

Bovis Lend Lease

**Darling Walk
Redevelopment**

Structural Design Report

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Structural Design Report

June 2008

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

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Executive Summary

The purpose of this report is to outline the design philosophy and loadings that will be used for the proposed commercial development at The Darling Walk redevelopment in Sydney.

The project includes the construction of a large building with 4 levels of basement car parking and approximately 60,000m² NLA which is to be used for commercial office space and some retail at ground floor.

1 Design Philosophy and Approach

It is proposed that the general structural format of the building will include a system of approximately parallel band beams on the columns lines. Preliminary design has shown that the depth of band beams will be in the range on 550mm by 2400mm wide. The band beams will be post-tensioned to reduce depth compared with a reinforced concrete structure solution and to control deflections.

In the basements the slabs will be a hybrid system of post tensioned concrete and reinforced concrete. These slabs will also act as restraints for the retaining walls.

2 Loading Criteria

2.1 Design Codes and Floor Loadings

The building structure will be designed in accordance with the requirements of the following Australian Standards:

- AS 1170.1 Dead and Live Loads
- AS 1170.2 Wind Forces
- AS 1170.4 Earthquake Forces
- AS 3600 Concrete structures
- AS 4100 Steel Structures

The following design live loads will be used for this building:

Geotechnical Conditions

The ground conditions are a mixture of soft marine mud with underlying rock as such the proposal is to support the building on piles through the mud into the rock. There is also a large amount of existing in-ground services which will be bridged with some large composite steel and concrete structures to straddle the elements.

Car parking Level

A design live load of 3.0 kPa generally and 10.0 kPa in the loading dock areas.

Ground Floor

A design live load of 4.0 kPa for retail areas. Additional loadings will be included for floor finishes. Typically this additional load will be approximately 2.5 kPa.

Office Floors

A design live load of 3.0 kPa plus 1.5 kPa for partitions ceilings and services.

Stairs

A design live load of 4.0 kPa.

Plant Motor Rooms

A design live load of 5.0 kPa subject to final equipment layouts to be confirmed in the detailed design phase.

Lateral Loads

The building will be designed to comply with the loading requirements in AS/NZA 1170.2 Wind Forces and AS1170.4.

2.2 Deflection Criteria

The current design brief stipulates that the total deflection of the floors and total incremental deflection of the floors cannot exceed 25mm and 20mm respectively. This criterion will add cost to the floors and all supporting structure. We propose that the deflection criteria specified in AS3600 and AS4100 and as specified below are appropriate for this building.

In all cases the actual design and observed deflection will be significantly less than those tabulated below because the floors will be post-tensioned which enables deflection to be controlled through the use of 'load-balancing'. This is a common technique in the design of office floors in commercial buildings.

Type of member	Deflection to be considered	Deflection limitation (ΔL_{ef}) for spans	Deflection limitations (ΔL_{ef}) for cantilevers
All members	The total vertical deflection	1/250	1/125
Members supporting masonry partitions	The deflection which occurs after the addition or attachment of the partitions	1/500 where provision is made to minimise the effect of movement, otherwise 1/1000	1/250 where provision is made to minimise the effect of movement, otherwise 1/500
Mullions	Deflection under wind load	1/240	

Articulation joints should be provided in masonry wall at locations to be agreed between FJMT and Arup.

2.3 Affect on Adjacent Structures

There are numerous structures around the proposed development. These include:

- The Cross City Tunnel (North and East of the building)
- The Western Distributor (North of the building)
- Chinese Friendship Gardens (South of the building)
- Bathurst Street Footbridge (North East of the building)
- Liverpool Street Footbridge (South of the building)

The proposed foundation system close to these structures is a piled solution. The toe levels of these piles will be such that its zone of influence is below the level of any adjacent foundation levels. This means that these structures are not compromised during and after construction of the Darling Walk Project. Please see a sketch showing the locations of these adjacent structures below in the attachment.

2.4 Durability

Structural concrete elements of the built form are to have a design durability, which complies with the requirements of AS3600-2001. The exposure classification various concrete elements are those shown in the following table. The requirements are taken from AS3600-2001 Section 4

Element	Exposure Classification
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Elements exposed to the environment	B2
Elements in interior environment	A1

2.5 Fire Resistance

The design of structural elements is to be based on fire resistance levels to satisfy BCA requirements as advised

