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*NCSI Certified Quality System ISO 9001*

Our reference: 200923638/LT\_6686:PH:cs

13 May 2009

Mr Perry Milledge  
Laing O'Rourke  
PO Box 1505  
NORTH SYDNEY NSW 2050

Dear Perry

## **100 Mount Street, North Sydney Assessment of impact of proposed commercial development on CBD Rail Link**

This letter details the proposed process to address engineering design issues associated with potential impacts of a proposed development at 88-96 & 100 Mount Street, North Sydney on RailCorp's proposed CBD Rail Link (CBDRL). The proposed scope of work is intended to facilitate Part 3A approval and acceptance of the proposed development with RailCorp.

We understand that Laing O'Rourke requires specific advice from Parsons Brinckerhoff (PB) in relation to the following:

- Assessment of proposed development impact on the proposed CBD Rail Link.
- Demonstrating that underground structures (e.g. building basement, ground anchors, rail tunnel and support elements) will not impact on RailCorp's proposal to construct the tunnels.
- Feasible engineering design solutions for platform cavern/access/concourse given constraints imposed by geology, existing buildings and the proposed building at 100 Mount Street.
- Obtaining RailCorp's non-objection to the proposed development.

### **1. Proposed development**

#### **1.1 Development**

The proposed development includes a 44-level commercial building with a 5-level basement excavation up to 15m deep (to RL 38.3m) along the southern Mount Street property boundary (see Drawing 001). Information supplied by RailCorp indicates the proposed CBDRL infrastructure in the vicinity of the development comprises a drained station cavern with rail level 17.75m i.e. the cavern is not designed for significant water pressure. Approximate cavern dimensions are 20m wide x 9m high.

The site is underlain by medium to high strength sandstone below about RL 50 to 51m. There are no known adverse structural geotechnical features such as fault zones or dykes in the vicinity of the site. Available geotechnical information is given in Drawing 002.

## **1.2 Available information**

To date we have received:

- Architectural drawings
- Geotechnical investigation reports (by Jeffrey & Katauskas dated 1983 & 2009)
- Plans and excavations sections
- Station cavern plan and section (by Halcrow on behalf of RailCorp)
- Topographical survey to MGA grid/co-ordinates showing lot boundary, footprint of proposed building, excavation lines
- Foundation loads sufficient to assess load transfer and displacement effects on proposed platform cavern structure
- Survey information showing approximate basement levels in existing buildings along Mount Street (see Dwg 001).

## **2. Methodology**

Our proposed methodology is heavily dependant on RailCorp's proposed station layout in the vicinity of 100 Mount Street, which is under development. We have staged our scope to allow coordination with others to minimise the risk of duplication of work, and facilitate RailCorp's non-objection to the proposed development.

### **2.1 Stage 1: Assess development constraints for DA submission**

Given that the RailCorp station layout is under development, it is unlikely that RailCorp can provide sufficient information to allow engineering design issues associated with potential impacts of the proposed development to be addressed at this time. We propose to:

- Review the proposed building development in relation to exclusion and restriction zone guidelines (to be supplied by RailCorp) and Director General's requirements in RailCorp letter of 8/4/09 to Department of Planning.
- Assess geotechnical conditions relevant to the development.
- Reference available information from PB's database on Sydney rail projects such as ECRL to qualitatively assess whether development has potential interaction with the future rail tunnel easement adjacent to the site.
- Advise on constraints associated with CBDRL development in the vicinity of the proposed 100 Mount Street development.

- Provide a brief letter report for Part 3A submission covering the preliminary technical findings in relation to these issues.

The currently planned station cavern with rail level 17.75mAHD appears to have sufficient cover of competent sandstone to allow building construction to proceed without adversely impacting on development of the future 20m wide x 9m high station cavern. Although unlikely, given the preliminary station cavern plan provided, an outcome of the initial assessment may be that predicted deformations and distortions of the CBDRL are unacceptable, and revisions to the DA or scheme design due to constraints imposed by factors such as site geology existing buildings or subsequent refinement of the station layout may be required. Alternatively, deformations may be close to specified limits and further analysis may be required to satisfy stakeholder concerns.

## 2.2 Reporting

For Stage 1, PB will provide a letter report providing comments and recommendations on:

- Aspects of technical feasibility and impacts of the proposed development on future CBDRL structures for both the current 'drained' design, and a possible 'undrained' design
- Risks associated with the proposed foundation system
- Construction staging/site retention/foundation measures required to mitigate construction effects on CBDRL.

