

Structural Engineering SSDA (SSD-16848913) Report

Murwillumbah Education Campus (SINSW01146/20)

Prepared for School Infrastructure NSW / Built / 17 March 2022

201603 / 211523

Contents

1.0	Introduction	3
1.1	Project Description	3
2.0	Existing Conditions	4
2.1	Existing site use and structure.....	4
2.2	Site constraints	4
2.3	Geotechnical Conditions.....	4
2.4	Heritage Wall	5
3.0	Design Standards and Parameters.....	6
3.1	Design Standards	6
3.2	Loading	6
3.2.1	Permanent Loads.....	6
3.2.2	Imposed Actions - Live Loads.....	7
3.2.3	Wind Loads.....	7
3.2.4	Earthquake Loads.....	8
3.2.5	Barriers	8
3.3	Serviceability.....	8
3.3.1	Deflection Limits	8
3.3.2	Vibration limits	8
3.4	Durability	8
3.5	Fire rating.....	9
4.0	Schematic Structural Design	10
4.1	Foundations and retentions systems.....	10
4.2	Retained Existing Buildings	10
4.3	Demolished Existing Structures.....	11
4.4	New Buildings	11
4.5	Other Structures	12
5.0	Safety In Design.....	12
5.1	Structural Risks and Solutions Register	12
6.0	Preparation for Detailed Design Phase	12
6.1	Intended focus for Detailed Design	12
	Appendix A - Structural Concept Marking Plan	13
	Appendix B - Structural Concept Risks and Solutions Register	14
	Appendix C - Heritage Wall Structural Condition Report.....	Error! Bookmark not defined.

1.0 Introduction

1.1 Project Description

The Murwillumbah Education Campus development, involves the co-location of Murwillumbah Primary School, Murwillumbah East Primary School, Murwillumbah High School, and Wollumbin High School, to establish a new primary school and a new high school as part of the same education campus.

The project will include the following scope of works within the SSD application:

- Demolition of Building E
- All inground slabs, pathways, hardstands and footings including those to buildings B, C, D, G, H, M, P, S, AW and AZ
- Associated ground works required to facilitate the construction of new buildings and landscaped areas
- Construction of new Buildings 1, 2, 3 and 4:
 - Building 1 – New public school building comprising general learning spaces, administration, canteen, School Support Unit (SSU) and library;
 - Building 2 – Hall building including a public school hall, out of school hours care (OSHC) facilities, high school hall/gymnasium and other spaces for physical education and creative and performing arts (CAPA);
 - Building 3 – New high school building including the following facilities; general and specialist learning spaces, SSU, and library.
 - Building 4 - New high school building including the following facilities; science, support, administration and canteen;
- Refurbish Building A for DoE offices and school community health facilities along with associated access requirements. Building A is a locally listed heritage building and will be retained and refurbished;
- Refurbishment of Building F to provide learning space for agricultural education;
- Retention of existing AY.
- Creation of new public school and high school outdoor learning spaces to support future focused learning outcomes;
- New landscaping and embellishment of outdoor playgrounds;
- Civil and infrastructure works; and

- Kiss n drop and parking off Nullum Street

2.0 Existing Conditions

2.1 Existing site use and structure

The development site is located within the existing Murwillumbah High School at Riverview Street, Murwillumbah NSW. As identified by the project Heritage Consultant, the Murwillumbah High School site includes buildings/elements of local heritage significance. Of primary importance is the Block A Building, that was the original school building constructed in 1929. The concept intent for each of the existing building is discussed below with some being retained unaltered, retained refurbished, and the remaining demolished.

2.2 Site constraints

The site is bound by Riverview Street to the west, High School Lane to the north, Nullum Street to the east and steep bushland to the south. The current concept locates new buildings close to the boundary at north-west corner which will require shoring.

The existing site topography is a significant challenge for the project with an approximate fall across the site of 17m from west to east.

2.3 Geotechnical Conditions

Geotechnical conditions have been preliminarily assessed by Douglas Partners, refer report Ref: 203033.02 dated October 2021. Further investigation was carried out, refer report Ref:203033.02 dated October 2021 and report addendum received via email dated 18 November 2021. Key advice taken from these reports relating to the structural design are as follows:

- Preliminary site classification Class P in accordance with AS2870 due to the presence of “uncontrolled” clay fill and sand fill in excess of 0.4m and 0.8m depths, respectively.
- High level foundation are required to be founded below the existing “uncontrolled” fill strata, otherwise pile foundations are required. Piled foundations would also be required where there are soft and firm soils of inadequate bearing pressure and/or unacceptable settlements.
- Deep foundations could comprise bored piles, CFA piles, screw piles, or driven piles. Consideration needs to be given to the disruption and vibration to adjacent structures during installation. Note: Douglas Partners have provided an indication of expected driven pile capacities, refer table below.

