



Largest precast retaining wall element to date in South Africa – for The Houghton

THE CONSTRUCTION of The Houghton, a development comprising two luxury residential apartment blocks (Houghton 1 and Houghton 2) and a 180-room boutique hotel development (Houghton 3), involves South Africa's largest deployment of precast hollow-core concrete panels as retaining walls to date.

Spanning approximately 2 000 m at an average height between 3,2 m and 5,0 m, the panels are fulfilling a dual role of retaining embankment soil and providing walling for parking basements and below-ground level service areas.

Supplied by Concrete Manufacturers Association (CMA) member, Echo Prestress, the prestressed panels were manufactured in standard 1,2 m widths varying in length from 3,2 m to 5,0 m. Panel thickness was a standard 150 mm in most instances, except where two slabs, one on top of the other, were required to accommodate embankment depths of up to 10 m, and in these instances panel thickness was increased to 250 mm.

The precast slabs used on Houghton 2 were between 3,2 m and 4,1 m, whereas

in the cases of Houghton 1 (residential) and Houghton 3 (the hotel) where the contours are more severe, there was a much greater variance in slab length.

Rogan Duffy of Pure Consulting, the consulting engineers responsible for the project's structural engineering, says that where possible the objective was to achieve as much standardisation as possible in panel sizing to render their manufacture and on-site deployment as simple as possible.

Foundation support for the Echo panels was provided by 250 mm deep footing channels. Additional lateral support was achieved through thickening the edge of the surface bed on the support side of the footing channel to 300 mm, thereby lifting the height on that side of the channel to 550 mm. Moreover, a fully cantilevered application was avoided by bolting small right-angled steel sections to the first floor slabs. These provided the head of each panel with additional support.

"In some instances we have done away with the steel angles and have allowed the Echo panels to rest against the first-floor slabs. The first floor slabs

receive no support from the panels and instead rest on concrete columns situated inside the basements," says Duffy.

The reason for opting for the footing channel support method is that it is very cost-effective. It is very similar to the footings that are used for the project's brick walls which, because they are curved, are not suitable for Echo panels unless the aim had been to create a faceted wall. Furthermore, by integrating the surface bed into the support channel, on-site productivity was improved significantly.

The channel or recess which provides foundation support to the panels was constructed in the same manner as any standard footing. Before the concrete was poured, a steel reinforced cage and a metal wedge were inserted into the trench. Once the concrete had set, the metal wedge was removed, yielding a support channel with very smooth chamfered edges.

As with most building projects a key objective was construction speed, and in this instance the use of precast panels meant that the retaining walls were generally erected three times faster than



in situ construction would have taken. According to Duffy they wanted to have the retaining walls erected before the casting of the first floor slab in order to improve access for the main contractor, Murray and Roberts.

As a result, Murray and Roberts has been able to lay about eight linear metres of walling a day in either brick or reinforced concrete, and the panel contractor, Echo Prestress, has achieved in excess of 30 m to 35 m of prestressed paneling erected each day without any significant involvement from Murray and Roberts.

Approximately 98% of the retaining wall requirement on the Houghton project comprised Echo precast panels. In some instances, however, it was not possible to use the panels, owing to on-site geometry. On walls with tight radii, for example, in situ concrete or brickwork was chosen. As it turned out brickwork was used in most of these instances.

Another advantage of Echo's panels is that they are very easy to cut, for example in creating space for the installation of air-conditioning units. The fric-

tion between the concrete and steel reinforcing in a prestressed panel ensures that the tension and structural integrity of the panel are retained after cutting.

The Houghton is being developed by ASVID Holdings, a company headed by Irishman David Nagle, an international property developer with other property interests in South Africa. Besides the 180-room five star hotel, the development will see a total of 320 high-end apartments being brought onto the market.

Architects Boogertman & Partners have designed Houghton 1 and Houghton 2 with considerable internal design flexibility. Apartments which begin at 190 m² and rise to 350 m² could be combined to form single units where required. Units could be combined horizontally or vertically and each would have a balcony with a spectacular view over the Houghton Golf Course.

The development includes a luxury spa and gym, and the golf course is being upgraded by world-renowned golf champion, Jack Nicklaus. A new club house is also being built in the middle of the course.

- 1 The Houghton construction site - two Echo prestressed hollow-core panels inserted into a foundation recess prior to the casting of a 300 mm deep by 300 mm wide surface bed edge on the right side of the channel
 - 2 Prestressed hollow-core panels measuring 3,2 m x 1,2 m x 150 mm shortly after offloading at The Houghton construction site
 - 3 A completed section of precast panel walling at Houghton 1 in the process of being waterproofed
 - 4 Precast panels at Houghton 1 are supported by steel poles while the casting of the first floor slab is taking place
 - 5 A parking basement at Houghton 2 showing how the precast panels provide internal walling as well as retaining support
- (Photographs: David Beer)

Construction work on The Houghton began in January. The hotel and the bulk of the apartments are due for completion at the beginning of 2010. However, some apartments will come on stream and be ready for occupation as early as April 2009. ■

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