SYDNEY METRO BARANGAROO STATION

A WORLD RECORD TOWER CRANE LIFT FOR SYDNEY METRO

AT A GLANCE

CLIENT	JOHN HOLLAND CPB GHELLA (JHCPBG) JOINT VENTURE
PROJECT	SYDNEY METRO
LOCATION	BARANGAROO STATION SITE
SECTOR	TRANSPORT INFRASTRUCTURE
DATE	2018 - 2021

WHAT IT TOOK

CRANES	1 X M2480D, 1 X M1280D
ENGINEERS	2
INSTALLATION CREW	6
OPERATIONAL CREW	3
MAINTENANCE CREW	1

THE PROJECT

Located on the southern shore of Sydney Harbour on what was once a working port at the western edge of the CBD, the new Barangaroo Station will provide greater public transport access to the city's newest commercial, residential and entertainment destination.

The new station, located 25 metres below ground level, will connect the Sydney Metro line between the City and North Sydney via twin one-kilometre long tunnels under Sydney Harbour.

For construction partners, John Holland CPB Ghella (JHCPBG) joint venture, the scope of works included extensive tunnelling and excavation works – and a lot of heavy lifting in a seriously congested area.

After working with John Holland and CPB Contractors as part of the NRT consortium on the construction of the Sydney Metro Castle Hill station, Marr's team were engaged by the JHCPBG joint venture partners during the tender process to develop a craneage solution that would allow them to install heavy pre-cast elements and reduce the construction programme.

THE CHALLENGE

With the site hemmed in by Sydney Harbour, a rockface and another development, the biggest challenge for JHCPBG was the lack of available real estate for access and the movement of equipment around the site.

In addition to the excavation and construction of Barangaroo Station and a large crossover cavern, JHCPBG's scope of works also included launching and retrieving the cutter heads and shields of two tunnel boring machines (TBMs) – with sections weighing up to 255 tonnes.

JHCPBG's extensive scope meant a similarly broad scope for Marr's team including the removal of the TBMs.

Prior to our involvement, the original craneage scheme proposed using multiple mobile cranes and a 600-tonne capacity crawler crane at the southern end of the station box. However, this scenario was inefficient due to the need for piling to accommodate the crawler and the limitations of night lifts on account of road closures to allow for slewing requirements. With limited laydown areas, multiple cranes would have also required extensive co-ordination.

With the TBM removal planned at the beginning of the construction program and site access limited, there was a need for a craneage solution that had the lifting capacity and flexibility to remove the TBM as well as perform general construction tasks within a congested worksite.

OUR SOLUTION

Adopting a similar methodology to that employed on Sydney Metro Castle Hill Station, our solution used a M2480D and M1280D sitting alongside the station boxes to provide lifting capacity across the project. Sitting on purpose-designed foundations in and outside of the station box, the cranes took up 90 per cent less room than the proposed traditional crawler crane and gantry set up.

When it came to removing the TBMs, one of our M2480D HLLs was positioned within the station box adjacent to the retrieval point for the TBM and configured with a 55-metre boom and six fall 330-tonne hook block to lift the 255-tonne TBM sections.

It was the first time a tower crane had been used to lift a TBM component of this weight – and set a world record for the heaviest lift by a tower crane.

After extracting the TBMs the M2480D was reconfigured to continue working on general construction requirements for the remainder of the project.

