Technical Paper

CPB CONTRACTORS

ACAA 2018 • TECHNICAL PAPER

Northern Beaches Hospital

Sydney, New South Wales

Client:	Health Infrastructure NSW and Healthscope Limited (operator)
Contract type:	Design and construct
Duration:	January 2015-2018
Contract value:	$540 million (value to CPB Contractors)

Summary

The world-class Northern Beaches Hospital project is the first healthcare operator-led public-private partnership in NSW, and the first hospital built on a greenfield site in Sydney in 20 years.

As a private hospital treating both public and private patients, the Northern Beaches Hospital is the first facility of its kind in NSW. It is also the first 4-star Green Star hospital facility in NSW.

The new 488-bed hospital features 20 high-tech operating theatres, state-of-the-art intensive care unit, large integrated emergency department, with a grand walkway and glass archways leading to the main entrance, attractive atrium as the centrepiece of the hospital, and shared amenities including bike paths, retails, cafes and outdoor eating areas.

Scope

CPB Contractors was responsible for all design and construction, including:

- Design from concept and environmental approvals
- 70,000m^2 hospital
- 50-space emergency department
- Operating theatres and surgical suites
- State-of-the-art intensive care and critical care units

Figure 1: The world-class hospital project is the first 4-star Green Star hospital facility in NSW

- Inpatient mental health facility
- 40,000m^2 car park with 1,250 car spaces
- Pedestrian flyover
- Campus wide roads and support infrastructure.

Large-scale complexity

This high-profile project is located in the NSW Health Minister's local constituency. It was a complex, large-scale greenfield project delivered on a 7.5-hectare site with no road infrastructure in place. The site was surrounded by concurrent road construction on three quarters of site boundaries to the north, east and south, a large high-school to the west, and existing roads carrying 130,000 cars every day.

The construction site was limited to one entry for vehicular access and egress and the high school next to site limited working hours and certain work activities. There were significant safety interface risks regarding school children, traffic and site personnel.

Delivery excellence

The team introduced new standards for safer EWP operations and temporary works, and an innovative riser construction sequence to minimise and virtually eliminate fall risks.

The project achieved an outstanding safety record, exceeding project safety targets way beyond industry averages.

The lump sum contract was delivered on budget and within one per cent of the original contract value despite market escalation challenges since commencement of the tender submission in 2013.

The project was tendered in only five months and is on target to finish three months ahead of schedule, and on track to achieve Interim Occupancy Certificate four months ahead of schedule.

The team's commitment to quality ensured the hospital maintained its Approval in Principle Private Hospital Licence during the design and construction phases.

Key issues and challenges

Operator-led healthcare PPP

CPB Contractors drove the concept and design development process and ensured that the operator, Healthscope had full visibility of the process, to ensure the final design met the requirements of the Operator's Brief. This included development of the masterplan and the concept and schematic design, including architectural, structural, civil, façade, landscaping and building services. Concept designs were submitted with the tender.

The design team carried out 91 user group sessions over six months. Over 130 clinical user consultation meetings were carried out to determine specific stakeholder requirements. The team responded to over 5,000 review comments.

The team pioneered the use of a room data sheet system and library (dRofus) and linked it to the Building Information Model, which enabled reporting of differences between design and scope. This system is now standard practice on all NSW Health projects.

Building Information Modelling was used to overcome planning challenges for construction sequences, including earthquake requirements for partitions and ceilings, in ceiling services, risers and plantrooms.

The unique contracting nature and PPP risk profile amplified the project's risks. All risks were allocated to the entity best placed to manage that risk, with room data sheets produced for each room at tender stage and a reference design produced as a baseline.

Early development and transparency of the completion process allowed stakeholders to understand the journey towards completion and prevent delays.

World-class hospital facility

As the first 4-star Green Star accredited hospital in NSW, the hospital features a sophisticated Building Management System and co-generation base load plant for maximum energy efficiency.

The design avoided permanent structural movement joints, with a temporary movement joint grouted dowel system eliminating infection risks and the need for pour strips.

A review of the design solution for the main eight-storey car park structure used advanced design tools to complete gravity, earthquake and wind analysis. As a result of this analysis, a smarter and more material efficient formwork solution was developed by orientating the band beam in a transverse direction.

A newly developed and innovative car park façade system known as Atmosphere was used to integrate the façade and car park barrier system (supported at the slab edges).

