP SYSTEM 

Date of construction

September 1998



During construction

The journal 'Ground Engineering' issued in November 1997 presented a paper by Dr D Russell and Dr N Pierpoint of Mott MacDonald, Foundation and Geotechnics Division, which demonstrated, by the use of the FLAC3D software program, that BS8006 produces inconsistent results compared to classical arching theories. As a result of this work and further studies by Mott Macdonald on behalf of Maccaferri Ltd have developed a modified design procedure.

Using a square or rectangular grid it is apparent that the main tensile resistance for a piled BRP is required directly between the piles. Due to the process of soil arching very little tensile resistance is required in the centre of the grid of piles. Therefore a 'strip' solution was adopted, providing a strong reinforcement in strips directly between the piles and a lower strength woven geotextile is detailed over the entire area to provide the lower tensile forces between the strips.

The optimum solution:

Transverse Direction	ParaLink 1250S
1250 kN/m geogrid	(600mm wide strip)
Longitudinal Direction	ParaLink 150S
150 kN/m geogrid	(630mm wide strip)
Total Area	Terram W/3-3 woven polypropylene geotextile

The solution was rapid to install as the 'strip' rolls of ParaLink are easily manhandled into position. As ParaLink has a tough 'shell' protecting these polyester high strength yarns. The grid can be placed in direct contact with the pile caps without fear of damage - unlike unprotected woven high strength polyester geotextiles.

Once the ParaLink strips were placed, the 30 W Polypropylene woven geotextile was placed over the entire area, and the embankment construction completed.



During construction



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