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Project Reference: 30 13390 02S

WITNESS STATEMENT
EES IAC Melbourne Metro Rail

1. CONSULTANT BACKGROUND

1.1. Name:

Stephen John Payne, a Director of Bonacci Group Pty Ltd, of 50 Hoddle Street, Abbotsford, Victoria, 3067.

1.2. Qualifications:

Bachelor of Engineering (Civil)

Chartered Fellow, Institute of Engineers Australia

Chartered Professional Engineer

Registered Building Practitioner, Victoria / Tasmania

1.3. Experience and Expertise:

Stephen Payne has extensive understanding of commercial construction techniques and has applied his skills to multiple recognisable projects in Melbourne and overseas.

He has been Project Director on a number of projects in this precinct, including developments involving basement excavation and deep pile foundations into the underlaying rock formation:

- Victorian Comprehensive Cancer Centre (PPP)
- Australian Centre for Neuroscience and Mental Health Research (Melbourne Brain Centre)
- Royal Women's Hospital (PPP)
- Leicester Street Student Accommodation, for The University of Melbourne
- The Victorian Gene Technology Access Centre
- Royal Children's Hospital (Bid)
- Newman College, The University of Melbourne
- Walter Boas Building, The University of Melbourne, Parkville campus
- Bid design services for Carlton Connect Initiative, on the old Royal Women's Hospital site
- Feasibility for development options for the Graduate Union
- Monash University Victorian College of Pharmacy, Parkville campus

Other relevant company experience in this precinct includes:

- Stage 1A: Private Medical Centre and Private Hospital
- Stage 1B: Combined Services and Operating Theatre Block
- Bone Marrow Research Centre and Donor Registry
- Underground car park below University High oval
- Royal Melbourne Hospital precinct
- Stella Langford Project, The Graduate Union of The University of Melbourne
- University High underground car park
- North Facility, Royal Melbourne Hospital

2. GRADUATE UNION DEVELOPMENT

2.1. Development Proposal

The Graduate Union seeks to optimise their development opportunities within the current planning framework to develop additional accommodation on their sites.

We are providing technical advice on all aspects of the construction, including:

- heritage building retention;
- site retention;
- basement excavation;
- foundation; and
- superstructure design for the accommodation tower.

In summary, the development will comprise:

- 12 levels above ground
- Ground floor
- 5 basement levels

The opportunity to connect to the adjoining underground University of Melbourne car park, in the future, along with the required car parks, dictates that the basement level should extend some 15 metres below natural surface.

Pad foundations, lift overruns, etc. are likely to extend a further 2 metres below the lowest basement.

2.2. Terrace House details

The terrace houses are two storey buildings constructed with brick perimeter and internal walls. The floor and roof are constructed in timber. The depth of the foundations is unknown, but is expected to be basalt blocks of the same width as the wall (around 350mm) and 400mm to 500mm below ground level. Investigations into the footing size, depth and founding conditions are proceeding. It is likely that the foundations are bearing in the upper fill layer.