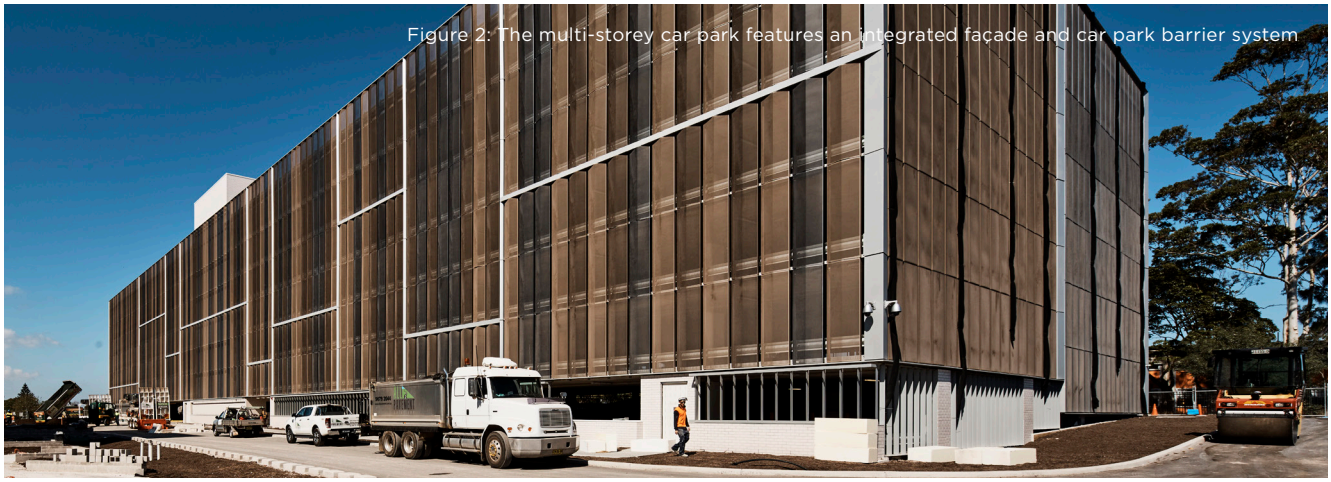

Figure 2: The multi-storey car park features an integrated façade and car park barrier system

Figure 3: Battered in-ground excavation to the east allows easy future expansion

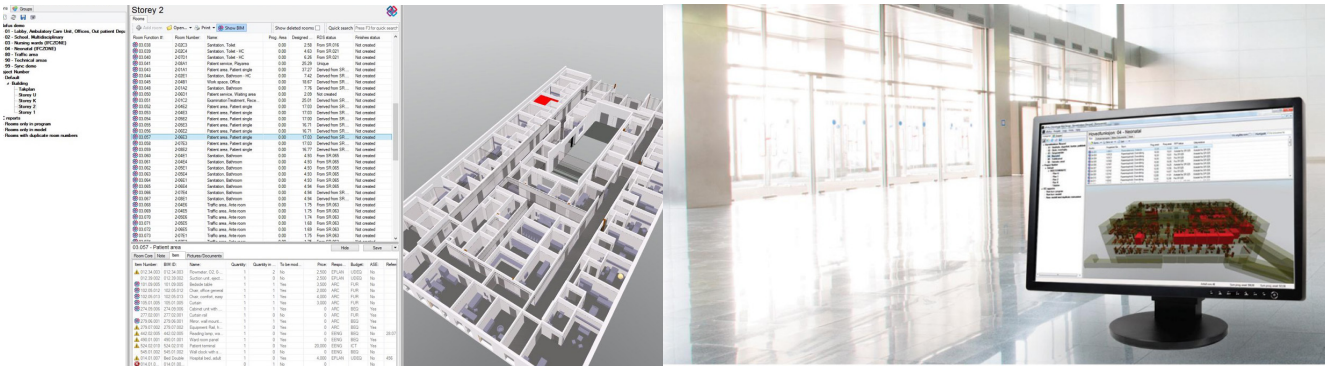

Figure 4: Design gaps were minimised using a linked room data sheet system and BIM

Future flexibility for the operator was provided through separate expansion strategies for the public and private patient portions during the operating term. These strategies included:

- Battered in-ground excavation to the east, allowing easy future expansion
- Hospital placed within masterplan to allow expansion of full ward configuration towards but inside set-backs to boundaries
- Alignment of corridors and layouts to allow for future link connections
- Separation of compensable and non-compensable patients to differentiate patient experience
- Design enables facility to split in half in 20 years' time and operate standalone.

Site constraints and interfaces

With concurrent construction of RMS works occurring on three quarters of site boundaries and the surrounding roads carrying 130,000 cars every day, careful identification and segregation of hospital works from the RMS works was required.

The presence of the high school next to the site demanded adherence to strict working hours, with limitations on nearby work activities and management of students walking by the site entry. Restrictions were also placed on noise and stormwater runoff as part of the statutory environmental planning approval.

The team overcame logistical challenges by obtaining early planning approval for the enabling works. This allowed acceleration of construction for the difficult permanent stormwater infrastructure, and introduction of loop roads to move materials around the site prior to the main hospital construction.

A signalised intersection was created at the site entry to provide safer vehicle access and egress to the site, and coordination of site entry with the signalised Hilmer Street opposite the site entry. The new signalised entry minimised the risk of school children crossing site entry (full-time traffic controllers further increased safety of pedestrians and school children even though entry was signalised).

The planning and timing of deliveries was important, particularly for concrete, due to the significant road congestion in the area. To minimise traffic impacts and meet program targets, concrete was always delivered against the flow of traffic congestion, with one concrete plant used from the east and one concrete plant used from the west.

The works required intensive and real-time communication with all community stakeholders, which resulted in minimal complaints being received.