## 2.3 Stage 2: Analytical modelling for detailed design stage (if required)

Following Part 3A consent and prior to construction certificate issue further work may be required to quantify the impact of the building construction development on the future rail corridor. The approach to address the interaction with underground infrastructure will be governed by the need to predict the ground stresses, movements and distortion of the CBDRL structures, and will likely require numerical analysis modelling.

This numerical analysis will require the following to be provided by RailCorp in sufficient time to allow approval:

- Concourse plan and section
- Platform cavern plan, sections and drainage details (i.e. drained or undrained)
- Entry shaft locations
- Exhaust tunnel, entry/ exit area and service building details.

If an outcome of the modelling is that the calculated deformations and distortions of the tunnel are unacceptable, further work is likely to be required to address areas of risk or further demonstrate that tunnel movements are within acceptable limits. This modelling may need to consider a range of input variables to account for sensitivity to such variables from construction configuration, initial stress conditions, ground stiffness, tunnel lining, requirements to avoid transfer of footing/pile loads to the tunnel, rock levels and building loads.

We propose to:

- Review the geotechnical information from previous site investigations by others on the site
- Verify the geological model through both the underground works and the project site. Representative tunnel sections will be adopted for numerical analysis
- Assess modelling outputs (such as predicted stress and deformations) against knowledge and experience from PB's work on similar rail projects in Sydney.

### 3. Closing

We trust this letter addresses your immediate project requirements. Please contact either the undersigned on 9272 5194 or Dr Nagen Loganathan on 9272 5434 for any further information you may require.

Yours sincerely,



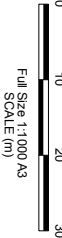
**Paul Hewitt**

Principal Geotechnical Engineer  
Parsons Brinckerhoff Australia Pty Limited

|       |          |   |
|-------|----------|---|
| Encl. | Dwg. 001 | Plan showing long sections along Mount Street and track alignment |
|       | Dwg. 002 | Site Sections   |

| REV   | DATE    | ISSUED FOR PART 3A INFORMATION | DESCRIPTION | DRAWN | CHECK | DESIGN | VERIFY | NCSI |
|---|---------|--------------------------------|-------------|-------|-------|--------|--------|------|
| A   | 2006.09 | ISSUED FOR PART 3A INFORMATION |             | NP    | AL    | PH     | PH     |      |
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| NCSI certified Quality System to ISO 9001   |         |                                |             |       |       |        |        |      |

SCALES



A3 ORIGINAL

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SIGNED  
DATE

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PROJECT

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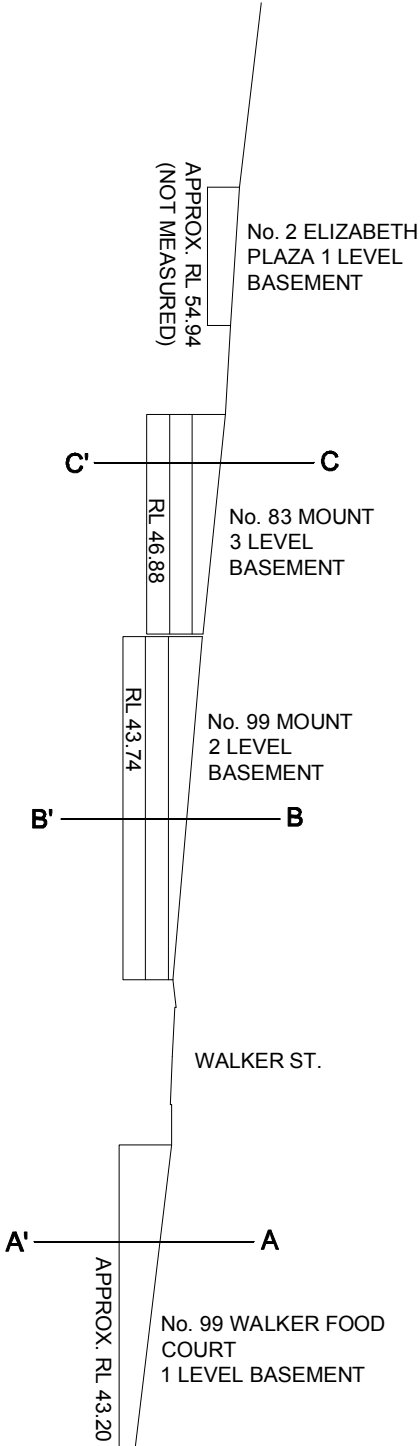
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**LAING O'ROURKE**

