

CROWN SYDNEY

A BESPOKE CRANAGE SOLUTION FOR SYDNEY'S NEWEST LANDMARK

AT A GLANCE

CLIENT	UNDISCLOSED
PROJECT	CROWN SYDNEY
LOCATION	SYDNEY AUSTRALIA
SECTOR	CONSTRUCTION - HIGH-RISE
DATE	2019-2020

WHAT IT TOOK

CRANES	1 X M2480D, 2 X 390D, 1 X M440
ENGINEERS	2
INSTALLATION CREW	8
MAINTENANCE CREW	2

Uniquely located on the Barangaroo foreshore, Crown Sydney is Sydney's tallest building and an iconic addition to the city's skyline. But from a construction point-of-view, the striking architectural design of the 275-metre-high skyscraper and its harbourfront location presented several significant challenges for Crown Resorts and their builder.

Knowing they needed to think differently about how to construct the project they contacted Marr's team to help them come up with a solution.

THE CHALLENGE

Located in a congested CBD waterfront space between Sydney Harbour to the west and another construction site to the east, the complex sculptural design of the building required a lot of heavy lifting to build the structural elements for the low-rise gaming floor and 75-storey high-rise tower.

When our client initially contacted us, their primary concern was borne out of previous experience (and frustration) working on a similar project where the craneage solution couldn't meet the demands of working at height in a high wind area like Barangaroo. The resulting downtime and associated costs on that project meant they wanted a new craneage solution for the construction of Crown Sydney.

The brief, in short, was to come up with a craneage solution that would speed up the construction program without compromising on safety or quality.

The main challenge for the construction of the open space gaming floor, was how to install steel reinforcing beams weighing up to 100-tonnes in such a congested space. Higher up, building the tower required a unique craneage solution that could meet the lifting requirements while operating in high winds.

OUR SOLUTION

Having a long-standing working relationship with our client, they invited us in early to help come up with a solution.

After analysing data from cranes currently available on the market, our answer to the problem was to develop a bespoke super high-speed M390D crane with a high-capacity winch system for the high-rise construction. This allowed lifts of up to 25-tonnes from ground level to the top of the tower in just over a minute, with the ability to work in the high winds that were prevalent at this elevation. The M390D could also be used to assist with some of the heavier steel structures around the tower.

Lower down, one of our Marr 2480D (M2480D) Heavy Lift Luffing (HLL) cranes made fast and light work of the heavy lifting requirements, lifting the large steel reinforcing beams weighing up to 100-tonne beams and 50-tonne columns that formed the base of the structure to be lifted in single lifts.

Crown Sydney also adopted a top-down construction methodology which allowed two work fronts, with the M2480D employed to lift heavy general machinery (such as excavators and drills rigs), saving the cost of crawler cranes and allowing excavation work to be taken off critical path. It also provided options for how to deal with any unexpected lifting requirements during the excavation works.

An additional M390D and M440D were also on-site to assist with the construction of the gaming floor and hotel. Both crane solutions were designed to fit in with Crown's construction methodology.

THE RESULT

Allowing our client to change their planned construction methodology, the bespoke M390D gave our client the hoisting speeds, winch capacity and ability to work at height in high wind speeds that the job demanded; with the heavy lift capacity of the M2480D allowing the large structural elements to be prefabricated off-site, transported by road, and installed straight into position.

Marr's team also designed an internal climbing system to suit the jump-form construction methodology used on the project, which reduced the number of climbs and disruption to the project by approximately 30 per cent with a typical 20-metre climbing cycle completed within two hours.

The end result was a safer method of construction that reduced complexity, helped de-risk the project and supported Crown's construction schedule.

According to Greg Munday, Vice President – Design & Construction, Crown Resorts, "The complex architectural design of Crown Sydney made this a uniquely challenging project. Seeing it come to life and take its place in Sydney's skyline has been incredibly rewarding. It's become a landmark that reflects the beauty of its surrounds on one of the world's most beautiful harbours. From a construction point-of-view this was a uniquely challenging project, but our partners at Marr had an innovative approach that aligned with our preferred construction methodology."



From a construction point-of-view this was a uniquely challenging project, but our partners at Marr had an innovative approach that aligned with our preferred construction methodology.

