APPENDIX 10

Structural engineers report (Mott MacDonald)

Sydney2030/Green/Global/Connected

city of villages

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21st January 2016

RE: 11-13 Randle Street, Surry Hills – Structural Report

1.0 INTRODUCTION

The purpose of this report is to assess the existing load capacity of the building, the capacity of the structure to support additional storeys, the fire resisting period of the structure (timber frame only), and the ability of the structure to accommodate the proposed alterations.

The proposed alterations and additions referred to in this report are based on those shown on Luigi Rosselli architectural drawings 1519-DD01 through DD23.

The building was inspected by Alex Been, senior structural engineer for Mott MacDonald on 21st December 2015. Member dimensions referred to in this report are based on the general measurements taken during this inspection.

2.0 DESCRIPTION

The building has been constructed as follows:

Building levels consist of a basement level with access from Randle Lane, and six suspended floors above (with a small mezzanine floor above level 5).

The basement is accessed from Randle Lane and is generally raised from street level. The basement has a concrete ground slab with a ramp at the vehicle entry.

The ground floor is accessed off and is slightly raised from Randle Street.

The building has masonry external walls of varying thickness over the height of the building. Masonry parapet walls extend above perimeter box gutters to a height nearing the ridgeline of the roof.

The roof structure consists of timber roof trusses forming a saw-tooth style roof with corrugated sheet metal cladding.

The internal building structure consists of a multi-bay hardwood timber column and beam frame supporting floor joists and floorboards.

Timber framing member sizes were measured to be as follows:

- Basement columns: 350mm x 340mm
- Ground floor columns: 330mm x 330mm
- Level 1 to Level 5 columns: 290mm x 290mm
- Typical floor beams (all suspended levels): 340mm deep x 290mm wide
- Typical floor joists (assumed similar on all suspended levels): 240mm deep x 50mm wide at 450mm spacing.

Timber beam to column joints include a structural steel I section laid on its side to form a corbel.

There is a timber staircase in the southeast corner, a modern steel staircase in the northwest corner and a modern lift enclosure near the southwest corner.

3.0 EXISTING CONDITION

3.1 TIMBER FRAMING

The timber framing structure (beams and columns) are currently exposed to view on all levels. No significant defects were observed in these elements.

The ground floor joists are mostly exposed to view in the basement level. While some staining of the joists has occurred, there is no obvious evidence of termite damage or decay and therefore the joists are expected to remain in serviceable condition.

The floor joists of levels 1 through 5 are hidden from view by floor and ceiling boards. Based on the performance on the floors it is expected that the floor joists remain in serviceable condition. Some removal of floorboards or ceiling boards will be necessary to confirm this.

The condition of the roof structure was not assessed as it is expected that this structure will be removed as part of the proposed development.

3.2 MASONRY WALLS

The overall condition of the masonry perimeter walls is very good. Defects observed during the recent inspection include:

- Corrosion of steel lintels over window openings, common across the Randle Street façade. Some spalling brickwork due to expansive corrosion of the lintels.
- Vegetation growth at parapet level along Randle Street.
- Damaged brick sills common at window openings along Randle Lane.
- Corrosion of embedded steel sections (from the old external fire stairs – now removed) on the Randle Lane facade. Some minor associated brick damage.
- Minor cracking in beams over the southern windows on the Randle Lane façade.
- Some dropped arches at window openings on the Randle Lane façade, with cracked brick spandrels above.

- Some vertical cracks in the parapet on Randle Lane.

It is expected that these defects will be addressed during construction of the proposed development. It is likely that a full height scaffold will be required on both Randle Street and Randle Lane to carry out remedial works to the facades.

4.0 EXISTING STRUCTURAL CAPACITIES

Based on the timber framing dimensions listed above and the layout of floors shown on the architectural drawings we advise the following:

1. The floor structure has sufficient capacity to support loads associated with the proposed usage – hotel rooms, lounges, cafes and restaurants (Live load of 2.0kPa) and for meeting rooms (Live Load of 3.0kPa).
2. The floor structure does not have sufficient capacity to support loads associated with areas of public assembly that have higher loading, such as dance floors, concert halls and the like.
3. The timber columns have axial capacities as follows:
    - Column capacity at L1 (290x290): 1575kN
    - Column capacity at ground floor (330x330): 2000kN
    - Column capacity at basement (350x340): 2600kN

5.0 PROPOSED ALTERATIONS

We understand the proposed development shall consist of the demolition of existing buildings either side of 11-13 Randle Street and construction of new buildings of similar overall dimensions. The development will provide a new hotel with a lobby on the ground floor and restaurant in the basement. The works to enable this development will include the following alterations to the building:

- Removal of the existing roof and addition of two storeys above the top floor of the building.
- Partial removal of the ground floor to provide an open space between the basement and ground floor.
- Removal of the basement ground slab and lowering of the level of the basement.
- Creation of openings on the north and south perimeter walls to form entrances to the adjacent (new) buildings.

