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St Aloysius' College, Kirribilli SSDA Masterplan Structural Design Statement

Prepared for:

St Aloysius' College

Prepared by:

Christopher Jennings

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Level 6, Building B, 207 Pacific Highway, St Leonards NSW 2065

T: (02) 8484 7000 E: sydney@wge.com.au W: www.wge.com.au

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REVISION

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1. Introduction

The following structural design statement has been prepared to define the key elements of the proposed works and illustrate our initial structural scheme. Defined planning and construction constraints are considered within the structural design works and whilst we note, these are generally not problematic for new build elements, specific consideration has been made to works formed within the envelope of the existing structure(s).

Structural design comment included within this report is based upon architectural SSDA documentation and available original drawn information for existing structures. Whilst further investigation and intrusive works are to be carried to determine the accuracy of the originally drafted information, the original drawings have been applied to allow structural scheme works to be developed.

The existing Wyalla classroom building is recognised as a heritage structure. The selection of material(s) and repair works are required and detailed to reflect NSW Heritage Office requirements.

For ease of reference, the Upper Pitt Street, Wyalla and Burton Street sites are considered individually with outline structural information provided. At this stage, the Structural Engineering services for this project are designed in accordance with the National Construction Code of Australia (BCA) 2016 and the relevant Australian Standards.

2. Structural Design Statement

2.1 Upper Pitt Street Campus

Bounded by Upper Pitt Street, Jeffreys Street and Kirribilli Avenue the existing St Aloysius' College site incorporates three primary building elements enclosing a central courtyard. The local topography is noted to fall (circa 14m) from the Upper Pitt Street elevation down to the lower Kirribilli Avenue with the interconnecting Jeffreys Street illustrating the significant change in level across the north/south axis of the site.

All existing structures within this campus have been developed during the schools occupation of the site, with the Great Hall and Chapel elements noted to be constructed circa 1961/62. The proposed development includes; the demolition of structure along Upper Pitt Street and the incorporation of the existing Great Hall & Chapel structures within the proposed scheme (Figure 1).