> **CPB Contractors has been proactive in the management of design and have diligently demonstrated their capability of delivering the design within budget constraints. They are delivering this project seamlessly with no impact to the community and I am proud to have them part of this project to its successful conclusion.**
>
> Deborah Latta, Project Director, Healthscope (operator)

Figure 5: The attractive atrium is the centrepiece of the hospital

Photo Submission
10 provided

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Photo 1

Hospital

and Hospital Road
as viewed from
south west

Photo 2

Hospital Entrance

Punch windows inside metal cladding, with timber look atrium clad picture frame & curtain wall inserts

Photo 3

Carpark Facade

With integrated vehicle barrier and façade system, purpose developed and manufactured.

Photo 4

Multi Storey Carpark

On level 1
looking north

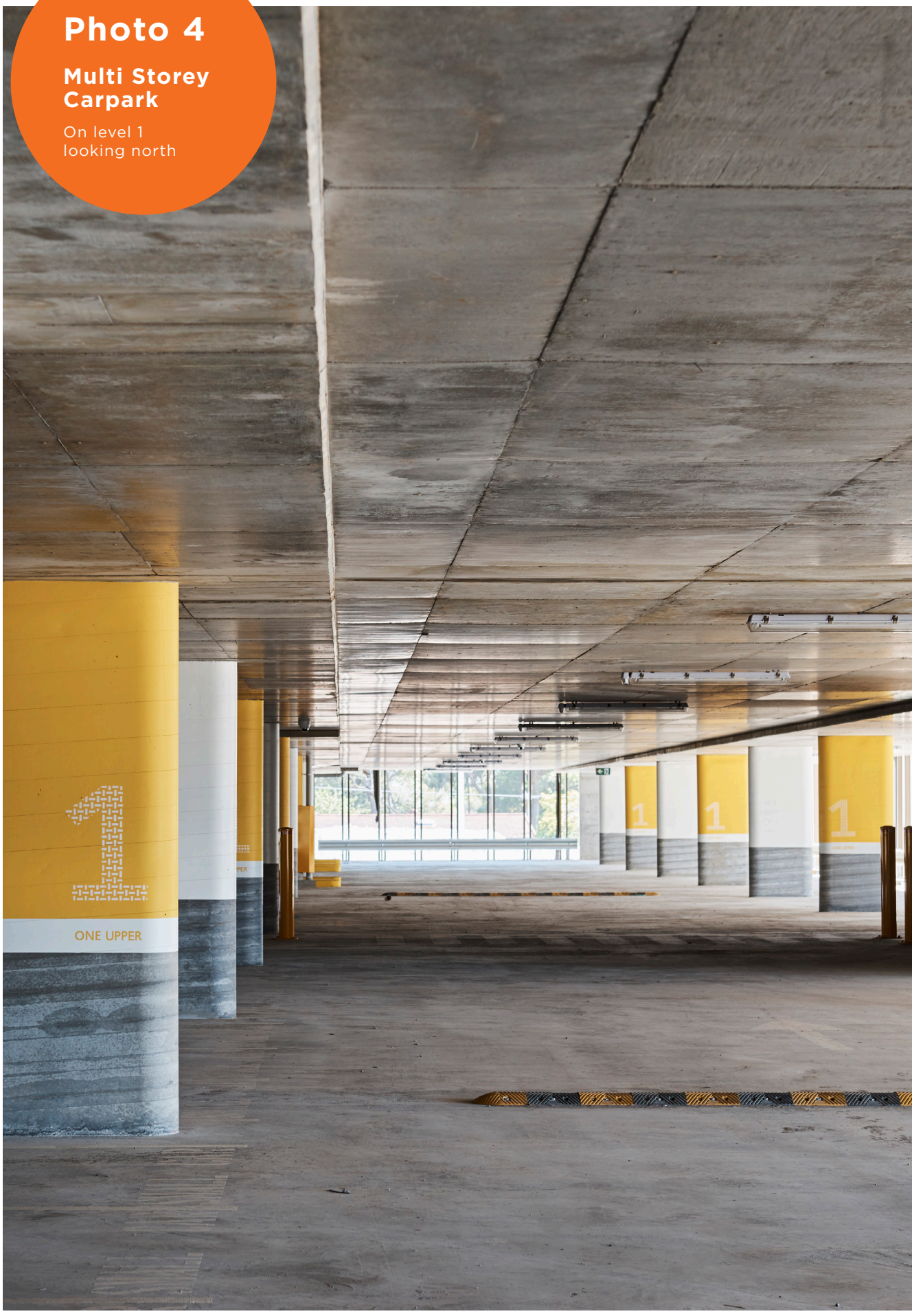

Photo 5

Hospital Reception Desk

Photo 6

Hospital Atrium

Viewed from ground floor with striking timber cladding

Photo 7

Atrium Conical Roof Skylights

From level 5 looking east

Photo 8

Staff Station

To paediatrics area,
level 2 of hospital

Photo 9

Birthing Suite

With birthing bath

Photo 10

Large Integrated Theatre

Level 1