

Stabilisation of sulfate clay soil speeds up new bypass



The A6 north of Bedford built on engineered capping material

Introduction

Work began in 2002 to construct a 4.5 km stretch of dual carriageway on the A6 running north of Bedford to bypass the village of Clapham. The Edmund Nuttall/Norwest Holst joint venture appointed Britpave member O'Keefe Soil Remediation to produce an engineered capping material, CBR 15%, from the existing clay. The treated area extended for 4 km and was up to 14 m wide, with a depth of 250 mm.

Design

The clay soil contained high concentrations of sulfur and sulfates and there was clear risk of 'heave' due to the formation of ettringite. Comprehensive laboratory testing was carried out and the final design mix used lime and ground granulated blastfurnace slag (ggbs). As well as minimizing any expansion due to sulfates, the ggbs also gave a slower rate of strength development, which increased the ease and speed of construction.

Construction

Due to the chemical reactions that take place within the soil following the addition of lime and ggbs a strict procedure for the timing of powder injection into the ground

had to be followed. This called for close supervision and co-ordination as a number of different work faces were 'open' along the whole length of the carriageway at any one time.

O'Keefe stabilised the road using one of their own powder 'integrated' versions of the WR2500 Wirtgen recycling machine. This had the major advantage over traditional stabilising plant of storing the powder within an on-board hopper. The powder was released and spread using computer control just below the machine seconds before being mixed in by the rotating drum. As the stabilising process was carried out entirely beneath the Wirtgen, surrounded by rubber skirts, the amount of dust pollution was kept to an absolute minimum – a crucial factor within the environmental management plan.

All works on the project were carried out strictly in accordance with the Highways Agency Specification for Highway Works. Compliance testing included:

- Rate of spread of powder
- Degree of pulverisation of the finished material
- Depth of rotavation
- Moisture Condition Values (MCV)
- Californian Bearing Ratios (CBR)



Following the addition of the ggbs powder, O'Keefe graded the stabilised material using its own GRT 2000 robotic total station and MS 2000 software. A three-dimensional ground map of the carriageway was created from design levels using the software. This information was then fed back via the robotic total station receivers attached to the 'dozer. A further computer within the 'dozer linked to the machine's blade received the levelling formation and the blade was adjusted automatically for height, pitch and cross fall angle.

This equipment allowed work to be completed within a tight timescale as well as providing a quality product, with tolerances of ± 10 mm being achieved along the stabilised capping layer.



Work in progress on the A6

Benefits

The local community benefited from:

- The immediate incorporation of the powder within an enclosed area below the Wirtgen as there was no disruption caused by wind borne powder.
- The reuse of the existing clay soil minimised the impact on the locality due to a major reduction in lorry movements.
- A shortening of the contract time.
- The quarrying of local stone was minimized.

Project details

Client:	Edmund Nuttall/Norwest Holst Joint Venture
Project duration:	Stabilisation 5 weeks
Main contractor:	Edmund Nuttall/Norwest Holst
Soil stabilisation contractor:	O'Keefe Soil Remediation Ltd
Area stabilised:	54,000 m ²
Soil type:	Clay with sulfur and sulfates
Blend:	2% lime, 2% ggbs
CBR achieved:	15%
Specialist plant:	Wirtgen WR2500K integrated soil mixer 17 tonne vibrating roller Static 52 tonne powder silo Mobile 4 x 4 16 tonne powder silo D5N grading 'dozer with 3D control grading system

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



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