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NARRABEEN EDUCATION PRECINCT

DESIGN APPROVAL REPORT - STRUCTURAL

Prepared for: School Infrastructure NSW
By: **en**struct group pty ltd
August 2022

NARRABEEN EDUCATION PRECINCT

DA REPORT – STRUCTURAL

ISSUE AUTHORISATION

PROJECT: Narrabeen Education Precinct
Project No: 6683

Rev	Date	Purpose of Issue / Nature of Revision	Prepared by	Reviewed by	Issue Authorise by
A	29/06/2022	DA REPORT	DAH	MOS	MOS
B	04/08/2022	DA REPORT DRAFT	MCS	MOS	MOS
C	19/08/2022	DA REPORT	WS	MCS	MOS

In the spirit of reconciliation, enstruct acknowledges the Traditional Custodians across all of the lands on which we work and their connections to land, sea and community. We pay our respect to Elders past and present and extend that respect to all First Nations peoples today.

Executive Summary

enstruct have been engaged by School Infrastructure NSW to provide structural engineering consultancy and design for the works at Narrabeen Education Precinct. This report relates to the structural engineering elements of the works.

The proposed development includes the redevelopment of Narrabeen North Public School (NNPS) and Narrabeen Sports High School (NSHS). The Public School and High School have been identified by the NSW Department of Education (DoE) as requiring upgrade works.

This report describes the proposed structural engineering strategy to meet the requirements of the project covering the following:

- Structural engineering options and principles for the proposed new buildings;
- Structural engineering options and principles for the proposed refurbishment works:
- Key structural engineering issues and risks.

This Design Approval Report has been prepared to set the basis for design and delivery phases in relation to the structural engineering for Narrabeen Education Precinct.

The structural schemes developed during the Schematic Design phase of the project specifically address issues in designing in accordance with the National Construction Code (NCC) and relevant Australian Standards and the Educational Facilities Standards and Guidelines (EFSG).

The proposed structural system for the development at this stage is as follows:

- Standard 7.5 x 9m grid with suspended floor plates;
- Lateral system achieved via concrete shear walls for the reinforced concrete structures and steel flat plate cross-bracing for the portal frame structures;
- Suspended structure on ground due to the high shrink/swell movements as detailed in the geotechnical report;
- Steel framed building supported off the ground floor suspended P/T band beam slab to the new school hall and administration building;
- Slab on grade with pad footings supporting steelwork for the new amenities block;
- Piled foundations under the new buildings;
- Modifications to existing structures to suit revised configuration especially the existing multipurpose hall at NSHS

Contents

1 Project Overview

enstruct group have been engaged by School Infrastructure NSW as structural engineering consultants for Narrabeen Education Precinct.

The proposed Narrabeen Education Precinct development includes the redevelopment of Narrabeen North Public School (NNPS) and Narrabeen Sports High School (NSHS). The Public School and High School have been identified by the NSW Department of Education (DoE) as requiring upgrade works.

The works at NNPS upgrade the school including demolition of existing buildings (Block H and J) construction of three (3) new buildings with refurbishment of three (3) existing buildings (Block B, K and V).

The works at NSHS upgrade the school including addition of new two (2) storey extension to Building A construction of new single storey amenities building and refurbishment of four (4) existing buildings (Building A, B, C and K).

The works at NNPS comprise;

- Construction and additions of a new two (2) storey General Learning Space (GLS) building containing administration facilities, multi-purpose hall and out-of-school-hours care (OSHC) facility on the ground floor with staff facilities and amenities on the first floor;
- New hall and administration block;
- New Covered Outdoor Learning Area (COLA).

The works at NSHS comprise:

- Alterations and additions to Building A (Gymnasium) to create new stage for gymnasium and new two (2) storey addition comprising canteen, boys and girls changing rooms and staff room on the ground floor; and movement studio and two (2) new General Learning Spaces (GLS) on the first floor.

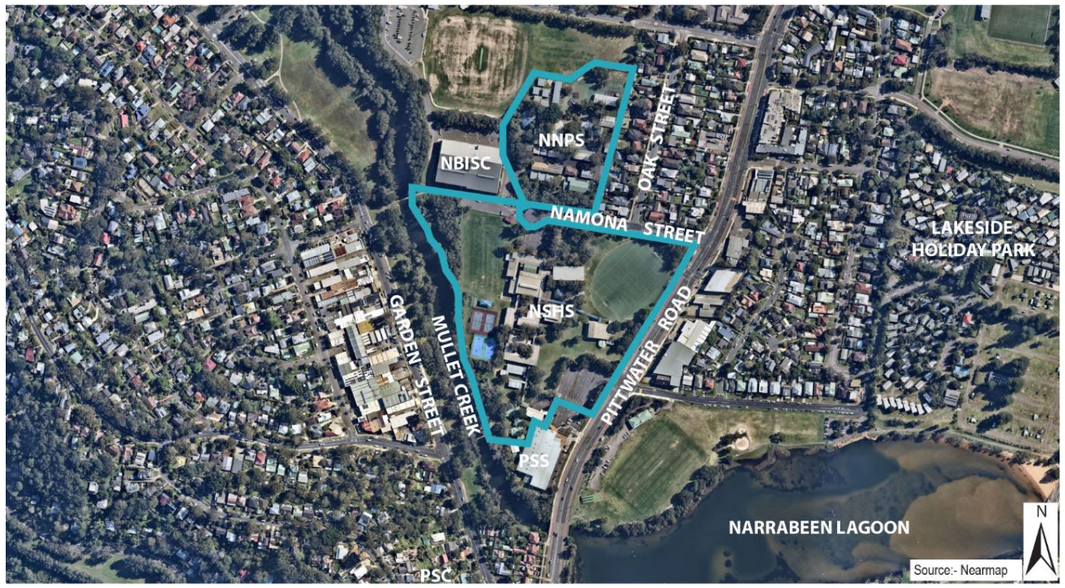
2 Site Description

2.1 Site Description

The subject sites are located at 6 and 10 Namona Street, North Narrabeen (referred to as the Narrabeen Education Precinct) and falls within the local government area of Northern Beaches Council. The Narrabeen Education Precinct has a total area of 9.84 hectares.

Narrabeen North Primary School (NNPS) is located on the northern side of Namona Street, North Narrabeen and is legally described as Lot 3 Deposited Plan (DP) 1018621. NNPS is surrounded by residential dwellings to the east, grassed sporting fields (Warriewood Valley Sportsground) to the north and Northern Beaches Indoor Sports Centre to the west. NNPS contains two (2) Binishell domes (Block A and Block B) which are identified as a local heritage item under the Pittwater Local Environmental Plan 2014. The two (2) Binishell Domes are listed as State significant on DoE's Section 170 Heritage and Conservation Register. The Double Binishell Dome (Block B) is listed on the State Heritage Register (SHR).

Narrabeen Sports High School (NSHS) is located on the southern side of Namona Street and is legally described as Lot 12 DP 1119562. NSHS is surrounded by Pittwater Road to the east, Pittwater Sports Centre to the south and Mullet Creek to the west.



2.2 Existing Topography

The site is generally flat to gently undulating, with RL levels about RL 3m and RL 5m AHD (Australian Height Datum. The NNPS site is flat within the existing building area and it should be noted that the site is battered along the northern, southern & western boundaries.

3 Existing Geotechnical Conditions

3.1 General Soil Conditions

In general, the site contains sand layers which are considered medium to dense, overlain by fill. The site is considered Class P in accordance with AS2870 – 2011.