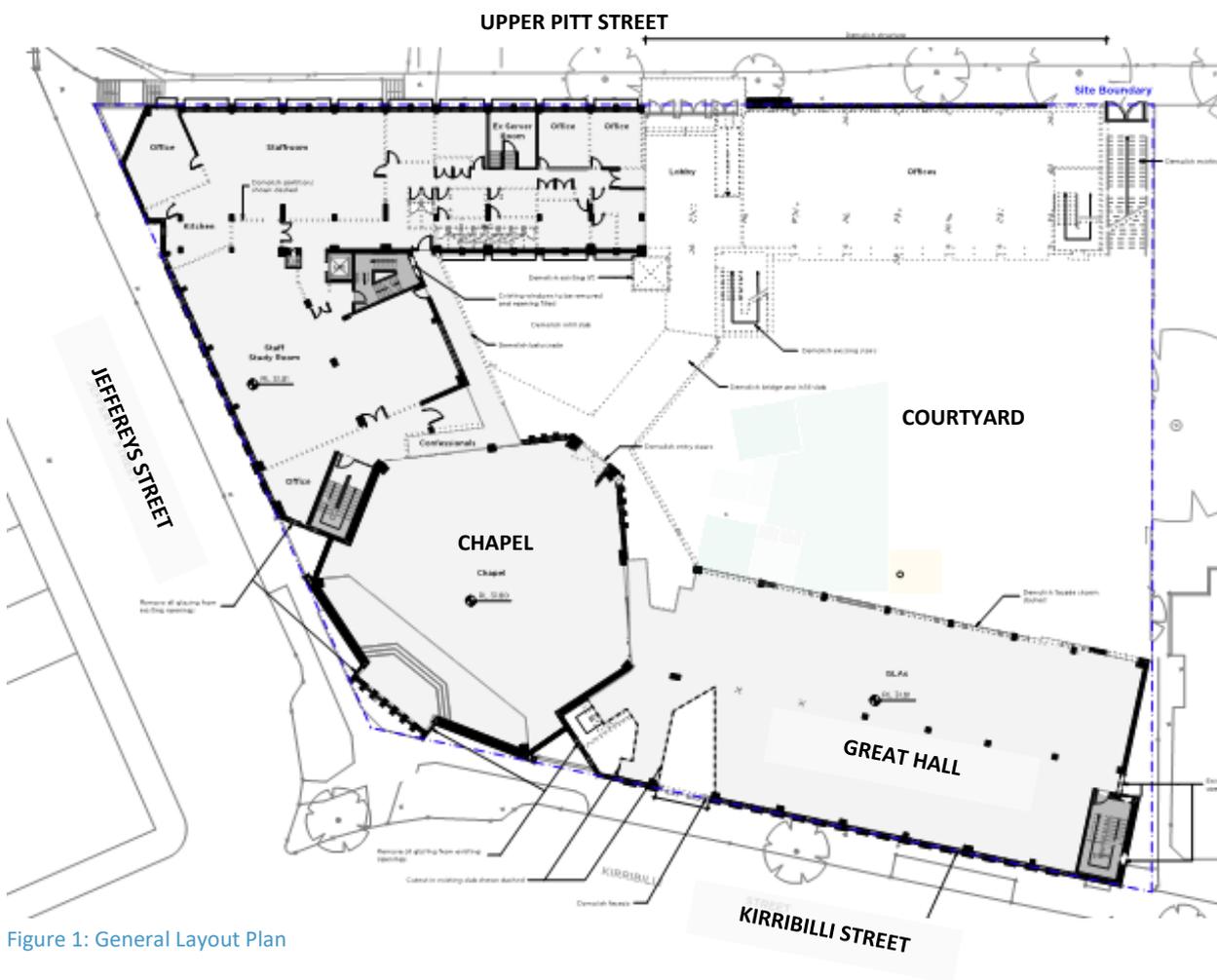


Figure 1: General Layout Plan

2.1.1 Great Hall Structure

The original structural 'scheme' drawings illustrate The Great Hall as a reinforced concrete framed structure with steelwork transfer deck within the Great Hall ceiling. The transfer structure, formed with long span steelwork elements (spanning north to south), are locally 'seated' upon supporting columns and positioned to support column frames over.

As the primary frame is to remain within the scope of the proposed work and significant enhancements in both dead and imposed loading are required, structural strengthening works are proposed.

Strengthening work to increase the overall capacity of the existing column sections with include, the stitching of additional structure to the existing concrete columns. The existing transfer structure is enhanced with the introduction

of additional steel sections. The drafted Great Hall balcony structure includes twin (long span) 'Pratt' trusses, sloping trusses and a deep steelwork edge beam. The original structure in this location appears to have been significantly adjusted with a reduction in viewing depth noted on site.

Based upon our site observation(s) and the requirement to finalize proposed strengthening works, intrusive investigation works are required. The scope of this work will require the removal of existing ceiling and wall finishes together with local Ferroskan works to determine the composition of the steelwork transfer structure and column elements.

2.1.2 Chapel Structure

Situated at the south-west corner of the college campus, the existing four storey octagonal Chapel structure (with 'Blue Gym' & Foyer below) links the Great Hall to classroom and drama facilities along the Jeffreys Street boundary.

