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SAMUEL GILBERT PUBLIC SCHOOL

AT RIDGECORP DRIVE, CASTLE HILL

STRUCTURAL DESIGN REPORT (REVISION 02)

Tuesday, September 04, 2018

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1. INTRODUCTION

This report has been prepared by Henry & Hymas for the proposed additions to Samuel Gilbert Public School at Ridgecorp Drive, Castle Hill, NSW for the Department of Education. The additions mainly comprise of a two 4-storey buildings and a single storey hall behind the proposed library building, based on the proposed Option 1 prepared by Fulton Trotter Architects.

2. GENERAL BUILDING DESCRIPTION

2.1 BUILDING CLASSIFICATIONS

According to the Building Code of Australia this building would be classified as a Class 5/ 9b building. With this type of classification these buildings would have an Importance Level of 3 unless a higher classification is specified by the certifier.

2.2 SITE GROUND CONDITIONS

A contour survey carried out by Land Partners Ltd dated 06 December 2017 has been made available. The survey indicates a gradual up slope of the ground starting from Ridgecorp Drive towards the back of the site in a Northeasterly direction.

A geotechnical Investigation has been carried out for the proposed construction by JK Geotechnics. The results of the investigation are presented in their report no. 31056S dated December 2017. Three additional boreholes were drilled and the test results are presented in report Report No: 31056Srptrev1, dated 19 June 2018.

The site is underlain with weak to low strength sandstone at a depth less than 1.0 m with a 700-1000 kPa bearing capacity.

Cut and fill will be battered to 1V:2H or retained with 1-2.0 m high block retaining walls depending on landscaping requirements.

3. BUILDING ELEMENTS

3.1 BUILDING FRAME

The building frame for the two 4 - storey buildings is proposed to be a conventional concrete framed building for cost effectiveness and construction efficiency. The other option is a steel frame (columns and beams) together with a concrete slab poured on Bondek sheeting with a reinforcing mesh. From past experience steel and Bondek option has proven to be more expensive than the preferred concrete framed option.

It would be possible to use concrete mixed with up to 30 % of Flyash where the shrinkage of concrete is not a critical factor. Such elements include, pad footings, bored piers, columns and walls.
For filling under slabs on ground, recycled concrete with sufficient fines may be used in lieu of road base type DGB20.

3.2 FOUNDATIONS

Based on the above-mentioned Geotechnical report, the foundations for all buildings are proposed to be high level pad footings designed for 700-1000 kPa of allowable bearing pressure. Perimeter walls will be supported on strip footings about 500 mm wide.

For the Hall behind the Library building, a 120 mm thick conventional raft slab on ground would be suitable with the footings poured integrally with the slab.

3.3 SUPERSTRUCTURE

For the multi-storey buildings, the suspended floor slabs would be designed as conventional reinforced concrete or post-tensioned slabs 180- 220 mm thick based on the column grid. Generally a 7.5 – 9.0 m column grid would provide the best structural efficiency based on our past experience.

If the columns on Level 2 do not align with the columns over, a transfer slab would be necessary at Level 3, the thickness of the transfer slab would depend on the column grid. However, based on our experience, we believe a 350 -400 mm thick slab would suffice, should a transfer slab be necessary.

Cost and construction efficiencies can be gained with a 220 mm thick flat plate (meaning a flat soffit, thus simplifying formwork) and a 50 mm max. set-downs in wet-areas so a minimum slab thickness of 170 mm is available for fire-rating (required minimum thickness according to Australian Standards). This is assuming a 2 hour fire-rating for Class 5 and 9b building.

The vertical load bearing elements for the multi-storey buildings are proposed to be 400 mm square columns or 450 dia. RC columns. Alternatively, blade columns of the size 220x900 mm can be used. Lift/ Stair walls will be designed as shear walls and will be 150- 200 mm thick.

For the single storey Hall, the structural system could be both a steel portal frame with wall girts and lightweight cladding or a steel roof frame supported on 150 thick tilt panels as load bearing walls.

3.4 ROOF STRUCTURE

The roof structure would be a pitched or flat roof based on architectural requirements in structural steel. It would also be possible to use a light-gauge steel or timber trusses.

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4. DESIGN LOADS

Refer to the architectural documents for the extent of different floor use areas. The nominated default provisions below are generally the minimum allowable from the relevant Australian Standards. Unless directed by the Client to adopt a higher standard, the design development and final design for the project will proceed on the basis of the nominated loadings below.

4.1 PERMANENT LOADS (TO AS/NZS 1170.1:2002)

Structural Elements

Self-weight as calculated	
Internal Services, Ceilings & lightweight partitions	1.0 kPa
External areas	1.5 kPa

4.2 LIVE LOADS (TO AS/NZS1170.1:2002)

Offices	4.0 kPa
Home Bases	3.0 kPa
Library	7.5 kPa
Courtyards / Corridors and common areas	4.0 kPa
Plant Rooms	5.0 kPa
Roof Areas	0.25 kPa

4.3 EARTHQUAKE LOADS

The buildings will be designed for the minimum seismic loads required for compliance with AS1170.4:2007.

Importance Level (BCA):	3
Sub-Soil Class (Section 4):	Ce
Annual Probability of Exceedance for Earthquake:	1:1000
Probability Factor (kp):	1.3
Hazard Factor (Z):	0.08
Earthquake Design Category (EDC):	II (for ht ≤ 25 m)

4.4 WIND LOADS

Wind loads will be in accordance with AS1170.2 and as follows;

Basic wind velocity (Region A) V1000:	46 m/s
Terrain Category:	3
Annual Probability of Exceedance for Wind:	1:1000