The site indicated a high probability the ground will contain Acid Sulphate Soils and is in an area of moderate salinity. Material brough to the surface should be treated as acid sulphate soil until proven otherwise.

Groundwater was encountered 0.7m to 1.8m below ground level, and during high tides and heavy rainfall could be expected to rise 1-2m above the measured levels.

3.2 Ground Movements

The site has been designated as “P” classification (as per AS2870) due to the proximity of close trees and abnormal moisture conditions as well as larger layers of uncontrolled fill. For footings/slabs at ground level a further 15mm of movement needs to be allowed for in the design to account for the tree roots.

Due to these large movements the main building is expected to be built as suspended slab on void former to avoid unnecessary stresses on the structural and non-structural elements in the building.

3.3 Seismic Design Parameters

The site has been assessed as a Site Sub-Soil Class of D_e in accordance with 1170.4 – 2007 for earthquake design with a hazard factor (Z) = 0.08.

4 Proposed Development

The proposed development at Narrabeen Education Precinct will allow for the formalization of learning spaces in a new 2 storey building that includes learning spaces, provision of an additional support learning unit, new administration and staff facilities, new hall and COLA, upgrades and additions to the existing School Hall building, and ancillary utility infrastructure and landscaping works. The upgrade consists of the following alterations and additions:

4.1 Hall, Admin & COLA

A new combined Hall and Admin building comprises of a single-story admin and hall with a two-story staff hub. The suspended floor plate will be flat plate post tensioned concrete, with all lightweight roofs supported by steelwork. The ground floor will be suspended on piles similar to the new GLS building. Adjacent to the Hall is a new COLA structure that is steel columns with a lightweight steel roof and slab on ground with pad footings at ground level.

4.2 Block A Gym

At the NSHS the gym is being upgraded, with partial demolition of the existing building and new additions. The extension will be a steel framed construction on pad footings. There will be significant alterations to the existing hall to account for the new space, primarily the replacement of columns and the introduction of a new stage.

Any new services laid beneath the existing slabs will require to be trenched through the existing slabs.

5 Structural Engineering Design Principles

This Section outlines the structural engineering design principles that will be adopted for the project as design progresses.

5.1 Design Standards

The structural design shall be in accordance with the latest issue of all relevant structural Australian Standards, relevant structural sections of the NCC and other statutory requirements.

In particular, the structural design will be in accordance with the following relevant Australian Standards:

Standard	Year	Title
AS/NZS 1170.0	2011	Structural Design Actions Part 0 General Principles
AS/NZS 1170.1	2002	Structural Design Actions Part 1 Permanent, Imposed and Other Actions
AS/NZS 1170.2	2021	Structural Design Actions Part 2 Wind Loads
AS 1170.4	2007	Structural Design Actions Part 4 Earthquake Actions in Australia
AS 2159	2009	Piling – Design and Installation
AS 2670.1	2001	Evaluation of Human Exposure to Whole-Body Vibration – General Requirements
AS 2670.4	2001	Evaluation of Human Exposure to Whole-Body Vibration – Continuous and Shock-Induced Vibration in Buildings (1 to 80Hz)
AS 3600	2018	Concrete Structures
AS 3700	2018	Masonry Code
AS 4100	2020	Steel Structures
AS 4678	2002	Earth Retaining Structures
NCC	2022	National Construction Code

5.2 NCC Provisions

The building is assessed as being Importance Level 3, for the purpose of wind and earthquake design in accordance with the NCC.

Event	Annual Probability of Exceedance
Earthquake	1:1000
Wind (non-cyclonic)	1:1000

5.3 Design Life

The building structure will be designed to provide adequate performance for a minimum period of 50 years with a typical structural maintenance system.

5.4 Materials

The following structural materials are proposed to be used in the works. Typical values for the properties of these materials are listed. These values are to be adjusted where appropriate.

5.4.1 Concrete

5.4.1.1 Properties

Co-efficient of thermal expansion	$12x10^{-6}$ per ^{0}C
Basic shrinkage strain	In accordance with AS 3600 Clause 3.1.7
Basic creep factor	In accordance with AS 3600 Clause 3.1.8
Poisson's ratio	0.2
Density	24 kN/m^3

5.4.1.2 Proposed Concrete Grades

Footings	40 MPa
Suspended Slabs and Beams	40 MPa
Transfer Beams	50 MPa
Columns	40 MPa
Walls	40 MPa
Other areas (UNO)	40 MPa

5.4.1.3 Reinforcement

Plain bars (R)	fsy = 250 MPa
Deformed bars (N)	fsy = 500 MPa
Welded wire fabric (L)	fsy = 500 Mpa
Young's modulus	200 x 10^3 MPa

5.4.1.4 Structural Steel

Grade (UNO)	300MPa
Steelwork density:	7850 kg/m^3
Young's modulus:	2.05 x 10^5 MPa
Poisson's ratio:	0.3
Coefficient of thermal expansion:	12 x 10^{-6}

5.4.1.5 Blockwork

Characteristic Strength	15 MPa.
Mortar mix (cement:lime:sand)	1 : 1 : 6 Unreinforced Blockwork 1 :0.5: 4.5 Reinforced Blockwork
Core fill grout	20 MPa

5.5 Loading

5.5.1 Vertical

The structure will be designed for the following imposed loads as outlined in 1170.4 or as required by EFSG - DG21 Structure, whichever is more stringent.

Area	Superimposed Dead Load (SDL)	Live Load
Classrooms	1.5 kPa	3.0 kPa
Corridors	3.0 kPa	4.0 kPa
Library	2.0 kPa	7.5 kPa
Hall	1.0 kPa	5.0 kPa
Stairs	1.0 kPa	4.0 kPa
Fire Stairs	0 kPa	4.0 kPa
COLAs	3.0 kPa	4.0 kPa
Storage	1.0 kPa	5.0 kPa
Stage	TBC	5.0 kPa
Visual Arts	1.5 kPa	5.0 kPa
Gymnasium	1.0 kPa	5.0 kPa
Office/Admin	1.0 kPa	3.0 kPa
Toilets/Bathrooms	3.0 kPa	2.0 kPa
Lightweight Facade	1.0 kPa on elevation	-
Brick Façade	2.1kPa on elevation	

Live load reduction to be adopted as permitted by AS/NZS1170.1

5.5.2 *Wind*

Wind loading is in accordance with AS/NZS 1170.2 – Structural Design Actions – Wind Actions with the following parameters;

- Importance Level: 3
- Annual probability of exceedance – 1:1000;
- Region – A2;
- V1000 – 46m/s;
- Terrain Category – 2.5;

5.5.3 *Robustness*

Robustness loading in accordance with AS/NZS 1170.0 – Structural Design Actions General Principles with the following parameters:

1.5% of (G + ψcQ) load case;

5.5.4 *Earthquake*

Earthquake loading in accordance with AS 1170.4 – Structural Design Actions – Earthquake Actions for Australia with the following parameters:

- Importance Level: 3
- Annual probability of exceedance – 1:1000;
- k_p = 1.3;
- Z = 0.08;
- Site Sub-Soil Class: De
- Earthquake Design Category: EDCII

5.5.5 *Horizontal Imposed Loads*

All horizontal imposed loads are to be in accordance with AS/NZS 1170.1 or as outlined by the EFSG. The following categories must be addressed individually:

- Handrails generally – in accordance with C3 usage
- Carpark parapets, walls, barriers – 1.5kN/m.