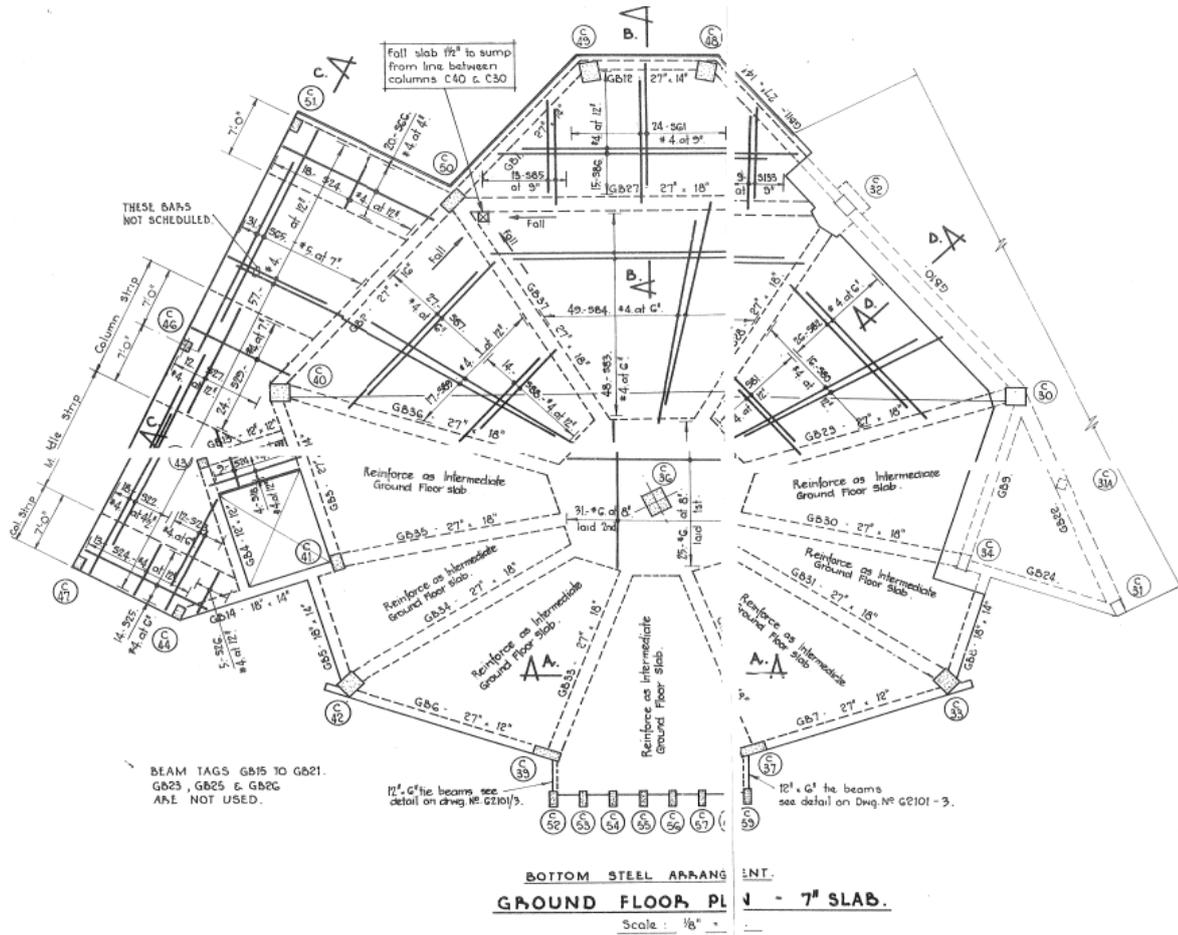


Figure 2: Chapel Ground Floor Plan

The existing floorplate is structurally defined by a single central column and down-stand beam sections radiating to the external columns (Figure 2). The central column provides primary vertical support to the Chapel, Blue Gym and Foyer floors. To allow for the removal of this central column two new columns are introduced to support the existing Chapel floor. The addition of these columns together with supporting beam and perimeter column strengthening works are to be undertaken prior to the demolition of the central column to ensure that the existing Chapel floor is fully supported for the full duration of the works.

Above the Chapel floor, the perimeter concrete frame incorporates full height twinned pre-stressed cantilever columns/beams supporting the existing roof slab (Figures 3&4). As no structural works are scheduled above the Chapel floor level, the existing support and roof construction is to remain as existing and subject to loading requirements, recommendations and certification by the Jacobs Group.

