

20th September 2017

RobertsDay
Level 4, 17 Randle Street
SURRY HILLS NSW 2010

Attention: Mr Oliver Klein

Dear Oliver,

Macquarie University propose to undertake refurbishment works to the existing W6B building which is closest to the Rail Corridor. Part of the 1st and 2nd Reserve pass underneath the existing building.

Taylor Lauder Bersten Pty Ltd is the consulting structural engineers for the project.

The Project has been broken into two stages. The first stage is the “Early Works” and the second stage the “Main Works”.

This letter is to be read in conjunction with the drawings numbers APP STR-SK0007/A – APP STR – SK0013/A (Inclusive) and drawing numbers 25WWA STR-0501/B, 25WWB STR-0502/B and 25WWB STR-0503/B

The Early Works

The early works generally consists of building a shoring wall and removing a mound of soil from the southern side of the site which is well outside the southern boundary of underground railway corridor (easement) and also outside the second reserve and hence influence zone of 1st reserve.

The shoring wall consists of concrete piers 450mm diam at 2400 cts drilled with auger and poured in-situ. The embedment of these piles are 3m into rock. However as can be seen from the drawing number APP STR-SK0009 the shoring wall is well outside (south) of the second reserve and therefore will have negligible effect on the railway corridor.

There is also the removal of existing ground floor slab and shallow footing beams in the central core of building 25WWB. These works are over the second reserve however are limited to within 500mm-600mm from the ground level. The removal of these slabs and beams will be undertaken with

hand tools (Saws and Jackhammers) and also with the assistance of a 15-20 tonne excavator with a rock (concrete) breaker attachment. These works are being carried out nearly 24m above and 15m to the south of the 1st reserve and will have negligible effect on the railway corridor.

Also in relation to **Clause 86 of the Infrastructure SEPP “Excavation in, above or adjacent to rail corridors”** we comment that:-

- (1) This clause applies to development (other than development to which clause 88 applies) that involves the penetration of ground to a depth of at least 2m below ground level (existing) on land:
 - (a) within or above a rail corridor, or
 - (b) within 25m (measured horizontally) of a rail corridor, or
 - (c) within 25m (measured horizontally) of the ground directly above an underground rail corridor.

As the excavation of the mound of soil to the south of the site occurs outside of the southern boundary of the railway corridor and also outside of the 2nd Reserve i.e. greater than 25m away from railway corridor we do not trigger the above excavation requirement.

The Main Works

i) Building 25WWA (Old Building name W6B)

There are generally no proposed structural works to the building footings of 25WWA (Old building name W6B) except for 4 locations where new columns are being introduced due to the removal of 4 existing concrete columns. The new steel columns will be supported on 4 new shallow pad footings which will be founded on class V rock approximately 1500 -1900mm below ground level. These new shallow pad footings are outside the 1st Reserve Rail corridor. The size of these pad footings have been designed so that the bearing pressure on the rock is less than 500kPa.

The drawing number APP STR – SK0012/A is a section through the building and it shows the location of the new pads relative to the 1st and 2nd Reserve. It is stated in section ECRL Tunnels Table 8 = Load Limits on ECRL Tunnels (T HRCI 12051 ST Development Near Rail Tunnels Document) that provided a shallow pad has a maximum 500kPa footing load and is above the 2nd Reserve (and within 2 m of ground) then no further assessment required.

Therefore with respect to the proposed column removal and new columns/footings in building 25WWA (old building designation W6B), TLB Engineers advises as follows:-

- We have reviewed the affect of the proposed shallow pad footings (onto the class 5 rock) for the relocated column loads and these new loads will not impact the underground railway tunnel as we are well
- outside the 1st Reserve exclusion (red) zone (shallow footings) and the footing excavations are less than the 2m depth within the 2nd Reserve Influence zone.
- Conversely any vibrations emanating from the rail corridor will not impact on the function of the building.

In relation to **Clause 86 of the Infrastructure SEPP “Excavation in, above or adjacent to rail corridors”** we comment that:-

- (1) This clause applies to development (other than development to which clause 88 applies) that involves the penetration of ground to a depth of at least 2m below ground level (existing) on land:
- (a) within or above a rail corridor, or
 - (b) within 25m (measured horizontally) of a rail corridor, or
 - (c) within 25m (measured horizontally) of the ground directly above an underground rail corridor.