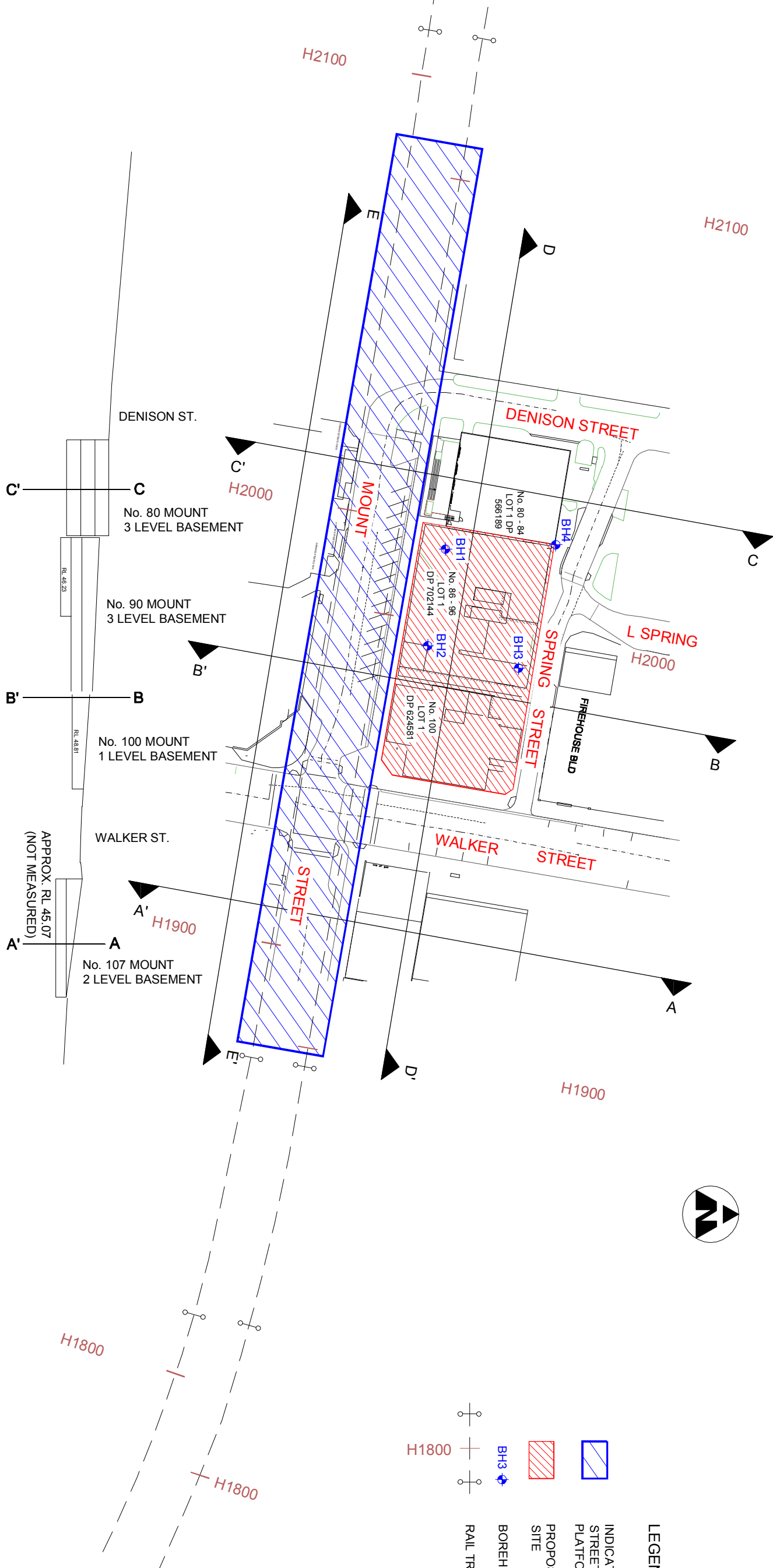
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SECTION E - E': SOUTHERN SIDE MOUNT STREET