Table 11: Precast Concrete Pile Capacities

Pile Section	Ultimate Factored Single Pile Design Geotechnical Strength ($R_{d,g}$)*
300 mm x 300 mm	1300 – 1450 kN
350 mm x 350 mm	2200 – 2500 kN
400 mm x 400 mm	3200 – 3500 kN

* assuming no eccentricity of load

- Soils would be classified as mild for buried concrete and non-aggressive for buried steel in accordance with AS2159-2009.
- High level foundations with pads wider than 2m and strip footing wider than 1m, can be designed for allowable values indicated in table below.

Table 9: Maximum Allowable High Level Footing Design Pressures

Material Description	Allowable Bearing Pressure (kPa)
'Uncontrolled' fill and soft and firm clay	Not recommended
'Controlled' fill ⁽ⁱ⁾ and stiff clay	100
Very stiff clay	200
Hard clay	400
Very low strength Metasiltstone	600

Note (i) Assuming 'controlled' fill is placed under 'Level 1' inspection and testing by DP in accordance with the recommendations of this report AS 3798 and good practice guidelines.

- Allowable design parameters for bored piles is tabulated below.

Material Description	Allowable Shaft Adhesion (kPa) ⁽ⁱ⁾⁽ⁱⁱ⁾	Allowable End Bearing (kPa)
'Uncontrolled' and 'Controlled' fill and soft and firm clays	Not Recommended	
Stiff clays	15	170
Very stiff clays	20	340
Hard clays	20	700
Very low and low strength Metasiltstone	75	800
Medium strength (or stronger) Metasiltstone	350	3500

Notes (i) It is recommended that the upper 0.75 m or 1.5 times pile diameter or depth of "uncontrolled" fill (whichever is greater), be ignored in pile shaft adhesion calculations due to the effects of load development and seasonal moisture variation.

(ii) Ignore if temporary or sacrificial liners are used during construction.

2.4 Heritage Wall

TTW carried out a structural condition investigation of the existing heritage wall on 20 January 2021 at the request of Built. Refer Appendix C for the report issued following. In brief summary,

- The heritage wall and stair are generally in good condition especially considering its age. The walls appeared plumb, and there were no significant signs of cracking or settlement worth noting.
- Some maintenance is required such as mortar repointing, removal of vegetation growth, and removal of redundant fixings.
- The existing balustrade did not form part of the heritage wall investigation however we note that it appears to be in poor condition with loose or missing fixings.

3.0 Design Standards and Parameters

3.1 Design Standards

The structural design will be in accordance with the latest revision of all relevant Australian Design Standards, Codes and other statutory requirements. As a minimum requirement, the design shall be based on, but not limited to;

NUMBER	EDITION	TITLE
AS/NZS 1170.0	2002	Structural design actions Part 0: General Principles
AS/NZS 1170.1	2011	Structural design actions Part 1: Permanent, imposed and other actions
AS/NZS 1170.2	2002	Structural design actions Part 2: Wind actions
AS 1170.4	2007	Structural design actions Part 4: Earthquake loads
AS 2159	2009	Piling – Design and installation
AS 3600	2018	Concrete Structures
AS 3700	2011	Masonry Structures
AS 4100	2020	Steel Structures
EFSG		NSW Department of Education Facilities Standards and Guidelines

3.2 Loading

3.2.1 Permanent Loads

The permanent loads which have been assumed at this stage are below. Structural self-weight will be applied in accordance with the relevant construction and member sizes.

Area	Services (kN/m ²)	Ceiling (kN/m ²)	Finish (kN/m ²)	Partitions (kN/m ²)
Classrooms	0.2	0.2	0.2	0.4
Laboratory/ Workshop	0.3	0.3	0.2	0.4

For schematic design, an average total SDL has been taken as 1.5kPa, the actual load is TBC upon confirmation of breakup of space usage, i.e. classroom, storage, laboratory.

Façade load assumed to be 1kPa on elevation.

3.2.2 Imposed Actions - Live Loads

Design floor live loadings are to generally satisfy the minimum provisions of AS 1170.1 with consideration to the EFSG and in particular the following:

	Uniformly Distributed Actions	Concentrated Actions
Classrooms	3.0 kPa	2.7 kN
Library	4.0 kPa	4.5 kN
Stairs & Corridors	4.0 kPa	4.5 kN
Kitchen/Dance studio/gymnasium	5.0 kPa	4.5 kN
Laboratory/Workshop (other than wood and metal)	3.0kPa	4.5kN
Workshop for wood and metal	5.0kPa	4.5kN
Wood/metal store	10kPa	9.0kN

Live Load reduction will be applied to applicable occupancy types in accordance with AS1170.1.

3.2.3 Wind Loads

Wind loads are in accordance with AS1170.2 and based on the following parameters:

Region:	B
Importance Level (BCA Table B1.2a):	3
Annual probability of exceedance (BCA Table B1.2b):	1:1000 (ultimate) 1:20 (serviceability)
Regional Wind Speed: Ultimate limit states -	V1000 = 60 m/s
Serviceability limit states -	V25 = 39 m/s
Terrain Category (all directions):	3

3.2.4 Earthquake Loads

Existing building with minor modifications will not be reviewed for current earthquake standards as conceptually agree with GroupDLA, Mace Group, and TTW.

New buildings will be designed for earthquake loading.

