State Significant Development

Application (SSDA) Report

Concord Hospital Redevelopment Stage 1

Prepared for Health Infrastructure / June 2018

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1 Executive Summary

This SSDA report seeks consent for the proposed redevelopment of Concord Repatriation General Hospital to improve and replace outmoded facilities to meet the substantial growth in clinical service demand across the hospital's catchment:

- Concept approval is sought for the redevelopment indicatively comprising 82,000sqm GFA, to be undertaken in two (2) stages including:
  - Clinical Services Building (CSB) and multi storey carpark (Stage 1); and
  - Acute Services Building (ASB) and multi-storey carpark (Stage 2).
- Detailed approval is sought for the Stage 1 construction of the proposed CSB (44,000sqm GFA) and the construction of a multi-storey car park located to the north of Hospital Road.

Detailed development approval for the proposed Stage 2 works will be completed at a later date and does form not part of this SSDA. The Stage 1 Detailed works are estimated to be completed by end 2021.

The proposed Concept redevelopment is in accordance with the concept architectural package prepared by Jacobs.

The proposed Stage 1 detailed development (CSB and multi-storey carpark) is in accordance with the architectural drawings prepared by Jacobs. The areas in the below staging plans have been assessed and are included within this report.
2 Introduction

The proposed new Clinical Services Building (CSB), Multi Storey Car Park (MSCP) and associated works forms the first stage in the proposed broader redevelopment of the Concord Hospital precinct. The stage 1 structural works primarily comprise the following:

- A CSB building to the south east of the current main hospital buildings, consisting of two (6) storey wings and one (3) storey wing connected by a support bar.
- At ground level a link via a three (3) storey atrium to the existing Multi-Block building with two (2) overhead link bridges within the atrium allowing patient movements between the new CSB and existing Multi-Block building.
- Construction of a new five (5) storey multi-storey car park on the existing at grade car park to the north of the main hospital building.
- Associated interface works to the existing hospital buildings surrounding the stage 1 project including to the Multi-Block building.

For the CSB a standard 8.4m grid of reinforced concrete columns and post-tensioned concrete banded slabs is being utilised after considering alternative slab configurations such as flat slab construction. Reinforced concrete shear walls are located around stair and lift cores to provide lateral stability against wind and seismic loading. Ground conditions under the proposed CSB have rock sloping towards the Parramatta River with bored cast-in-place piles socketed into class II shale selected as the most efficient foundation system. A concrete soldier pile shoring wall with shotcrete infill panels extends around the north, east and west sides of the CSB with a combination of temporary and permanent ground anchors depending on the permanent structure available to prop the shoring wall.

The atrium and link bridges are located between buildings 3, 4 and 5 of the existing Multi-Block building with a new lift located partially within the existing basement of building 5. The atrium structural system has been developed to both satisfy the architectural intent of a large open space at ground level and consider the constructability of the atrium within the context of the overall stage 1 construction. Structural steel construction is predominately used throughout the atrium for both the vertical and horizontal structure except for the cast-in-place piles and concrete slabs. The use of steel over concrete construction allows the long clear spans and tall columns that are a feature of the atrium space to be erected quickly to limit the impact on the construction programme. The lateral stability system for the atrium comprises steel portal frames in both primary directions and permanent movement joints to the surrounding buildings including the CSB.

The CSB and associated atrium have been designed for an importance level 4 in accordance with Health Infrastructure (HI) guidelines and the vibration requirements of HI Design Guidance Note 1 are being implemented to achieve Response Factor 2 (RF2) as there are no operating theatres or other areas that are highly sensitive to vibration in the CSB which require RF1. All other HI guidelines that are applicable have been included in the design including a sacrificial integral topping and allowance for future penetrations adjacent to internal columns. HI have confirmed that no vertical future extensions to the CSB are to be allowed for in the structural design with only a future service tunnel extending east from the CSB basement to be allowed for in the stage 1 design. The structural design considers the impact on the surrounding existing buildings and differential settlements have been accounted for by typically founding the building throughout on similar rock material.

For the MSCP the column grid at the concept stage is likely to be 8.4m x 10.3m with post tensioned bands spanning the longer grid direction. The walls around the stairs and lifts will form the lateral stability system for the building which is founded on piles socketed in Shale rock. Further options to be explore in the next design stage is precast concrete for the vertical elements and a composite steel structure solution to remove form working trades.
3 Site Overview

The Concord Hospital site is bounded by Hospital Road and on grade car parking to the north-west, private residences to the south-west, and part of the Parramatta River to the East. The site falls to the south-east towards the Parramatta River.

3.1 Site Geotechnical Information

3.1.1 Geotechnical Investigations and Reports

The following site investigation reports have been undertaken for the Stage 1 development sites:

Douglas Partners - 2016
- Geotechnical Investigation Concord Repatriation General Hospital Redevelopment by Douglas Partners, report no. 85356.00.R.001.Rev0 dated 11 April 2016. This investigation covered the stage 1 CSB development site.
- Preliminary Site Contamination Investigation with Limited Soil Sampling by Douglas Partners, report no. 85326.01.R.001.Rev 1. This report covered the stage 1 CSB development site.

Coffey - 2018
- Geotechnical Site Investigation for Lift Well in Phase 1 Development, report no. SYDGE221253-AC dated 23 January 2018
- Geotechnical Site Investigation for Phase 2 Development (existing Helipad site), report no. SYDGE221253-AD dated 30 January 2018
- Geotechnical Site Investigation for Phase 3 Development (Proposed MSCP), report no. SYDGE221253-AC dated 2 February 2018

A further interpretative report will be issued in the next design phase covering the CSB development site building on the earlier report by Douglas Partners.

3.1.2 Typical Ground Conditions

On initial review of Douglas Partners report 85356.00.R.001.Rev0, at the location of the stage 1 (and 2) multi-storey car park the ground conditions encountered generally comprise clay and silty clay material over shale of extremely low to medium strength. Some medium and high strength sandstone was identified at levels below RL 0.5 on the north-west side of the site, with rock levels falling towards the south east.

At the location of the proposed CSB, the ground conditions vary quite significantly between boreholes taken with the depth of fill and clay much deeper some areas.

Sandstone was encountered in some locations at 11.5m below ground level and various strengths of shale was encountered in a zone around 1m to 7m below ground level. Refer to the Geotechnical Investigation report 85356.00.R.001.Rev0 for further details.

No issues have been identified in relation to slope stability, or items that would affect the proposed development. At this stage all new structures are proposed to be founded on bedrock.

3.1.3 Ground Contamination

In any project where development occurs in and around existing buildings such as Concord Hospital it is assumed there is a risk of contaminants in the ground. Douglas Partners have commented on contamination both in the primary Geotechnical Investigation report (85356.00.R.001.Rev0) and in the Contamination Investigation report (85356.01.R.001.Rev0). No significant contamination was identified in the contamination report to impact their geotechnical recommendations. The Geotechnical Investigation report however reports on the presence of acid sulphate soils.

Based on the Geotechnical report, it appears that at the location of the stage 1 multi storey carpark, excavation into acid sulphate soil is likely limited to piling excavation and as such the disturbance should be limited to less than 1000 tonnes meaning that no management plan is required. This is assuming that no significant excavation is done into the alluvial clays (or clays below RL5.0), and that the piling excavation volume is similar to that resulting from 0.6m to 0.9m diameter piles on an 8m x8m grid.

