



Drilling soil nails into the rock beneath the warehouse avoids the need for a retaining wall between the buildings



A mini pile installation technique was found to be the quickest and cheapest solution for both the soil nailing and piling

PILING AND FOUNDATIONS

— Designed by Jim Martin

NAILING THE SOLUTION

Novel soil nailing is helping to provide valuable extra space on a city centre development site. David Hayward reports from Birmingham.

Every square metre of extra building space, squeezed out of tight, expensive, city centre development sites, is an increasingly valuable bonus. And with government policy encouraging developers to explore more inner city brownfield sites, often sporting a history of multiple previous uses, techniques to maximise the new building's available footprint are at a premium.

Cementation Foundations Skanska (CFS) using its versatile mini-piling rigs for both piling and soil nailing is developing just such a service.

The company's first widespread use of the idea is on a congested site close to Birmingham city centre, where the site is challenged by Victorian buildings and busy side streets lying tight up to the site perimeter.

Soil nailing to strengthen vertical sided building foundations, and mini-piling to retain adjacent roads, is offering the client a fast, cost effective solution to containing the site perimeter, as well as the opportunity to maximise construction space by building tight against boundary structures.

By drilling rows of soil nails into the excavated vertical face of rock

directly beneath the 100 year old warehouses bordering the site, the subcontractor needs no additional retaining wall between these existing buildings and basement excavation. This means the new apartment block can be built as close as possible to the site perimeter.

"A conventional contiguous piled retaining wall, even bored tight against the old building, would still have encroached into the site area by at least a metre," explains CFS contracts manager, Geoff Prudhoe. "Our solution provides zero site intrusion, allowing the proposed new apartments to butt directly against existing properties."

The extra space - made available for what will be a two level basement car park - offers 25 more parking spaces for client Chord Developments, who are keen to ensure all one and two bedroom apartments on this central site have their own parking spaces.

So the additional basement space directly increases the number of flats than can be included in the £21M, six storey building, now planned to house 176 apartments and an office complex.

Elsewhere along the site perimeter, sections of busy side roads need retaining to accommodate this basement excavation. Here, contiguous mini-piled walls emerged as the most practical space-saving solution.

As the rig crews could use the multipurpose Twin-Tech TD308 rig for soil nailing and for 220mm diameter mini-pile installation, it flagged the technique as the quickest and most cost effective option.

CFS became involved in the project's conceptual design over a year ago when Chord Developments despatched its consultant BWB to search for a solution offering maximum building space. The St Paul's Square site is a tight though very valuable 1.2ha plot just a few hundred metres from Birmingham's city centre Bull Ring shopping complex.

Two existing structures bordering the site posed particular challenges as they lay right on the proposed building line of the new development. It was here, alongside these old offices and an art gallery - a combined site perimeter totalling 94m - that BWB sought a basement excavation retention option that did not invade its client's land.

CFS had already employed a similar soil nailing solution on a nearby, equally congested site, so the company was brought in to carry out a similar design for BWB, and later with main contractor Costain.

The technique involves a relatively simple extension of soil nailing's conventional role in strengthening or steepening earth embankments. The difference here is this 'slope' is the vertical excavated side of foundation material directly beneath the building to be protected, and the material must meet a specific strength standard.

"The rock has to be soft enough to accommodate drilled nails, but also competent and self standing in the short period between excavation and nail completion," says CFS design engineer Jim Martin. "Fortunately the sandstone at this site was ideal and could safely be exposed for the maximum 12 hours we needed to install the nails."

The soft Wildmoor Sandstone has weathered upper layers becoming increasingly competent with depth, and when excavated or drilled, the spoil becomes easily managed red sand.