Earthquake loadings shall be in accordance with AS1170.4 – 2007 (Earthquake actions in Australia) and AS/NZS1170.0 – 2002.

3.2.5 Barriers

Barriers including parapets, balustrades and railings are to be designed in accordance with Table 3.3 of AS/NZS 1170.1.

3.3 Serviceability

3.3.1 Deflection Limits

Vertical loads

Deflection limits for the floor plate designs to be generally as follows.

	Maximum Floor Deflection Limit			
	Dead	Incremental	Live	DL + LL
Floors supporting masonry walls	Span/360	Span/1000 ¹ .	Span/500	Span/300 (25mm max.)
Other floor areas	Span/360 (20mm max.)	N/A	Span/500	Span/300 (25mm max.)
Steel Roof	Span/360 (25mm max.)		Span/300	Span/250 (25mm max.)

¹. Areas supporting normal weight masonry partitions.

Horizontal loads

Lateral sway limits

Overall - H/500

Inter storey drift to be limited in accordance with earthquake code requirements.

3.3.2 Vibration limits

Typical floor plates are expected to be designed to suit standard typical footfall vibration limits for the usage in question, i.e. classroom, gym, dance studio.

3.4 Durability

For concrete elements this will be achieved by specifying all elements in accordance with section 4 of AS 3600 which sets out requirements for plain, reinforced and post tensioned concrete structures and members with a design life of 40 to 60 years. Exposure classifications are as follows

Exposure Classification	Elements
A2	Internal
B2	In Ground & External

In ground exposure may be required to be changed depending on results of a geotechnical investigation of soil contaminants.

Protective coatings to structural steel elements shall comply with AS/NZS 2312 and ISO 2063 for the long-term protection category.

3.5 Fire rating

A fire rating period of 2hrs is required to all suspended structure.

New concrete structure would resolve fire rating by adopting minimum element sizes and axis distance to the centre of the primary tension steel.

Steel structure would require application of a fire rated coating, options could include vermiculite spray, intumescent coatings and boarding. Careful consideration of required maintenance and inspection requirements needs to be made with the use of fire rated coatings.

Where refurbishment works are to be conducted on existing buildings with suspended floors, new works will be required to ensure the 2hr FRL.

4.0 Schematic Structural Design

Refer Appendix A for structural schematic design documentation. Each key structural element is discussed below.

4.1 Foundations and retentions systems

To avoid structural impact due to excessive and /or differentials settlements, piled foundations are intended for all building structures.

Screw piles were considered and deemed not suitable for this site and building foundation loads. For example, Building 1 internal column footings have a working axial load of circa 2000kN. If a screw pile could achieve a conservatively assumed 100kN, then at each location 20 screw piles would be required. This is considered not practical.

Bored, CFA, or driven piles could be considered. The concept sketches assume bored piles which is consistent with geotechnical advice. The TTW pile concept focused priority on minimising socket lengths. Two footing schedules have been provided on the sketch plans. One option was based upon a 750DIA maximum pile for ease of install socketed into very stiff clays only, some pile locations required groups of piles. An alternate option was provided with up to 1200DIA piles socketing into either very stiff clay or metasiltstone, but with on single piles at each location. The alternate option was provided to help reduce project costs. The further geotechnical investigation mentioned in section 2.4 of this report is expected to impact the pile design and hopefully yield high bearing capacities to further reduce piling costs.

During schematic design phase, Built team have consulted with a piling subcontractor to progress a driven pile solution. Current feedback is that the proposed loading can be achieved, and piles are likely to be 275-300mm square piles, typically one of per location except at pile tags P11, P31, and P41 locations where two piles will be required. This proposed piling system will be adopted as we move into design development phase.

Due to building proximity to each other, to school boundary, and due to varying levels across the site, specific retaining walls will be required adjacent to new buildings. Refer civil documentation for details.

4.2 Retained Existing Buildings

Building A

Original school building Constructed in 1929 and is of local heritage significance. The existing condition appears to be reasonably good. There is no existing structural documentation available for this building. Some of the existing internal walls are proposed to be removed or altered. Site investigations are required to determine the load bearing nature of these existing walls for further structural review during schematic design. A new lift is proposed adjacent to the building which will be designed to appear disconnected from the existing building to compliment the Heritage significance. The lift will likely be steel framed with glass or light weight solid cladding. Refer Concept sketches for comments.

Building F

We understand that no structural modifications are intended for this building; therefore, the building history and structure has not been investigated. Upon visual inspection it appears to have been constructed in the last 20 years.