Walls and barriers acting as car barriers in the carpark areas to be designed for a load of:

- 30kN (Based on clause 3.8 of AS/NZS1170.1) at a height of 0.5m above floor level typically;
- 240kN (Based on clause 3.8 of AS/NZS1170.1) at a height of 0.5m above floor level at end of ramps exceeding 20m in length.

5.6 *Serviceability*

5.6.1 *Deflection limits*

5.6.1.1 *Vertical*

Maximum vertical deflections shall be in accordance with Table 2.3.2 of AS 3600 – 2009 or as outlined in EFSG - DG21 Structure, whichever is the more stringent.

5.6.1.2 *Lateral*

- The lateral drift of the building will be limited to the following:
- Under Serviceability Wind Actions – Height/500
- Under Earthquake Actions (AS 1170.4 clause 7.5) – Height/67

5.6.2 *Floor Vibrations*

The design of the floor structure will ensure that vibration due to footfall excitation is kept within acceptable limits. These limits will be based accepted good practice and the recommendations of AS 2670.2 adjusted for the intended occupancy and approximate duration of vibration.

All floorplates will be checked in accordance with the Cement and Concrete Industry publication "A Design Guide for Footfall Induced Vibration."

The vibration design parameters proposed for the project will be as follows.

Area	Damping	Footfall Frequency (Hz)	Response Factor
Office/Classroom Areas	3.0%	2.2Hz Typically 2.5Hz Corridors	8

It is assumed that all equipment which may be a possible source of vibration will be isolated from the structure through the provision of isolation mounts.

5.6.3 *Imposed Movements*

The effect of imposed movements on the structure will be considered in the calculations. These include the following types of movement:

Settlement	either absolute or differential
Temperature range	either absolute or differential
Shrinkage	when restrained between stiff elements
Foundation movement	include shrink/swell under slab on grade

5.7 *Fire resistance levels for structural elements*

Fire resistance levels for structural elements will be in accordance with the structural requirements of the NCC and will developed with the project BCA consultant. Design of individual structural elements to achieve the required FRL will be in accordance with the appropriate materials design code.

5.8 *Foundations*

Based on the current geotechnical report the following has been assumed for the design:

Hall Extension/Admin Building

- Pad foundations
- Suspended slab supported by stub columns to foundations

New COLA Structure

- Pad footings
- Slab on grade structure

5.9 *Retaining Walls*

The structural and civil design will likely utilise conventional blockwork or concrete retaining formed in soil batters where possible. Noting also the current masterplan has no basement levels included and will most likely be built all on or above existing ground level. Where excavation is close to the boundaries or the presence of adjacent structures or services preclude batters, a temporary and/or permanent retention system in the form of soldier piles with close shuttering or shotcrete infill panels or contiguous piling may be necessary.

5.10 *Lateral System*

The main building lateral structure will typically be reinforced concrete shear walls and moment frames. Other alternatives include sway frames which utilise the floorplates and columns. This will be confirmed with further development of the architectural scheme.

Single storey buildings will be braced building using steel members.

5.11 *Vertical Structure*

All columns for the primary building structure will be constructed from reinforced concrete. From level one to the underside of the roof steel columns will be used to support the steel rafters.

The hall modification will consist of steel columns.

5.12 Column Grid

The current architectural design is based on a 7.5m x 9.0m grid with a 2.5m corridor typically, noting that there are several locations with non-standard grids due to the building form and geometry.

5.13 On-Grade slabs

The Staff Hub floors will be suspended with CFA piles for support. CFA piles are appropriate for use here due to the high ground water table. They are to extend down to sit on the dense sand layer that is typically 4m below existing ground level, however this does vary.

On grade slabs can be used for the single-story structures including the COLA and new hall and admin building. The ground needs to be thoroughly prepared to mitigate the movements as outlined in the geotechnical report.

5.14 Suspended Floor Plates

Based upon discussions with the architect during the concept stage a post-tensioned (PT) concrete structure is being developed for the design of the new building. Our experience on similar school projects using post-tensioned concrete flat plate slabs has shown it as the most efficient and preferred structural solution.

The PT floorplates have been designed with KingFielders KF40 metal decking as 'lost' formwork if preferred by the builder. This is to help with the ease and speed of construction. The KF40 is only to be used in conditioned 'indoor' environments for corrosion protection and not to be used in exposed areas where the architectural intent is off-form concrete, i.e., on balcony areas or on exposed slabs covering COLA areas.

For reference, multiple structural systems were developed during the Concept phase for the typical suspended floor plates including:

- Post-tensioned concrete flat plate;
- Post tensioned concrete band beams with one-way slabs;
- Precast post-tensioned beams and slabs with an in-situ topping;
- Composite steel framed floor plate with concrete slab formed on self-supporting on metal decking.

5.15 Roof Structure

The roof structure to the building generally is proposed to be lightweight steelwork. The steelwork will be designed as appropriate for the loading on the roof (i.e.. PV Cells). It is recommended that the PV cells are flush mounted to reduce the applied wind loads. The roof has not been designed for heavy plant loading or any trafficable regions.

5.16 Future Expansion

Structurally we recommend that allowances for future expansion be made for horizontal expansion with vertical expansion allowance avoided where possible.

Vertical expansion over existing structures typically causes unavoidable disruptions to operating facilities below. To avoid future impacts to the school's operation we recommend that vertical expansion is avoided.

5.17 EFSG Non-Compliance

No structural non-compliances have been identified at this point in the design.

5.18 Green Star Requirements

To achieve the nominated 5-Star Green Star rating for the project the following is required:

- Portland cement content shall be reduced by 40%, measured by mass across all concrete used in the project compared to the reference case nominated by the GBCA.
- Aggregate and Water

  Mix water for all concrete used in the project contains at least 50% captured or reclaimed water (measured across all concrete mixes in the project),

  Either of the following must be satisfied:

a) At least 40% of coarse aggregate in the concrete is crushed slag aggregate or another alternative material (measured by mass across all concrete mixes in the project), provided that use of such materials does not increase the use of Portland cement by over five kilograms per cubic meter of concrete;