SECTION D - D': NORTHERN SIDE MOUNT STREET



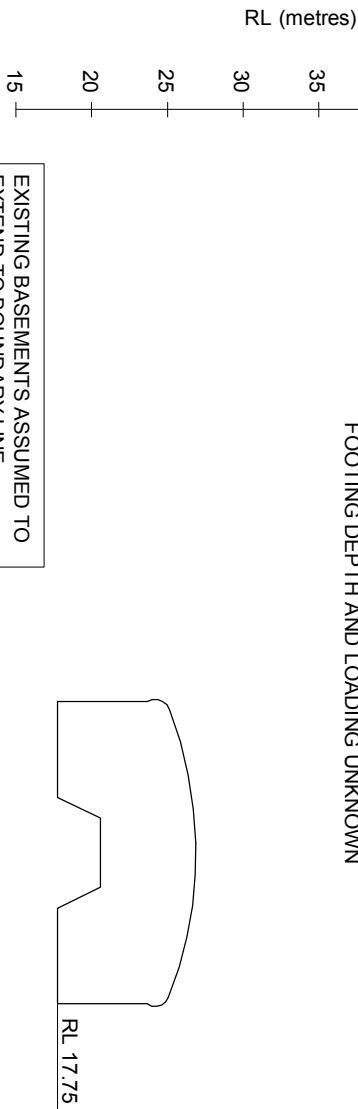
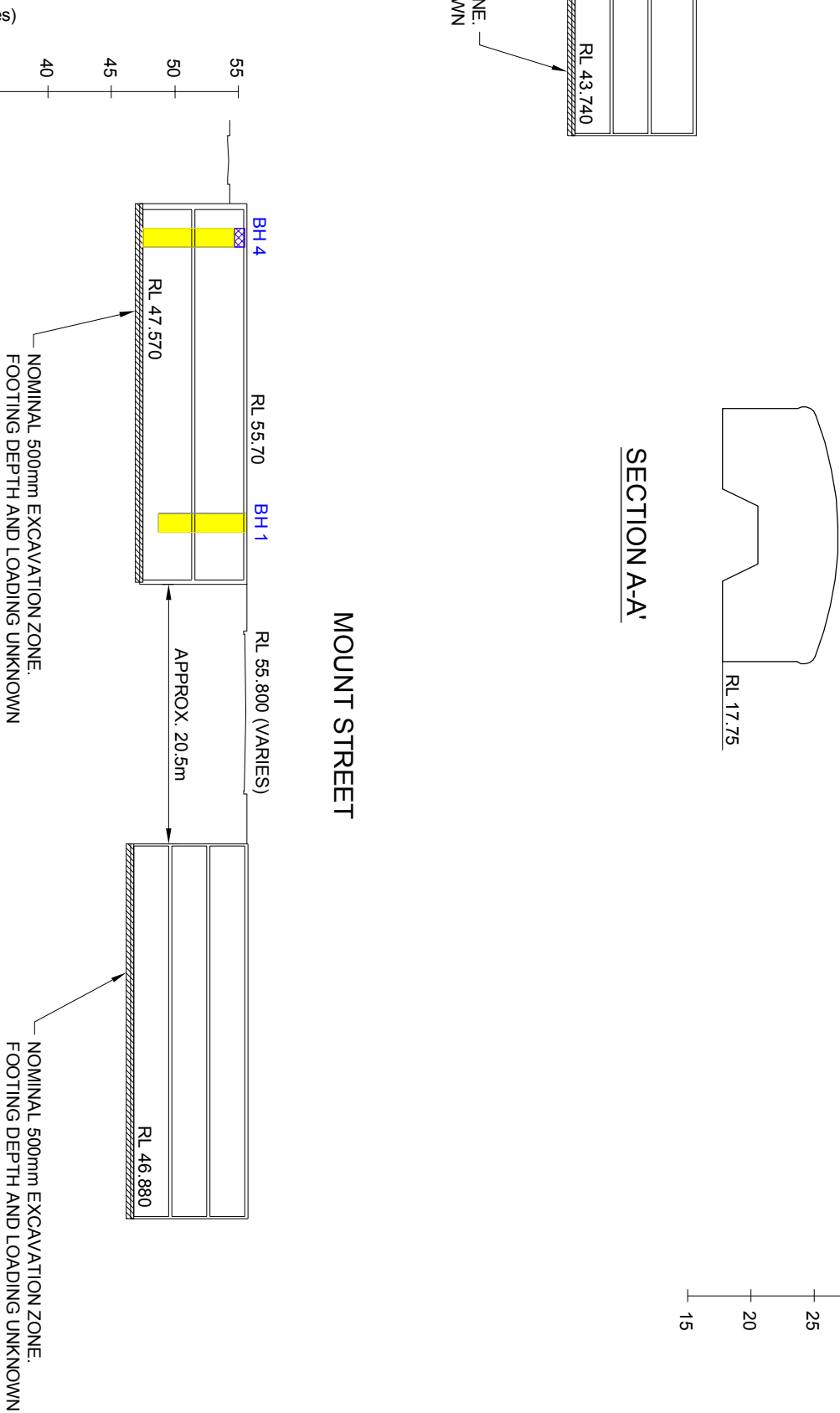