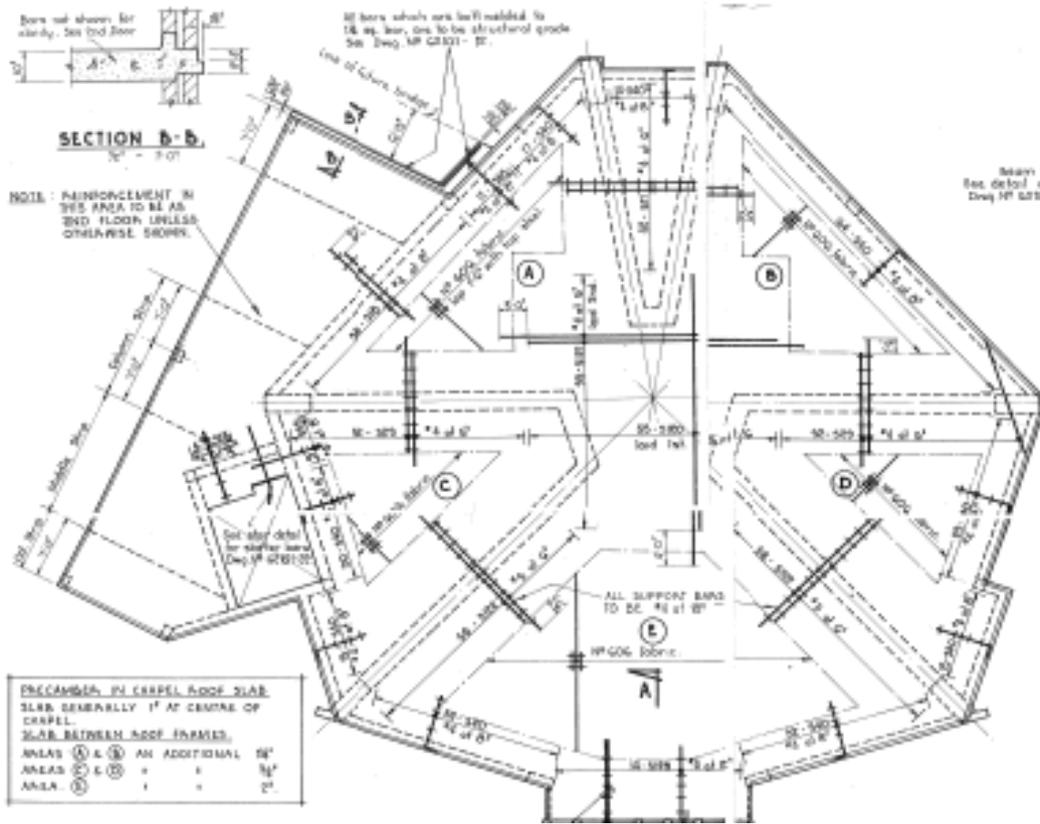


Figure 3 Chapel Roof Plan

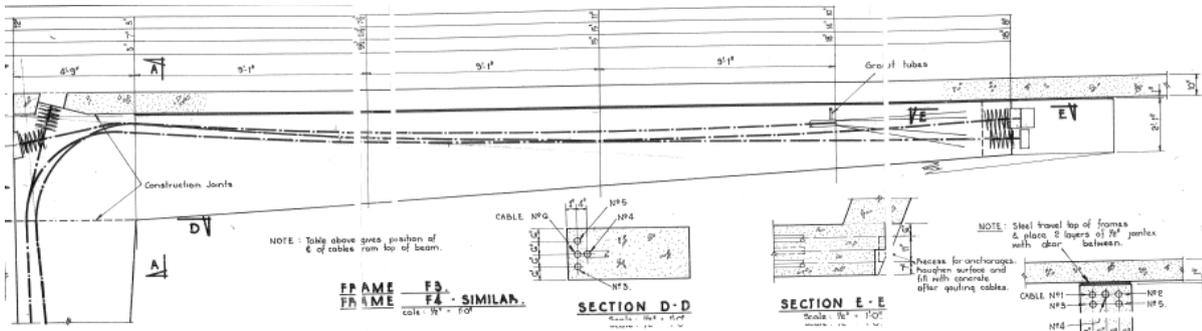


Figure 4 Chapel Roof Section

Strengthening works required to perimeter columns will require intrusive investigation of structural interfaces together with local Ferroskan works to determine the composition of the existing concrete frame.

2.1.3 New Build Structure

The development incorporates significant new build works on the existing Upper Pitt Street campus (Figure 5). The four-storey structure formed as a concrete frame comprises of reinforced concrete columns, post-tensioned slab and deep band beams.



Figure 5: General Arrangement Plan. New Build works highlighted in Blue

Vertically forces are distributed through beam and column elements into the underlying sandstone. Intrusive investigation works illustrate the sandstone to be at shallow depth with rock classification improving with depth.

The lateral structural stability of the structure is accommodated by the local provision of concrete shear walls and stiffened frames with new floorplates forming a structural diaphragm. Where proposed and existing structures meet, the new works include specific joint / interface details to accommodate local vertical and horizontal displacements.

2.2 Wyalla

Structural works within this campus relate primarily to the proposed classroom extension works located adjacent to the Robertson Lane boundary. Works within this location are subject to NSW Heritage requirements and more particularly defined by the limited access for contractor and sub-contractor access. With all significant elements of structure subject to limiting manual handling requirements construction phase methodology has been considered and incorporated within the design from the outset.

The proposed classroom extension is founded upon the underlying sandstone formation (circa 900mm) with pumped concrete strip and pad foundations detailed to support the external masonry. Brick and blockwork cavity wall together with blockwork sleeper walls are provided to support a precast suspended floor slab. To allow for limiting handling requirements the proposed suspended floor is formed with precast beam elements supporting permanent form and insulation. The overlying pumped concrete slab is to be finished to reflect architects requirements.



Figure 6 Wyalla, Existing Structure

The lightweight 'lean-to' frame structure supporting the extension roof is formed in structural steel. Roof elements are clad in lightweight sheeting and supported upon purlin elements whilst vertical elevations are enclosed with masonry and curtain wall. The existing perimeter external masonry wall is opened up in two locations to access the extended classrooms. Each new opening is supported upon twin steelwork beams. Twin beams sections provided for each opening, are tied in pairs to limit depth and supported upon concrete padstones.

The existing classroom building (Figure 6) is recognised as heritage structure with requirements of NSW Heritage Office strictly applied to the proposed works. All brickwork repairs, pointing, packing and support works are to be carried out to reflect NSW Heritage Office '*How to carry out work on Heritage Buildings and Sites*'. Specific attention is given to the selection of materials and the application of any local temporary structural support works provided and designed by the Contractor.