At the location of the CSB, it is unclear as to the extent of the potential acid sulphate soils and the potential extent of excavation within these soils. Douglas Partners have suggested that further assessment may be required once further details of the development and excavation are known. The Coffey report in the next design stage will cover the ASS potential on the CSB site more detail with further investigations as required during enabling works.

3.2 Existing Buildings

The Clinical Services Building will be located such that a number of existing buildings will need to be demolished and will also be positioned closely to a number of other existing buildings to be retained. The main buildings in the surrounding areas are a combination of steel and concrete frame buildings with brick infill.

Buildings 3 and 5 (also known as building 71 and 69 respectively) shown in the figure below, will interact closely with the new building as a new link bridge and atrium is to be built between these two buildings. The original parts of these buildings were built in the 1940’s with additions in the 1960’s and 2000’s. Record drawings indicate the main frame of the buildings comprise concrete encased steel columns and beams with reinforced concrete ribbed slabs. The foundations appear to be concrete pad footings which is understandable as high strength rock at this part of the site appears to sit relatively high compared to the ground level.

The south east of building 5 is a recent extension that sits approximately 3.5m away from the new Clinical Services Building with footings below the new building shoring works. The south west corner of this building (part of the original building) comes closer at ground level (~1.8m) which will be a pinch point for installing services between the existing building and the new building.

Adjacent to the proposed radiation bunker on the western side of the new building sits existing building 74. Record drawings of the building have not been found and further investigations may be required to establish how much the new building will impact this structure depending on the final shoring layout.
3.2.1 Potential Construction Impacts

Noise/dust/vibration issues are a significant construction risk around an operational facility. Demolition of parts of the existing structure will have a noise and vibration impact on hospital patients.

Potential impact on existing in-ground services at Concord Hospital is a key risk on the project to be considered during the design stages. Refer to Section 3.6 for further information.

Existing services and footings can be disrupted when working in close proximity to an operational facility and detailed investigations surveys have been carried out to minimise this risk. The new footings for the building are mainly piled, and due to the risk of clashes with existing services it is proposed that all services within the site area are diverted around the new building perimeter or into a nominated services corridor.

Construction traffic can disrupt hospital operations. The provision of construction access to the site will need to be carefully considered by the contractor. Excavation and concrete trucks will be arriving and departing on a regular basis which will impact the use of roadways. The contractor will require a site mobilisation area for the workforce which will take up space on the existing site. The contractor should provide traffic control measures for the adjacent roads throughout the works.

Figure 5. Clinical Services Building footprint overlaid with existing buildings (Jacobs)
4 Design Parameters

4.1 Loads

In general all loads and load combinations shall comply with AS/NZS 1170 Parts 0 to 4 Structural Design Actions. Live load reductions will be applied as permitted by AS/NZS 1170.1. Generally the design loads are:

4.1.1 Permanent Actions – Dead Loads

Dead load shall be considered as the self-weight of the structure plus an allowance for services, toppings, walls and ceilings which vary significantly throughout the site. The additional dead loads should not be less than the following:

<table>
<thead>
<tr>
<th>Heading</th>
<th>Services, ceilings, partitions etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Floors &amp; Office areas</td>
<td>1.8 kPa</td>
</tr>
<tr>
<td>Car Park areas</td>
<td>N/A</td>
</tr>
<tr>
<td>Plant and concrete roof areas</td>
<td>2.2 kPa(^1)</td>
</tr>
<tr>
<td>Planter boxes</td>
<td>Varies based on depth</td>
</tr>
<tr>
<td>Non-trafficable roof (no steel roof over)</td>
<td>1.2 kPa</td>
</tr>
</tbody>
</table>

\(^1\) Loading includes allowance of 1 kPa for metal deck roof over.

No facade or masonry wall loading is included in the above loads. We will allow for a facade loading of 1.2 kPa which equates to approximately 5 kN/m depending on the floor to floor heights. This will need to be confirmed once the facade type and extent is developed. In areas with a full glass facade the loading could be reduced to around 0.5 kPa.

It is assumed that all internal partitions will be of lightweight stud construction and specific allowance will be made for masonry partitions if required. In particular, masonry walls will most likely be required around services risers and additional band beams will be required around the major risers.

4.1.2 Imposed Actions - Live Loads

Design floor live loadings are to generally satisfy the minimum provisions of AS 1170.1 and in particular the following:

<table>
<thead>
<tr>
<th>Heading</th>
<th>Uniformly Distributed Actions</th>
<th>Concentrated Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Hospital Floors</td>
<td>3.0 kPa</td>
<td>2.7 kN</td>
</tr>
<tr>
<td>Theatres / X-ray Rooms / Laboratories</td>
<td>3.0 kPa</td>
<td>4.5 kN</td>
</tr>
<tr>
<td>Stairs &amp; Corridors</td>
<td>4.0 kPa</td>
<td>4.5 kN</td>
</tr>
<tr>
<td>Office Areas</td>
<td>3.0 kPa</td>
<td>2.7 kN</td>
</tr>
<tr>
<td>Car Parking</td>
<td>2.5 kPa</td>
<td>13 kN</td>
</tr>
<tr>
<td>Truck areas up to 10,000 kg gross mass</td>
<td>5 kPa</td>
<td>31 kN</td>
</tr>
<tr>
<td>Plant and Utility Areas</td>
<td>Plant loads or 5.0 kPa (minimum)</td>
<td>4.5 kN (minimum)</td>
</tr>
<tr>
<td>General Store Rooms</td>
<td>2.4 kPa for each metre of storage height (Max 2.1m)</td>
<td>7.0 kN</td>
</tr>
<tr>
<td>Compacrus</td>
<td>4.0 kPa for each metre of storage height. (Locations to be confirmed.)</td>
<td>To be calculated</td>
</tr>
<tr>
<td>Trafficable Roof</td>
<td>4 kPa</td>
<td>1.8 kN</td>
</tr>
<tr>
<td>Non-trafficable Roof</td>
<td>0.25 kPa</td>
<td>1.4 kN</td>
</tr>
</tbody>
</table>

Pattern loading will be considered when determining worst case scenarios for strength and serviceability where required by AS1170. Live load reductions will be considered for columns, walls and footing design in accordance with AS1170.1. No live load reductions are to be applied to any floor system elements.

Loads in plant areas are to be confirmed by services engineers once layouts are known. Higher loading will be required for large pieces of plant or tanks.

If the construction of the upper levels of the tower are to be staged, then an allowance of 10kPa construction loading will be required for any levels that act as a temporary roof.

4.1.3 Wind Loads

Wind loads are in accordance with AS1170.2 and based on the following parameters:

**Clinical Services Building:**
- Region: A2
- Importance Level (BCA Table B1.2a): 4
- Annual probability of exceeding (BCA Table B1.2b): 1:2500 (ultimate), 1:25 (serviceability)
- Regional Wind Speed: Ultimate limit states - V2500 = 48 m/s, V25 = 37 m/s
- Terrain Category (all directions): 3

**Multi Storey Car Park:**
- Region: A2
- Importance Level (BCA Table B1.2a): 4
- Annual probability of exceeding (BCA Table B1.2b): 1:500 (ultimate), 1:25 (serviceability)
- Regional Wind Speed: Ultimate limit states - V2500 = 45 m/s, V25 = 37 m/s
- Terrain Category (all directions): 3

4.1.4 Earthquake Loads

Earthquake loadings shall be in accordance with AS1170.4 – 2007 (Earthquake actions in Australia) and AS/NZS1170.0 – 2002.

