Woolacotts.
CONSULTING ENGINEERS

Alexandria Park Community School

Structural Design Report

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Contents

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1.0 Introduction

1.1 General

This Structural Design Report has been prepared by Woolacotts Consulting Engineers on behalf of the NSW Department of Education (the 'Applicant'). It accompanies an Environmental Impact Statement (EIS) prepared in support of State Significant Development Application SSD 17_8373 for the redevelopment of 'Alexandria Park Community School' at 7-11 Park Road, Alexandria (the 'Site'). The EIS seeks development consent for the following works:

The redevelopment of the Alexandria Park Community School ('the School') will address issues of capacity for schools in the inner city areas of Sydney and is also driven by the population growth resulting from the large number of residential developments that are transforming the former industrial precincts of Zetland, Waterloo and Alexandria.

The new school has been briefed to accommodate up to 1,000 primary school students and up to 1,200 secondary school students on one campus in an integrated and fully connected school building.

Specifically, this project includes:

- Demolition of all existing buildings on-site, including the temporary pop-up schools;
- Remediation of specific areas of the site containing contaminated fill;
- Construction of multiple school buildings of up to five stories, arranged along the western and southern parts of the site comprising:
    - Classroom home bases;
    - Collaborative learning spaces;
    - Specialist learning hubs;
    - Learning support spaces;
    - Offices for teachers and administrative staff;
    - Library; and
    - Student canteen.
- Construction of a sports hall and multiple outdoor sports courts;
- An all-weather multipurpose synthetic sports field;
- Informal play spaces and Covered Outdoor Learning Space or COLA;
- A community centre;
- A pre-school for 39 children;
- Site landscaping including green links, community garden and open space;
- Construction of a new on-site car park and associated vehicular access point off Belmont Street; and

- Augmentation and construction of ancillary infrastructure and utilities as required.

Delivery of the project will be undertaken in sequential phases to maintain an operational school on the Park Road Campus and will involve enabling works separate to this application followed by three main construction phases for the new building and external works.

The purpose of this report is to provide an assessment of the proposal as described above and detailed within the EIS.

1.2 Design Life

The structures are to be designed for a 50 year design life

2.0 Scope of Work

The scope of work shall consist of the design and documentation of the following

- Piled Footings;
- Lift and stair cores
- Cast-in-situ and precast columns
- Slabs on ground
- Suspended reinforced concrete slabs
- Post-tensioned floor and trafficable roof slabs
- Structural steel wall and roof framing
- Masonry wall framing
- Miscellaneous items

3.0 Relevant Design Standards

The structural design of the project will be carried out in accordance with the following Australian Standard Codes of Practice.

- Building Code of Australia (BCA)
- The Educational Facilities Standards & Guidelines (ESFG)
- AS/NZS 1170 Part 0 Structural Design Actions - General Principles
- AS/NZS 1170 Part 1 Structural Design Actions – Permanent, imposed and other actions
- AS/NZS 1170 Part 2 Structural Design Actions – Wind actions
- AS/NZS 1170 Part 4 Structural Design Actions – Earthquake Actions
- AS 3600 Concrete Structures
- AS3700 Masonry Structures
- AS4100 Steel Structures
- AS4600 Cold Formed Steel Structures

4.0 BCA Classification

The structures have been classified in accordance with the Building Code of Australia as:

- Class of Building: 9b Typical
- Type of Construction: A Typical, Class B at Sports Hall
- FRL of Building Elements: 2 hrs

5.0 Loading Criteria

5.1 Vertical Loads

- Super imposed dead load (SDL)
  - 0.25 kPa non-trafficable roofs for solar panels
  - 0.5 kPa generally
  - 1.0 kPa at wet areas, sprung timber floors
  - 2.4 kPa where hydronic heating topping slabs installed (up to 75 max screed thickness)
  - 5.4 kPa at trafficable roof garden beds (up to 300mm max soil)
- Live Load (LL)
  - Non-trafficable roofs 0.25kPa min / 1.4kN
  - Classrooms: 3.0kPa / 2.7kN
  - Corridors, hallways, ailses, stairs, landing not subject to wheeled vehicles: 4.0kPa / 4.5kN
  - Corridors, hallways, ailses, landing subject to wheeled vehicles: 5.0kPa / 4.5kN
  - Trafficable roofs: 5.0kPa / 4.5kN
  - Library, stage, canteen, gymnasium, technology, food preparation areas, applied studies, computer areas, arts, plant rooms: 5.0kPa / 4.5 kN
  - Bulk stores, store in materials room, kiln area: 7.5kPa / 9.0 kN
  - Wood / Metal Store: 10kPa / 9.0kN

5.2 Wind Loads

Wind loads will be assessed in accordance with AS/NZS 1170.2, using the following parameters:

- Region: A2
- Importance Level: 3
- Return period: 1000 years
- Vu = 46 m/s, Vs = 37 m/s
- Terrain Category: 3
- Topographic multiplier: 1.0
- Shielding multiplier: 1.0

5.3 Earthquake Loads

Earthquake loads will be assessed in accordance with AS/NZS 1170.4 using the following parameters:

- Importance Level: 3

- Return period: 1000 years
- Probability factor (k_p): 1.3
- Hazard Factor (Z): 0.08
- Site Sub-Soil Class: C_e
- Earthquake Design Category: II

6.0 Deflection Criteria

6.1 Lateral deflection

Interstorey drift due to earthquake – 1.5% storey height

Interstorey drift due to wind – storey height/500 (serviceability)

6.2 Vertical Deflection

All floors Total deflection: span/500mm generally, span/1000 at face masonry walls

7.0 Geotechnical Conditions

7.1 Piles

The existing school buildings at the site are founded on piles, with a maximum pile load of 350kN. A geotechnical investigation was completed for the temporary school buildings, with bore holes drilled to 4m depth in sandy soils.

It is intended to found the new buildings on CFA or screw piles, with further geotechnical investigation required to determine the maximum tonnages that can be achieved.

7.2 Groundwater

Groundwater is not expected to be a significant issue. There are no basements proposed.

8.0 Materials

8.1 Concrete

- Exposure classification: External: B1 – 32MPa / 40mm cover to reinforcement

  Internal: A2 – 25MPa / 30mm cover

  In-ground: A2 – 25MPa / 50mm cover (40 with membrane)
- Maximum permissible drying shrinkage: 700 microstrain

8.2 Reinforcing Steel

Grade 500 MPa, ARCS certified

8.3 Structural Steel

- ACRS Certified
- Design life to first maintenance: 15 years
- Atmospheric Corrosion Category: C2
- All exposed steelwork to be hot dip galvanized
- All internal steelwork to be painted with an inorganic silicate coating

9.0 Waterproofing

All exposed slabs to be waterproofed with an applied waterproof membrane in accordance with architectural specifications.

10.0 Flooding

The flood planning level for the site is 13.83m, which is 500mm higher than the 1% AEP flood vent and higher than the Probable Maximum Flood (PMF) level of 13.77m.

The buildings are to be relied upon for “shelter-in-place” evacuation and all structure below the flood planning level will be robust concrete framing, designed to withstand the flood velocities for the site.

11.0 Structural Framing System

11.1 Foundations

CFA or screw piles founded in existing soils – further geotechnical investigation required to determine maximum tonnages.

11.2 Load Bearing Elements

Cast-in-situ concrete columns supporting reinforced and post-tensioned banded slabs.

11.3 Lateral Load Resisting Elements

The lateral wind and earthquake forces at all levels shall be resisted by reinforced concrete shear walls.