

27 April 2009

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TaylorThomsonWhitting

CITY ONE – WYNYARD, SYDNEY

STRUCTURAL REPORT

Introduction

This report outlines the proposed structural concept level design, based on the Concept Plan Application for the proposed development.

The proposed development will consist of a 20 storeys office tower above an 11 storey podium. The podium will include both commercial office space and a five storey high retail centre. The retail centre will include the pedestrian access ramps from George St down to the Wynyard Station concourse. There is potential to link the refurbished concourse to the Barangaroo development and the CBD Metro.

The proposed structure will be designed for strength, serviceability and stability, in accordance with the relevant structural clauses of the BCA and Australian Standards.

Proposed Superstructure

The proposed structural system is a reinforced and prestressed concrete frame with reinforced concrete core and shear wall system.

Prestress concrete is proposed to maximise the column grids and minimise any possible transfer structure.

The lateral loads will be resisted mainly by reinforced concrete core and shear walls that enclose stair and lift shafts and perimeter walls. Vertical loads will be carried by the walls and reinforced concrete columns.

A key element in the structural design is column grid which will minimise the impact on the station access and the Hunter Connection whilst leaving Wynyard lane unobstructed.

Geotechnical

A geotechnical investigation has not taken place on the site because the site is covered by existing buildings. Once the existing buildings are demolished, a Geotechnical investigation will take place. It is anticipated that Sydney CBD sandstone rock will be encountered about one level down from street level.

Foundation

The proposed foundation will be pads on high to medium strength rock.

The proposed foundation levels is below existing rail tunnels and Station Concourse.

Structural

Civil

Traffic

Facade

Engineers

TTW Group

Directors

RT Green BE(Hons) MEng Sc FIE Aust
 D Carolan BE(Hons) MEng Sc MIE Aust
 R VanKatwyk BE(Hons) DipEng MIE Aust
 R Mackellar BE(Hons) MIE Aust
 B Young BE(Hons) MIE Aust
 M Eddy BE(Hons)

Technical Directors

P Yannoulatos BE(Hons) Dip LGE MIE Aust
 D Genner BE(Hons) MIE Aust
 S Brain BE(Hons) MIE Aust
 D Jeffree BE MIE Aust
 R McDougall BE MIE Aust

Associate Directors

G Hetherington BE(Hons) MIE Aust
 S Schuetze BE(Hons) MIE Aust
 M Rogers BSc(Hons) MIE Aust
 T Sharrock BE(Hons) BEc MIE Aust
 A Scroggie BE(Hons) LLB MIE Aust
 G Freeman BE(Hons) Grad Dip IT MIE Aust
 N Foye BE(Hons) MIE Aust
 G Janes BE(Hons) MIE Aust
 H Nguyen BSc(Eng) MIE Aust
 D Taylor BE(Hons) MIE Aust
 J Troplano BE MIE Aust
 P Lambley BE MIE Aust

Associates

G. Petschack JP
 M. Raddatz

Shoring

Temporary shoring, underpinning and permanent retaining wall may be required around the site depending on the founding level of existing footing of adjoining buildings and extent of excavation.

Temporary ground anchors and rock bolts might be required. Temporary ground anchors will be destressed when the permanent retaining wall and basement structure are constructed to provide the necessary restraint.

Modification to existing structures and construction within Shell House

Existing structural drawings will be viewed and site inspections will be carried out including the former Shell House and existing Concourse.

The heritage part of the building structure will be maintained and repaired if required.

Emergency egress stairs are proposed at each end of Platform 3/4 and 5/6 which connects to the concourse and rise to York St level. Construction of these stairs will be done from top down during rail shutdown periods managed by RailCorp.

A key item to be assessed with the builder will be the requirement for carefully staged demolition and construction while maintaining the safe and unimpeded operation of the station and its access.

Design and Construction/Buildability Considerations

Structural design will take into consideration having Wynyard lane unimpeded or an alternative method of servicing the building within Wynyard lane and allow the operation of the station and its access to remain in use at all time.

Access to Hunter St via Hunter Connection beneath George St will be maintained.

Demolition and construction works will be programmed to minimise any temporary closure of Wynyard Lane and the public carpark access. The structural design will reflect this requirement.

The structural design and demolition will be considered in detail with the Builder and building consultants. Preliminary discussion has ensured that the proposed building structures can be built while maintaining all access.

RailCorp's requirements

To date the project has not been discussed in detail with the RailCorp authority but we do not anticipate any problem from our previous experiences.