Structural requirements to enable the proposed works are as follows:

5.1 ADDITION OF TWO STOREYS

It is expected that the additional storey will be constructed using a lightweight structural steel frame supported at the column locations and perimeter walls of L5 only. We

assume therefore that no additional (false) floor structure will be required at L5. Loads associated with the new floors have been determined to be as follows:

- L6 and L7 Live loads (per level): 2.0kPa
- L6 and L7 floor structure weight (per level): 0.6kPa
- Superimposed dead loads L6 and L7 and roof (per level): 1.0kPa
- New roof structure weight: 0.5kPa
- Roof live load: 0.25kPa

Based on these loads we provide the following advice:

- Design column axial load at L1: 890kN
- Design column axial load at ground floor: 1040kN
- Design column axial load at basement: 1190kN

Based on the column capacities advised in section 3.0 we confirm the columns have sufficient axial capacity to carry the proposed two storey addition.

Geotechnical investigation is required to confirm the dimensions of existing footings and the bearing capacity of founding material prior to an assessment of the adequacy of footings to carry the proposed loads.

Based on the existing performance of the building it appears reasonably likely that the existing footings will have sufficient capacity to carry the proposed loads. Geotechnical investigation will be required to confirm this.

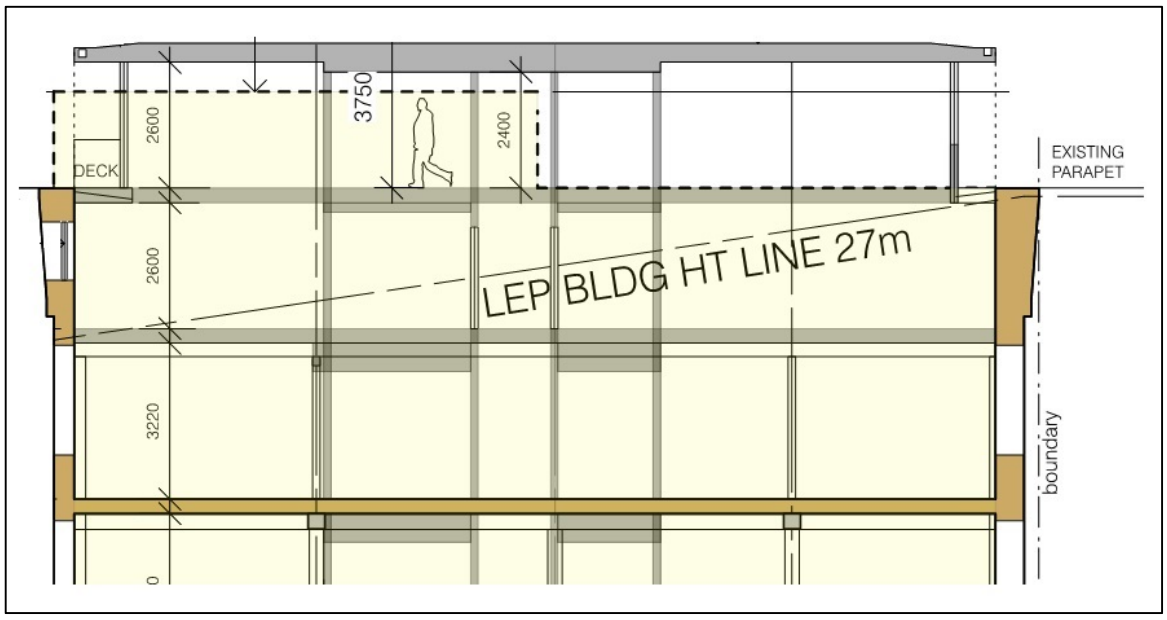


FIGURE 1: BUILDING SECTION SHOWING TWO STOREY ADDITION ABOVE LEVEL 5

5.2 PARTIAL REMOVAL OF THE GROUND FLOOR STRUCTURE

Removal of the ground floor structure to the extent shown on the architect's drawing 1519-DD06 is possible with the following restrictions:

- Retention of the existing beams in the east-west direction and installation of new bracing beams in the north-south direction are required at each column at the ground floor to provide lateral bracing to the columns, which would previously been provided by the joist and floorboard diaphragm. The new bracing beams shall be connected to a sufficiently robust structure (masonry walls or the remaining floor).
- Some timber or steel trimmers may be required to support joists where half bays are removed.