4.3 Demolished Existing Structures

Demolition of Building E and all inground slabs, pathways, hardstands and footings including those to buildings B, C, D, G, H, M, P, S, AW and AZ

4.4 New Buildings

Buildings 1, 3 and 4

Due to the regular and standard layout of these education buildings, DfMA construction is proposed. Refer Appendix A for structural schematic documentation for structural intent which is generally summarized below

- Precast concrete driven piles
- Lowest level to be a suspended reinforced concrete banded slab, this is as per geotechnical advice but also for structural stability and durability protection reasons. Note for Building 4, Level 1 is part on grade and part suspended and due to the limitations of the current DfMA system it has been decided that this level will be design a reinforced concrete slab.
- Remaining suspended levels to be DFMA construction consisting of a timber steel hybrid which we are developing with the Built team. The system generally includes the following
 - Primary steel beams on grid at 7500mm centres
 - Secondary steel beams at 3000mm centres spanning between primary beams
 - Internal steel column
 - Load bearing CLT timber walls around the perimeter of the building and shear walls typical dividing hubs or bathrooms or outdoor learning spaces. These walls will support vertical load as well as lateral stability forces.
 - Floors will typically be CLT timber spanning between secondary beams. For bathroom and outdoor learning spaces, the CLT will be replaced with reinforced concrete for durability reasons.
 - The roof will consist of a secondary steel frame to falls built off a CLT timber floor

Building 2 and adjacent COLA structures

The structure of this building is proposed to be half DfMA and half standard construction. The DfMA form will be a similar system to Buildings 1, 3, and 4. The remaining will be steel framed, either braced from the DfMA building or a portalised frame in one direction and a braced frame in the other.

4.5 Other Structures

Walkway canopies, stairs, and lifts are intended to be structural steel framing with detailing to maximise modularised DfMA construction.

5.0 Safety In Design

5.1 Structural Risks and Solutions Register

Refer to Appendix B for Structural Risks and Solutions Register based upon the current concept design.

6.0 Preparation for Detailed Design Phase

6.1 Intended focus for Detailed Design

The following list highlights the structural focus as we move into detailed design phase.

- Finalisation of lateral stability modelling to finalise member sizes.
- Development of connection details to suit delivery and assembly sequence.
- Development of base slab framing to suit lateral stability reactions and driven pile system below
- Building 2 hall and COLA steel framing
- Steel framing modules for external lifts and stairs

Required information is as follows

- Service equipment specifications, such as plan dimensions, operating weights, etc.
- Service penetrations through structure for review.
- Sample lift specification and shop drawings.

Prepared and Authorised by
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST



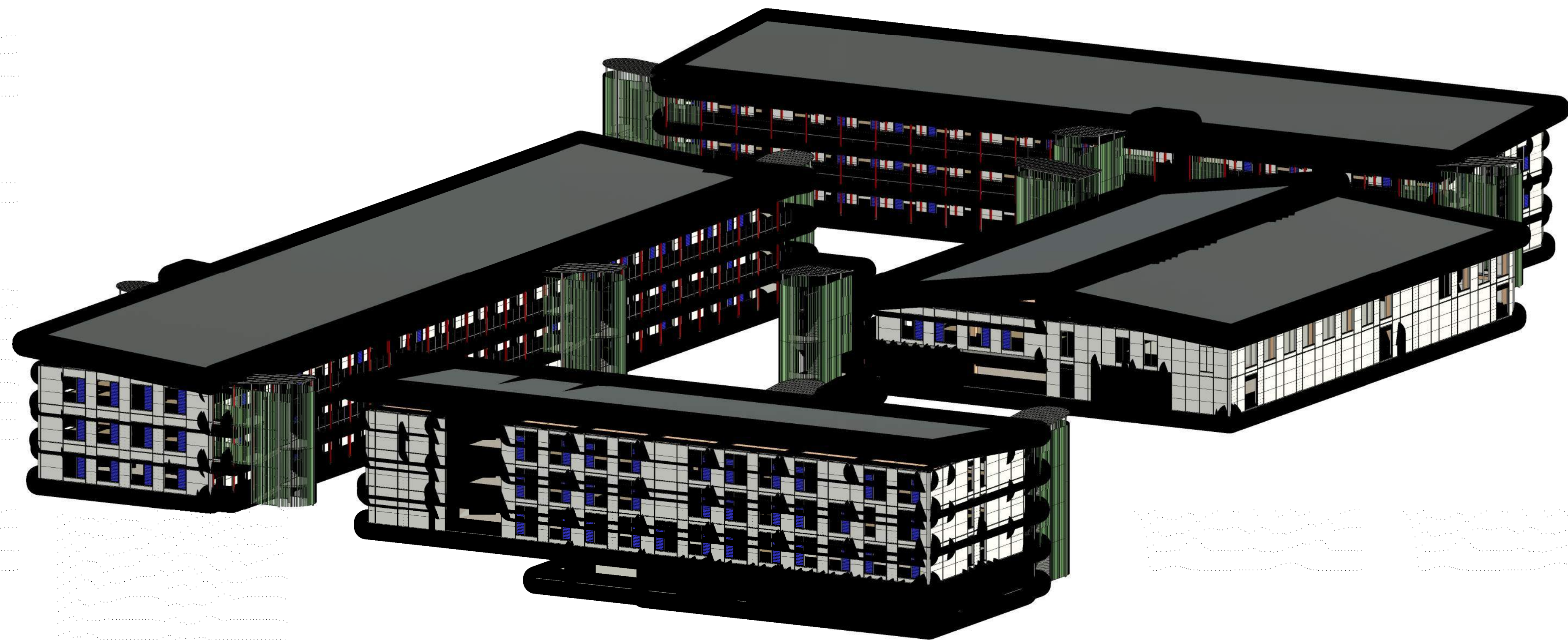
GEOFF BILLS
Technical Director

\\ttwcloud2.ttw.net.au\Jobfiles\$\2021\2115\211523\Reports\TTW\SSDA design report\structural\220317 Structural Engineering SSDA Report gb.docx