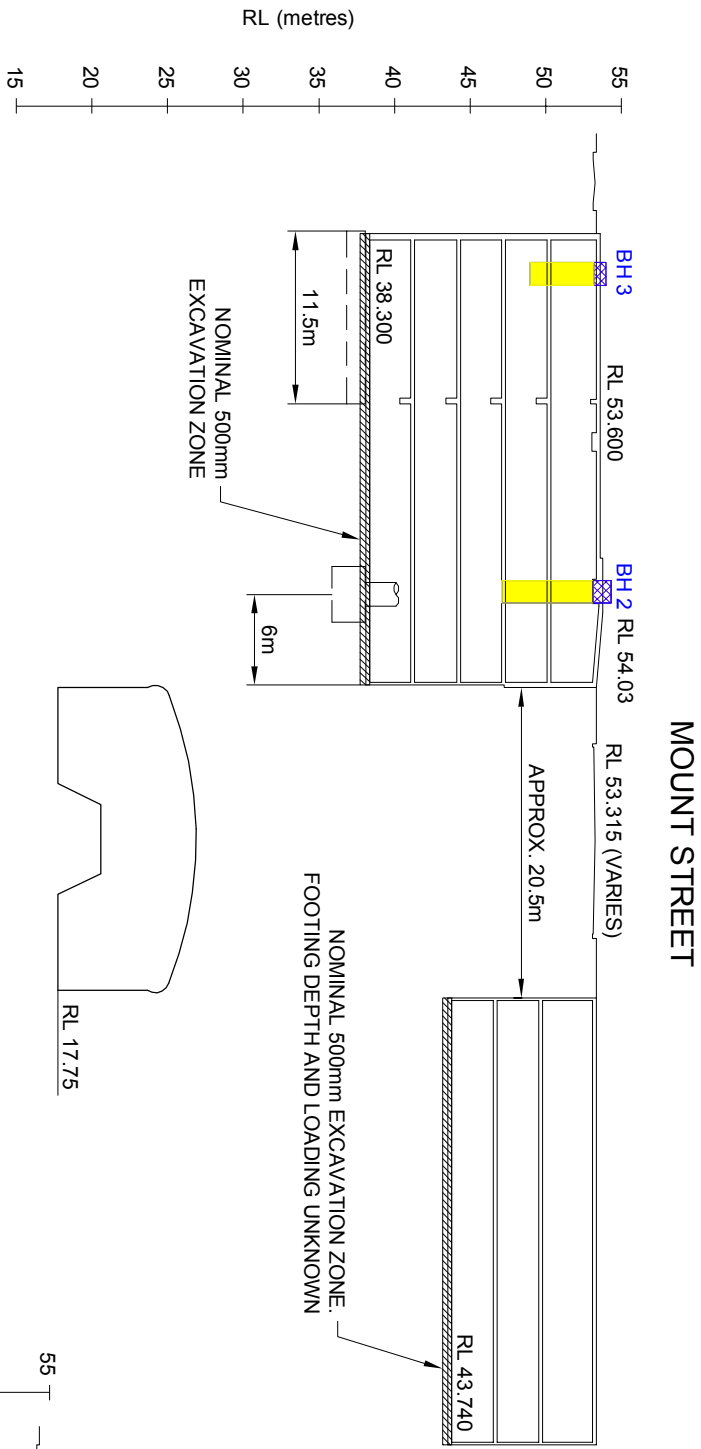
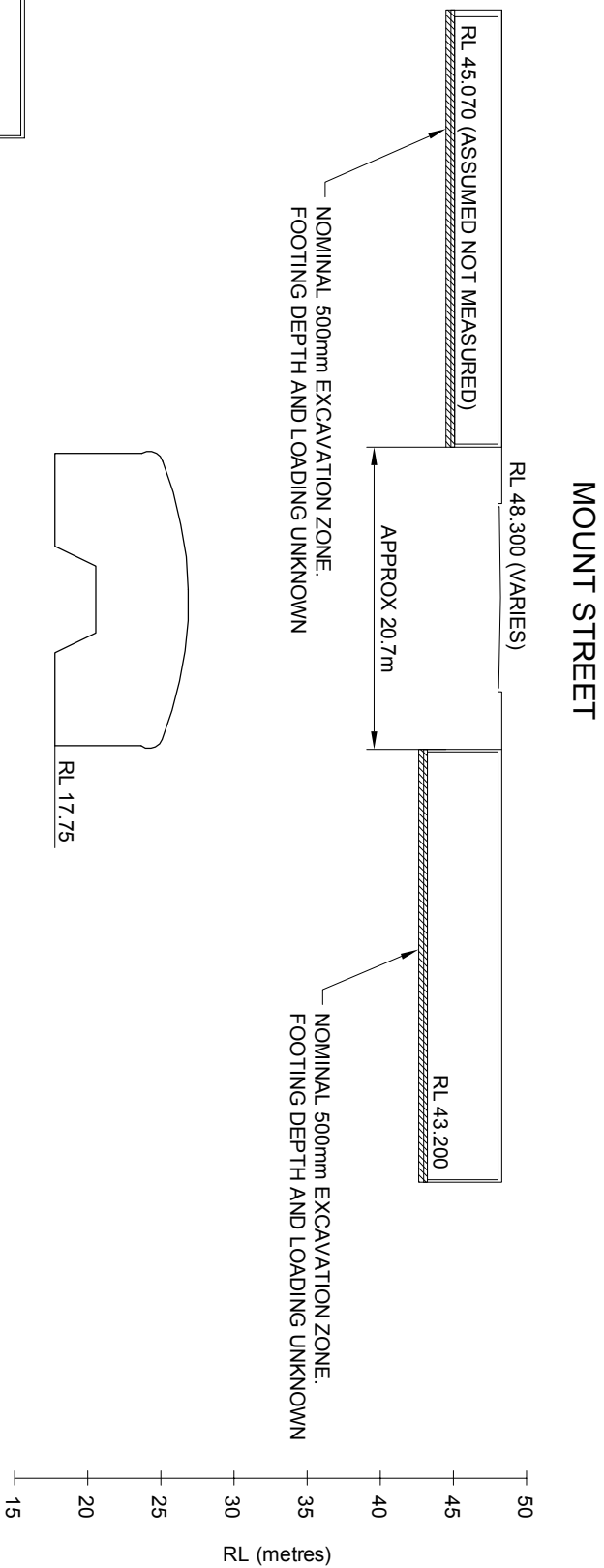
LEGEND

