

## Waterfront City, Melbourne – Lime Cement Soil Mixing to improve very soft Coode Island Silt



**Dry Lime Cement Mixing (LCM) minimised long term creep settlement of the Coode Island Silt subject to increased loads.**

**AUSTRALIA  
NEW ZEALAND  
PACIFIC ISLANDS  
INDONESIA**

Enquiries to:  
PO Box 7974  
Baulkham Hills NSW 1755  
  
Level 1, 4 Burbank Place  
Baulkham Hills NSW 2153  
Australia  
t: (02) 8866 1155  
f: (02) 8866 1151  
e: info@kellerge.com.au



### Project

In a recent development on the Melbourne Waterfront, in which the structures were founded on piles driven to 30m depth, the internal roads were stabilised by treating the underlying soft Coode Island Silts with dry Lime Cement Mixing. (LCM) The treatment catered for the traffic loads as well as loads from fills and pavement layers. Keller proposed deep LCM mixing as an alternative solution to piling and suspended slabs, thereby providing logistical, programming and financial advantages.

### Soil Conditions

The soil conditions onsite comprised of 2m of granular fill overlying 10m to 13m of Coode Island Silt (CIS), a very soft silty clay soil found over most of Melbourne's docklands, and which settles by 10mm to 20mm per year under its own weight.

### Solution

Working closely with the principle contractor Keller proposed a design and construct solution using LCM to form stiffened soil to strengthen and stiffen the soft clayey silts. 500mm diameter LCM columns were installed to depths of between 5m and 15m on a regular grid spacing. The design of the system was based on established soil improvement principles where the increase in soil strength is controlled both by the strength of the insitu material and the mixed columns which interact to form a composite soil mass.

### Construction

Following laboratory trials with various binder types and dosages, site verification columns were installed to confirm that the design parameters could be achieved. Two LCM mixing units were used on the project and over 30,000 metres of column were installed.

### Advantages

In addition to program and cost advantages, the LCM system negated the need for the construction of suspended slabs for the roads and enabled standard construction procedures to be followed in the placing and construction of both roads and services. Construction traffic was readily accommodated and the finishing of the road pavements was carried out at the end of the project obviating the risk of damage to finished works.

**Principle Contractor:  
Hansen Yuncken Pty Ltd**

**Client:  
ING Real Estate**

**Specialist Geotechnical  
Constructor:  
Keller Ground Engineering Pty Ltd**