Appendix A

Structural Schematic Documentation

86 RIVERVIEW STREET, MURWILLUMBAH NSW



A1 0 1 2 3 4 5 6 7 8 9 10

				Client  Education School Infrastructure				Contractor  Level 4 185 Clarence Street Sydney NSW 2000 T +61 2 8332 4111				Architect  Level 18 MLC Centre 19 Martin Place Sydney NSW 2000 T (61 2) 8252 8400				Structural Engineer  +61 2 9439 7288 L6 73 Miller Street North Sydney NSW 2060				Project MURWILLUMBAH EDUCATION CAMPUS				Sheet Subject COVER SHEET				Scale : A1 Drawn PSH Authorised GB				Job No 2211523 Drawing No S0001 Revision P1				22/11/2021 12:48:43 PM			
P1 SCHEMATIC DESIGN				GB PSH 22.11.21																																			
Rev Description				Eng Draft Date				Rev Description				Eng Draft Date																											

GENERAL NOTES

- These drawings are for structural purposes only and are to be read in conjunction with the specification, architectural drawings, other contract documentation and the requirements of the relevant authorities.
- Verify all setting out dimensions with the Architect.
- Do not obtain dimensions by scaling the structural elements.
- Should any ambiguity, error, omission, discrepancy, inconsistency or other fault exist or seem to exist in the contract documents, immediately notify in writing to the Superintendent.
- Maintain the structure in a stable condition during construction. Temporary bracing/shoring shall be provided by the contractor to keep the structure and excavations stable at all times, ensuring that no part of the documented structure becomes overstressed. For all temporary batters obtain geotechnical engineer's recommendations.
- All workmanship and materials shall be in accordance with the requirements of current Standards Australia codes and the bylaws, ordinances or other requirements of the relevant building authorities.
- All proprietary items are to be installed and fixed in accordance with the manufacturers specifications and instructions.
- All work is to be carried out in accordance with all Workcover requirements and occupational health and safety act regulations
- Construction using these drawings shall not commence until a Construction Certificate is issued by the Principal Certifying Authority.

DESIGN LOADS:

Floor loads : Refer respective loading plans.

Wind Loads : Va = 60 Region = B Where R = 1000 years Terrain Category = 3

Earthquake Loads: Design Category = II Site Sub-soil class = Cc Hazard Factor = 0.08 Probability Factor kp = 1.3 Importance Level = 3

SAFETY IN DESIGN

TTW operates under Safe Work Australia's Code of Conduct for the Safe Design of Structures. These drawings shall be read in conjunction with the TTW Transfer of Information Letter and Structural Risk and Solutions Register. Under the Code of Conduct it is the Client's responsibility to provide a copy of the Structural Risk and Solutions Register to the Principal Contractor. It is the Principal Contractor's responsibility to review the hazards and risks identified during the design process to ensure a safe workplace is maintained for the construction, maintenance and eventual demolition of the structure.

SLAB ON GROUND NOTES

Refer to Geotechnical Report No. 203033.00.R.001, Rev 0 dated May 2021 by Douglas Partners for all subgrade and subbase/basecourse requirements and unless directed otherwise the following requirements apply.

- Strip all topsoil from the construction area and remove from the site.
- Before placing fill, proof roll exposed subgrade with 6 passes of a 10 tonne minimum roller to test subgrade and then remove soft spots (areas with more than 3mm movement under roller). Soft spots to be replaced with select fill as per table:

Sieve Aperture (mm) to AS1152	Percentage passed (by mass)
75.0	100
9.50	100 to 50
2.36	100 to 30
0.60	50 to 15
0.075	<25

- Plasticity index to be > or = 2% and < or = 15%
- Non dispersive (a rating of nil as defined by the "dispersion" test AS1289.3.8.1) Submit proposed select fill for Engineers approval.

- Compact fill areas and subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.

- All basecourse material to be crushed hard rock or crushed natural gravel capable of being compacted to an even stable surface and complying with the grading and properties listed in the tables below and compacted to minimum 98% modified standard dry density in accordance with AS 1289 5.2.1

NON-FREE DRAINING BASECOURSE

Sieve aperture (mm) to AS1152	Percentage passed (by mass)
26.5	100
19.0	95 to 100
13.2	75 to 90
9.50	60 to 90
4.75	42 to 76
2.36	28 to 60
0.425	10 to 28
0.075	2 to 10

- Plasticity Index: Not greater than 10%
- Liquid Limit: Not greater than 25%
- California Bearing Ratio: Not less than 35%
- Unsound rock: Not greater than 20%
- Nondispersive (a rating of nil as defined by the dispersion test AS1289.3.8.1)
- Submit proposed basecourse for Engineers approval.

