onesteel reinforcing

Project:
Westlink M7,
Sydney

PROJECT 11 SOLUTIONS

REINVENTING onesteel reinforcing REINFORCING

OneSteel Reinforcing helping drive construction of Westlink M7

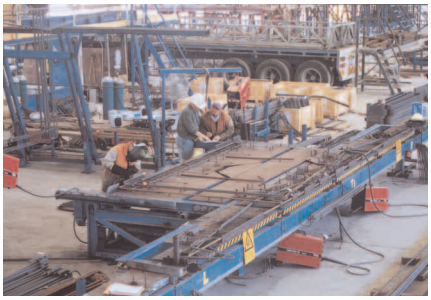
OneSteel Reinforcing played a key role in the construction of Australia's largest ever urban road: the 40km Westlink M7, supplying more than 40,000 tonnes of steel reinforcing for various parts of the project.

The missing link in Sydney's orbital network of motorways, the M7 is a 40km dual carriageway motorway between the M5/Hume Highway at Prestons and the M2 at Baulkham Hills.

The M7 bypasses up to 56 sets of traffic lights, cutting travel times across western Sydney by up to an hour and replaces the Cumberland Highway as the national highway link through Sydney, providing a new route for the transport industry and taking heavy vehicles off local roads.

The massive project was built by a joint venture company comprising Abigroup and Leighton Contractors (ALJV).

Key construction features of the project were the erection of 144 bridges and the use of continuously reinforced concrete pavement for the roadway.



Above left: All reo was delivered to site in cages up to three times a day. Left: Materials were colour-coded to ease identification and special jigs were used to weld up the frames (right), and assist the steelfixers (below).

REINFORCING SOLUTIONS

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- Save time, money & effort
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- OneSteel Reinforcing products are certified by ACRS, the Australian Certification Authority for Reinforcing Steels

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Continuously Reinforced Concrete Pavement (CRCP)

OneSteel Reinforcing also supplied all of the steel reinforcing for the 40km of dual carriageway that was built using CRCP, one of the largest applications of the construction technique in Australia.

To minimise wastage throughout the roadway, OneSteel manufactured 15m and 10.3m lengths of the 16mm and 12mm diameter 500PLUS Rebar used in the pavement, with the steel delivered direct to site from the OneSteel rolling mill in Rooty Hill.

Bundles of the steel were dropped at the required intervals along the length of the roadway for placement by OK Steelex.

OKSteelex principal, Lenny Beyers, used two of his patented mobile steelfixing rigs to place the steel, completing up to 500m of roadway a day.

The reinforcing was placed over a 200mm thick concrete sub-base, with the CRCP varying in thickness from 150-175mm.

Other Works

As part of the site establishment works, OneSteel Reinforcing supplied more than 4000 tonnes of prefabricated reinforcing cages for piles and columns.

Several thousand tonnes of steel reinforcing was also supplied for other works, including the construction of retained earth walls, and for other precast concrete including standard bridge decks, and roadway elements including kerbing and noise barriers.

Left: The majority of bridges on the project used conventional precast bridge decks, as does the M7 cycleway.

REINFORCING SOLUTIONS

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The very complex reinforcement assemblies were lifted by crane into the special casting moulds, which were lined with steel formwork. Note the starter reinforcement for the concrete kerbing on the deck.

REINFORCING SOLUTIONS

WESTLINK M7 CONSORTIUM

Abigroup (10%) and Leighton Contractors (10%) are both partners in the consortium, which is responsible for the design, construction, maintenance and operation of the M7 for a total of 34 years, after which it will be transferred back to the NSW Government.
The other partners in the consortium are Transurban (40%), which was responsible for the Melbourne City Link project, and Macquarie Infrastructure Group (40%), one of the largest developers and owners of toll roads in the world.

Above: Mating precast segments interlock like building blocks.

