

## Stabilisation cuts 25% off time and costs for container facility



*The new container handling facility withstands extremely heavy loads*

### Introduction

An old rail yard at Elderslie in Renfrewshire has been redeveloped for W H Malcolm Logistic Services to provide a state-of-the-art container facility. The company provides supply chain and distribution services to a wide range of industries. The container facility had to be capable of withstanding massive loads from containers stacked three or four high and the 112 tonne loads that could be applied through the front axles of the reach stackers used to move the containers.

### Design

The original design called for a 600 mm capping layer plus a 150 mm layer of stone and a 400 mm concrete slab. This would have required around 12,000 m<sup>3</sup> of site material to be shipped offsite and around 23,000 m<sup>3</sup> of replacement material brought in. The site also contained non-hazardous contaminated materials resulting from its use as a rail yard. These would have required analysis and classification before they could be sent offsite. The design also needed to allow for potential long-term settlement which could have had a major detrimental effect on the long-term performance of the concrete slab.

Britpave member, CON-FORM, worked with the client's designers to develop a solution that enabled the site materials to be incorporated into the design, with a focus on sustainability, affordability and practicality.

Key elements of the alternative design included the stockpiling and re-engineering of the site-won materials so that they could be incorporated as a hydraulically bound material (HBM) into the main structural layers of the alternative pavement design. Rolling Dynamic Compaction (RDC) was also utilised across the site to minimize any potential differential settlement.

### Construction

The use of RDC achieved up to 150 mm of settlement, averaging 75 mm across the site. The site was then profiled and the base material stabilised in-situ to a depth of 300 mm using a cement/fly ash blend of 75 kg/m<sup>3</sup> to achieve a CBR of >50%. A cement/fly ash blend was used as a binder instead of cement alone as it provided a more sustainable solution by making beneficial use of a by-product generated in the creation of electricity by coal-fired power stations.



Site-won material from the cut operation was then mixed with 200 kg/m<sup>3</sup> of CEM1 to produce a CBM3 layer. This was placed in 200 mm layers to form a 600 mm layer across the site. This was overlaid with 30 mm of sand and 80 mm thick block paving. In total, only 110 mm of material was imported (for the sand and block paving), versus the 1150 mm as detailed in the original design.

Compliance testing carried out on the project included Nuclear Density Meter (NDM), Californian Bearing Ratios (CBR), settlement displacement plus cube tests to confirm the strength of the CBM3 layer.



**Rolling dynamic compaction of base layer**



**Blading out site-won material before in-situ stabilisation**

## Benefits

The local community benefited from:

- The reuse of the existing site materials minimised the impact on the locality due to a saving of 4,000 lorry movements over a 12 week period.
- A shortening of the contract time by 25%.

The project benefited from:

- Avoidance of soil classification analysis. The mixed nature of the site materials meant that detailed analysis would have been required to establish soil classifications before shipping the materials to landfill.
- Although the materials were not classified as hazardous, any contaminants were effectively locked up in the modification process as they were incorporated into the cement bound layers.
- The client saved around £250,000 and four weeks, amounting to a reduction of 25% in both cases.

## Project details

<b>Client:</b>	W H Malcolm Group
<b>Project duration:</b>	Total 3 months in 2 phases. Stabilisation works 10 weeks
<b>Main contractor:</b>	CON-FORM Contracting
<b>Soil stabilisation contractor:</b>	CON-FORM Contracting
<b>Area stabilised:</b>	21,500 m <sup>2</sup>
<b>Soil type:</b>	Made ground comprised primarily of an ash-based material
<b>Blend:</b>	75 kg/m <sup>3</sup> cement/fly ash blend; 200 kg/m <sup>3</sup> CEM1
<b>Specialist plant:</b>	Integrated soil stabilisation units, CBM batch plant, laser controlled trimmer and rolling dynamic compaction roller

## The benefits of stabilisation

### LOWER COSTS

- Significant savings compared with conventional treatments
- Less expenditure on imported materials
- Reduced disposal costs

### ECO-FRIENDLY

- Recycling existing soils conserves natural resources
- Fewer lorry movements save fuel and reduce emissions and impact on the local community
- Reuse of on-site soils reduces disposal to landfill

### REDUCED CONTRACT TIME

- Significantly quicker than other site preparation operations
- Stabilisation brings your project back on schedule

For more information visit

[www.soilstabilisation.org.uk](http://www.soilstabilisation.org.uk)



The British In-situ Concrete Paving Association

Ref: DS/SS/006

Published 2008

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Britpave acknowledges financial support from The Concrete Centre in the production of this publication.

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