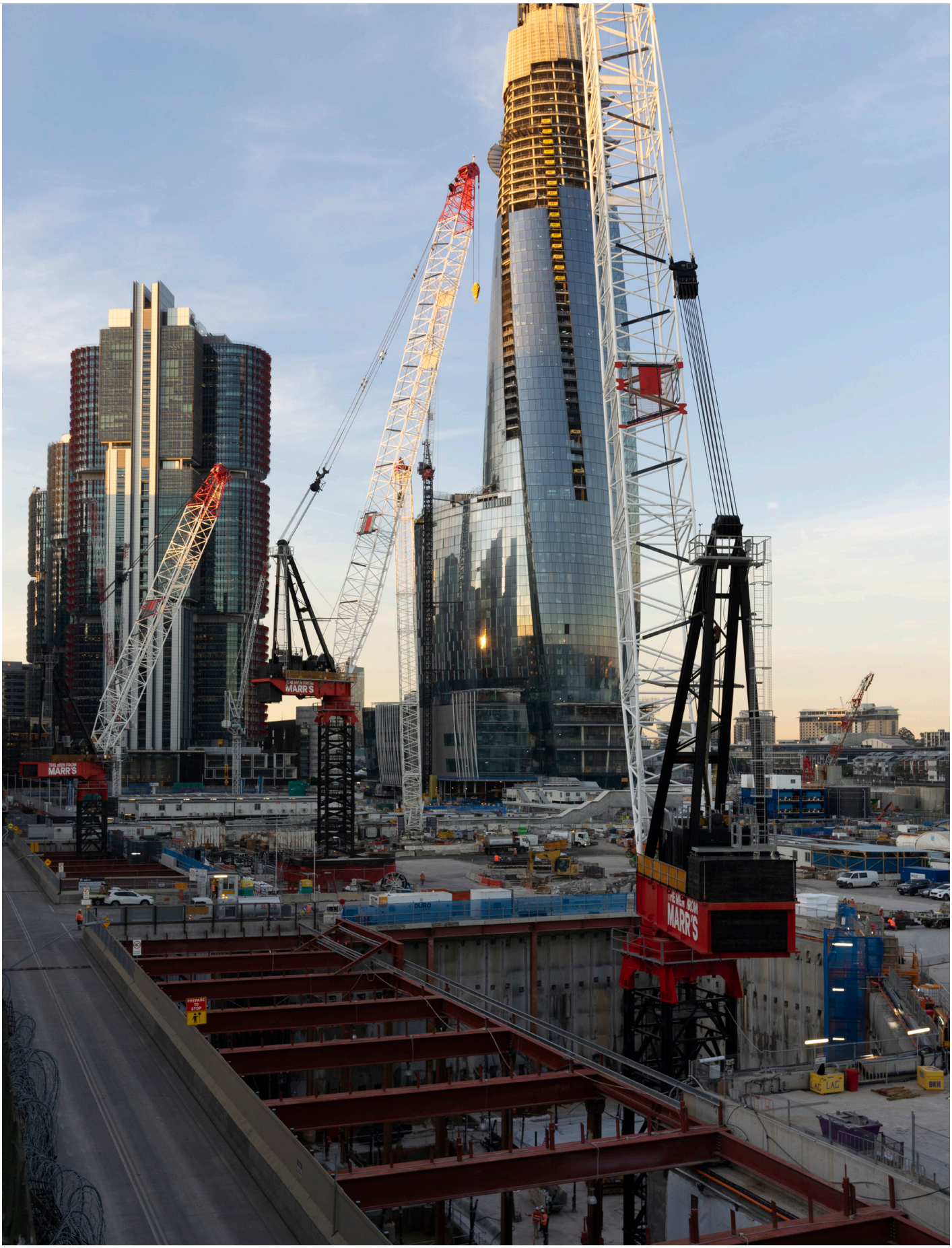
THE RESULT

Marr's approach has reduced congestion, improved site utilisation, and reduced complexity, risk and time on the project. Using our higher capacity cranes also gave JHCPBG the option to build with precast beams allowing for increased modularisation and fewer lifts.

The approach adopted for the extraction of the TBMs has also been a game changer for future infrastructure projects around the world, demonstrating that there is a simpler, smarter way to construct projects of this kind.

> The M2480D heavy lift tower crane was the only solution for the job. With a very limited footprint and heavy loads to lift, the M2480D saved time on the program by minimising the number of crane lifts required, without impacting construction activities of the Barangaroo Station works adjacent.