**Clinical Services Building:**
- Hazard Factor (Z): 0.08
- Site Sub-Soil Class: Be (Rock)
- Importance Level (BCA Table B1.2a): 4
- Annual probability of exceeding (BCA Table B1.2b): 1:2500
- Earthquake Design Category: III

**Multi Storey Car Park:**
- Hazard Factor (Z): 0.08
- Site Sub-Soil Class: Be (Rock)
- Importance Level (BCA Table B1.2a): 2
- Annual probability of exceeding (BCA Table B1.2b): 1:500
- Earthquake Design Category: II

4.1.5 Barriers

Barriers including parapets, balustrades and railings are to be designed in accordance with Table 3.3 of AS/NZS 1170.1.
4.2 Serviceability

4.2.1 Deflection Limits

Deflection limits for the concrete structures are generally as follows.

<table>
<thead>
<tr>
<th>Maximum Floor Deflection Limit</th>
<th>Dead</th>
<th>Incremental</th>
<th>Live</th>
<th>DL + LL</th>
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<tr>
<td>Floors supporting masonry walls</td>
<td>Span/360</td>
<td>Span/1000 ¹.</td>
<td>Span/500</td>
<td>Span/300 (25mm max.)</td>
</tr>
<tr>
<td>Compactus areas</td>
<td>N/A</td>
<td>Span/750 ²</td>
<td>N/A</td>
<td>25mm max.</td>
</tr>
<tr>
<td>Other floor areas</td>
<td>Span/360 (20mm max.)</td>
<td>N/A</td>
<td>Span/500</td>
<td>Span/300 (25mm max.)</td>
</tr>
</tbody>
</table>

¹ Areas supporting normal weight masonry partitions.
² Incremental deflection after compactus installed

4.2.2 Durability

For concrete elements this will be achieved by specifying all elements in accordance with section 4 of AS 3600 which sets out requirements for plain, reinforced and post tensioned concrete structures and members with a design life of 40 to 60 years. Exposure classifications are as follows.

<table>
<thead>
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<th>Exposure classification</th>
<th>Elements</th>
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<tr>
<td>A2</td>
<td>Internal</td>
</tr>
<tr>
<td>B1</td>
<td>External</td>
</tr>
<tr>
<td>A2 – To be confirmed by Geotechnical Engineer</td>
<td>In Ground</td>
</tr>
</tbody>
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Protective coatings to structural steel elements shall comply with AS/NZS 2312 and ISO 2063 for the long-term protection category.

4.2.3 Occupant Perception of Motion

As outlined in section 5.7.4, the Clinical Services Building will be designed to an RF2 response factor as there are no operating theatres and other sensitive areas which require a greater restriction on vibrations experienced by the occupants.

4.2.4 Fire Resistance Levels

The BCA type of construction required for this building will be type A. Fire Resistance Levels (FRL) for the structural elements will need to be in accordance with Specification C1.1 of the BCA. Typically the FRL (minutes) for concrete structural elements is 120/120/120.

4.3 Design Standards

The structural design will be in accordance with the latest revision of all relevant Australian Design Standards, the Building Code of Australia and other statutory requirements. As a minimum requirement, the design shall be based on, but not limited to:

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<th>Title</th>
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<td>AS/NZS 1170.0</td>
<td>2002</td>
<td>Structural design actions Part 0: General Principles</td>
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<tr>
<td>AS/NZS 1170.1</td>
<td>2002</td>
<td>Structural design actions Part 1: Permanent, imposed and other actions</td>
</tr>
<tr>
<td>AS/NZS 1170.2</td>
<td>2002</td>
<td>Structural design actions Part 2: Wind actions</td>
</tr>
<tr>
<td>AS 1170.4</td>
<td>2007</td>
<td>Structural design actions Part 4: Earthquake loads</td>
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<tr>
<td>AS 2159</td>
<td>2009</td>
<td>Piling – Design and installation</td>
</tr>
<tr>
<td>AS 3600</td>
<td>2009</td>
<td>Concrete Structures</td>
</tr>
<tr>
<td>AS 3700</td>
<td>2001</td>
<td>Masonry Structures</td>
</tr>
<tr>
<td>AS 4100</td>
<td>1998</td>
<td>Steel Structures</td>
</tr>
<tr>
<td>HI Design Guidance Note 1</td>
<td>Rev A 22 Oct 2012</td>
<td>Structural Design Criteria Guidelines</td>
</tr>
</tbody>
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5 Clinical Services Building (CSB)

The Clinical Services Building is comprised of three wings with a support bar in an 'E' configuration. One basement level, six suspended internal floors and a concrete roof make up the main frame from the West and Central wings, whilst the third wing is to have three suspended internal floors and a concrete roof. An open atrium portal frame structure with high level hanging walkways will act as a bridge between the Clinical Services Building and the adjacent existing hospital buildings 3 and 5 (69 and 71) built in the 1940's. The typical structural grid of 8.4m x 8.4m has been adopted in accordance with Health Infrastructure guidelines.

5.1 Future Proofing

The new building will be designed in consideration of the later stages noted in the 171026 Concord Repatriation General Hospital Master Plan Optimisation drawings. HI have advised that no future levels are to be allowed for in the Stage 1 CSB design; however, the structural design of the shoring will consider future extension of the services tunnel east for stages 2 and 3.

5.1.1 Concrete Floor Slabs

All new suspended slabs other than roofs, atrium and link bridges have been documented with an integral 40mm topping as per Health Infrastructure guidelines for future proofing. Slabs have been designed for vibration to achieve RF2 in accordance with Design Guidance Note 1, noting that there are no areas surgical areas or laboratories that would require RF1.

The Health Infrastructure Design Guidance Note 1 recommends a detail for typical future penetration provisions as shown below. Conversations between TTW, the hydraulic engineers and the architects are ongoing. The current hydraulic requirement is to have a 500x250 penetration adjacent to a column to allow 3 pipes to pass through each floor. The information they have provided at this stage is that should there be any future works done to the building, these three pipes would be sufficient, and that future penetrations are not required. Structurally for most internal columns, the additional allowance for a future penetration will not be a problem—however, requirements by HI will be clarified and confirmed during detailed design.

TTW note that not all internal columns will be able to have these penetrations as in some locations large mechanical risers are adjacent or are limited by other design elements.

Some edge columns will have small hydraulic risers adjacent to them, however, in general no allowance will be made for future penetrations.

5.2 In Ground Services

Historically the area between building 3 and 5 was an access road through the hospital site and consequently many of the major existing in ground services including stormwater and sewer run under the proposed atrium towards the CSB. During enabling works many of the existing services will be decommissioned or temporarily diverted. At this stage both the sewer and stormwater pipes will impact on the design of the shoring walls and require coordination with both the temporary and permanent works. During the enabling works both services are proposed to run between existing building 5 and the CSB shoring wall SW12 to the North. The permanent location of the stormwater is proposed to run underneath a new service tunnel that will run along the south side of the North shoring wall SW12. Whilst the pipe is documented to be located approximately 4m away from the face of the shoring wall, the pipe will be sitting up to 2m below the typical bulk excavation level having a significant impact on the shoring design. Allowance for a permanent sewer line and other services in this same area have also been made in the preliminary design of the shoring wall. This has resulted in larger 900 diameter piles along this section of the shoring wall.

Future Proofing

Allowance for a permanent sewer line and other services in this same area have also been made in the preliminary design of the shoring wall. This has resulted in larger 900 diameter piles along this section of the shoring wall.

