MACCAFERRI

CASE HISTORY

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PUKEKOHE MEGACENTRE

PUKEKOHE

PAVEMENT REINFORCEMENT

Product: Tensar SS geogrid, Bidim geotextiles

Problem

An asphalt-surfaced carpark and truck access lane was required to be constructed over swamp land. This area contained tree root vegetation in saturated peat. Scala penetrometer-inferred CBR at this 2 hectare site was generally less than 1, i.e. very soft. A basis for design of a pavement was needed. It was decided by the contractor to infer subgrade CBR from deflection testing.

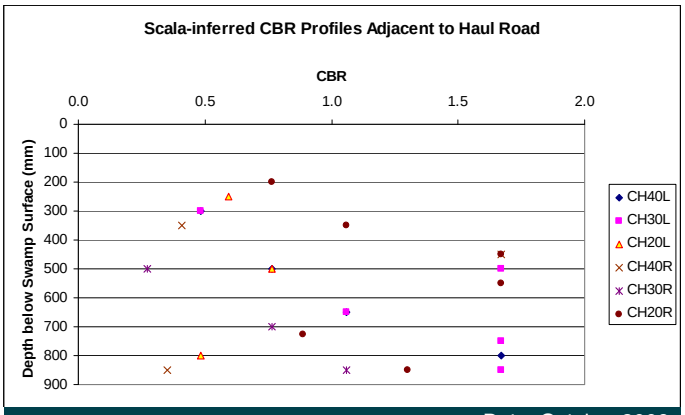
Solution

Maccaferri was contacted by the contractor in August for a solution to the construction of a pavement over weak soils. A design CBR of 2% was considered at this preliminary stage and three road types having different design ESA's were analysed. The original design considered a deep excavation and replacement with Woodhill sand. Using the Tensar software Maccaferri was able to demonstrate that the incorporation of Tensar geogrid within the pavement structure would be an economical alternative to the original design for the contractor to pursue further.

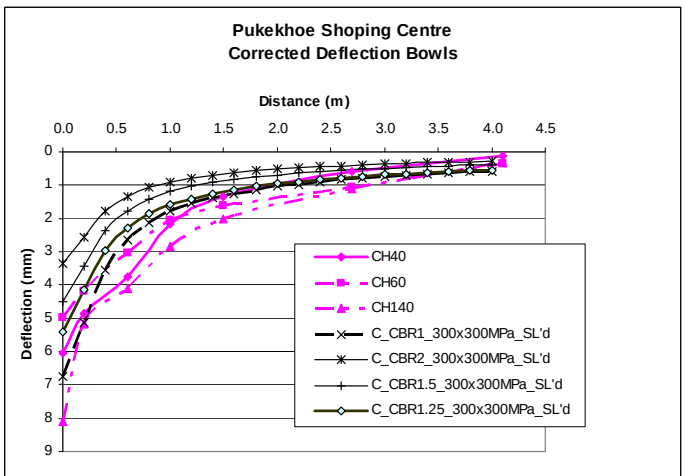
The subsequent approach taken by the contractor for this site having a highly variability in foundation conditions was to measure deflections from a previously constructed Tensar reinforced haul road on the site, of known depth of structure. The results were then compared with theoretical deflections, using the known depth of structure.

The back-analysis inferred a design subgrade CBR of 1 and less, and this was used for forward analysis and design of pavements. Deflection profiles as successive pavement layers were constructed were compared with targets derived from analysis (CIRCLY).

Soft Subgrade Date: August 2006



Subgrade Strengths Date: October 2006



Deflection bowls Date: October 2006

Client name:
DOWNER EDI
Main contractor name:
DOWNER EDI
Consultant:
MSC CONSULTING GROUP
Product used:
TENSAR SS30, BIDIM A19
Construction date:
DECEMBER 2006 TO MAY 2007

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A performance-basis for design was developed by the Contractor. Theoretical targets of deflection were established for the site and from the table below, were bettered during construction (with 10% probability of non-compliance) in the service lane at SG improvement and subbase level.

Although there was non-compliance in some lower layers at 90% level of confidence, all layers passed at 50% level (average values). Importantly, the top layer passed at better than the 90% level.

Construction

The use of Bidim geotextiles and Tensar biaxial geogrid provided a number of benefits. Firstly they allowed for the construction of a haul road over very weak peat for heavy construction equipment. Secondly the separation function of the geotextile ensured that the design depth could be maintained during the fill placement and compaction preventing loss of expensive imported fill into the soft subgrade. Thirdly the use of a mechanical stabilisation system incorporating Tensar biaxial geogrids maximised construction time as this is less weather dependent than chemical stabilisation or deep excavation methods. Lastly the performance of Tensar biaxial geogrid which have been extensively tested overseas was verified through locally accepted test methods.

By monitoring pavement construction layer by layer a high level of quality control was achieved by the contractor. This straight forward measurable approach was also easily understood by the field crews.

Acknowledgement

Maccaferri wishes to acknowledge David Hutchison of Downer EDI in the preparation of this Case Study.

Location	Target Max Def(mm)	Achieved Average	Achieved 10% Exceedance
Top of SG Imp Layer			
Service Lane	3.5	1.3	1.75
Type 2 area	4.3	3.3	4.9
Car park	4.3	4.36	5.52
Top of Subbase			
Service Lane	2.7	0.91	1.41
Type 2 area	3.2	2.61	3.62
Car park	N/A	N/A	N/A
Top of Basecourse			
Service Lane	2.2	0.9	1.13
Type 2 area	2.6	0.91	2.16
Car park	3	1.4	1.97

Table of results Date: October 2006

Site excavation Date: December 2006

Bidim and Tensar placement Date: January 2007

Surface compaction Date: May 2007

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