Pendle Hill High School

Structural Design Report

Schools Infrastructure NSW

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Contents

1 Introduction

1.1 Purpose

The Department of Education (DoE) and SINSW is proposing to redevelop Pendle Hill High school, to increase student capacity for up to 1,360 students, in addition to an overall improvement of the site layout, infrastructure and street presence.

Aurecon has been engaged by SINSW to undertake structural engineering design for the development. This report will outline the structural design principle for the new three-storey school building 'Building H', in responding to the Planning Secretary's Environmental Assessment Requirements (SEARs) SSD-9579147, issued 26 October 2020.

1.2 Project Overview

Pendle Hill High School is located in Toongabbie, approximately 30 kilometres west of the Sydney central business district. The site fronts Binalong Road (East), Knox Street (South) and Cornock Avenue to the west of the school.

The proposed school upgrades consists of;

- Construction of a new three-storey courtyard building on Binalong Road comprising two (2) three-storey wings under a connected roof which will accommodate a library, staff unit, lecture theatre, multimedia and senior learning spaces, administration unit and student amenities;
- External transport infrastructure upgrade works;
- New covered walkways and upgraded landscaping; and
- New hard stand areas for bicycle parking.

The building design shall adhere to the Educational Facilities Standard & Guidelines (EFSG) for new buildings.

Building H is also targeting Environmental Sustainable Design (ESD) measures with the objective to achieve 5 Star Green Star rating.

Figure 1: Site plan of existing Pendle Hill HS layout indicating proposed Building H

2 Structural Engineering

2.1 Design Intent

The intent structurally will be to design buildings that allow for the fastest build time, using materials and processes that satisfy School Infrastructure (SI)'s guide lines. Options for design include the use of modular construction or prefabricated elements such as precast. Generally, the massing indicated by the architect suggest that conventional steel and concrete designs are likely to be used for this school.

Figure 2: North East view render

2.2 Building Structure

For the new building H, the current scheme is for a concrete framed building – concrete columns and core/shear walls with Post Tensioned two-way flat slab with perimeter concrete Post Tensioned beams. The roof comprises lightweight steel framing.

There is a potential to move to precast concrete elements if there is market availability. Due to the current high demand in the industry for precast, lead times should be investigated prior to confirming a change from insitu concrete.

The site is overlain with uncontrolled fill, and the Douglas Partners Report R.003.rev1 issued 2 March 202, recommends that the buildings be constructed on piles, or foundations deeper than the fill layer.

The Douglas Partners *Report on Updated Preliminary Site Investigation with Limited Soil Sampling dated Feb 2020 Document 86977.00.R.004.Rev0* reviewed the site to assess the soil for contamination. The report notes that there was asbestos detected in one of the borehole locations (BH109). This borehole is in the vicinity of the proposed location of the new Block H. The Douglas Partner reports identify that there is no evidence of free ground water in any of the boreholes on the site, indicating that dewatering during construction is unlikely to be required and contamination through ground water is also unlikely. Acid sulfate soils were not detected.

2.3 Structural Loads

For the design of all new buildings and renovation of existing buildings the following standards and codes should be used, at a minimum, as a basis for design:

- NCC 2019
- AS1170.0 – General Principles
- AS1170.1 – Permanent, imposed and other actions
- AS1170.2 – Wind Actions
- AS1170.4 – Earthquake actions in Australia
- AS3600 – Concrete Structures
- AS3700 – Masonry Structures
- AS4100 – Steel Structures

2.3.1 Static loading

Typical Building Loads to be as follows:

Description	Live Load	Super Imposed Dead Load
Hall	5 kPa	1 kPa
Library	4 kPa	1.5 kPa
Learning Hubs	3 kPa	1.5 kPa
Plant	5 kPa	1 kPa
Landscaping on suspended slabs	4 kPa	2.5 kPa
Roof	0.25 kPa min	

2.3.2 Lateral Loads

Description	
Importance level	IV
Earthquake Design Category	II
Soil Class	Be
KpZ	0.12
Earthquake Return Period	1:1500
Wind Return Period	1:2000

2.4 Design Compliance

Structural design of the new building, by Aurecon at this stage, adheres to NCC2019 and relevant Australian Standards requirements. Further design development by the builder during D&C period is to be adhered to all relevant regulations.

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