FREE DRAINING BASECOURSE

Sieve aperture (mm) to AS1152	Percentage passed (by mass)
9.50	100
6.70	95 to 98
4.75	58 to 78
2.36	37 to 50
1.38	22 to 30
0.425	10 to 17
0.075	2 to 10

- Plasticity Index: Not greater than 3%
- Liquid Limit: Not greater than 25%
- Coefficient of permeability: Not less than 0.1mm/sec
- Nondispersive (a rating of nil as defined by the 'dispersion test' AS1289.3.8.1)
- Submit proposed basecourse for Engineers approval.

- Place sand blinding to areas where Concrete Underlays are required.

FOOTING NOTES

- Foundations have been designed for:
Allowable Bearing Pressure =
Allowable Side Shear = to AS 2870
Reactivity Class
Foundation material is to be inspected and approved by the geotechnical engineer before casting footings.
Refer to geotechnical report No. 203033.00.R.001, Rev 0 dated May 2021 by Douglas Partners.
Locate all pipes, retaining walls and excavation outside a 1:2 (vertical:horizontal) zone of influence from the bottom edge of the footing.
Where side shear is required to be developed, clean and roughen the sides of the excavation to the satisfaction of the geotechnical engineer.
Footings shall be located centrally under walls and columns unless noted otherwise.
Footings to be constructed and backfilled as soon as possible following excavation to avoid softening or drying out by exposure.
Contractor is to allow for cost of geotechnical inspections and any required certification.

RETAINING WALL NOTES

- Drainage shall be provided as shown on the drainage drawings.
- Backfilling shall be carried out after grout or concrete has reached a minimum strength of 0.85 f_c.
Backfilling shall be approved granular material compacted in layers not exceeding 200mm to 95% Standard compaction unless noted otherwise.
- Provide waterproofing to back of walls as specified or noted.
- Where retaining walls rely on connecting structural elements for stability, do not backfill against the wall unless it is adequately propped or the elements have been constructed and have sufficient strength to withstand the loads.
- For all temporary batters obtain geotechnical engineers recommendations.

MASONRY NOTES

- Temporary bracing shall be provided by the contractor to keep the masonry stable at all times.
- Masonry to be in accordance with AS 3700
- Masonry units shall comply with AS/NZS 4455 and as follows:

Type of masonry unit	Characteristic unconfined compressive strength (f _{uc})	Characteristic lateral modulus of rupture (F _{ut})
Clay & Calcium silicate	15 MPa	0.8 MPa
Concrete	15 MPa (hollow units) 10 MPa (solid or cored units)	0.8 MPa

- Mortar shall consist of the following:
M3 for general applications 1 part Type GP cement:
5 parts sand plus water thickener
M4 for elements in interior environments subject to saline wetting and drying,below a damp-proof course or in contact with ground in aggressive soils; in severe marine environments; with ground in aggressive soils; in severe marine environments; in saline or contaminated water including tidal splash zones; and within 1km of an industry producing chemical pollutants.
1 part Type GP cement: 4 parts sand plus water thickener
- Provide vertical control joints in masonry over permanent floor joints and as per the architectural drawings.
- Masonry walls shown on the structural plans are load-bearing UNO. Non-loadbearing walls shall be separated from the concrete structure above with 20mm compressible filler. Masonry walls supporting slabs shall have a layer of mortar troweled smooth on top. Provide MET slijoint to separate floor slabs and masonry. Provide Hercules HERCULSIP COMPOSITE to separate roof slabs and masonry.
- Other than what is allowed in the specification no chasing or rebates may be made in masonry walls without written approval.
- The contractor shall provide records that demonstrate all masonry bed joint reinforcement, masonry ties and masonry wall stiffeners have been installed in accordance with the drawings and specification.
- All load bearing concrete masonry walls shall have all cores filled with grout UNO. Core filling grout shall be thoroughly compacted. Grout to be in accordance with AS3700 and as follows:

Location	f _c g MPa	Specified Slump	Maximum Aggregate size
Grout	20	230	10mm

- All core filled blockwalls shall be constructed with "Double U" blocks
- In core filled blockwalls cleanout openings shall be provided at the bottom of each core and shall be cleaned of mortar protrusions before grouting.
- All core filled block walls shall have all cores filled with grout UNO. Core filling grout to be in accordance with note 9.
- Cover to reinforcement to be 50mm to face of block UNO.
- Provide bed joint reinforcement as follows :
MET galvanized masonry reo where M3 mortar is used (supplied by DUNSTONE MAZE in NSW)
Ancon stainless steel where M4 mortar is used and located as follows
- in 2 bed joints below and above head and sill flashings to openings
- in 2 bed joints below and above openings
- in third bed joint above bottom of wall
- in second bed joint below top of wall

CONCRETE NOTES

EXPOSURE CLASSIFICATION : External - Internal -

Location	f _c MPa at 28 days
Piles	S40
Pile Caps, Footing Beams, Pad Footings	S40
Slabs on Ground	S32
Suspended Slabs and Bands	S40
Walls	Refer Schedule
Dintel and/or AFS Walls	Refer Schedule
Columns	S32
Stairs	SF... at 90 days
Warehouse Pavements	