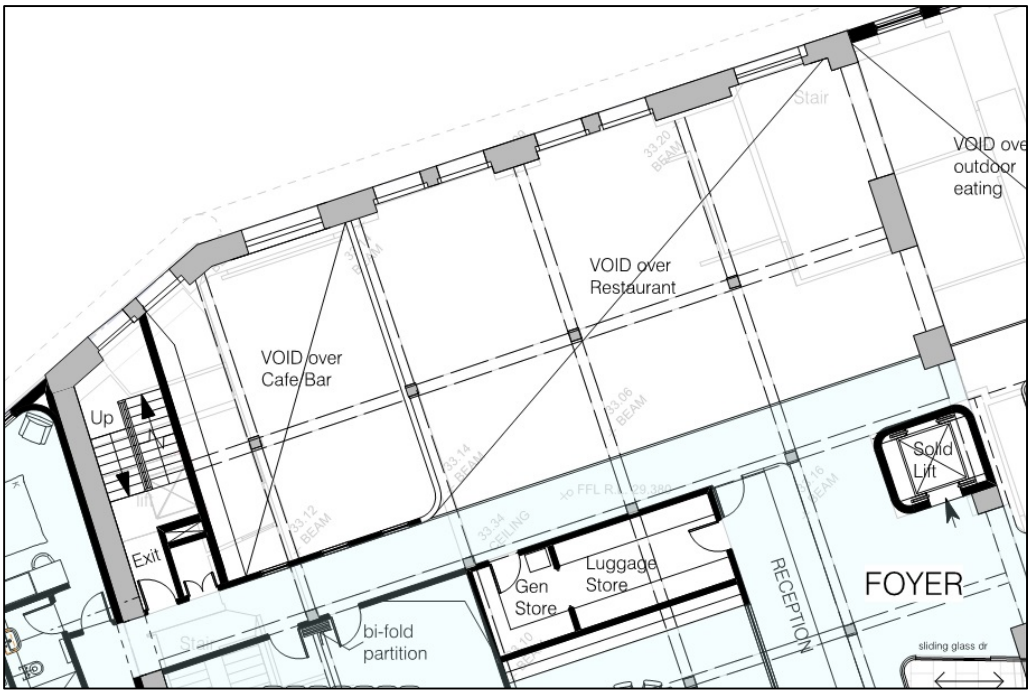


FIGURE 2: PARTIAL REMOVAL OF THE GROUND FLOOR STRUCTURE

5.3 LOWERING OF THE BASEMENT LEVEL GROUND SLAB

It is understood that lowering of the floor level in the basement is desired to provide a level surface at street level. This may be feasible, but requires geotechnical investigation to determine the existing slab thickness, ground conditions under the slab, the presence of buried services (such as an oil tank) and the dimensions of footings for the timber columns and masonry walls. Depending on the amount of lowering required, some underpinning of the perimeter masonry walls may be required.

5.4 NEW OPENINGS IN NORTH AND SOUTH PERIMETER WALLS

Large openings are proposed through the north and south perimeter walls at all levels to provide a continuous central corridor through the building and for accessing the adjacent buildings. To enable the creation of these openings the masonry above will need to be supported on a new lintel. This is likely to consist of several prestressed concrete lintels stacked across the width of the wall.

At the ground floor the north perimeter wall is shown to be punctured by several large openings, leaving only occasional masonry piers. As this wall is currently a major lateral force resisting element of the building, alternative means of resisting such forces will be required. It is expected that the “solid lift” shown on the line of this wall will act in the new development as a major lateral force resisting element, and will need to be designed as such (see section 7.0 Seismic Strengthening below for details).