DAN CALDICOTT, JHCPBG BARANGAROO STATION SITE SUPERINTENDENT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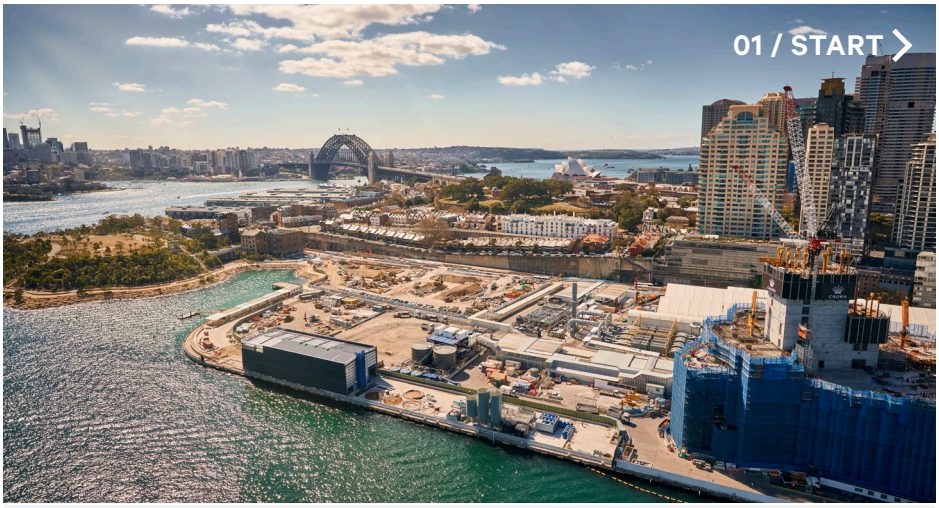
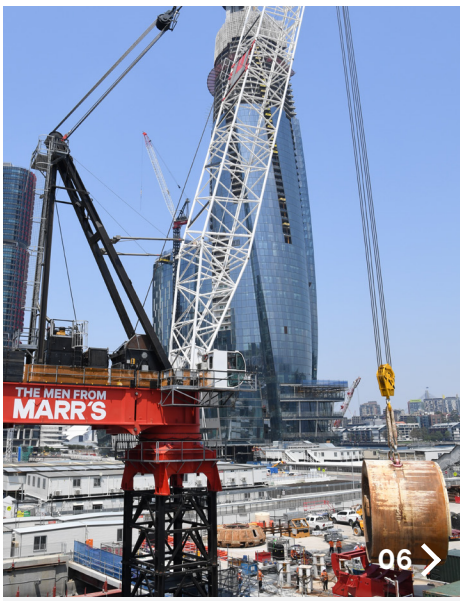


Located on the southern shore of Sydney Harbour at the western edge of the CBD, the new Sydney Metro Barangaroo Station will connect the Sydney Metro line between the City and North Sydney via twin one-kilometre long tunnels under Sydney Harbour.

Construction partners, John Holland CPB Ghella (JHCPBG) joint venture, engaged Marr during the tender process to develop a craneage solution that would support the extensive tunnelling and excavation works required and their proposed construction methodology – which included the installation of heavy precast elements – for the new underground station and large crossover cavern.

Marr's solution was to install one of our M2480D and M1280Ds sitting alongside the station boxes to provide lifting capacity across the project. Set on purpose-designed foundations in and outside of the station box, the cranes took up 90 per cent less room than the proposed traditional crawler crane and gantry set up.

Flanked by Sydney Harbour, a rockface and another development to the south, the already congested site posed significant access and mobility issues for JHCPBG. The originally proposed craneage scheme was to use multiple mobile cranes and a 600-tonne capacity crawler, but was inefficient in such a congested space.



In addition to the excavation, tunneling and general construction works, JHCPBG's scope of works also included launching and retrieving two tunnel boring machines (TBMs). With our M2480D installed inside the station box at the exit point of the tunnel and configured with a 55-metre boom and six fall 330-tonne hook block, we were able to remove the 255-tonne TBM sections in a single lift. It was the first time a tower crane had been used to lift a TBM component of this weight – and set a world record for the heaviest lift by a tower crane.

After the TBM was dismantled and transported offsite, the M2480D was reconfigured to continue general construction works on the project. Using Marr's higher capacity cranes gave JHCPBG the option to build with precast beams allowing for increased modularisation and fewer lifts. Marr's approach has also reduced congestion, improved site utilisation, and reduced complexity, risk and time on the project.