In four locations there will be a need to excavate up to approx 1500-1900mm to install new shallow pad footings which will trigger the above Clause 86 of the Infrastructure SEPP, however our comments in relation to their impact (as stated above) remain valid – that there will be negligible effect on the railway reserve as these pad footings are within the 2m depth and are loaded to below 500kPa.

ii) Building 25WWB (Old Building name W6A)

There is there a new central core being built to the existing building which will consist of 9 new concrete floors 250mm thick (over a footprint of 19m x 19m) and these new floors are being supported on concrete in-situ bored piers founded on class IV shale with an

allowable bearing pressure of 3500kPa. Some of these new piers are being founded within the second reserve.

The deepest pier will be approximately 5.120 below ground and will be located 12.3m to the south of the 1st Reserve and also 19m above the 1st reserve. The stress contours through the rock will peak at the termination of the pier and dissipate to negligible levels at depths of 12-15 D below the foundation level. As D represents the diameter of the pier and the piers are generally 750 -900mm in diameter, this would be at around 13.5m below the foundation level - still well above the level of the 1st Reserve.

The drawing number APP STR – SK0012/A is a section through the building and it shows the location of the new bored piers relative to the 1st and 2nd Reserve.

The construction methodology for the new bored piers will be to drill the holes using an drilling auger plant. Once the hole is drilled to the required depth the hole is filled with a steel reinforcement cage and concrete is poured.

Therefore with respect to the proposed new concrete bored piers TLB Engineers advises as follows:-

- We have reviewed the affect of the proposed new bored piers (into class 4 rock) and these new loads will have negligible impact on the underground railway tunnel as the founding level of the deepest pier is well above the 1st Reserve (19m in vertical height and 12.3 m to the south).
- Vibrations from the drilling operations should have minimal impact on the 1st Reserve provided that the drilling is undertaken in accordance with the requirements stipulated in the geotechnical engineers report with a peak particle velocity (PPV) be limited to 20mm/sec.

Also in relation to **Clause 86 of the Infrastructure SEPP “Excavation in, above or adjacent to rail corridors”** we comment that:-

- (1) This clause applies to development (other than development to which clause 88 applies) that involves the penetration of ground to a depth of at least 2m below ground level (existing) on land:
 - (a) within or above a rail corridor, or

- (b) within 25m (measured horizontally) of a rail corridor, or
- (c) within 25m (measured horizontally) of the ground directly above an underground rail corridor.

There will be bored piers that need to be installed to depths of approximately 5.2m below ground. The drilling of these piers will trigger the above Clause 86 of the Infrastructure SEPP, however our comments above in relation to the impact of the piers to the first reserve remain valid – that there will be negligible impact on the railway 1st reserve.

iii) Building 25WWC (New Museum Building)

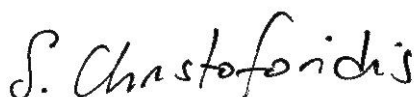
The construction of a new 4 storey Museum and Office building which is located to the south of the new site and well outside the 2nd Reserve and southern boundary corridor easement. The footings for this building are bored piers embedded approximately 2.5m into rock. These founding levels are well outside any influence zones of the 2nd reserve let alone the 1st Reserve.

Also in relation to **Clause 86 of the Infrastructure SEPP “Excavation in, above or adjacent to rail corridors”** we comment that:-

- (1) This clause applies to development (other than development to which clause 88 applies) that involves the penetration of ground to a depth of at least 2m below ground level (existing) on land:
 - (a) within or above a rail corridor, or
 - (b) within 25m (measured horizontally) of a rail corridor, or
 - (c) within 25m (measured horizontally) of the ground directly above an underground rail corridor.

As we are outside the distances mentioned above we do not trigger the clause 86 of the Infrastructure SEPP.

Yours faithfully

A handwritten signature in black ink that reads 'S. Christoforidis'.

Savas Christoforidis BE (Hons), MIE Aust, CP Eng, NER
Director