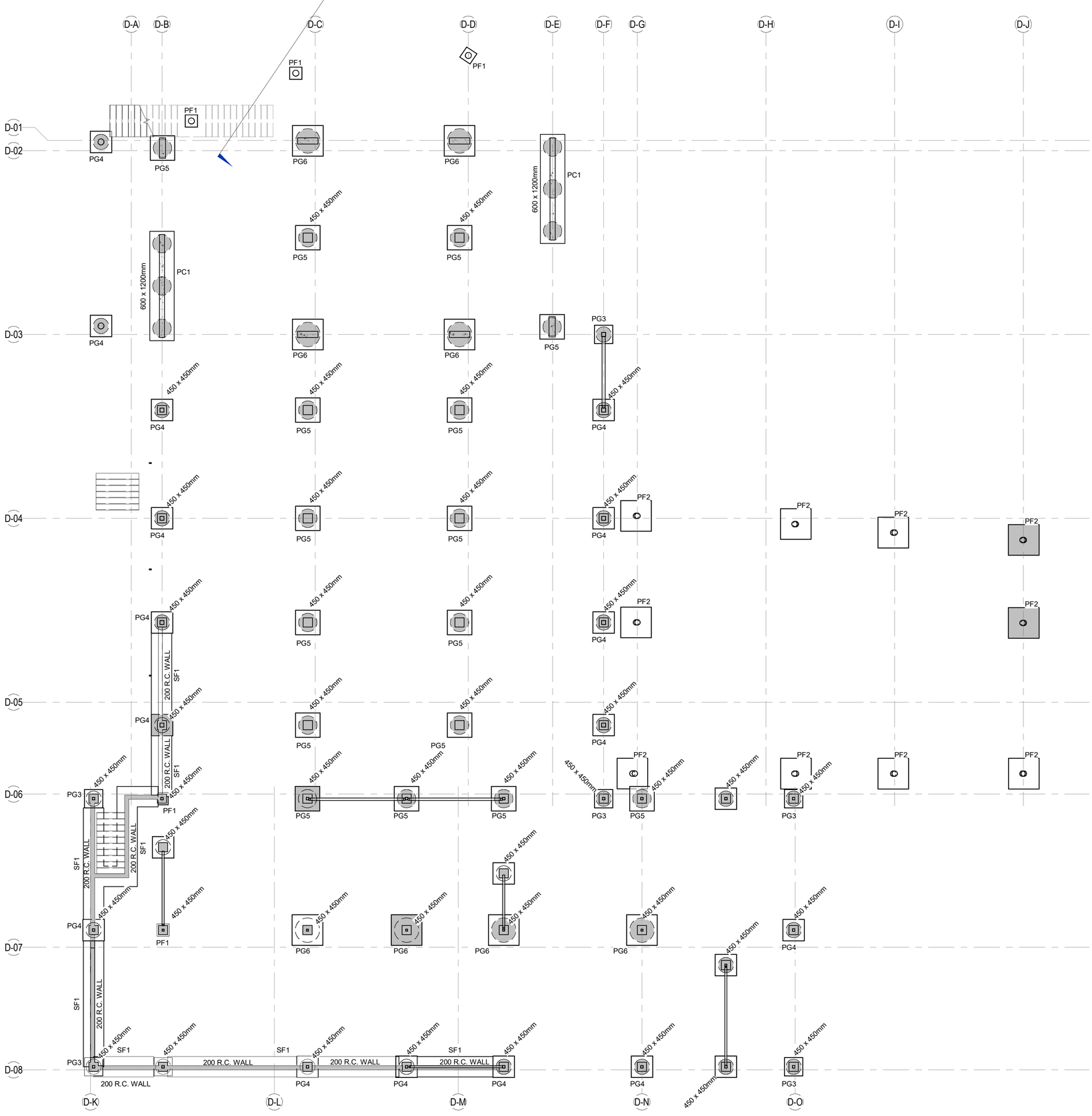
b) At least 25% of fine aggregate (sand) inputs in the concrete are manufactured sand or other alternative materials (measured by mass across all concrete mixes in the project), provided that use of such materials does not increase the use of Portland cement by over five kilograms per cubic meter of concrete.

- At least 95% of all reinforcing bar and mesh meets or exceeds 500MPa strength grade, and at least 60% of all reinforcing steel is produced using energy-reducing processes in its manufacture (measured by average mass by steel maker annually) and at least 15% (by mass) of all reinforcing steel is assembled using off site optimal fabrication techniques as defined by the GBCA.

APPENDIX A

SCHEMATIC STRUCTURAL DRAWINGS

REFER TO DRG. ST-001-01 & ST-001-02 FOR GENERAL NOTES



ADMIN & HALL - FOUNDATIONS GENERAL ARRANGEMENT

SCALE: 1 : 100

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2	02.09.22	ISSUED FOR DA
1	26.08.22	SD - DRAFT

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CLIENT

NSW GOVERNMENT Education School Infrastructure

BUILDER

PROJECT NAME

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PROJECT NUMBER: 6683

DRAWING TITLE

ADMIN & HALL - FOUNDATIONS GENERAL ARRANGEMENT

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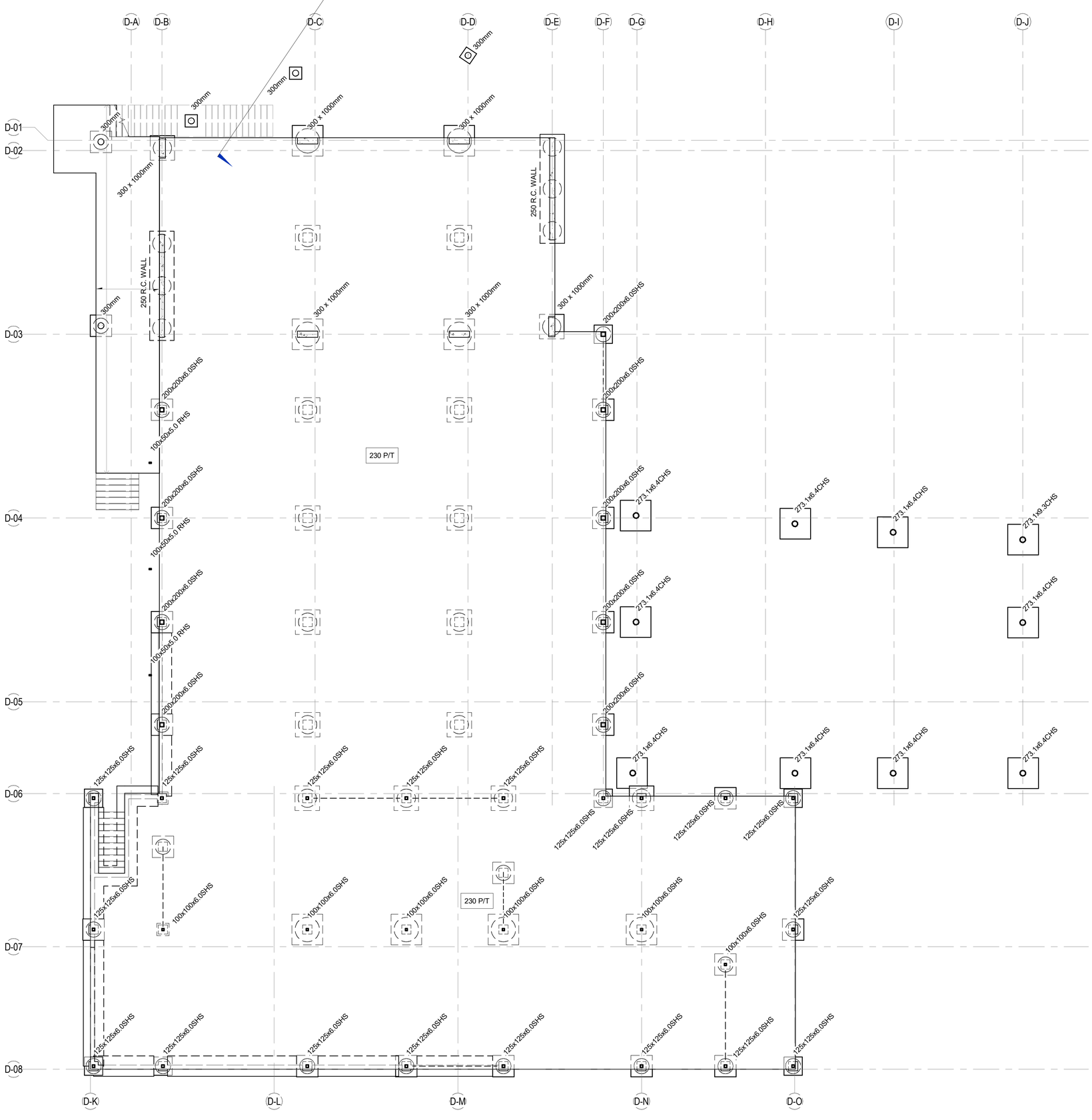

ADMIN & HALL - GROUND FLOOR GENERAL ARRANGEMENT

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REFER TO DRG. ST-001-01 & ST-001-02 FOR GENERAL NOTES