5.3 Bulk Excavation

Based on Douglas Partners geotechnical report 85356.00.R.001.Rev0 the rock profiles vary across the CSB development site. Most of the site will require at least minor excavation into rock with the rock level dropping towards the south east the excavation will become limited to fill and clay or extremely low strength shale. It is considered that the natural soils will be readily excavated using standard earth moving equipment. For excavation into rock reference should be made to the Geotechnical Investigation Report.

Groundwater is not expected to be an issue, as no groundwater was observed during auger drilling. Douglas Partners note that it is likely that the permanent groundwater level is within the rock (below bulk excavation level) and that some seepage should be expected from temporary flows. Drainage systems should be installed to manage any seepage. Shoring and retaining structures will be designed assuming adequate drainage is provided to prevent hydrostatic loading onto these structures.
5.4 Earth Retaining Structures

With excavation depths up to 6m on the north side of the CSB a piled shoring wall consisting of bored cast-in-place soldier piles and shotcrete infill panels has been selected. Along the east and west sides of the CSB the retained height gradually reduces, however, due to the proximity of the existing buildings on the west and a road critical to the hospital operation the shoring continues rather than changing to retaining walls which require temporary batter. Block retaining walls will be used where retained heights are around 2m or less, and there are no restrictions for temporary batter.

The shoring wall systems will vary across the extent of the site. A combination of cantilevered piles, soldier piles with permanent anchors, and piles with temporary anchors with permanent propping by the slab will be utilised due to various site conditions and building outlines. Piles will typically vary between 600 and 900 diameter with the final design by piling contractor.

Due to air intake requirements into specific areas of the basement, there are limitations put on the shoring design in these areas as the lower ground slab cannot fully prop the shoring wall. In some locations, the cantilever height of the shoring wall is too high for a reasonable cantilever design solution. In this situation, a soldier pile wall with small propping beams at each pile location is proposed to prop back to the main structure (Figure ). At these locations, temporary anchors will be used to support the shoring wall prior to Lower Ground level being built, stressed and early shrinkage has occurred. At another air intake location, propping beams cannot be used, as these will encroach on the volume of the air intake. In this location the pile wall needs to cantilever without support at Lower Ground floor and as such contiguous piles are needed to limit the pile size to 600 diameter (Figure ).

Figure 8. Propping beams used to support shoring wall

Figure 9. Cantilever piles at air intake along North East of the basement

Along the East side of the site, openings in the shoring wall below lower ground level into the basement are required for air flow. A soldier pile wall with a sloping capping beam is being proposed, with columns built off the capping beams used to prop the shoring wall back up to the Lower Ground floor over. Even though the retained height in this area is lower, the rock is well below the excavation height, and a cantilever design would be uneconomic with deep pile toe depths.

The light well on the west side of the lift core creates a large void through the floor plates which normally prop the shoring walls and due to the retained height it is not feasible to cantilever the shoring wall. Permanent ground anchors are proposed along the length of the light well with anchors grouted into strong rock to the north under building 4 (Figure ).
5.5 Foundations

Foundations below columns, lift cores and stairwells are expected to be large diameter (nominally 900mm) bored piers with lengths varying across the site as the rock profile drops from West to East. Piles located under the lift cores and stair wells will be tied together with a base to transfer loads from columns to piles. Piles are socketed into class II shale with larger socket lengths for piles in tension. The Geotechnical Investigation conducted by Douglas Partners notes an allowable bearing pressure of 3500kPa and an allowable shaft adhesion of 350kPa for class II shale. Where piles are in tension sockets in rock will be prepared for shaft adhesion.

5.6 Vertical Structure and Stability

Floor to floor height in the new build varies between 4.0m (in the basement) to 4.2m and 4.5m (for the typical floors), up to 5.14m on the lower Ground entry level. Transfer structures have been minimised by the use of a simple grid, however in some areas there are some minor transfers required where the building wings step back on the upper floors. These transfer bands are typically deeper than the typical band thickness.

The new building has a stair core at the south end of each wing, and a number of stair and lift cores along the north of the building. These provide the primary stability to the building. The atrium link bridge structure will provide its own stability and will be designed as separate from the main structure in terms of lateral forces, refer section 4.10.

Differential settlements between the new and existing buildings are not critical to the design due to the articulation length provided by the atrium and the CSB building will be entirely founded on similar rock to limit differential settlement of the foundations.

5.7 Slab Design Considerations

As part of the Schematic Design Stage, TTW have investigated a number of floor options. From this investigation and consultation with the rest of the design team, a suggested post tensioned structural system has been proposed.

Option 1 - Post Tensioned Concrete Banded Slab

As shown on the structural drawings in Appendix A the post-tensioned banded slab consists of 2200 wide band beams. This system is considered to be the most efficient solution based upon cost and speed of construction. By minimising the structural depths the weight of the structure is also reduced which in turn allows the transfer beam depths to be less than those required for other types of structures.

Option 2 - Post-tensioned or reinforced flat slab with drop panels

This option maintains the typical 8.4m grid as per option 1. In place of 2.2m wide bands, 2.2m x 2.2m drop panels are provided at the columns. While not as cost-efficient as the banded slab option (due to more complicated formwork) the benefits of this system include the greater flexibility of mechanical ducts (which are not required to be dropped such as when traversing a band) which makes them less onerous for services reticulation.

Reinforced systems are deeper than post tensioned systems.

Option 3 – Post Tensioned flat plate

With its flat soffit, this option has the advantage of the simplest formwork of the 3 options considered, making it an economical option. The flat soffit also has advantages for services reticulation due to the minimising of obstructions. The disadvantages of this system include the requirement for a significantly thicker slab and inferior dynamic performance. Like the other 2 options, the flat plate option is also post-tensioned in both orthogonal directions.

Steel framed systems were considered but rejected, particularly for the areas matching existing levels and low floor to floor heights.
5.7.3 Penetration Requirements

Future flexibility is achieved whereby additional penetrations can be placed cut adjacent to columns or existing penetrations next to columns. In the detailed design stage, these locations will be marked on plan and coordinated with services consultants and the architect. Post tensioning tendons will be kept clear of the penetration zone and any zones that are not used as part of this development will be marked on the slab soffit so that the extent of the possible future penetrations is clear.

A post-tensioned system does result in some limitations with regards to larger scale future services penetrations, as the stressed tendons within the slab cannot be compromised without detriment to the capacity of the slab. As such it is recommended that the tendon layouts for the slab are marked on to the formwork and then permanently to the underside of the slab in order to locate tendons in the future. Future penetrations up to 1m x 1m can usually be accommodated between tendons without additional strengthening.

5.7.4 Vibration

The vibration criteria being adopted is similar to that being used in the design of other major NSW public hospitals. In this case, the new building (including the floor over) which are to comply with RF1 (Response Factor 1). This is a British Standards term that relates to a multiplying factor of 1 on the vibration base curve in AS 2670.2-1990 and ISO 10137-2007. The new building will be designed for the vibration criteria RF2 (Response Factor 2) which is less sensitive to vibration. Note that RF1 and RF2 areas have slightly different structural requirements for slab thickness and band depth when using the preferred proposed post-tensioned banded slab system.

Organisation where applicable. The design criteria are also informed by the report "Floor Vibration due to Human Activity" by Thomas Murray, David Allen and Eric Ungar.

It is anticipated that no special equipment will be required to achieve high vibration performance better than RF2 response.

5.7.5 Slab on ground

The Basement floor of the Clinical Services Building will be designed as a slab on ground with allowance for HRV trucks up to 16tonnes in the loading dock and MRV up to 8tonnes in the ambulance bay.

