(1995-Nov international Construction)

New project born on dyeing site

Ground engineering subcontractors are using ten HD Engineering drill rigs and a fleet of Atlas Copco air compressors on an extensive grouting and piling programme covering a five hectare site in Hong Kong.

With available prime land always at a premium in Hong Kong, the closure of the long-established China Dyeing Works factory at Tsuen Wan in the New Territories presented eager developers with a large area suitable for full scale residential and commercial development.

Two of Hong Kong's most prominent developers, New World Development and Hong Kong Resort Properties Ltd identified the site as ideal for establishing a careful mix of residential towers, a commercial centre, a transport terminus, a podium and extensive landscaped open areas. The two companies formed a joint venture for the US$50 million development.

The 5ha site lies in north west Tseun Wan New Town, bordering Castle Peak Road dual-carriageway on the southern side and the Mass Transit Railway (MTR) tracks and depot on the northern side, the point where the Kowloon section of the MTR terminates.

Unusually, a waterway, the Chung Hang Nullah extends through the site posing a challenge for engineers. The development which includes 11 residential tower blocks is designed to extend across the nullah.

Consultant engineers Scott Wilson Kirpatrick (SWK), who first became involved in the project providing drainage impact assessments, civil infrastructure designs and geotechnical advice, provided a detailed design for a permanent deck to span the nullah - an unusual engineering feature in Hong Kong.

SWK also provided construction supervision of the steel reinforced concrete deck which measures 350 m in length and is 30 m wide, effectively providing a buildable area and at the same time sealing the nullah from the development above.

A temporary steel deck was first erected, probably the largest of its type ever built in Hong Kong, comprising 300 steel beams to act as a temporary working platform above the nullah. This temporary deck will be removed in stages as work on the permanent nullah decking progresses.

Site development engineering involved several complex areas and SWK subsequently had extensive responsibilities covering piled foundation design, design of road and bridge works and diversion of three 1 km long large diameter water mains one of 450 mm, one 900 mm and one 1 m diameter - around the development site.

The main foundation piling for permanent works (box culvert) comprises 6-10 m deep caissons at the upstream end of the site and 20-30 m bored pile works downstream. Geology is shallow rock head upstream and a deep rock head soil downstream.

SWK engineers also had to provide a detailed design for a 1 km section of the proposed Route 5 highway which will extend through the development including the commercial centre. Even though the proposed highway will not be built until late, casting the development foundations had to take the new road routing into consideration.

SWK also advised on the geotechnical aspects of design and construction of the development's 14 m deep basement.

With an established waterway running through the area and excavation in progress, careful planning was required to improve the hydraulic profile of the site and in diverting the stream to allow excavation where hand dug caisson work could be minimised.

Design of the temporary groundwater control system included extensive perimeter grouting, effectively building a 'grout curtain' around the excavation works, as well as installing pumped dewatering wells. Careful monitoring of water levels was required to eliminate the possibility of disruption to the adjacent MTR operations.

Main contractor Vibro is responsible for installing more than 10,000 x 101 mm diameter grouting piles to an average depth of 12 m and has appointed a number of subcontractors to undertake the vital geotechnical works.

Gammon Ground Engineering and Foundation Contractor Ltd has deployed a fleet of six locally designed and built HD Engineering HD90's and an HD120S-A rig to expedite the extensive grouting programme.

Gammon's HD90 uses an HB30A drifter while the HD120S-A is fitted with a RH2000 hydraulic rotator. The HB30A drifter works best in what are typically hard, rocky ground conditions.

The HD120S-A, powered by an 87 kW (117 hp) Deutz diesel engine, has been specially designed for foundation applications including micro piling, rock anchoring and large diameter tie installations; and is in its element on the difficult ground conditions experienced on the Tuen Wan site.

Its highly manoeuvrable drilling mast is complemented by the mobility provided by the twin crawler tracks and innovative 'Jack Step' system allowing the rig access to even the most confined areas of the site. The 'Jack Step' system allows the rig to turn around in no more than its own length using a pair of rear jacks and the mast shift ram. The hydraulically driven crawlers can be operated individually and each crawler track can move in pendulum motion through 23° to aid mobility of the rig.

With several of the Gammon rigs working along the edge of the nullah, a fleet of Atlas Copco compressors are deployed on the temporary platform 7m above the water.

Two other local firms, Powerway and Tong Lick, are operating HD engineering rigs on the site.