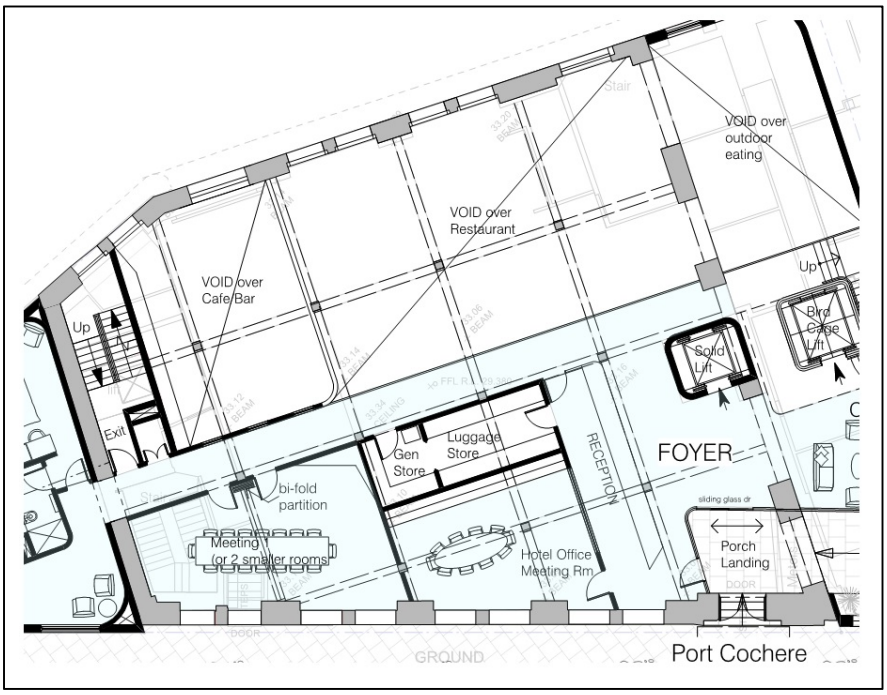


FIGURE 3: REMOVAL OF NORTH AND SOUTH PERIMETER WALLS

6.0 FIRE RESISTANCE PERIODS

We understand that for building class 3 (Hotel) the Building Code of Australia requires fire resisting limits as follows:

- External loadbearing walls: 90/60/30 (structural adequacy/ Integrity/ Insulation)
- Internal columns: 90/-/-
- Floors: 90/90/90

Based on inspection and for the purposes of this report we assume the following timber properties for the structural framing:

- Timber density: 1100kg/m3
- Timber grade: F17

Based on these assumptions we provide the following structural fire resistance periods for structural elements:

- Floor joists: 15mins
- Beams: 100mins
- L1-L4 columns (with existing loads): 70mins
- L1-L4 columns (with two storey addition): 50mins
- Ground floor columns (with existing loads): 90mins
- Ground floor columns (with two storey addition): 70mins
- Basement columns (with existing loads): 110mins
- Basement columns (with two storey addition): 90mins

We would expect that as part of any development an engineered solution would be required to provide additional fire resistance to structural elements to comply with the Building Code of Australia. Some additional fire resistance may be gained upon confirmation of timber grade and density after inspection of the timber by a forestry consultant.

7.0 SEISMIC STRENGTHENING

The proposed alterations to the building will increase the population of the building, add additional weight, and alter major structural elements. Therefore under AS3826 – *Strengthening existing buildings for earthquakes,* assessment and upgrade of the lateral force resisting structures of the building is required to comply with the existing seismic loading code (AS1170.4 – *Earthquake loads*).

Lateral force resisting structures within the building include:

- Existing perimeter masonry walls
- Proposed new lift and stair shafts

We advise the following works will be necessary to enable compliance of the building with the current seismic loading code:

- Design of new lift and stair shaft walls to resist lateral forces.
- Provision of adequate diaphragm or braced action in the floors. Typically this requires the installation of structural plywood boarding to one surface of the floor joists.
- Upgrade of the connection of floors to the perimeter walls and other lateral bracing structures.

8.0 ADDITIONAL INVESTIGATIONS

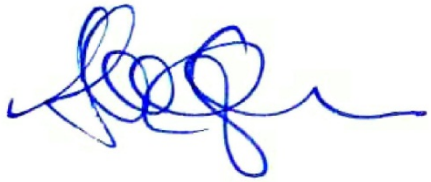
As noted above, we suggest geotechnical investigation in the basement of the building is required to:

- Determine the construction and dimensions of any footings under timber columns and masonry walls.
- Determine the ground conditions under the ground slab including the characteristics of the founding material for the building's footings.
- Determine the feasibility of lowering the ground slab.

The load capacity and fire resistance period of the columns is highly dependent on the grade and density of the timber. The capacity assessment contained in this report is based on conservative estimates of both these values. Visual assessment and grading of the timber by a qualified and experienced forestry consultant may enable the use of higher values.

We trust that the foregoing is of assistance. Please contact the undersigned for any further information.

Yours faithfully



Mott MacDonald Australia
ALEX BEEN
SENIOR STRUCTURAL ENGINEER
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APPENDIX A: PHOTOS

PHOTO 1: BASEMENT COLUMN TO BEAM CONNECTION

PHOTO 2: GROUND FLOOR JOISTS AND FLOORBOARDS

PHOTO 3: GROUND FLOOR COLUMN, BEAM AND CEILING CONSTRUCTION

PHOTO 4: RANDLE STREET FACADE

PHOTO 5: RANDLE LANE FAÇADE