For the atrium link bridge, the Lower Ground Floor is the base level and will be designed as slab on ground. The remaining levels are to be suspended, with composite steel construction proposed for the link bridges hung from the roof rafters.

5.8 Radiation Bunker

Historically health projects in NSW have generally adopted a reinforced slab system as it is considered to be more flexible for the installation of future penetrations. Whilst this is correct to some extent there are still limitations on where penetrations can be installed.

Post tensioned slab systems are now being used in health projects more regularly due to the reduced slab depths, speed of construction and lower costs. This is even more relevant for this project given the size of the structural grid which has been adopted. The reduced slab depths also has a beneficial effect on earthquake loads which increase as the mass of the building increases. In any cases where spans greater than 8.4m exist, options 2 and 3 start to become uneconomical.

Differential settlements between new and existing buildings to be designed for, typically by ensuring all new structure is founded on the same material as the existing buildings. Movement joints are proposed at the junctions between new and existing buildings.

The requirements of HI Design Guidance Note 1 – Structural Design Criteria have been implemented as outlined in sections 5.7.2 to 5.7.4 below.

5.9 Roof Structure

The Clinical Services Building is to be designed with a post tensioned concrete slab for the roof, similar to the lower floors except with no sacrificial integral topping. A light weight steel framed roof structure will generally cover all concrete roof areas not designated as plant space. The lightweight steel is proposed to be trusses similar to recent major hospital developments. The concrete roof will be laid to falls and have a waterproof membrane as required by the architect.

This type of roof structure is preferable to a full steel roof for a number of reasons;

- It enables a roof to be installed soon after the last floor goes up, enabling the building to become covered without bringing on another trade; speeding up the time in construction and the waterproofing of the structure.
- It simplifies the installation and design of the façade because both the top level and the lower levels can maintain the same interface details.
• Having anchor points on a concrete roof provides a simple solution for future cleaning of the façade.
• Having a greater capacity than a typical steel roof, concrete lends itself to more flexibility in the future (e.g., if additional plant is required on the roof).

5.10 Atrium and Link Bridges

An atrium and link bridge structure is proposed to be built between existing building 3 (formerly building 71), existing building 5 (formerly building 69) and the new CSB. At the schematic design stage, the proposed structure is to be independent from the main building, existing buildings and the proposed atrium lift/lobby structures. The proposed structural design for the Atrium is to be a two-way portalised sway frame, relying on the structural frame strength and stiffness to provide stability for the structure (Figure 2).

The new atrium service lift and lobby structures are proposed to be designed and constructed independently from the atrium structure. The lift structure is proposed to be designed with steel members consisting of rectangular and square hollow sections. The lift lobby floor structure is proposed to be a composite slab, supported by structural steel framing. To stabilise the lift and lobby structures, it is proposed to tie the new structures into the existing buildings Figure 4. This will require localised demolition of the existing face brick to tie the new structural members to the existing structure beyond. In addition, an ingress/egress opening will need to be provided in the western wall of building 5, with associated minor works expected to cut penetrations into the existing brick facade.

5.10.1 Existing building constraints

The existing buildings and associated in-ground utilities present a number of constraints to the proposed Atrium. The proposed lift requires a reinforced concrete lift-pit partially built into the existing basement of building 5 (Figure 5). This will require the partial demolition and stabilisation of the existing retaining wall and breaking out of the existing basement slab to found the lift-pit onto a suitable foundation material - in close proximity to the existing footings. Similarly, the proposed structural layout requires the columns to be located as close to the existing buildings as possible, to ensure an adequate clear space is provided. The proposed foundation system developed to support the structural columns consists of bored, cast-in-place piles. Due to the location of the columns, the proposed bored piles may encounter excavated footings from the existing structure or existing utilities and accompanying pits (Figure 6). If this were to be the case, it is envisioned that the piles would have to be relocated and a series of ground beams implemented to clear the in-ground constraints.

The atrium site presents access and lifting constraints that potentially impact the constructability of the atrium. It is proposed that the steel portion of the structure for the lift/lobby and main atrium would be constructed first, with the composite steel-concrete columns starting form lower ground level. The remaining concrete elements at Lower Ground and Ground level could follow after demobilisation of the crane used for steel erection.
5.10.2 Fire Strategy

The fire protection strategy is being developed in coordination with the BCA consultant, architect and fire engineer. A number of options have been submitted utilising a combination of fire walls, drenching sprinklers and design of structural members to comply with the required FRL. In all current options, the main atrium columns are to achieve 120/120/120 FRL with concessions being explored for the suspended link bridges and remaining roof structural steel.

5.11 Construction Considerations

5.11.1 Core walls

All core walls are specified as reinforced concrete and generally retain the same geometry over the full height of the building. The selected contractor may choose to either build the walls conventionally or jump the walls ahead of the slab working deck using a jump form. Our expectation is the walls will be constructed either conventionally or with a modular formwork system that is craned into position. Due to the relatively short height of the building a jump form system is unlikely to be cost efficient.

5.11.2 Tall columns

There are a number of columns across the building both internal and external that span multiple stories between supports. The CSB columns are typically 600 diameter concrete columns and vary in height from about 8.5m to approximately 14m. These columns can be built in situ using standard propped circular form-a-tube formwork however the taller columns will need to be poured in lifts.

5.11.3 Staging

The CSB and atrium slabs are anticipated to be constructed over 6 pours either starting or finishing with the atrium, refer to figure 17 for indicative staging.
6 Multi Storey Car Park (MSCP)

6.1 Structural Description

On the North side of Hospital Road a multi storey carpark is proposed to be constructed in stage 1 on the site of the existing on grade car park with future horizontal extensions of the building planned towards the East in future stages. At the planning stage the carpark follows an 8.4m x 10.3m column grid with a post-tensioned banded slab design recommended to be adopted based on previous major hospital car parks. Further options will be evaluated once the ramp configurations and column grid is finalised.

6.2 Geotechnical Conditions

Douglas Partners addressed the multi Storey Carpark in report 85366.00.R.001.Rev0 and Coffey have undertaken further investigation of the entire existing on grade car park site in report SYDGE221253-AC dated 2 February 2018.

6.3 Foundations

The foundations are expected to be bored cast-in-place reinforced concrete piles socketed into medium strength or better shale. Where the column sizes permit the piles will not require a pile cap.

6.4 Slab System

The proposed 8.4m x 10.3m column grid suits a banded post-tensioned slab rather than a flat slab solution. The vertical reinforced concrete elements may become precast to speed up the construction, however, this option will be dependent on the preference of the builder selected. An alternative steel framed structural scheme with composite or precast slabs will be investigated further in the next design stage.
7 Risks and Opportunities

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<tr>
<th>Risks</th>
<th>Mitigation Strategy</th>
<th>Risk Weighting</th>
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<tbody>
<tr>
<td>Presence of existing in ground services clashing with proposed new build works, leading to damage to services and impact on hospital critical operations.</td>
<td>• Divert services around site to reduce risk of clashes. Undertake and overlay in ground services survey on footing plans to inform contractor of in-ground risks.</td>
<td>Medium</td>
</tr>
<tr>
<td>Presence of existing in ground obstructions clashing with proposed new build works, leading to site delays and extensive re-work to avoid.</td>
<td>• Review all available as built documentation and overlay line marking plans on footing plans to inform contractor of in ground risks. Clashes to be reviewed in Detailed Design stages.</td>
<td>Medium</td>
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<tr>
<td>Disruption of hospital operations during construction works, particularly with the construction within an extremely enclosed site.</td>
<td>• Completion of decanting works prior to excavation and demolition activities. Architect to specify acoustic and infection control approved hoarding lines to construction site during later design stages.</td>
<td>Medium</td>
</tr>
<tr>
<td>Maintaining access to emergency drop off and main entry during construction.</td>
<td>• Project Manager to include provision of full traffic control as a contractor requirement in contract prelims. Design team to review site logistics during enabling works design stage.</td>
<td>Medium</td>
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<tr>
<td>Opportunities</td>
<td>Proposal for Review</td>
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<tr>
<td>Investigate using Building 5 service tunnel that enters the new building site through the shoring line. This could be tied into the new buildings service tunnel.</td>
<td>• Reviewed during DD stage.</td>
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8 Appendix

8.1 Appendix A - Structural Drawings
CONCORD HOSPITAL REDEVELOPMENT
STAGE 1

TENDER NOTES
1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete set of construction drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural drawings.
3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.
4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.
1. Refer Architects Drawings for setout of all columns, and walls.