2.3. Development Arrangement

2.3.1. Design requirements of the Graduate Union development

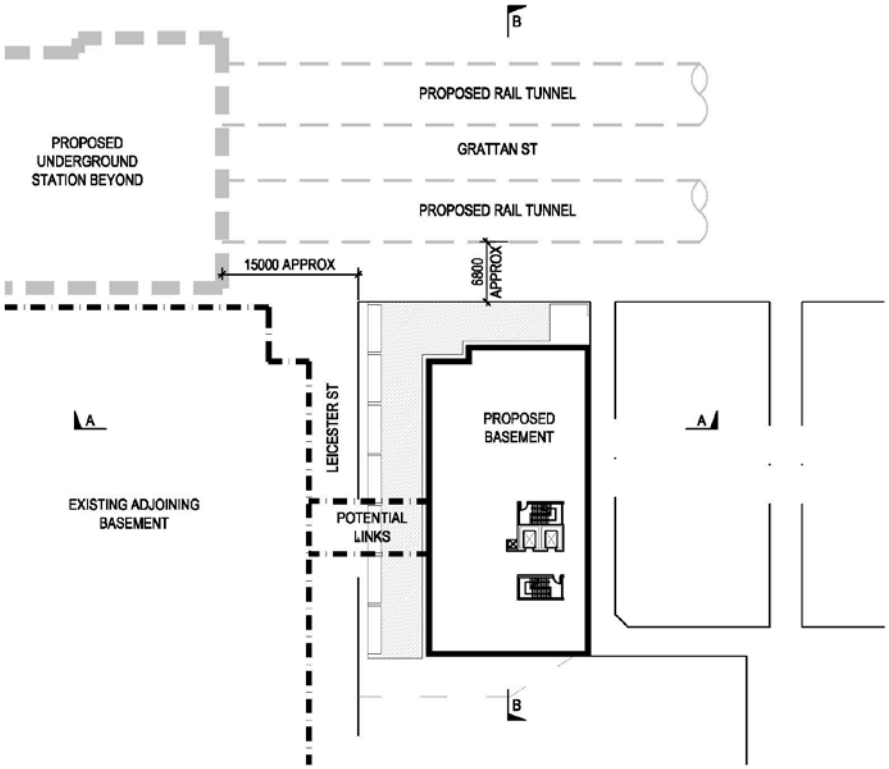
Design of the underground tunnels and station structure are required to account for the imposed loads of the Graduate Union development.

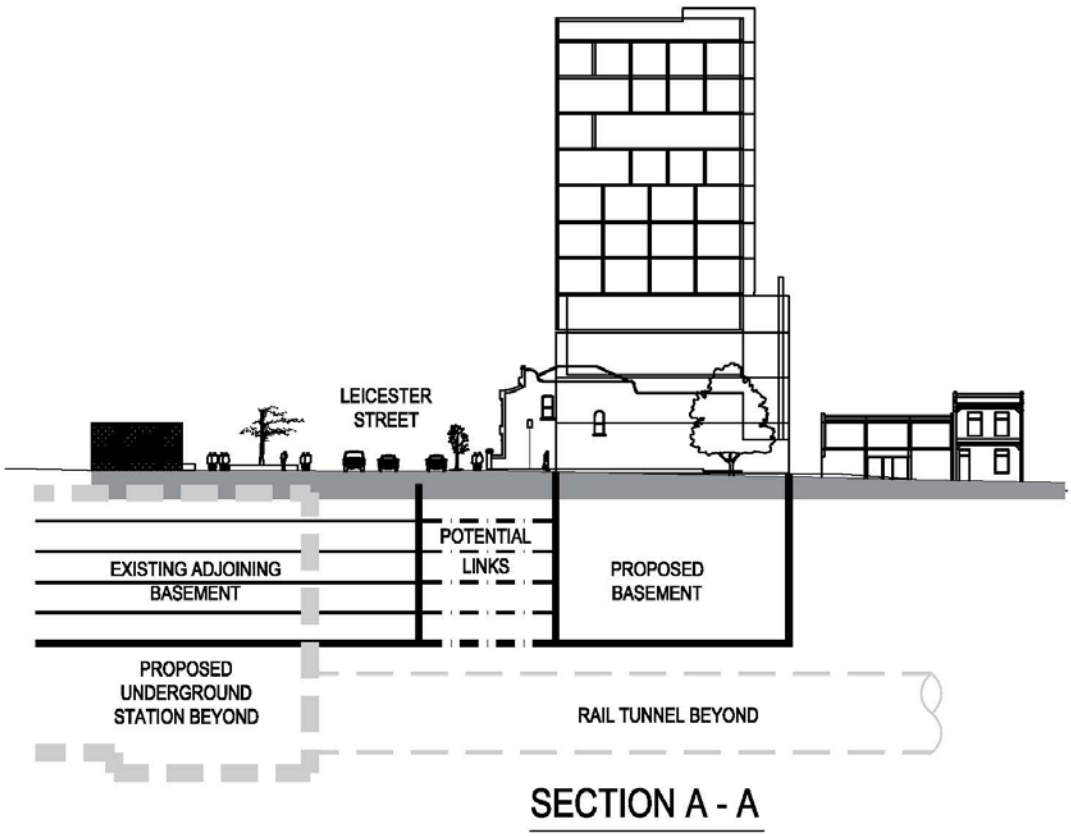
Several cases of building loading imposed upon the ground material directly below the lowest basement area are to be included in the MMRA design:

- During excavation, a net unloading load of 270 kPa. This will require the excavation in some 15 metres below ground level.
- Following completion of structure, a load of 270 kPa.
- Localised short term load increases from earthquake and wind loads are likely to increase the ground loads by 30%.