Bridge Construction

A major challenge for ALJV was construction of the 144 bridges, including interchanges and over-and underpasses.

33 of the largest bridges for the project were precast segmental box girder-types, with two types of segmental construction used – span-by-span and balanced cantilever.

About 1750 span-by-span and 1000 balanced cantilever precast concrete segments weighing up to 70 tonne were manufactured.

A $10 million precast factory, located midway along the 40km motorway off Wallgrove Road at Eastern Creek, was constructed to supply the project with reinforced concrete bridge segments to meet the requirements for all of the segmental bridges within the construction timeframe.

Special access roads were designed and built to accommodate the oversize low-bed vehicles required to move the concrete segments from the facility to construction sites along the motorway.

The precast factory comprised two main buildings: the Reinforcement Building, which was over 100m long and 30m wide; and the Casting Building, which was over 250m long and 30m wide.

All of the reinforcement cages for the precast concrete bridge segments were assembled in the Reinforcement Building.

The large team of steelfixers assembled the very complex and heavily reinforced cages using a series of special jigs.

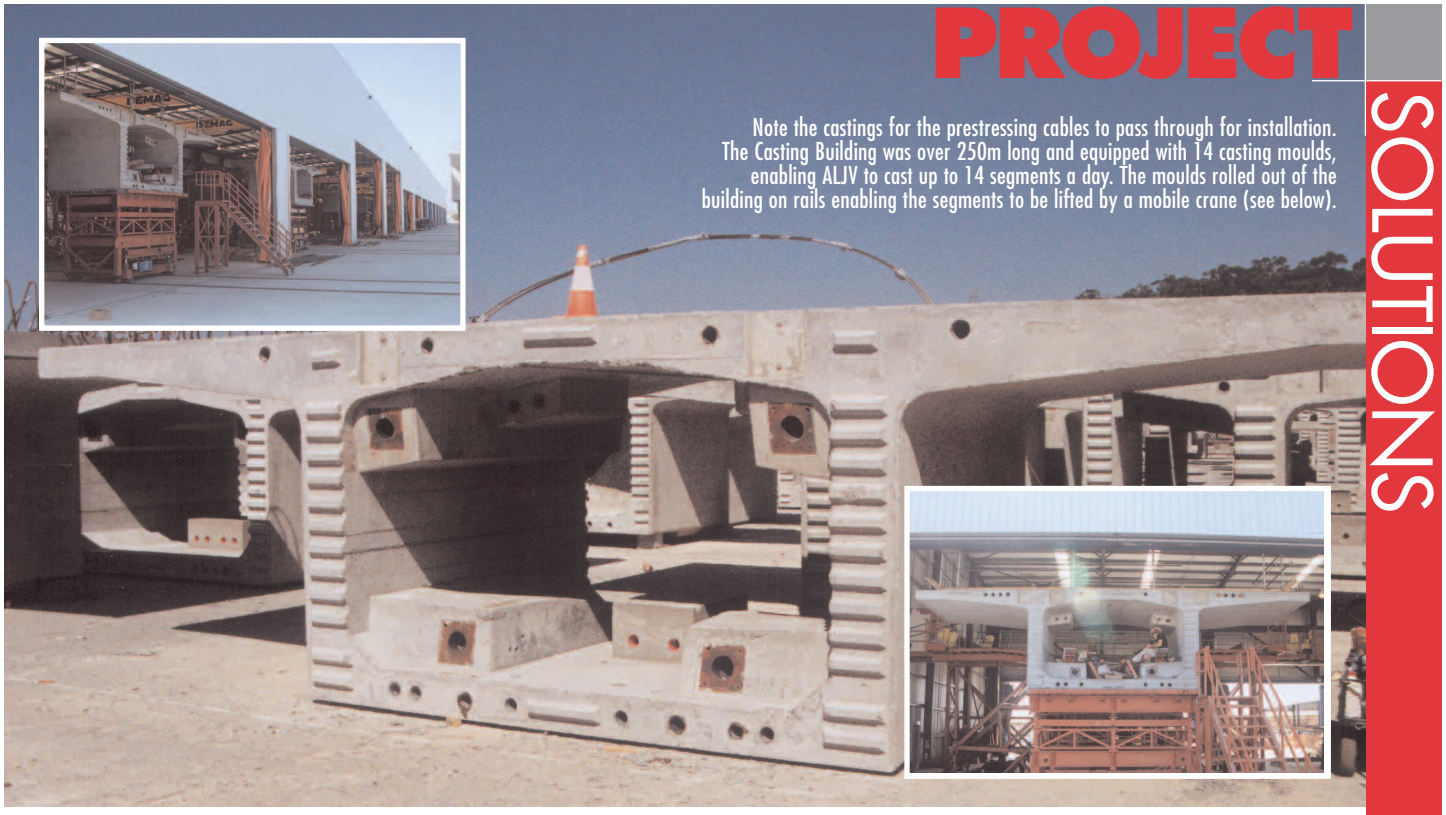
Because the cages were being used in very accurate steel moulds, the tolerances for the steel reinforcing being supplied by OneSteel Reinforcing were amongst the tightest yet required for any project. OneSteel Reinforcing's representative for the project, Peter Markuse, said everyone involved in the project at OneSteel relished the challenge of working to such demanding specifications.