NOTES:

1. WET AREA SETDOWNS SHOWN INDICATIVELY ONLY AND ARE SUBJECT TO FUTURE COORDINATION.
2. REFER TO ARCHITECTS DRAWINGS FOR ALL SETDOWNS, HOBS, PLINTHS, FALLS, ETC.
3. STEEL ANGLES FOR SUPPORT OF NON-LOAD-BEARING BRICK FACADE TO BE DESIGNED AND CERTIFIED BY THE CONTRACTOR. SLAB EDGE TREATMENT AND POTENTIAL FOR EDGE THICKENINGS TO BE COORDINATED WITH THE FACADE CONTRACTOR.
4. ADDITIONAL SETDOWNS AND SLAB FOLDS ARE LIKELY TO BE NEEDED AT THE EXTERNAL CORRIDOR AND ARE TO BE COORDINATED WITH FALLS.
5. CONSTRUCTION JOINTS TO BE COORDINATED WITH THE CONTRACTOR
6. POSSIBLE ALTERNATIVE TO USE A PT FLOORPLATE BY GROUND FLOOR D&C BY THE FLOORPLATE CONTRACTOR WITH SLIP JOINTS PROVIDED TO RELEIVE RESTRAINT FROM FOOTINGS. THIS WOULD ALLOW PILES TAGGED PG5 TO BE OMITTED. THE THICKNESS FOR THIS OPTION WOULD BE APPROXIMATELY 250mm THICK TBC BY PT CONTRACTOR.
7. SERVICES PENETRATIONS REQUIRE FURTHER COORDINATION AND ARE TO BE FINALISED UNDER THE CONTRACTOR

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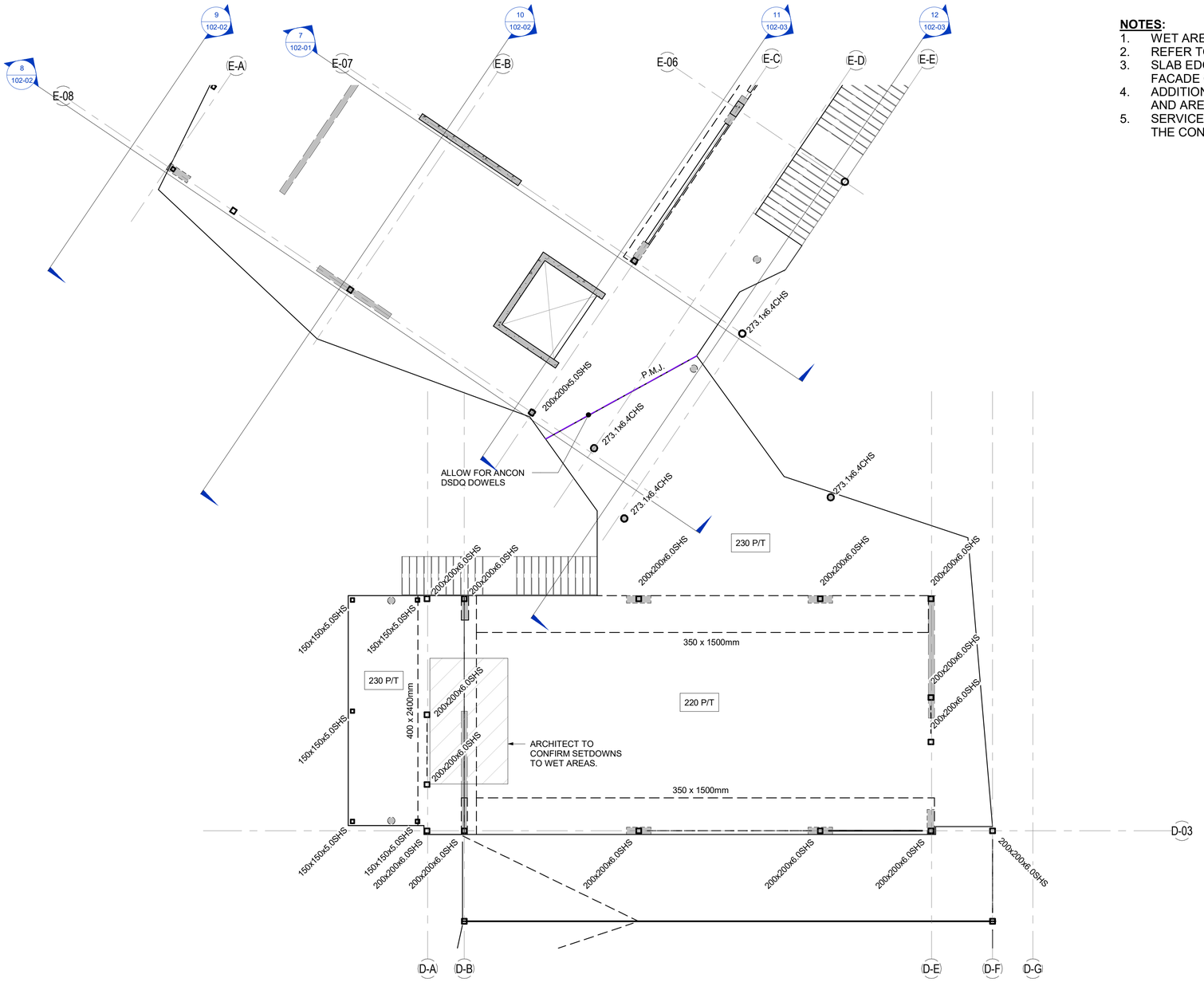

ADMIN & HALL - LEVEL 01 GENERAL ARRANGEMENT

SCALE: 1 : 100

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2. REFER TO ARCHITECTS DRAWINGS FOR ALL SETDOWNS, HOBS, PLINTHS, FALLS, ETC.
3. SLAB EDGE TREATMENT AND POTENTIAL FOR EDGE THICKENINGS TO BE COORDINATED WITH THE FACADE CONTRACTOR.
4. ADDITIONAL SETDOWNS AND SLAB FOLDS ARE LIKELY TO BE NEEDED AT THE EXTERNAL CORRIDOR AND ARE TO BE COORDINATED WITH FALLS.
5. SERVICES PENETRATIONS REQUIRE FURTHER COORDINATION AND ARE TO BE FINALISED UNDER THE CONTRACTOR

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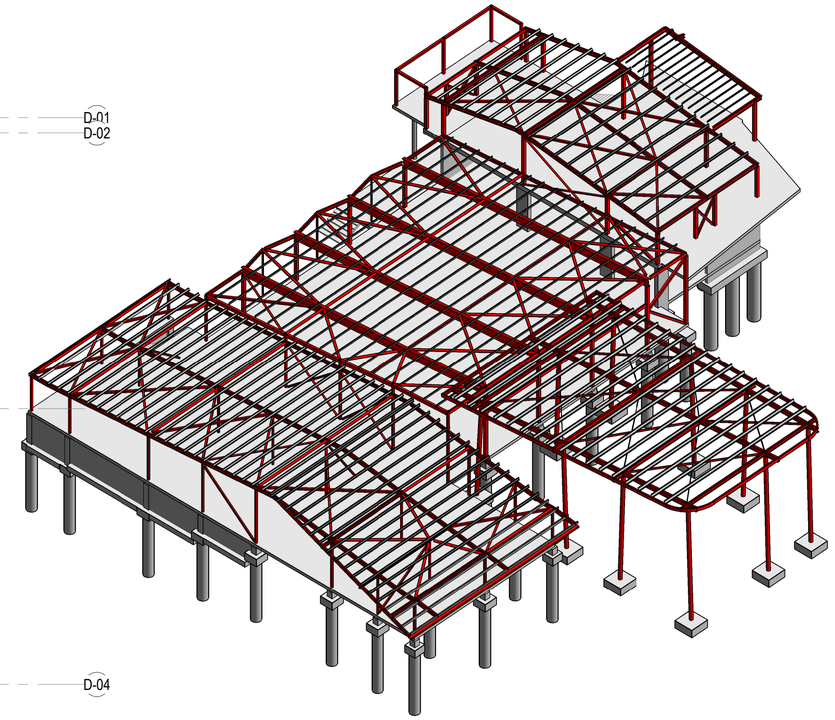

