The Express Rail Link (XRL) is one of the ten infrastructure megaprojects launched by the Hong Kong Government in response to the 2008 financial crisis. The project consists of the construction of an underground high speed railway line going from Kowloon to the Chinese border and linking Hong Kong to the existing high speed rail network in China.

The West Kowloon Terminus (WKT) is located in the Western part of Kowloon, on the reclaimed but already mature urban area across the harbour from Hong Kong Island. The WKT site extends over a surface of 12 hectares and comprises a 4 level basement to accommodate the railway station and a stabling facility. There were four foundation packages for the project and BACHY SOLETANCHE were awarded the largest of these, Contracts 803A and 803D in January 2010. These two contracts comprised the execution of the perimeter retaining structure and

**FINANCING:** Government of the Special Administrative Region of Hong Kong

**CLIENT:** Mass Transit Railway

**CONSULTANT ENGINEER:** AECOM

**MAIN CONTRACTOR:** Bachy Soletanche Group limited

**QUANTITIES**
- Diaphragm wall: 47,000 m²
- Large diameter bored piles: 177 nos corresponding to 8,150 lm of boring
- Socketed H-piles: 890 nos corresponding to 49,000 lm of boring
- 224 units of 13 lm deep micropiles
- 2,875 m² of slurry wall
- 46 pumping wells
a temporary cut off wall as well as a significant part of the foundations for the Terminus. The programme for these 2 contracts was a challenging 14 months for the largest foundation project ever carried out by BSGL. The award of the projects to BACHY SOLETANCHE affirmed the capacity of the company to blend their extensive technical know-how with a broad management capacity.

In addition to the heavy specialist foundation works, Contracts 803A and D also required very complex utility and road diversion works and the construction and management of a barging facility used to dispose of the excavated spoil from all four of the WKT foundation projects and the future bulk excavation.

The specialist works
A 1.6 km long, 1,500 mm thick diaphragm wall excavated to depths varying from 24 m to 56 m was installed around the site. Each panel had to be socketed 300 mm into the Moderately Decomposed Granite. However, due to a very complex geology in this area, up to 20 m of boulders and corestones were encountered on some of the panels before achieving the founding criteria. The diaphragm wall excavation required the implementation of specific techniques using a combination of down the hole hammer drilling, chiseling and excavation with Hydrofraise and mechanical grab.

In certain cases, some panels were founded in sound rock above the formation level of the basement. These had to be underpinned with 224, 13 m deep micropiles. Grouting at the base of the panels was also carried out to prevent the ingress of water during the future excavation and construction of the basement.

Within the perimeter of the diaphragm wall, 177, 3 m diameter bored piles drilled to depths of 40 m to 65 m and socketed into the granite were installed. These piles were constructed using oscillators to insert a temporary casing and Reverse Circulation Drilling rigs to drill out the pile. In order to facilitate the subsequent basement construction using the ‘Top Down’ method, 80 t prefabricated steel columns were placed in the piles prior to concrete to a very strict tolerance.

A further 890, 610 mm diameter Socketed H-piles were required to take the building uplift loads. These were installed up to 65 m deep and 305x305x223 kg/m H beams were installed to cope with the tension loads.

Exceptional resources
The tight programme for the works required the mobilisation of an exceptional level of resources which was brought to site within a very short period.

Local and regional staff were mobilised for the project on which more than 500 staff and personnel were working daily. At the peak, up to 3 hydrofraises, 4 hydraulic grabs and 15 mechanical excavation grabs were working on the diaphragm wall while 6 Reverse Circulation Rigs and 10 socketed H-pile rigs were installing the piles. Overall, up to 50 cranes from 60 to 250 tonnes were working concurrently on site, a significant logistical challenge that was successfully met by Bachy Soletanche’s project team.

Other works
A further important element of the Bachy Soletanche works consisted of the diversion of a 4 lanes highway including the relocation of bus stops and traffic lights. Additionally, the works involved the diversion of numerous utilities that clashed with the diaphragm wall alignment. These works were carried out according to a very specific sequence and were planned and executed by coordinating with the various stakeholders including the local residents. Public Relations to inform and explain the works to all parties involved was a key element to ensure the support of the general public in the neighbourhood. A dedicated team within the overall project management was allocated to these key works and functions.

The “barging facility” was another key element of the Bachy Soletanche works. Required to take the excavated spoil from our own works, the other foundation contracts and then the subsequent main basement bulk excavation, the temporary steel structure was constructed on the existing Quay Wall and was designed, constructed and operated by Bachy Soletanche for the duration of our contract and subsequently handed over to the follow on contractor.

The successful completion of Contracts XRL 803A and D has further demonstrated the capacity of Bachy Soletanche to undertake complex underground engineering projects as main contractor.