2.6 Balustrade Loadings

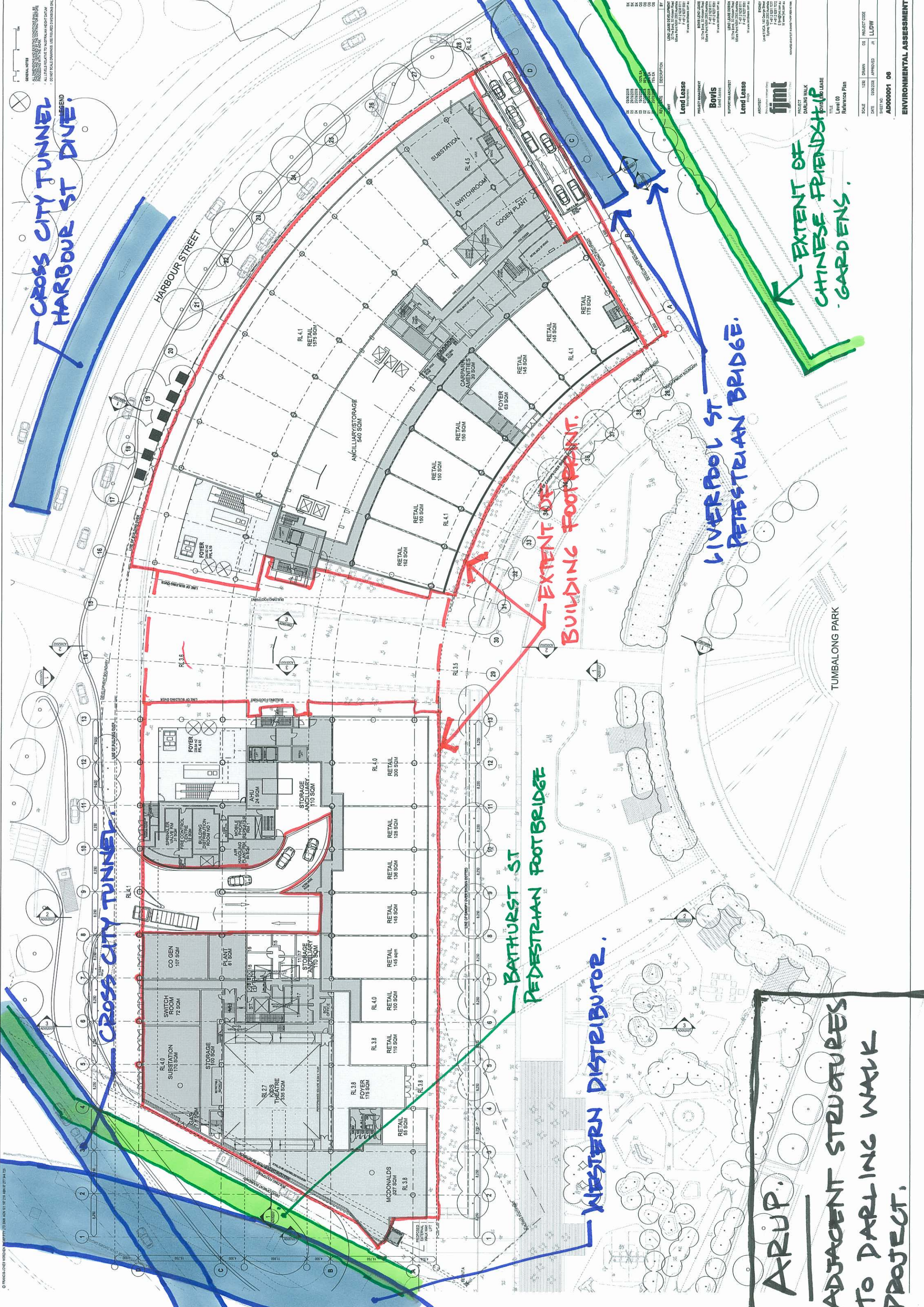
Balustrades are to be designed in accordance with AS1170.2 as follows:

- All other handrails, balustrades and the like, including parapets and railings to all roofs, shall be designed to resist a static load of 0.75 kN/m acting inward, outward or downward, or the appropriate wind load, whichever produces the most adverse effects.
- Balustrades, which may be called upon to restrain crowds or people under panic conditions, are to be designed for a load of 2 kN/m.

2.7 Blast Forces

The building will not be designed for blast forces of any kind.

CROSS CITY TUNNEL
HARBOUR ST DIVE.



GENERAL NOTES
 1. ALL LEVELS UNLESS OTHERWISE STATED ARE TO FINISH OF WORK SURFACE.
 2. REFER TO THE ARCHITECT'S GENERAL NOTES FOR FURTHER INFORMATION.
 3. REFER TO THE ARCHITECT'S GENERAL NOTES FOR FURTHER INFORMATION.

NO.	DATE	DESCRIPTION	BY
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