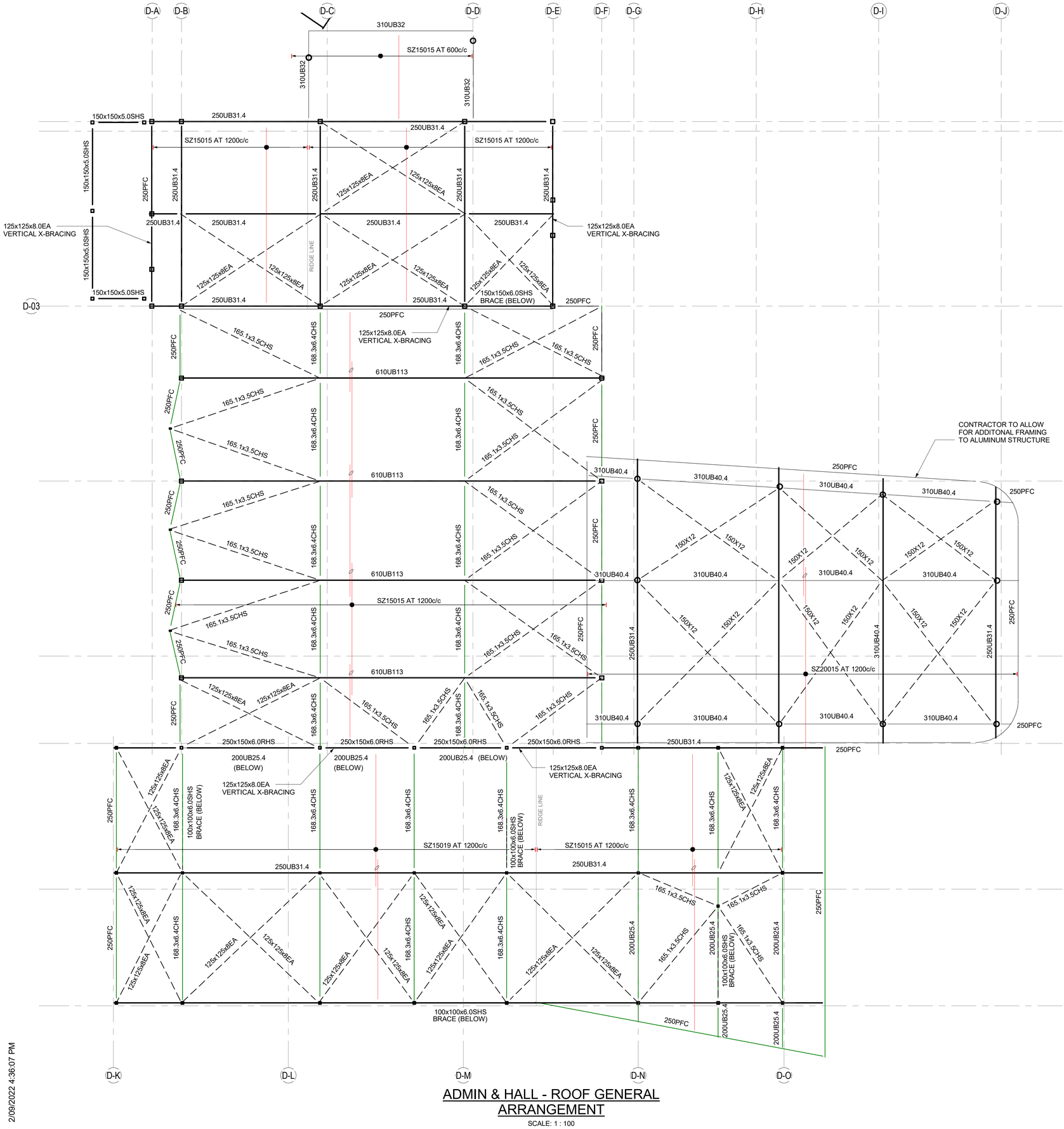

ADMIN & HALL - ROOF GENERAL ARRANGEMENT

SCALE: 1 : 100

ROOF GENERAL NOTES:

1. SECONDARY STEELWORK FOR THE SUPPORT OF THE OPERABLE WALLS ARE NOT SHOWN AND ARE TO BE DESIGNED AND DETAILED BY THE SUB-CONTRACTOR.
2. TEMPORARY STABILITY OF STEELWORK TO BE PROVIDED BY THE CONTRACTOR TO THE DESIGN OF THE TEMPORARY WORKS ENGINEER AND TO BE FURTHER CONSIDERED IF THIS SCHEME IS SELECTED.
3. ALL SIZES ARE PRELIMINARY AND SUBJECT TO CHANGE.
4. ASSUMPTION IS THAT ALL FLOORPLATES CONNECT INTO LIFT CORES/STAIR CORES/SHEAR WALLS TO USE FOR LATERAL STABILITY.
5. SERVICES WEIGHTS TBC WITH SERVICES SUBCONTRACTOR
6. SECONDARY STEELWORK BY D&C CONTRACTOR INCLUDING BUT NOT LIMITED TO:
   a. STUDWORK
   b. DOOR AND WINDOW FRAMING
   c. ACOUSTIC PANEL FRAMING AND SUPPORT (IF REQUIRED)
   d. AV EQUIPMENT FRAMING AND SUPPORT
   e. LOUVRE FRAMING
   f. SECONDARY STEELWORK FOR OPERABLE WALLS
7. ROOF FLOORS DESIGNED TO SPAN/360 DEFLECTION LIMIT UNDER DEAD LOAD AS SET OUT BY THE EFSG.
8. ALLOW FOR ADDITIONAL GUTTER PURLINS AS REQUIRED.
9. EAVES GUTTER SUPPORT AND LOADING TO BE CONFIRMED.
10. PV PANELS ARE ASSUMED TO BE LAID PARALLEL TO THE ROOF.
11. FALL ARREST SYSTEM TO BE CONFIRMED AND INCORPORATED INTO THE DESIGN.
12. NUMBER AND LOCATION OF SPLICES TO BE COORDINATED WITH CONTRACTOR AND FABRICATOR.
13. EXTERNAL STRUCTURAL STEELWORK TO BE HOT-DIP GALVANISED UNLESS NOTED OTHERWISE BY ARCHITECTURAL REQUIREMENTS. ALL STEELWORK FINISHES TO COMPLY WITH EFSG AND STRUCTURAL SPECIFICATION.
14. STRUCTURAL FRAMING FOR FACADE ITEMS SUCH AS, BUT NOT LIMITED TO DOORS, LOUVRES, WINDOWS, ETC. ARE INDICATIVE AND SUBJECT TO FINAL COORDINATION. NOT ALL FACADE ITEMS HAVE BEEN FRAMED ON THE PRELIMINARY DESIGN DRAWINGS AND THE CONTRACTOR SHOULD MAKE APPROPRIATE ALLOWANCE FOR THE STRUCTURAL FRAMING OF ALL FACADE ITEMS AND OPENINGS.
15. ALLOW FOR STEELWORK CONNECTIONS.
16. ALLOW FOR HALF-SPACING OF PURLINS NEAR ROOF EDGES.
17. FACADE IS ASSUMED TO CONSIST OF SECONDARY STUDWORK DESIGNED AND CERTIFIED BY THE FACADE CONTRACTOR. THE SECONDARY STUDWORK IS TO BE DESIGNED BY THE FACADE CONTRACTOR TO PROVIDE LATERAL RESTRAINT TO THE FACADE.
18. SERVICES PENETRATIONS REQUIRE FURTHER COORDINATION AND ARE TO BE FINALISED UNDER THE CONTRACTOR.
19. ALL FIRE RATING REQUIREMENTS TO BE CONFIRMED BY BCA CONSULTANT. ASSUMPTION IS ROOFS DO NOT REQUIRE TO BE FIRE RATED.

