

Discovery Point Pty Ltd

Discovery Point Stage 1 Structural Engineering Consultancy

Structural Report for Project Application Stage 1

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1.0 Introduction

This report has been prepared for the purpose of describing the structural systems associated with the Project Application for the Stage 1 Discovery Point site.

In particular this report has been prepared to specifically address the structural requirements of DGR No 1L in regard to :-

(a) "Brief for review of geotechnical and structural design for developments adjacent to or above rail corridor for external third party works performed under the NSW Environmental Planning Policy (Infrastructure) 2007 by NSW RailCorp.

And

(b) "Development Near Rail Corridors and Busy Roads – Interim Guideline" by NSW D of P, in particular Section 6 – "Excavation, earthworks and other construction related issues"

2.0 Site Description

The Stage 1 site at Discovery Point is located at Wollie Creek and is bounded by :

- North Boundary : Wollie Creek train station and The Airport (East Hills) Rail Line
- East Boundary : Brodie Sparks Drive (Private existing suspended road on Site 2 (Verge) and Site 4 (Vine) Superstructure)
- West Boundary: Illawarra Rail Line
- South Boundary : Magdalene Terrace (Council owned). The Southern edge of Stage 1 does not extend to the street boundary with the exception of a suspended road access way that runs parallel to the Illawarra rail line boundary.

3.0 Stage 1 Development Summary

Stage 1 consists of Buildings 1C (Residential tower) of 13 storeys immediately adjacent to Brodie Spark Drive and a two storey mixed use building denoted "1B" consisting of ground floor retail, and a landscaped roof podium level. On the Western side of Building 1C there is a loading dock provisioned for the proposed retail centre and Supermarket. Above this loading dock provision has been made for the development of a future residential tower denoted "Building 4" which is not part of the Stage 1 Project Application.

Stage 1 has an integrated basement at level B0 used for car parking at approximately RL +1.8. This basement extends over to near the Illawarra Rail line boundary at the Western edge of the site and extends North adjacent to the Wollie Creek Rail station.

Basement level B1 car parking is located a approximately RL-1.0. This basement level is contained within the extent of the previously approved and constructed diaphragm wall and also extends the basements of the previously constructed Site 2 and Site 4 (Verge and Vine buildings).

Similarly basement Level B2 and B3 car parking and sewer recycling plant are located within the confines of the existing diaphragm wall.

Stage 1 includes the demolition of existing redundant sales centre and site accommodations.

4.0 Likely Structural Systems

The structure for Stage 1 is anticipated to be a concrete frame construction consisting of reinforced load bearing columns and walls with structural slab systems.

The buildings within Stage 1 are expected to be founded on load bearing piles designed in accordance with the BCA and relevant Australian Standards that extend down to rock and on this basis no vertical building loads will be transferred into the rail corridor. These piles are expected to be groups of 750 – 900mm dia CFA type piles.

Structural materials to be used will include a combination of steel, concrete, masonry and timber sized appropriately to suit the applied loads, BCA requirements and the Principals requirements.

Construction movement joints and vibration isolation provisions will be incorporated into the structural design where necessary.

Construction will be carried out by experienced building contractors who will issue appropriate safe working method statements for all parts of the works.

5.0 Geotechnical Conditions

A number of geotechnical investigations have been previously completed by Coffey Geosciences and these reports describe the ground conditions, the geotechnical issues associated with excavation and the groundwater issues. Refer to these previous Coffey reports for a more detailed description of the geotechnical conditions across the Concept plan site.

Rock levels vary across the site and rock contours are as shown on the Civil drawings 20 01193 01/CSK04 and CSK05.

Ground water levels vary across the site however based on the 2003 Coffey report the ground water level is at RL +1.50 AHD and is just below the basement B0. Variances in groundwater due to sea level rise and flooding issues will be taken into account in the final detailed design of the basement level B0 structures and reference is made to the Coffey report of Groundwater assessment dated 11th June 2010.

Additional groundwater monitoring has been undertaken on the Stage 1 site by Douglas Partners during December 2010 and January 2011 and this has confirmed that the ground water level beneath the site is at RL + 1.25 which is below the basement slab B0.

6.0 Excavation and Site Retention

Site retention and bulk excavation levels across the Stage 1 site are as shown on the Civil drawings 20 01193 01/CSK04 and CSK05.

For the Stage 1 site, excavation of up to approximately 4m in depth will be required outside the line of the existing diaphragm wall and up to 10-11 metres inside the diaphragm wall. This excavation will be carried out by experienced bulk excavation contractors using earth moving equipment to remove the material.

The depth to rock beneath the Stage 1 site is deep and no excavation in rock is expected. Excavation method statements will be prepared by the excavation contractor prior to the issue of the Construction Certificate for Stage 1 early works.

Temporary and permanent retention systems for the Stage 1 basement excavations will be required as shown on the Civil drawings 20 01193 01/CSK04 and CSK05. This site retention systems is consistent with the recommendations of the Robert Bird Group Concept Plan Structural Report.

8.0 Rail Interface Considerations

8.1 Site Retention Systems

Retention systems that directly interface with Rail boundaries can be described as follows :-

Western Boundary Alongside Illawarra Rail Corridor : Cantilever contiguous pile walls up to the natural ground levels. It is noted that no anchors will be installed in this wall that extend into the Rail corridor. Refer to Figure 1 for a description of the structural interface along the rail boundary.