2.3 Burton Street

The Burton street site (Figure 7) comprises of new multipurpose hall, courtyard and the further development of an additional second level over the existing western classrooms.

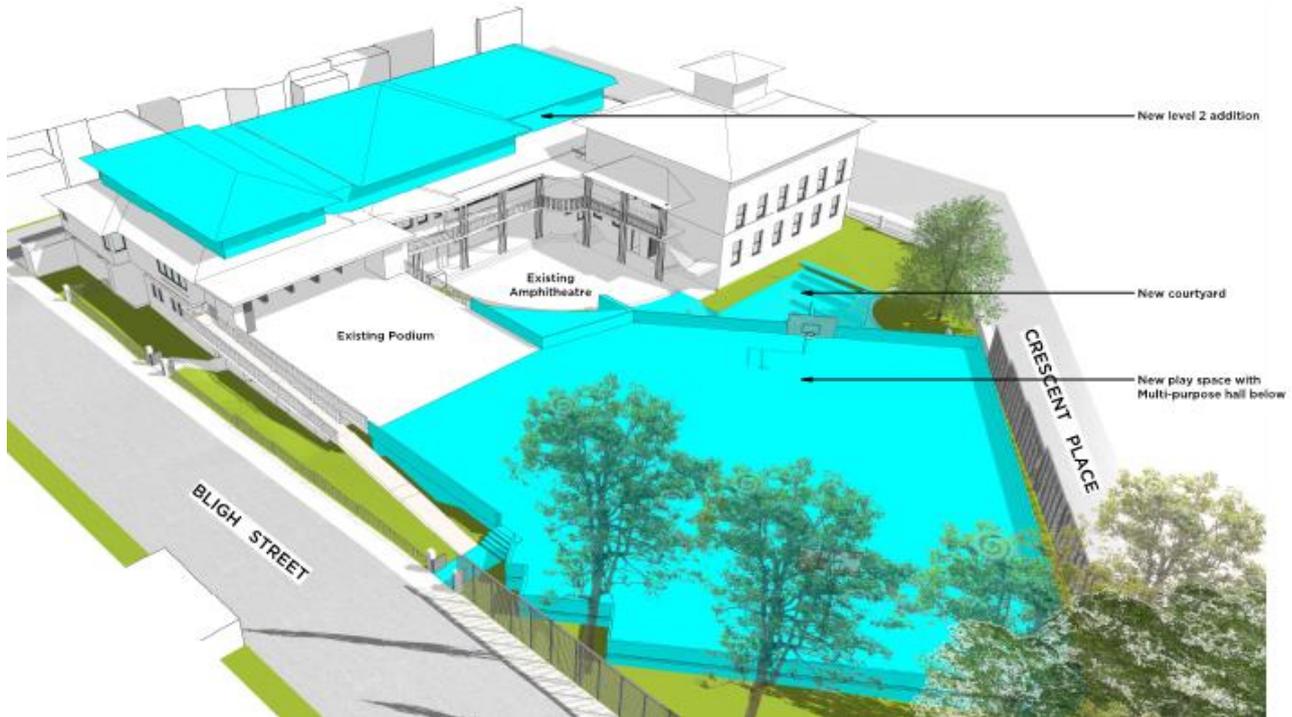


Figure 7 Burton Street General Arrangement

Partial basement construction required to form the multi-purpose hall and courtyard forms the principle element of civil & structural engineering works. The multi-purpose hall structure is to be formed as an insitu concrete structure with shoring works envisaged to support the perimeter envelope along the Crescent Place and Bligh Street boundaries. Once shoring is placed, Sandstone and fill material is to be cut to form the local excavation with surplus material exported from the site as required.

New level two addition is envisaged as a lightweight structure supported upon a new primary steelwork frame formed within the envelope of the existing floor plate. The new structure is founded upon the underlying sandstone with local strengthening works provided as may be required to the existing structure.

3. Conclusion

Structural comment included within this report is based upon architectural SSDA documentation and available original drawn information. For clarity the following key points are highlighted;

- Primary structural frames for Great Hall and Chapel structures are to remain with structural strengthening works required.
- Based upon site observation and the requirement for strengthening work, intrusive investigation works are required.
- The scope of intrusive work will require the removal of existing ceiling and wall finishes together with local Ferroskan to determine the composition of existing column, floor and transfer structure elements.
- The existing Wyalla classroom building is recognised as a heritage structure. The selection of materials, repair work and methodology are to be detailed to reflect NSW Heritage Office requirements.