MATERIAL ASSUMPTIONS:
- CONCRETE SLABS = 40MPa
- COLUMNS = 40MPa
- STEELWORK = 300MPa OR GREATER

LOADING ASSUMPTIONS:
- STEEL ROOF
  - SDL = 0.5kPa
  - LL = 0.25kPa

Rev.	Date	Description
2	02.09.22	ISSUED FOR DA
1	26.08.22	SD - DRAFT

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CLIENT
NSW GOVERNMENT Education School Infrastructure

BUILDER

PROJECT NAME
NARRABEEN EDUCATION PRECINCT

PROJECT NUMBER: 6683

DRAWING TITLE
ADMIN & HALL - ROOF GENERAL ARRANGEMENT

SCALE AT A1: 1 : 100
DRAWN BY: Author
CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

DRAWING NUMBER: ST-102-10
REV.: 2

2/09/2022 4:36:07 PM

LEGEND

- EXISTING
- REFURBISHMENT
- NEW BUILDING
- EXISTING CIRCULATION
- NEW CIRCULATION
- EXISTING WALLS
- NEW WALLS

REFER DEVELOPMENT APPLICATION

REFER REF APPLICATION

LINE OF EXISTING WALKWAY ABOVE

PROPOSED MECHANICAL ENCLOSURE

EXISTING COLA

PROPOSED DRINKING FOUNTAIN

EXISTING GATE

A3

AR0062 LARGE EQUIPMENT 21 m²

AR0063 SPORTS STORE

AR10065 ALU CAFE 24 m²

FFL 2.42 AR0064 CONTROL 10 m²

PANTRY

AR0028 CANTEEN 64 m²

EXISTING INTERNAL STAIR

EDB

FFL 2.42

NEW INFILL WALL

LINE OF EXISTING WALKWAY ABOVE

PG3 PG3 PG3

RC COLUMN / FOOTING BELOW

PG4 PG4

PG3 PG3 PG3

STEEL COLUMN ABOVE

PG4

PG5 PG5 PG5 PG5

RAMP

PG6

AR0066 STAGE 101 m²

PG5

AR0077 CHANGE RMS SHWR GIRLS 62 m²

AR0024 GYMNASIUM 739 m²

PG5

DRINKING FOUNTAIN

PG8 PG8

RAMP

AR0076 CHANGE RMS SHWR BOYS 62 m²

PG7

PG5

FFL 3.32

EXISTING DOORS TO REMAIN

PROPOSED OPERABLE RENLITA DOORS

A3 FFL 2.42

FFL 2.55

FFL 2.42

PG8

PG5

PG5

AR0075 STU WC 7 m²

AR0067 CLEANER S. 4 m²

GROUND FLOOR CIRCULATION

PG5

PG8 FIRST AID 10 m²

HIGH-LEVEL STRIP FROSTED GLAZING

AR0074 STU BOYS TOILETS 62 m²

GROUND FLOOR SUSPENDED SLAB

200 PT FLAT PLATE

AR0072 OUTDOOR STORE 18 m²

PG4

CHAIR STORE 35 m²

PG4

PG5

PG8

A3

AR0070 BULK STORE 13 m²

PG8

GLAZED ENTRY

PG8

PG4

PG5

HIGH-LEVEL STRIP FROSTED GLAZING

TOILETS AFTER-HOURS SECURITY GATE

PG3

PG4 PG5 PG5 PG4 PG4

PROPOSED STAIR

PG3

LINE OF OVERHANG OVER

LINE OF EXISTING WALKWAY ABOVE

NOTE: FFL FOR NEW EXTENSION ALLOWS GPO'S TO BE LOCATED AT RL 3.45, WHICH IS 900MM AFFL OF FFL 2.55.

FOUNDATION PLAN

LEGEND:

- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- STEP — DENOTES SLAB STEP
- DENOTES SLAB EDGE

PILE GROUP SCHEDULE

PG3 1x600 DIA PILE

PG4 1x750 DIA PILE

PG5 1x900 DIA PILE

PG6 1x1200 DIA PILE

PG7 2x900 DIA PILE
WITH 1200 WIDE X 600MM DEEP PILE CAP, LENGTH VARIES

PG8 3x900 DIA PILE
WITH 1200 WIDE X 600MM DEEP PILE CAP, LENGTH VARIES

SCALE BAR - 1:100

PROJECT
NARRABEEN EDUCATION PRECINCT

enstruct

SKETCH TITLE
NARRABEEN SPORTS HIGH SCHOOL
- BLOCK A - PROPOSED STRUCTURAL SCHEME

PROJECT No.	DRAWN	CHECKED	DATE
6683	WSU	MS	16/09/22

SKETCH STATUS	SCALE
DESIGN APPROVAL	NTS

SKETCH NUMBER	REV.
STR-SK-006	C

LEGEND

- EXISTING
- REFURBISHMENT
- NEW BUILDING
- EXISTING CIRCULATION
- NEW CIRCULATION
- EXISTING WALLS
- NEW WALLS

REFER DEVELOPMENT APPLICATION

REFER REF APPLICATION

LINE OF EXISTING WALKWAY ABOVE

PROPOSED MECHANICAL ENCLOSURE

PROPOSED DRINKING FOUNTAIN

EXISTING COLA

EXISTING GATE

AR0062 LARGE EQUIPMENT 21 m²

AR0063 SPORTS STORE

AR10065 ALU CAFE 24 m²

AR0064 CONTROL 10 m²

AR0028 CANTEEN 64 m²

PANTRY

EXISTING INTERNAL STAIR

EDB

FFL 2.42

NEW INFILL WALL

350X350 RC COLUMN (TYP)

RC COLUMN / FOOTING BELOW

300X600 RC COLUMN (TYP)

STEEL COLUMN ABOVE

300 DIA. RC COLUMN (TYP)

EXISTING COLUMNS TO BE DEMOLISHED.