Site investigation

Site investigation to identify existing footing level and condition of the adjoining structures.

Survey of existing underground services

The design of the structure will accommodate the retention, relocation and replacement of existing services discovered when the existing services have been surveyed. No works effecting RailCorps traction or services power are envisaged.

Dilapidation report

Dilapidation inspection of all adjoining properties and infrastructures will be carried out. The survey will establish the extent of any existing damage and enable any deterioration during construction to be identified.

Building condition report

Inspect structural condition of existing structures to be kept and identify items which may require repair, replacement or modification.

Impact from Railway

Consideration of any impact from Railway including: Noise and vibration; Stray currents and electrolysis from rail operations

Design Standards

The structural design will conform with the most current version of following Codes of Practices:

- AS 1170.0/2002 Structural design actions
- AS 1170.1/2002 Permanent imposed & Other actions

- AS 1170.2/2002 Wind actions
- AS 1170.4/2007 Earthquake loads
- AS 3600/2001 Concrete Structures
- AS 4100/1998 Steel Structures
- AS 3700/2001 Masonry Structures
- AS4678/2002 Earth Retaining Structures

The structural design will comply with the relevant sections of the Building Code of Australia, and the conditions of approval from the Department of Planning.

Design Criteria

The following design criteria shall apply:

<i>Geotechnical Conditions (to be confirmed by Geotechnical Engineer)</i>		
	Allowable end bearing pressures	Class II-III Sandstone (TBC)
	Retaining wall parameters	TBC
	Water Table Level	TBC
	Rock level	TBC
<i>Wind Load</i>		
	Terrain Category	4 (general)
	Region	A2

	Annual probability of exceedance	1:1000
	Regional Wind Speed	V=46 m/s
	Wind tunnel	TBC
Earthquake		
	Structure Classification	Type II
	Acceleration Coefficient	0.08
	Site Factor	0.67
	Importance Factor	1
	Earthquake design category	B

Design Loads

The Structure will be designed for the following design loads:

Floor Usage	Superimposed Dead Load (kPa)	Live Load (kPa)
Car park	0.25	2.5
Plants	2.5	5.0
Substation	5.0	5.0
Loading dock	0	10.0
Retails, Concourse	3.0	5.0
Office floor	1.0	4.0

Code recommendations will be used for satisfying the serviceability limit state.

Deflection limits

Deflection limits are generally to comply with

- Table 2.4.2 of AS3600 Concrete Structures Code
- Appendix B of AS4100 Steel Structures Code

except the following more stringent limits are to be complied with.

	Maximum Floor Deflection Limit (long term)			
	Dead	Incremental	Live	DL + LL
Car park, loading	Span/360 25mm max.	N/a	Span/500	Span/300 30mm max.
Retails, Concourse		Span/500	Span/500	Span/300 25mm max.
Plant				Span/300 30mm max
Office floor	Span/360 20mm max.	Span/500	Span/500	Span/300 25mm max.

All partitions will need to have regular vertical jointing to provide adequate flexibility

Lateral Drift

Wind load Inter-storey lateral drift = storey height / 500

Earthquake Inter-storey lateral drift $\leq 0.015 h_s$ (h_s = height of storey)

Floor Vibration

Method of analysis is in accordance with Floor Vibration due to Human Activity
- Murray, Allen and Ungar 1997

Forcing function is based on spectral frequency analysis of a single 75kg person walking.

Damping coefficient is 0.025.

Recommended peak acceleration is 0.05m/s^2 (0.5%g) in the vicinity of a single person walking.

Human sensitivity to vibration at this level is considered as being slightly perceptible but conforms with recommendations from several sources.

Durability Requirements

The durability requirements of AS3600 Concrete Structures will be applied to all reinforced concrete elements.

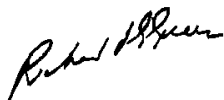
Protective coatings to structural steel elements shall comply with AS/NZS 2312 and ISO 2063 for the long-term protection category.

Fire Resistance Levels

The fire resistance levels of all structural elements shall comply with the relevant requirements of the BCA code or the requirements of the Fire engineering consultant where this supersedes the BCA.

Waterproof Structures

All concrete structures exposed to water and soil (i.e roof deck, water tanks, retaining wall, lift pits etc.) should be waterproofed. The type of waterproofing is yet to be confirmed.



RICHARD GREEN
DIRECTOR