- INDICATIVE LOCATION OF MOUNT STREET STATION CAVERN FOR PLATFORMS AND TRACKS
- PROPOSED 100 MOUNT STREET SITE
- BOREHOLE LOCATIONS
- RAIL TRACK AND KILOMETRAGE

**PRELIMINARY ISSUE**  
NOT FOR CONSTRUCTION

SOURCES:

PSN PROJECT REFERENCE 4151  
(DRAWING No. P4151\_MOUNT\_LONG\_SECTIONS\_COMBINED\_I)  
HALCROW - DRG TTSRCP-601)  
GEOTECHNICAL REPORT BY JEFFERY AND KATAUSKAS  
PTY. LTD. 18 MARCH 2009 - REF. 221965rpt



## LEGEND

FILL


HAWKESBURY SANDSTONE

## SOURCES:

ENSTRUCT GROUP PTY LTD  
PROJECT No. 3890 & DRAWING No. SK-05 REV.03 DATED 05 MAY 2009 &  
DRAWING No. P4151\_MOUNT\_LONG\_SECTIONS\_COMBINED\_I  
HALCROW - DRG TTSRCP-601

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**SCALES**



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SIGNED \_\_\_\_\_

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DATE \_\_\_\_\_

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|                |   |            |          |
|----------------|---|------------|----------|
| CLIENT         | PROJECT<br>100 MOUNT STREET, NORTH SYDNEY |            |          |
| LAING O'ROURKE | SITE SECTIONS                             |            |          |
|                | PROJECT No                                | DISCIPLINE | NUMBER   |
|                | 2110490A                                  | - GEO -    | 002      |
|                |   |            | REV<br>A |

# PRELIMINARY ISSUE

NOT FOR CONSTRUCTION

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