"Normally the tolerance for the supply of steel reinforcing in most building works is around 20mm. For this project, all we had to play with is 5mm, which means there was literally no margin for error. This was certainly one job where near enough was not good enough. It had to be exact."

OneSteel Reinforcing supplied more than 8000 tonnes of steel reinforcement for the construction of the precast concrete segments, with up to three deliveries a day to keep the assembly process running as smoothly as possible.

A complicating factor with the steel reinforcement for the precast concrete segments was that many of the segments differed slightly to accommodate the curve of the roadway.

That meant making sure the reinforcement for one segment did not get mixed up with another was a priority.



Note the castings for the prestressing cables to pass through for installation. The Casting Building was over 250m long and equipped with 14 casting moulds, enabling ALJV to cast up to 14 segments a day. The moulds rolled out of the building on rails enabling the segments to be lifted by a mobile crane (see below).

To overcome this problem, OneSteel Reinforcing introduced a colour-coded delivery tag system for the project.

"Quality is always a priority in all of our operations, but this project required us to lift our performance to a new benchmark for the steel reinforcing industry in Australia," said Peter.

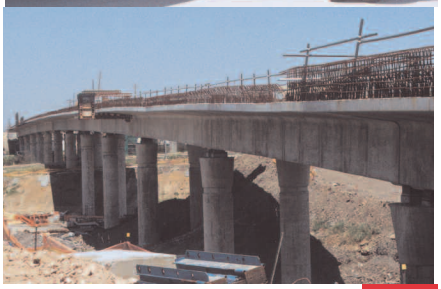
"We worked very closely with ALJV from well before the project commenced, providing them with advice on how best to tackle the assembly of the very complex and heavily reinforced cages for the precast concrete segments.

"We also based one of our production co-ordinators, on site full time to assist with scheduling and any other aspects concerning the supply of reinforcing for the duration of the project.

"We also assisted ALJV by using our Nemetschek software to detail the most complex areas of the cages and improve steelfixing efficiencies."

After the reinforcement cages were assembled, they were transferred to the adjacent Casting Building by forklift, where any final detailing, including the installation of prestressing ducts and cables, was completed prior to them being lifted into position in one of the 14 casting moulds.

ALJV aimed to cast up to 14 segments every day, with the facility providing sufficient space for storage of up to 550 completed units.



The first large bridge completed was the 400m long structure at the Light Horse interchange.

Segments were installed span-by-span (above) or by balanced cantilever. Complex prefabricated reinforcement was required for bridge columns (right).