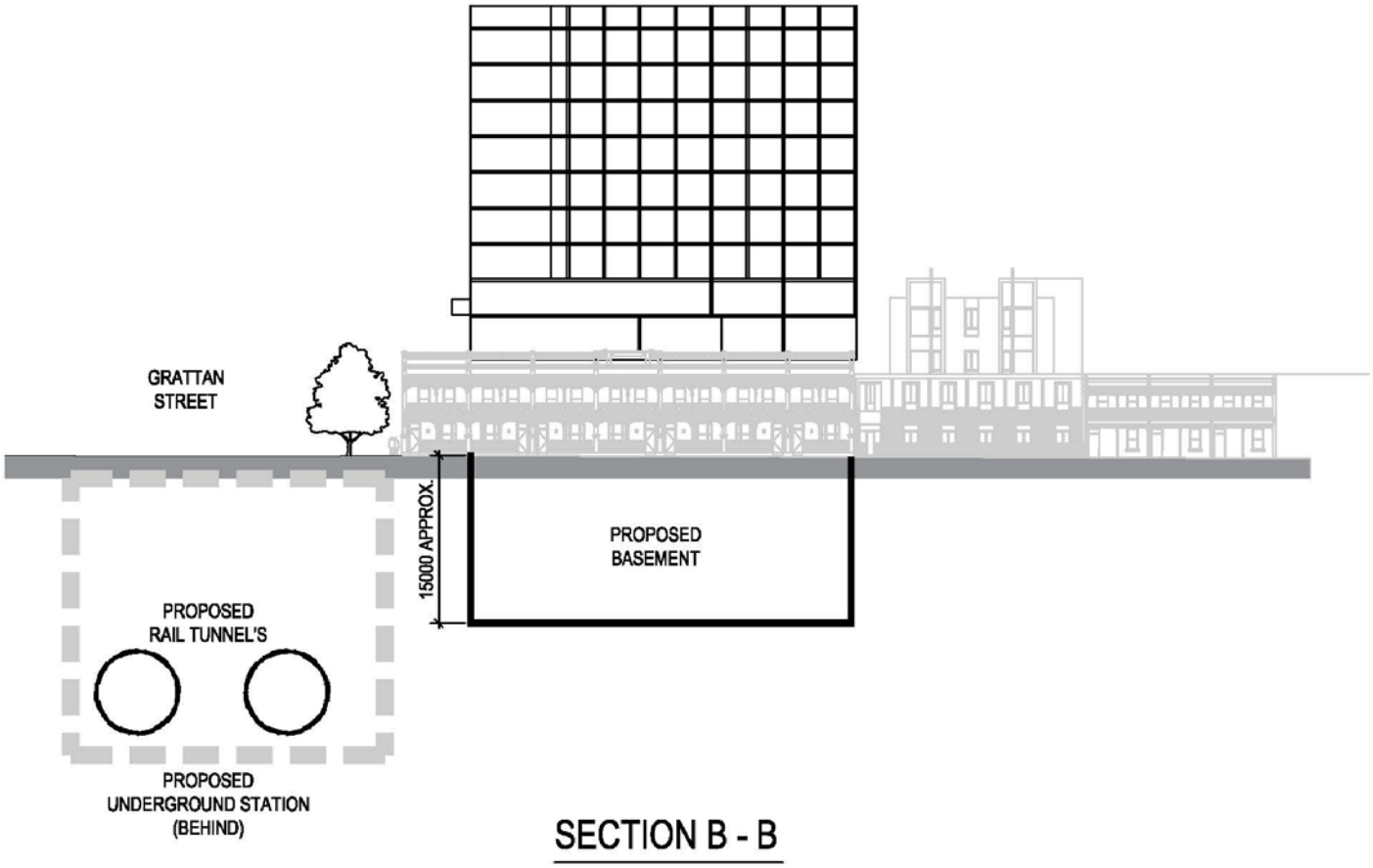
2.3.2. **Graduate Union development relative to MMRA construction**

The plan and sections set out below indicate the proposed Graduate Union development on their northern site, relative to the proposed underground rail tunnels and Parkville Station excavation.