AR0024 GYMNASIUM 739 m²

AR0077 CHANGE RMS SHWR GIRLS 62 m²

AR0066 STAGE 101 m²

RAMP

DRINKING FOUNTAIN

200MM THK WALL

AR0076 CHANGE RMS SHWR BOYS 62 m²

FFL 2.55

GROUND FLOOR CIRCULATION

300X600 RC COLUMN (TYP)

200MM THK WALL

EXISTING DOORS TO REMAIN

PROPOSED OPERABLE RENLITA DOORS

AR0075 STU WC 7 m²

AR0067 CLEANER S. 4 m²

AR0069 FIRST AID 10 m²

AR0072 OUTDOOR STORE 18 m²

CHAIR STORE 35 m²

AR0070 BULK STORE 13 m²

AR0080 PROPOSED COLA AREA 270 m²

GROUND FLOOR SUSPENDED SLAB

200 PT FLAT PLATE

AR0074 STU BOYS TOILETS 62 m²

HIGH-LEVEL STRIP FROSTED GLAZING

300X600 RC COLUMN (TYP)

GLAZED ENTRY

P+C STORE 12 m²

350X350 RC COLUMN (TYP)

HIGH-LEVEL STRIP FROSTED GLAZING

TOILETS AFTER-HOURS SECURITY GATE

300 DIA. RC COLUMN (TYP)

PROPOSED STAIR

LINE OF OVERHANG OVER

LINE OF EXISTING WALKWAY ABOVE

NOTE: FFL FOR NEW EXTENSION ALLOWS GPO'S TO BE LOCATED AT RL 3.45, WHICH IS 900MM AFFL OF FFL 2.55.

GROUND FLOOR PLAN

SCALE BAR - 1:100

LEGEND:

- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- STEP — DENOTES SLAB STEP
- DENOTES SLAB EDGE

PROJECT
NARRABEEN EDUCATION PRECINCT

enstruct

SKETCH TITLE
NARRABEEN SPORTS HIGH SCHOOL - BLOCK A - PROPOSED STRUCTURAL SCHEME

PROJECT No.	DRAWN	CHECKED	DATE
6683	WSU	MS	16/09/22

SKETCH STATUS	SCALE
DESIGN APPROVAL	NTS

SKETCH NUMBER	REV.
STR-SK-006	C

LEGEND

EXISTING
REFURBISHMENT
NEW BUILDING
EXISTING CIRCULATION
NEW CIRCULATION
EXISTING WALLS
NEW WALLS

REFER DEVELOPMENT APPLICATION
REFER REF APPLICATION

FFL 5.42
MECHANICAL ACOUSTIC WALL BELOW
A3
FFL 5.44
AR1058 STAFF AWC SHWR 6 m²
AR1057 UNIFORM SHOP 30 m²
AR1059 STAFF AMB WC 3 m²
AR1060 STAFF AMB WC 3 m²
AR1061 CLEANER STORE
AR1062 STAFF ROOM 127 m²
WINDOW SILL LOUVRED
FFL 5.43
EXISTING INTERNAL STAIR
AR1021 EDB 1 m²
EXISTING WALKWAY
NEW GLAZING REQUIRED
FFL 5.42
EXISTING EXTERNAL WALKWAY
FFL 5.34
NEW BALUSTRADE
1:14
PROPOSED RAMP
TGSI
GLAZING WITH FIXED LOUVRE SUN PROTECTION (HIGH LEVEL)
NORTH
WALL BRACE 125X8 EA (TYP)
INTERNAL VOID
GLAZED ENTRY
700 HIGH TIERED PLATFORM
RC COLUMN BELOW
STEEL COLUMN ABOVE
AR0084 M. ST. STORE 5 m²
GLAZING WITH LOUVRE SUN PROTECTION (HIGH LEVEL)
VOID ABOVE STAGE
VOID OVER GYM
AR0024 GYMNASIUM 739 m²
350D X 600W BEAM
AR1072 MOVEMENT STUDIO 171 m²
200 PT FLAT PLATE
40MM SETDOWN ASSUMED
AR1073 CONTROL ROOM 10 m²
RISER
AR0079 EDB 1 m²
350D X 600W BEAM
WALL MOUNTED BARRE AND MIRROR
FIRST FLOOR CIRCULATION
AR1064 BCR 8 m²
AR1069 STU AMB WC 3 m²
100X200X6 RHS
AR1068 STU AMB WC 3 m²
AR1065 MOVEMENT STUDIO STORE 8 m²
240 PT FLAT PLATE
AR1067 STU AMB WC 8 m²
STEEL COLUMN AS 150X6 SHS OR 100X200X6 RHS (TYP)
AR1071 PE GLS 63 m²
240 PT FLAT PLATE
AR1070 PE GLS 63 m²
FFL 5.9
WALL BRACE 125X8 EA (TYP)
PROPOSED COLA BELOW
PROPOSED MECHANICAL ENCLOSURE
OPERABLE GLAZED WALL
OPERABLE GLAZED WALL
AR1066 CHAIR STORE
WALL BRACE
GLAZED ENTRY
EXISTING BRIDGE DEMOLISHED IN THIS AREA
PROPOSED RAMP
1:20
FFL 5.33
OUTDOOR LEARNING
200 MIN. PT FLAT PLATE
4497 PERFORATED
STAIR TO GROUND LEVEL
NEW CONNECTION TO EXISTING BRIDGE IN THIS LOCATION
EXISTING BRIDGE
FACADE- MIXTURE OF OPEN AND PERFORATED ALUMINIUM PANELS
EXISTING BRIDGE
FFL 5.34

LEVEL 1 FLOOR PLAN

SCALE BAR - 1:100

LEGEND:

- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- STEP — DENOTES SLAB STEP
- DENOTES SLAB EDGE

PROJECT
NARRABEEN EDUCATION PRECINCT

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SKETCH TITLE
NARRABEEN SPORTS HIGH SCHOOL
- BLOCK A - PROPOSED STRUCTURAL SCHEME

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LEGEND

EXISTING

NEW

REFER DEVELOPMENT APPLICATION

REFER REF APPLICATION

A3

PROPOSED EXHAUST COWL

PROPOSED EXHAUST COWL

EXISTING GYMNASIUM ROOF

200UB22.3

250 PFC

WALL BRACE 125X8 EA (TYP)

250 PFC

EA100X6 PLANAR BRACE (TYP)

168.3x4.8CHS

168.3x4.8CHS

168.3x6.4CHS

460UB74.6

EA100X6 PLANAR BRACE (TYP)

168.3x6.4CHS

250 PFC

410UB59.7

410UB59.7

168.3x6.4CHS

168.3x6.4CHS

250UB31.4

250UB31.4

SZ15019 @ 1200 c/c

168.3x6.4CHS

168.3x6.4CHS

410UB59.7

WALL BRACE 125X8 EA (TYP)

EA100X6 PLANAR BRACE (TYP)

168.3x6.4CHS

250 PFC

WALL BRACE

250UB31.4 (BELOW)

125X6SHS (BELOW)

125X6SHS

250UB31.4

125X6SHS

250 PFC

SZ15015 AT 1200 c/c

PROPOSED CORRUGATED STEEL ROOF

PROPOSED RISER

PROPOSED EXHAUST COWL

PROPOSED CORRUGATED STEEL ROOF

GUTTER

GUTTER

GUTTER

VOID

MR-01

MR-01

RL 7.87

RL 7.87

0 1 2 3 4 5 m

SCALE BAR - 1:100

ROOF FLOOR PLAN

LEGEND:

- DENOTES LOAD BEARING ELEMENT UNDER AND INSITU CONCRETE ELEMENT OVER
- DENOTES INSITU CONCRETE ELEMENT OVER
- DENOTES LOAD BEARING ELEMENT UNDER
- THK — DENOTES SLAB THICKNESS
- DENOTES PENETRATION
- STEP — DENOTES SLAB STEP
- DENOTES SLAB EDGE

PROJECT
NARRABEEN EDUCATION PRECINCT

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SKETCH TITLE
NARRABEEN SPORTS HIGH SCHOOL
- BLOCK A - PROPOSED STRUCTURAL SCHEME

PROJECT No.	DRAWN	CHECKED	DATE
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