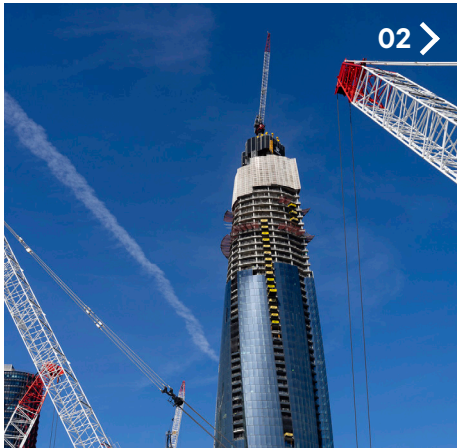


**GREG MUNDAY, VICE PRESIDENT –
DESIGN & CONSTRUCTION, CROWN RESORTS**



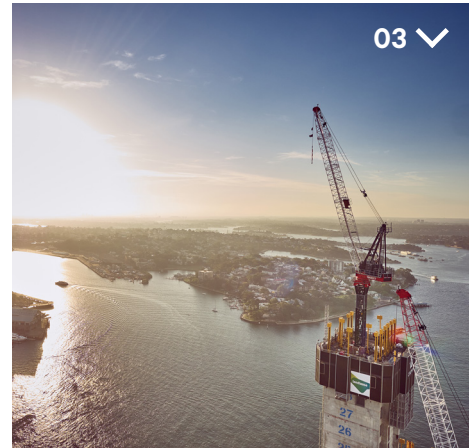
01 / START ▾

Located in a congested CBD site on the Barangaroo foreshore between Sydney Harbour to the west and another construction site to the west, Crown Sydney's location and complex sculptural design presented several challenges to Crown and their builder. The construction team's primary concern was how to meet the demands of working at height in a high wind area like the Barangaroo foreshore and complete the heavy lifting requirements in such a confined space.



02 ▸

Having a long-standing working relationship with Crown's construction partners and knowing they needed to think differently about how to construct the 275-metre-tall high-rise tower, they contacted Marr's team early on in the project to come up with a solution. The brief was to come up with a craneage methodology that would speed up the construction program without compromising on safety or quality.



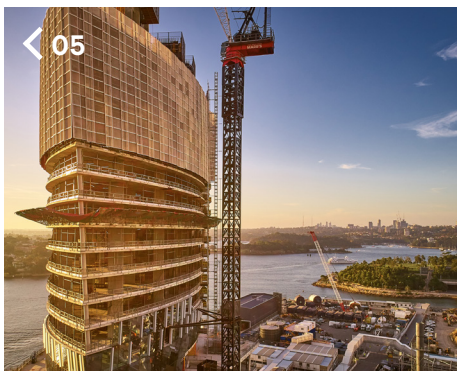
03 ▾

To meet the challenges of working on the high-rise construction in a high wind area, we designed a bespoke Marr 390D (M390D) crane with a high-capacity winch system. The super high-speed crane allowed lifts of up to 25-tonnes from ground level to the top of the tower in just over a minute, with the ability to work in winds of up to 72 kms per hour. The M390D was also used to assist with lifting some of the heavier steel structures around the tower.



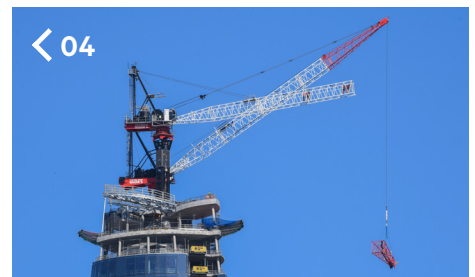
06 ▾

Crown Sydney also adopted a top-down construction methodology which allowed two work fronts, with the M2480D employed to lift heavy general machinery (such as excavators and drills rigs), saving the cost of additional craneage and supporting the critical path for excavation works. It also provided options for how to deal with any unexpected lifting requirements during the excavation works. Designed to fit in with Crown's construction methodology, an additional M390D and M440D were also on-site to assist with the construction of the gaming floor and hotel.



05 ◀

The unique architectural design of building also required an innovative approach to lifting the large structural elements for the low-rise gaming floor 75-storey high-rise tower. Using one of Marr's M2480D Heavy Lift Luffing (HLL) cranes to lift the large 100-tonne steel reinforcing beams and 50-tonne columns that formed the base of the structure in single lifts.



04 ◀

Once the project had topped out, the M390D's 46-metre boom and other sections were removed using Marr's unique recovery crane system.



07 ▸

Marr's team also designed an internal climbing system to suit the jump-form construction methodology used on the project, which reduced the number of climbs and disruption to the project by approximately 30 per cent with a typical 20-metre climbing cycle completed within two hours.



08 / FINISH —

The end result was a safer, less complex method of construction that supported and de-risked Crown's construction schedule.