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Henry & Hymas
Consulting Engineers Pty Ltd

NSW GOVERNMENT | Health Infrastructure

Bowral and District Hospital Redevelopment

Future Proofing of Level 2 Extension

Addendum Statement – Structural Design

(To be read in conjunction with the Structural Design report by Enstruct group dated 30th April 2018)

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EXECUTIVE SUMMARY

This report presents the changes carried out in the structural design and the relevant structural engineering strategies adopted to accommodate the possible future extension of level 2 slab in the Bowral and District Hospital redevelopment. This includes the changes to both the gravity and lateral loads realised during analysis and the consequential necessary upgrade to some of the structural elements to sustain the maximum expected loads from both scenarios (before extension of level 2 slab and after extension).

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INTRODUCTION

This report has been prepared on behalf of NSW Health Infrastructure to accompany a Section 4.55 application to modify State Significant Development 8980 which was approved by the NSW Department of Planning, Industry and Environment on 21 February 2019 (SSDA approval). The SSDA approval was for the redevelopment of the Bowral and District Hospital, located at Nos 97-103 Bowral Street, Bowral within the Wingecarribee Shire local government area.

NSW Health Infrastructure is seeking to lodge an application to modify the SSDA approval to capture minor changes to Levels 2 of the Hospital. The modifications can be summarised as follows:

- Additional Level 2 floor space to accommodate hospital service rooms and back-of-house facilities (including a Central Sterilising Department (CSD), pharmacy, and bathrooms);
- Additional 317.52 sqm GFA;
- Minor changes to roof pitch and building elevations; and
- Minor changes to cladding and façade treatment (including external materials and finishes).

Henry & Hymas has been assigned to carry out the structural design for the Bowral and District Hospital. During the process we were requested to future proof the building for the possible extension of the floor area in level 2. In doing so, some changes were implemented to the design of some of the structural elements as explained below. This report highlights the changes carried out to the structural design to allow for the required future proofing and thus confirms that the possible future extension of level 2 has been accounted for in the structural design of the building.

STRUCTURAL DESIGN

The structure has been designed as Post Tensioned (PT) slabs with band beams. The PT tendons and reinforcement for the PT slabs and beams are designed by others. With a few exceptions, the band beams are designed to be supported by a grid of size 500x500 concrete columns at an 8.4 to 8.6m typical spacing in both directions. Each column is designed to be supported on a single pile 600/750mm diameter depending on the column load and in accordance with the soil capacity as provided in the geotechnical report.

The original intention was to have the ground floor slab and level 1 slab cover the entire floor area from grid 'A' to grid 'K' while level 2 slab covers a smaller area, between grids 'C' to 'K'. level 3 slab also extending between grids 'C' to 'K' but with the southern edge stopping at grid '11' rather than grid '13' as it does in all of the lower levels resulting in an even smaller slab area.

However, we were later instructed to future proof the design for the potential extension of level 2 slab. Consequently, the following changes have been made to the design of the respective structural elements as explained below.

Foundations

Piles supporting all columns in the future extension areas have been upgraded to support the larger column loads expected after the slab extension.

Columns

Columns in the extension areas have been designed to sustain the larger loads after slab extension.

Slabs

The slabs have been designed for both scenarios (before/after future extension) to account for the effect of the slab continuity on the outer bays while still designing the exterior bays to have continuity from one side only during the initial stage (no slab extension yet).

Lateral Loads

The change in the geometry of level 2 slab had an impact on both Earthquake design and the Wind load analysis, which were both realised and considered in the analysis and design as discussed below.

Earthquake Design

The effect of the possible future extension on the total mass of the structure has been considered in the analysis for seismic loads and consequently the change in the base shear after extension. The change in the force distribution has also been taken into account while calculating the storey shear at each level.

In addition, the alteration in the eccentricity at level 2 slab resulting from the shift of the centre of mass relative to the centre of rigidity has also been accounted for in the modal analysis.

Consequently, the shear walls, which are the main lateral load resisting elements, were designed to resist the maximum forces expected from both scenarios.

Wind Analysis

The change in the wind loads resulting from the future extension of level 2 slab was found to have no impact on the design because the design was governed by the Earthquake loads.