

# Speedy Steel in a Tight Spot

## Time and space constraints were creatively overcome in the construction of a new hospital carpark.

Structural Steel met the challenges for construction of new staff parking facilities at the Prince of Wales Hospital in Randwick, Sydney. Faced with the constraints of building the new carpark on an entire block without obstructing the main ambulance thoroughfare, the International Parking Group in charge of the \$25 million parking management contract, chose to take advantage of construction benefits inherent in structural steel. The design was headed by Park Up, a joint venture between BHP Engineering and ABBEC.

The new two level carpark caters for 271 vehicles, with security measures to ensure the safety of staff using the facility. As part of the design, a roof was added to cover the top level, which improved the amenity for users.

## Design

The speed of erection that steel offered allowed a tight project program of 26 weeks, from excavation to handover, to be met. The advantage of being able to maximise off-site fabrication of steel not only contributed to construction speed, but minimised on-site construction noise; a major benefit given the location of the project.

The carpark was designed to occupy the entire block. As a main ambulance thoroughfare road ran alongside the site, no road closures were allowed during construction. By choosing steel, the designers were able to select an option where the carpark could be built in two halves. One half of the carpark was built from the foundations up to the roof level, with the second half providing storage areas for the steel, decking and reinforcing mesh. Once the first half was complete, construction of the other half could proceed, utilising the completed half of the carpark for storage.

The initial design of the steel floor beams employed BHP's recently released software,



While one half of the carpark was being built, the other half was used for storage of materials.

COMPBEAM™, which is based on the new composite beam design code, AS2327.1 - 1996. Mr Sav Dell Aquila, project engineer, explained; "We decided on a composite floor system to gain the advantages of composite action, the reduced beam sizes and associated economies. COMPBEAM allowed us to generate member sizes very quickly and accurately. Final design was merely a formality, as COMPBEAM sizes were accurate." Column and bracing design used AS4100. The lateral resisting system consists of RHS sections used as bracing members.

The slab incorporates a 150mm high raised curb around the perimeter of the building. This curb was designed as part of the perimeter crash barrier system, in conjunction with a 200UC section as the primary barrier, which was fixed to the external columns. The 120mm thick floor of 32 MPa concrete is supported by 1.0 mm Bondek II steel sheeting. The secondary beams are typically 310UB 300PLUS sections spanning 8m and supported on 460UB67 300PLUS primary beams spanning 8.05m.

Floor to floor heights were set at 3.2m for the lower level and 3.0m for the upper level. Eventual floor to ceiling heights

were well in excess of the minimum 2.2m set by the carparking code AS2890.1-1993.

## Construction

Single height columns are used from the foundations to the top slab level. Smaller columns run from the top slab to the roof level.

Although each half of the carpark was built up to the roof members and purlins, the decision was made that the roof sheeting would be left until last, so the roof contractor would only be on site once.

Internal members were hot dip galvanised, and external members were painted with a single coat of inorganic zinc phosphate and two top coats of epoxy enamel to 150 µm.

Shear studs were generally 19mm diameter, with the primary beams fabricated in ABBEC's Tomago fabrication facility and the secondary beam studs applied on site straight through the Bondek sheeting.

A single 25 tonne mobile crane provided all the lifting requirements on the site. Due to the proximity of the site to the hospital helipad, there were several occasions where the crane boom had to be lowered prior to an emergency helicopter landing. This did not hamper construction, with the carpark being completed on time and to budget.

Client	AIDC for Prince of Wales Hospital
Architect	The Architecture Company
Engineer & Design Manager	BHP Engineering
Builder & Construction Manager	ABBEC
Shop Detailer	Precision Detailing
Distributor	Tubemakers Metaland Newcastle