2. To determine the full extent of work, these drawings shall be read in conjunction with the Architects Drawings and design anchors to avoid any ambiguity.

3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.

4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

5. Contractor to allow for geotechnical engineer to inspect and certify the required bearing and friction capacities prior to construction of any footings or prior to commencing excavation. Divert all services where indicated on services consultants drawings. Where any clashes have been achieved before casting footings.

6. Line denotes approximate existing ground level.

7. Denotes borehole locations. Refer to geotechnical report noted on drawing DRG-0001.

All existing services under building footprint to be located prior to construction of any footings or prior to commencing excavation. Divert all services where indicated on services consultants drawings. Where any clashes have been achieved before casting footings.

PLOTTED BY: AT ON EXISTING BUILDING 74

CONCORD HOSPITAL REDEVELOPMENT STAGE 1
SHORING AND FOOTING PLAN

FOOTING BEAM SCHEDULE

SCALE: 1:200

SHORING AND FOOTING PLAN

Fabrication requirements etc.

BASE EXISTING RETAINING WALL ASSUMED LOCATION OF INDICATIVELY TO BE DEMOLISHED SHOWN EXISTING SERVICING TUNNEL SHORING DEMOLISHED BACK TO EXISTING TUNNEL. TO BE

ALL RELEVANT NOTES ON DRG-0001 WHITTING (NSW) Pty Ltd and must not be used without authorisation.

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P3

SCHEMATIC DESIGN

TENDER NOTES

1. These drawings and preliminary design data include as an indication of the extent of works. They are not complete set of construction drawings.

2. The tenderer shall maintain control of work. These drawings shall be read and used in conjunction with the tenderers own site surveys and all other relevant information.

3. The tenderer shall arrange for their own site visits and the submission of the final tender documentation.

4. The tenderer shall take their own site surveys and all other relevant information.

5. They shall arrange for their own site visits and the submission of the final tender documentation.
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Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify the Authorised Representative.
NOTES:

SHORING DESIGN BY D&C CONTRACTOR.
ANCHORS TO BE POSITIONED TO AVOID CLASH WITH PERMANENT STRUCTURE.
PILE CUT OFF LEVEL TO BE DETERMINED BY SHORING D&C CONTRACTOR.

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4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

TENDER NOTES

1. These systems and permanent elevations need to be revised in accordance of site’s existing levels. They are to be finalised at a later stage.

2. To determine the extent of works, these elevations shall be reviewed in conjunction with the structural drawings. Care should be taken not to conflict with the existing structural elements. In case of any doubts, please advise the structural engineer.

3. Please note that this drawing is for the indication of ground level and elevation change to the existing structure.

4. Any changes to the existing ground levels and elevations to be confirmed by the structural engineer.

5. The structural engineer shall confirm any changes to the existing ground levels and elevations in the tender documents.

6. Please refer to the architectural drawings for any additional information.

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North Sydney, NSW, 2060

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AT

CONCORD HOSPITAL
REDEVELOPMENT
STAGE 1
SHORING ELEVATIONS - SHEET 2

SCHEMATIC DESIGN

P3
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SCHEMATIC DESIGN

CONCORD HOSPITAL REDEVELOPMENT STAGE 1
SHORING SECTIONS - SHEET 2

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P2 12.03.18 PRELIMINARY ISSUE TK HJ
P3 16.03.18 DRAFT SCHEMATIC DESIGN AT RJ

PLOTTED BY:  AT ON
TENDER NOTES
1. These preliminary and schematic drawings tend to require an
understanding of the entire set of drawings. They are not considered as
complete drawings.
2. To determine the extent of work, these drawings shall be read in
conjunction with the architectural drawings and other contract
documents. Allow for all items shown on architectural and other
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TYPICAL SHOTCRETE WALL PLAN
SCALE 1:20

TYPICAL CAPPING BEAM DETAILS
SCALE 1:20

TYPICAL PILE SECTION
SCALE 1:20

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WALL SCHEDULE - W9 TO W12

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SCHEMATIC DESIGN

WALL SCHEDULE - W13 TO W16

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CONCORD HOSPITAL REDEVELOPMENT STAGE 1
WALL ELEVATIONS SHEET 6

TENDER NOTES
1. These structural and preliminary drawings need to be read in conjunction with the architectural drawings and the structural engineer's design.
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Scale: 1 : 100
ELEVATION - W25
ELEVATION - W26
ELEVATION - W27
ELEVATION - W28
ELEVATION - W29
ELEVATION - W30
ELEVATION - W31

ELEVATION - W25
ELEVATION - W26
ELEVATION - W27
ELEVATION - W28
ELEVATION - W29
ELEVATION - W30
ELEVATION - W31

KEY PLAN - W25 TO W31

WALL SCHEDULE - W25 TO W31

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WALL ELEVATIONS SHEET 8

SCALE: 1:100

ELEVATION - W39

ELEVATION - W40

ELEVATION - W41

ELEVATION - W42

ELEVATION - W43

ELEVATION - W44

ELEVATION - W45

KEY PLAN - W39 TO W45

WALL SCHEDULE - W39 TO W45

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TENDER NOTES
1. These drawings and preliminary drawings made in accordance with the Architect's concept of design and are subject to change as the design and/or construction drawings are revised.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and contract documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural drawings.
3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify in writing to the superintendent.
4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.
NOTES:
1. REFER PLANS AND ELEVATIONS FOR LOCATIONS OF JOINTS.
2. WATERSTOPS & SEALANTS (WITH BOND BREAKERS) TO BE INSTALLED IN W.P.J. AND C.J. MAY BE INTERCHANGED AT ANY LOCATIONS.
3. C.J. TO BE AT 8000 MAX CTS. E.J. TO BE AT 30m MAX CTS.
4. SEALANTS TO HAVE A MINIMUM FIRE RATING EQUIVALENT TO WALL.

TENDER NOTES
1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete set of construction drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents.
3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.
4. Rates shown on these drawings are for the final structure in place (N16 MINIMUM).
TENDER NOTES
1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete set of construction drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural drawings.
3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.
4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.
TYPICAL STAIR DETAILS

NOTE: NUMBER OF RISERS MAY VARY.
REVIEW ARCHITECT’S DRAWINGS FOR NUMBER OF RISERS.

