



## China Harbour – Transfield Joint Venture

Contract No. DC/99/05

West Kowloon Drainage Improvement

Stage 2 Phase 2 - Kai Tak Transfer Scheme



### Hong Kong Breakthrough

China Harbour – Transfield Joint Venture's TBM has broken through for the first of three such events on the Hong Kong Government's Drainage Services Department's Contract No. DC/99/05, West Kowloon Drainage Improvement, Stage 2 Phase 2 - Kai Tak Transfer Scheme.

This first breakthrough was made into the fourth of six shafts, after previously tunnelling through two foamed concrete backfilled lower shafts along the alignment following initial launch at the first shaft, with the TBM remaining unseen.

The 5.17m diameter Herrenknecht mixshield TBM has completed 1030m of 1420m through highly variable ground conditions, including completely decomposed granite (CDG), full face slightly decomposed granite (SDG), alluvium and CDG with corestones beneath the streets north of the old Kai Tak airport. The mixshield has proved effective to date for settlement control in areas of low cover, utilities and mixed faces of rock and soft ground.

The spoil handling system uses a slurry treatment plant and technical support provided by Pigott Shaft Drilling Ltd (PSD) from the UK, which consists of a four-stage separation plant of primary shaker, desander, desilters and two centrifuges with a total capacity in excess of 750m<sup>3</sup> per hour. The PSD system has proved particularly effective at separating the varying ground conditions and has been very reliable to date with effectively 0% down time against the TBM utilisation time.

The TBM has only 370m of excavation remaining; however has two additional major challenges to overcome. Firstly the TBM will be turned through 90 degrees and re-launched from a jet grouted NATM chamber for a short 90m drive with low cover whilst operating on flexible "umbilical" lines allowing the back-up to be "left" behind in the first drive. Secondly, following completion of this drive, the TBM will be removed and re-launched in the opposite direction from the starting shaft for a 280m drive, which is also complicated by low cover and utilities below an existing road.

The successful use of the mixshield TBM in the variable ground conditions for controlling surface settlements, the use of flexible "umbilicals" for the TBM launches from shafts, NATM driven headings in soft ground and shotcrete lined permanent works shafts are considered firsts for Hong Kong.

China Harbour Engineering Company (Group) is a State owned Company whose long-term involvement in the Hong Kong construction industry has made their Joint Venture with Transfield a dynamic combination in undertaking this complicated tunnelling project.

Transfield Holdings sold its construction business in January 2003, including its underground division, to John Holland Pty Ltd, a subsidiary of Leighton Holdings Limited. Consequently the TBM tunnelling works on the project are being manned by John Holland's specialist tunnelling staff.