Northern Boundary alongside Wollie Creek Station (Airport line): The ground levels along this side generally match the basement B0 level of approximately RL 1.8 and little or no site retention will be required. In this respect a permanent concrete wall will be installed to separate the basement B0 from the rail property along the Northern side.

It is noted that the existing diaphragm wall retention system already has authority approval for the installation of temporary anchors required during the excavation of the Stage 1 basement works.

Stage 1 temporary and permanent retention structural systems adjacent to rail boundaries will be designed in accordance with the following documents :-

1. RailCorp Document "Brief for review of geotechnical and structural design for developments adjacent to or above rail corridor for external third party works performed under the NSW Environmental Planning Policy (Infrastructure) 2007.
2. "Development Near Rail Corridors and Busy Roads – Interim Guideline" by NSW D of P, in particular Section 6 – "Excavation, earthworks and other construction related issues"
3. The BCA
4. Relevant Australian Standards
5. The Geotechnical reports
6. In accordance with the Concept Plan design report prepared by Robert Bird Group

8.2 Structure Adjacent to Illawarra Rail Line

It is noted that habitable structures are greater than 10 metres away from the track centrelines of the Illawarra line and that a risk workshop has been conducted with Railcorp on 16/12/10 and moderated by Arup. From this meeting a Hazard log has been produced identifying risks items and subsequent actions.

The structural system along the Illawarra Rail corridor boundary consists of primary structure (piles and slabs) below the existing ground level of the boundary as shown in the Figure 1 below. The built up section of the proposed Sparks Lane is higher than the rail boundary levels and is supported by a small independent and isolated retaining wall. This retaining wall is considered as a redundant structural element that will not cause structural failure of the primary building structures if impacted.

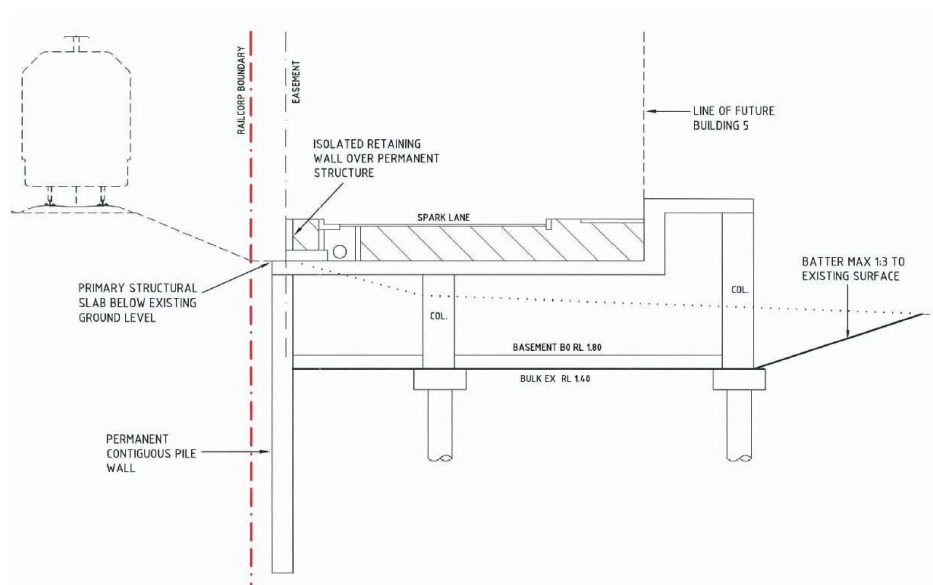


Figure 1 : Indicative Section along Illawarra Rail Boundary

8.3 Track Monitoring Requirements

Monitoring of critical rail infrastructure for vibration and movements will be developed as a comprehensive set of procedures, safety plans and SWMS methodologies by the contractor engaged to build the development. This information will be issued to RailCorp prior to the issue of the Construction Certificate for early works and bulk excavation.

8.4 Geotechnical Rail Impact Assessment Report

Coffey Geosciences have previously commented on the geotechnical impacts of excavations adjacent to rail corridors applicable for the Concept Plan application. The Stage 1 structural design will comply with these requirements.

Additional detailed Stage 1 specific geotechnical analysis and impact assessment reports will be produced as part of the detailed design of the Stage 1 project which will be provided to Rail Corp as part of a Construction Certificate application process. These geotechnical impact reports will follow the requirements of :-

- RailCorp Document “Brief for review of geotechnical and structural design for developments adjacent to or above rail corridor for external third party works performed under the NSW Environmental Planning Policy (Infrastructure) 2007.
- “Development Near Rail Corridors and Busy Roads – Interim Guideline” by NSW D of P, in particular Section 6 – “Excavation, earthworks and other construction related issues”

It is expected that this Geotechnical Impact Assessment will investigate and analyse the proposed Stage 1 site retention, piling and foundation design associated with ground movements, settlements, construction borne vibrations associate with excavation and piling adjacent to the rail corridor.

9.0 Summary

- The detailed structural design for Stage 1 is consistent with the Concept Plan Structural Report by Robert Bird Group recommendations;
- The detailed structural design for Stage 1 is consistent with the requirements of DGR No 1L relating to the rail documents (a) and (b) as noted in section 1.0 of this report.
- A risk workshop was conducted with Railcorp on 16/12/10 and the structural design is consistent with that workshop.
- The structural systems described in this report are suitable for use in a residential development and are typical of other similar developments in Sydney adjacent to Rail property;
- Detailed Structural and Geotechnical Impact reports will be submitted at the CC stage for Railcorp approval.