LANDING
N12-450 SUPPORT BARS
TOP TYPICAL
N12-300 CROSS RODS
L/3 SPAN = L

STRAIGHT LANDING
L/3

TENSION LAP
B1

CROSS FLIGHT
TENSION LAP

SLAB REINFORCEMENT

WALL

DOORWAY

30mm CONSTRUCTION JOINT

FOR WALL REBATE REFER TYPICAL WALL DETAILS

NOTE: THESE DRAWINGS ARE FOR TENDER PURPOSES AND ARE NOT CONSIDERED AS A SET OF COMPLETED DRAWINGS. THEY ARE THE PROPERTY OF TAYLOR THOMSON WHITTING (NSW) PTY LTD AND MUST NOT BE USED WITHOUT AUTHORIZATION.

TENDER NOTES
1. These drawings are preliminary drawings issued for tender as an indication of the work to be done. They are not a complete set of construction drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural drawings.
3. If any ambiguity, error, omission, discrepancy, or other fault is found or seems to be found in the documents, immediately notify, in writing, to the superintendent.
4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements.

CONCORD HOSPITAL REDEVELOPMENT STAGE 1

STAIR DETAILS

SCHEMATIC DESIGN

TAYLOR THOMSON WHITTING
602 39 SRB 1980 - 4 Cheddar Street, Luddenham, NSW 2741
TEL: +61 2 9928 2100 FAX: +61 2 9928 2500 WEB: www.jacobs.com

171496-NEWB-ST-DRG-001
16/03/2018 4:30:53 PM

PLOTTED BY: AT ON SCHEMATIC DESIGN
1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete set of construction drawings.

2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural drawings.

3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.

4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.
TENDER NOTES
1. These drawings are preliminary drawings issued for tender as an indication of the form and style of the final construction drawings.
2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other contract documents.
3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.
4. Without prejudice to the above, in the absence of instructions in the tender documents, the Contractor shall be responsible for checking the drawings and the documents, and for ensuring the work is carried out in accordance with the drawings and the documents.
This drawing is copyright and is the property of TAYLOR THOMSON

REFER DRAWING S2501 FOR CONTINUATION

REFER DRG-2601 FOR STEEL MARKING PLAN

MARK SIZE COMMENTS

- C 2 600 DENOTES SOFT ZONE FOR CAST-IN CONDUITS IN SLAB
- C 7 200 500
- C 8 250 1000

TYPICAL CONCRETE STRENGTHS:
- 65MPa AT BASEMENT AND LOWER GROUND
- 50MPa AT GROUND FLOOR - LEVEL 2

CONCRETE STRENGTHS AT EAST WING COLUMNS ON GRIDS 1-5, GRIDS L-P:
- 40MPa AT GROUND FLOOR - LEVEL 6

TENDER NOTES
1. These drawings and associated documents must be read in conjunction with any tender notes or other contract documents.
2. The drawings demonstrate that there are no faults, errors or omissions that are material.
3. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, or fabrication requirements.
4. Rates for soft zones reflect the costs of cast-in conduits in slabs.

North Sydney, NSW, 2060

Structural Engineer

T: +61 2 9928 2100
F: +61 2 9928 2500

Conceptual Design

CONCORD HOSPITAL REDEVELOPMENT
STAGE 1
LEVEL 2 OUTLINE PLAN
This drawing is copyright and is the property of TAYLOR THOMSON WHITTING (NSW) Pty Ltd and must not be used without authorisation.

REFER DRAWING S2601 FOR CONTINUATION

REFER DRG-2601 FOR STEEL MARKING PLAN

CONCRETE COLUMN SCHEDULE

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TENDER NOTES

1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete set of construction drawings.

2. To determine the full extent of work, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other contract documents.

3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.

4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

5. ANY PENETRATIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS ARE TO BE SUBMITTED TO THE PRINCIPAL PRIOR TO CASTING CONCRETE. ALL HYDRAULIC SERVICES ARE TO BE PLACED PRIOR TO POURING CONCRETE NO CORING THROUGH SLAB STRUCTURE IS PERMITTED.

6. FINAL LOCATIONS OF TEMPORARY MOVEMENT JOINTS AND CONSTRUCTION JOINTS BY D&C CONTRACTOR.

7. THESE DRAWINGS ARE ISSUED FOR TENDER AS AN INDICATION OF THE EXTENT OF WORKS ONLY. THEY ARE NOT A COMPLETE SET OF CONSTRUCTION DRAWINGS.

8. TO DETERMINE THE FULL EXTENT OF WORK, THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE ARCHITECTURAL DRAWINGS AND OTHER CONTRACT DOCUMENTS. ALLOW FOR ALL ITEMS SHOWN ON ARCHITECTURAL AND OTHER CONTRACT DOCUMENTS.

9. SHOULD ANY AMBIGUITY, ERROR, OMISSION, DISCREPANCY, INCONSISTENCY OR OTHER FAULT EXIST OR SEEM TO EXIST IN THE DOCUMENTS, IMMEDIATELY NOTIFY, IN WRITING, TO THE SUPERINTENDENT.

10. RATES SHOWN ON THESE DRAWINGS ARE FOR THE FINAL STRUCTURE IN PLACE AND DO NOT ALLOW FOR ANY WASTAGE, ROLLING MARGINS, OVER SUPPLY OR FABRICATION REQUIREMENTS ETC.

11. ANY PENETRATIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS ARE TO BE SUBMITTED TO THE PRINCIPAL PRIOR TO CASTING CONCRETE. ALL HYDRAULIC SERVICES ARE TO BE PLACED PRIOR TO POURING CONCRETE NO CORING THROUGH SLAB STRUCTURE IS PERMITTED.

12. FINAL LOCATIONS OF TEMPORARY MOVEMENT JOINTS AND CONSTRUCTION JOINTS BY D&C CONTRACTOR.
This drawing is copyright and is the property of TAYLOR THOMSON WHITTING (NSW) Pty Ltd and must not be used without authorisation.

TENDER NOTES
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2. To determine the full extent of work, these drawings shall be read in conjunction with all relevant notes on DRG-0001.

3. Should any ambiguity, error, omission, discrepancy, inconsistency or inaccuracy arise from these drawings, the Architect should be consulted.

4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

LEVEL 5 OUTLINE PLAN - 220 THICK SLAB U.N.O.

1. ALL SLAB BANDS TO BE 2200 WIDE U.N.O.
2. ALL SLAB BANDS TO BE 400 DEEP U.N.O.
3. REFER ARCHITECTS DRAWINGS FOR LEVELS, FALLS & FINISHES.
4. REFER ARCHITECTS DRAWINGS FOR SETOUT OF ALL COLUMNS, PLINTHS, WALLS, HOBS AND SETDOWNS.
5. ANY PENETRATIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS ARE TO BE SUBMITTED TO THE D&C CONTRACTOR PRIOR TO CASTING CONCRETE. ALL HYDRAULIC SERVICES ARE TO BE PLACED PRIOR TO POURING CONCRETE NO CORING THROUGH SLAB STRUCTURE IS PERMITTED.
6. FINAL LOCATIONS OF TEMPORARY MOVEMENT JOINTS AND CONSTRUCTION JOINTS BY D&C CONTRACTOR.

LEVEL 5 OUTLINE PLAN

CONCRETE COLUMN SCHEDULE

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TYPICAL CONCRETE STRENGTHS:
- 65MPa AT BASEMENT AND LOWER GROUND
- 50MPa AT GROUND FLOOR - LEVEL 2
- 40MPa AT LEVEL 3 - LEVEL 6
- 30MPa AT LEVEL 4 - LEVEL 5

TENDER NOTES
1. These drawings are preliminary drawings issued for tender as an indication of the extent of works only. They are not a complete set of documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural drawings.