SECTION A - A



3. **MELBOURNE METRO RAIL PROJECT**

3.1. **Documentation**

In order to understand the potential construction and final operating affects the Melbourne Metro Rail may have on the Graduate House building assets, we have reviewed the Melbourne Metro Rail project Environmental Effects Statement, including Volumes 1, 2 and 3; and the Technical Appendices.

We have also been provided with the reference design drawings for the architectural Reference Design for the Parkville Station.

3.2. **MMRA Development**

The twin underground rail tunnel structures and the Parkville underground station are within the zones of influence of the existing heritage listed Graduate House buildings and the future development of the Graduate House site.

3.3. **Underground Tunnels**

The location of the underground tunnels is immediately north of the Graduate House building asset.

These tunnels comprise two 7 to 7.5 metre diameter tunnels, which are to be tunnelled some 20 metres (to the top of the tunnel) below the natural surface.

3.4. **Underground Station Structure**

The location of the underground structure is some 15 metres from the north west corner of the Graduate House building assets. The station excavation is approximately 30 metres down from natural surface level.

3.5. **MMRA Construction**

Reference is made to the EES Volume 1, Chapter 13 Noise and Vibration.

The EES documentation states that should construction or operational activities induce long and short term vibration limits into structures that have a particular susceptibility to vibrations, such as heritage buildings, exceed 3mm/s and 2.5mm/s then appropriate management actions will be implemented.

Given the proximity of the rail tunnels; the Parkville underground station excavation; and anticipated high volume of excavation equipment traffic, The Graduate Union is concerned at the impact of vibration transference resulting from the above activities into the Graduate House building assets, and particularly the heritage listed terrace houses.

The vibrations experienced by the heritage listed terrace houses, we believe, will exceed the long and short term vibration limits, particularly when the TBM begins demolition of the eastern retaining wall of the station.

Section 13.8.1 of this volume contains a section titled "Vibration Impact to Structures". This section provides a commentary on the "Structural condition assessment may be conducted on buildings identified as potentially being impacted by vibration". Certainly, the heritage listed terrace house will require this structural condition assessment.

We note that the EES document does not provide any remediation works process, should vibration induced movements and consequential structural damage occur to adjoining building assets.

As a result of the above concerns, we outline the following issues for resolution:

3.5.1 The Graduate Union will require the MMRA to undertake a full photographic and conditions survey of the heritage listed buildings and provide regular survey to monitor potential movements during construction.

3.5.2 The MMRA shall provide a remediation works process, should construction vibration induced cracking and structural damage occur.

3.5.3 The Graduate Union will require the MMRA to undertake a geotechnical and foundation conditions survey, to understand the current founding conditions.

We envisage that the heritage buildings are founded upon the upper fill layer and this material will settle when subjected to vibration transference from tunnelling and station excavation works.

Consideration shall be given to strengthening the fill material with a Euretek or similar product, immediately below the foundations.

3.5.4 The early works component will require relevant services in Leicester Street and Grattan Street to be relocated. The MMRA should provide relevant details.

4. **CONCLUSION**

The Graduate Union supports the Melbourne Metro project and acknowledges the benefits it will bring to Melbourne and particularly the Parkville precinct.

The Graduate Union currently comprises a mixture of buildings providing accommodation and administrative functions, located within the zone of influence of the underground tunnels and station.

We have concerns that construction of the tunnels and station (refer 3.6 above) will be detrimental to the integrity of the sensitive heritage listed buildings (refer section 3.2), given their location, relative to the underground station and underground tunnels, and their susceptibility to vibration movements resulting from excavation, tunnelling and construction traffic works (refer section 3.6.3).

Design of the tunnels and station box shall consider the future development plans for the Graduate Union, for both the basement excavation and completion of structure loading cases.