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LEVEL 5 OUTLINE PLAN

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TYPICAL CONCRETE STRENGTHS:
- 65MPa AT BASEMENT AND LOWER GROUND
- 50MPa AT GROUND FLOOR - LEVEL 2
- 40MPa AT LEVEL 3 - LEVEL 6
- 30MPa AT LEVEL 4 - LEVEL 5

TENDER NOTES
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4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

LEVEL 5 OUTLINE PLAN

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LEVEL 6 OUTLINE PLAN - 180 THICK SLAB U.N.O.

1. ALL SLAB BANDS TO BE 2200 WIDE U.N.O.
2. ALL SLAB BANDS TO BE 400 DEEP U.N.O.
3. REFER ARCHITECTS DRAWINGS FOR LEVELS, FALLS & FINISHES.
4. REFER ARCHITECTS DRAWINGS FOR SETOUT OF ALL COLUMNS, PLINTHS, WALLS, HOBS AND SETDOWNS.
5. ANY PENETRATIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS ARE TO BE SUBMITTED TO THE SUPERINTENDENT PRIOR TO CASTING CONCRETE. ALL HYDRAULIC SERVICES ARE TO BE PLACED PRIOR TO POURING CONCRETE. NO CORING THROUGH SLAB STRUCTURE IS PERMITTED.

LEVELS:
- Level 6
- Level 5
- Level 4
- Level 3
- Level 2
- Level 1
- Ground Floor

SCALE: 1 : 200

CONCRETE COLUMN SCHEDULE

- TYPICAL CONCRETE STRENGTHS:
  - 65MPa AT BASEMENT AND LOWER GROUND LEVEL
  - 50MPa AT GROUND FLOOR - LEVEL 2
  - 40MPa AT LEVEL 3 - LEVEL 6
  - 40MPa AT GROUND FLOOR - LEVEL 6
1. ALL SLAB BANDS TO BE 2200 WIDE U.N.O.
2. ALL SLAB BANDS TO BE 400 DEEP U.N.O.
3. REFER ARCHITECTS DRAWINGS FOR LEVELS, FALLS & FINISHES.
4. REFER ARCHITECTS DRAWINGS FOR SETOUT OF ALL COLUMNS, PLINTHS, WALLS, HOBS AND SETDOWNS.
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6. FINAL LOCATIONS OF TEMPORARY MOVEMENT JOINTS AND CONSTRUCTION JOINTS BY D&C CONTRACTOR.

LEVEL 7 OUTLINE PLAN - 2200 THICK SLAB U.N.O.

CONCRETE COLUMN SCHEDULE

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TENDER NOTES
1. These drawings and preliminary design ideas are not to be resold as an independent product. They are not complete in all details.
2. To determine the full extent of works, these drawings shall be read in conjunction with the architectural drawings and other contract documents. Allow for all items shown on architectural and other drawings as not all items are shown on the structural drawings.
3. Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the documents, immediately notify, in writing, to the superintendent.
4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements.
TENDER NOTES
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4. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

NOTE: PILE SETOUT & Design to be coordinated with the Inground Services. Ground Beams may need to be introduced depending on Site Conditions & Services.

ATRIUM FOUNDATION PILE SCHEDULE

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NOTE:
1. Pile Setout & Design to be coordinated with the Inground Services. Ground Beams may need to be introduced depending on Site Conditions & Services.
2. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

NOTE:
1. Pile Setout & Design to be coordinated with the Inground Services. Ground Beams may need to be introduced depending on Site Conditions & Services.
2. Rates shown on these drawings are for the final structure in place and do not allow for any wastage, rolling margins, over supply or fabrication requirements etc.

Refer Drawing S0101 for Continuation.
ATRIUM STEEL COLUMN SCHEDULE

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1. Slabs on columns to be cast on layers of aggregate slab over 100mm free draining basecourse (Refer to Geotechnical Engineers Report).
2. Reinforce slabs on ground with 1 layer of steel fabric top throughout 30mm cover.
3. All levels and falls to Architect's details.
4. Refer to Hydraulic Engineers details for all sub-soil drainage, sumps, pits and grated drains.
5. Refer to the Geotechnical Engineer for all subbase requirements.
6. Allow for sawn joints at a maximum of 4.2m cts.
7. Allow for key joints at 8.4m cts.

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CONCORD HOSPITAL
REDEVELOPMENT
STAGE 1
ATRIUM LOWER GROUND OUTLINE PLAN

SCALE: 1 : 100

ATRIUM LOWER GROUND OUTLINE PLAN - 150 THICK SLAB ON GROUND U.N.O.

DENOTES EXTENT OF EXISTING SLAB TO BE DEMOLISHED

DENOTES EXISTING STRUCTURE

LOCALLY CORE EXISTING SLAB TO PASS NEW COLUMN THROUGH

EXISTING LOADING DOCK STRUCTURE TO REMAIN

NEW TOPPING TO ARCHITECT'S DETAILS

REFERENCE DRAWING S0900 FOR CONTINUATION

NOTE: PRINTS OR COPIES ARE NOT ACCURATE DRAWINGS AND ARE FOR INFORMATION ONLY
ATRIUM GROUND LEVEL OUTLINE PLAN - 220 THICK SLAB U.N.O.

1. ALL SURFACES TO BE GLOSS WHITE.
2. FLOOR FINISHES TO INCLUDE A FULLY TILED FINISHED SURFACE.
3. ANY PENETRATIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS ARE TO BE SUBMITTED TO THE PRINCIPAL PRIOR TO CASTING CONCRETE. ALL HYDRAULIC SERVICES ARE TO BE PLACED PRIOR TO POURING CONCRETE. NO CORING THROUGH SLAB STRUCTURE IS PERMITTED.

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DRAWING ISSUANCE: P1-23.02.18 70% SCHEMATIC DESIGN ISSUE AT RJ
P2-12.03.18 PRELIMINARY ISSUE AT RJ
P3-16.03.18 DRAFT SCHEMATIC DESIGN AT RJ

CONCORD HOSPITAL REDEVELOPMENT STAGE 1
ATRIUM GROUND FLOOR OUTLINE PLAN

SCALE: 1 : 100

PLOTTED BY: AT ON SCHEMATIC DESIGN

SCHEMATIC DESIGN

16/03/2018 4:31:30 PM
1. DENOTES DIRECTION OF BONDEK SPAN. 1.0MM BMT SHEETING.

REINFORCE WITH SL62 FABRIC TOP. Z450 COATING.

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SCALE: 1 : 100

CONCORD HOSPITAL
REDEVELOPMENT
STAGE 1

ATRIUM LEVEL 1 OUTLINE PLAN
- 130 THICK BONDEK SLAB U.N.O.

ATRIUM STEEL COLUMN SCHEDULE

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ATRIUM STEEL MEMBER SCHEDULE

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GP1 C20024
HB1 24 dia. ROD CLASS S TURNBUCKLE
P1 Z20024 AT 900 CTS
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Scale: 1:100

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CONCORD HOSPITAL REDEVELOPMENT STAGE 1
ATRIUM STEELWORK ELEVATIONS - SHEET 1

SCHEMATIC DESIGN

171496-NEWB-ST-DRG-2651 P2
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TYPICAL ATRIUM LIFT AND LOBBY PLANS

ATRIUM LIFT PLAN LEVELS 4, 5, 6

ATRIUM LIFT ROOF PLAN

ATRIUM STEEL COLUMN SCHEDULE

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