- Use Type 'GP' cement, unless otherwise specified.
- All concrete shall be subject to project assessment and testing to AS 1379.
- Consolidate by mechanical vibration. Cure all concrete surfaces as directed in the Specification.
- For all falls in slab, drip grooves, reglets, chamfers etc. refer to the architect's drawings and specifications.
- Unless shown on the drawings, the location of all construction joints shall be submitted to engineer for review.
- No holes or chases shall be made in the slab without the approval of the Engineer.
- Conduits and pipes are to be fixed to the underside of the top reinforcement layer.
- Slurry used to lubricate concrete pump lines is not to be used in any structural members.
- All slabs cast on ground require sand blinding with a Concrete Underlay
- (175) Indicates slab or band thickness

FORMWORK

- The design, certification, construction and performance of the formwork, falsework and backpropping is the responsibility of the contractor.
- The proposed method of installation and removal of formwork is to be submitted to the Superintendent for comment prior to work being carried out.

REINFORCEMENT NOTES

- Fix reinforcement as shown on drawings. The type and grade is indicated by a symbol as shown below. On the drawings this is followed by a numeral which indicates the size in millimetres of the reinforcement.

N	Hot rolled ribbed bar	grade D500N
RL	Plain round bar	grade R250N
SL	Square mesh	grade 500L
RL	Rectangular mesh	grade 500L

- Provide bar supports or spacers to give the following concrete cover to all reinforcement unless otherwise noted on drawings.

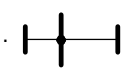
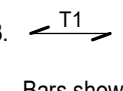
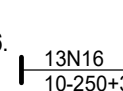
Footings	- top, bottom, sides.
Slabs	- top, bottom, sides. - when exposed to weather or ground.
Beams	- bottom, sides, top to ties. - when exposed to weather or ground. - to ties and spirals.
Columns	- when exposed to weather or ground.
Walls	- generally. - when cast in forms but later exposed to weather or ground. - when cast directly in contact with ground.

- Cover to reinforcement ends to be 50 mm UNO.
- Provide N12-450 support bars to top reinforcement as required.
- Tension Lap UNO
- Maintain cover to all pipes, conduits, reglets, drip grooves etc.
- All cogs to be standard cogs unless noted otherwise.
- Fabric end and side laps are to be placed strictly in accordance with the manufacturers requirements to achieve a full tensile lap. Fabric shall be laid so that there is a maximum of 3 layers at any location.

FABRIC LAPS


- Laps in reinforcement shall be made only where shown on the drawings unless otherwise approved. Refer to Reinforcement Lap table below. Gap between lapped bars to be no more than 3 bar diameters as per AS3600 clause 13.2

REINFORCEMENT LEGEND

-  Denotes the extent of area covered by bars.
-  Denotes a change in bar shape and/or length.
-  Indicates to repeat bars lagged thus T1 etc. LAY BARS IN DIRECTION INDICATED BY ARROW
- Bars shown staggered on plan are to be placed alternately.
- ALT. denotes bars of different length and/or shape to be laid alternately.
-  Indicates 10 bars at 250 centres plus 3 bars placed one per space centrally over column.

ABBREVIATIONS USED ON DRAWINGS :			
UNO	- Unless Noted Otherwise	EW	- Each Way
NSOP	- Not Shown On Plan	EF	- Each Face
NSOE	- Not Shown On Elevation	NF	- Near Face
LV	- Bar Lengths Vary	FF	- Far Face
NTS	- Not To Scale		

POST-TENSIONED CONCRETE NOTES

GENERAL

- Submit all test certificates, theoretical extensions, calculations and shop drawing to the Superintendent as required by the Specification prior to construction.
- All reactions from post-tensioning shall be supplied to the formwork contractor for formwork design.
- Stressing contractor is to pay particular attention to concrete compaction where ducts cross columns and at all tendon anchors and ensure that pump lines are adequately chaired and restrained so as to be kept separate from tendons and reinforcement.
- Provide mesh over bands where band depth exceeds 350mm or as required by Workcover (Refer typical post tensioning details). Holes cored through post-tensioned slabs must be approved by the structural Engineer in writing.
- Holes cored through post-tensioned slabs must be approved by the structural Engineer in writing.

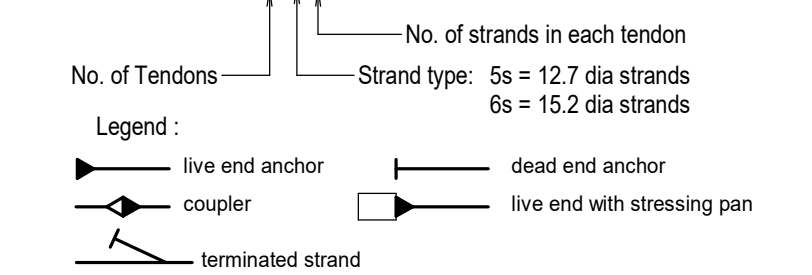
DESIGN ASSUMPTIONS

The design assumptions used in the calculation of stressing losses for slab tendons in galvanised flat ducts were:

Friction curvature coefficient	μ = 0.2
Wobble (rad. per m)	β = 0.024
Draw-in at anchorage	= 6mm
Relaxation of stressed steel (after 1 000 hours at 0.70 fp)	= 2.5%

TENDONS

- All Strands shall be 7 wire ordinary strands with Class 2 relaxation in accordance with AS 4672.1 and AS 4672.2 unless noted otherwise.
- Bar shall be high-tensile alloy steel bars in accordance with AS 4672.1 and AS 4672.2 with a nominal tensile strength of 1030 MPa unless noted otherwise.
- Locate and fix tendons as shown on the drawings & co-ordinate with cast in bolts, conduits & penetrations etc.
- Tendon profiles to be parabolic unless noted otherwise and vertical offsets shall be measured from the deck (i.e. soffit of the concrete) to the underside of the duct, except for soffit of concrete to centreline of duct at anchorage unless noted otherwise.
- Offsets marked with a * shall be measured from the top of slab.
- Tendon notation : 35s-5



- Ducting for slab tendons shall be galvanised steel:
- 70 x 19 for 5 x 12.7dia strand tendons
- 90 x 19 for 5 x 15.2dia strand tendons
- Seal off all ducts and securely tape joints to prevent ingress of mortar during concreting.
- The performance of the post tensioning anchorages is the responsibility of the stressing contractor and they shall provide any additional bursting reinforcement needed to meet the requirements of their post tensioning system.

TENSIONING AND GROUTING

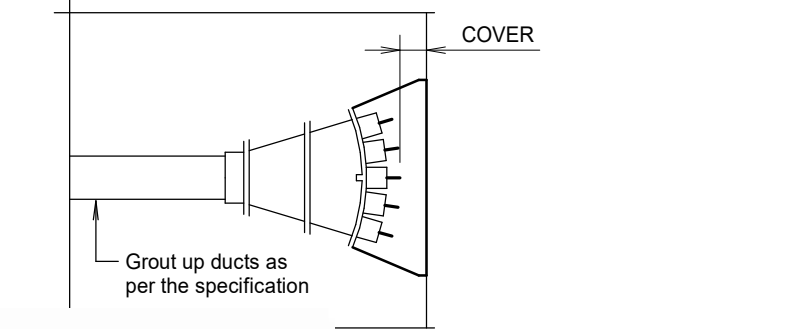
- Tendons shall be stressed to the following jacking forces unless noted otherwise.
12.7dia strand tendons - 156 kN (0.85 UTS) per strand.
15.2dia strand tendons - 212 kN (0.85 UTS) per strand.
- The first stage of stressing is for 25% of the jacking force to be applied between 18 and 36 hours after concrete placement (f_{cp} = 9 MPa minimum) followed by the remainder of the jacking force at - f_{cp} = 22 MPa unless noted otherwise below. Each individual strand or bar shall be tensioned during the first stage unless noted otherwise.
- Records of net tendon elongation and other aspects of the tensioning operation required by the Specification shall be submitted to the Engineer and approved prior to cutting of tendons and grouting the ducts.
- All tendons to be grouted in accordance with the specification.
- Post-tensioning anchorage pockets shall be fully grouted with a polymer modified repair mortar. Minimum cover to any tendons or anchorage plate shall be as for the element in which they are located.
- Concrete test cylinders used for assessing strength for tensioning are to be site cured in similar conditions to the concrete element being stressed.

ANCHORAGE RECESS GROUTING
NOT EXPOSED TO WEATHER (INTERNAL)
Exposure Class A1 as per AS3600

- After final stressing and approval of extensions by TTW, cut off strands to give 30mm minimum cover to ends of strands.
- Provide records of measured cover at each anchor recess for TTW to inspect and provide the opportunity for TTW to inspect recesses.
- Thoroughly clean anchorage pocket (use high pressure water jet if necessary) to remove all laitance, polystyrene etc.
- Prime all concrete surfaces with 'Nitobond EP' or approved equivalent.
- Grout up recess with 3:1 Sand: Cement grout mix or 'Renderoc HB'. Infill is to be finished flush with surrounding concrete surface.
- The contractor shall provide records that demonstrate steps 3,4 & 5 have been satisfactorily completed at each anchor recess.

ANCHORAGE RECESS GROUTING
EXPOSED TO WEATHER (EXTERNAL)
Exposure Class B1 as per AS3600 - Near Coastal/Industrial
Exposure Class B2 as per AS3600 - Within 1km of coastline

- After final stressing and approval of extensions by TTW cut off strands to give 30mm minimum cover to ends of strands.
- Provide records of measured cover at each anchor recess for TTW to inspect and provide the opportunity for TTW to inspect recesses.
- Thoroughly clean anchorage recess (use high pressure water jet if necessary) to remove all laitance, polystyrene etc.
- Prime all metal surfaces with 'Nitopriime Zincrich' or approved equivalent.
- Prime all concrete surfaces with 'Nitobond EP' or approved equivalent.
- Grout up recess with 'Renderoc HB40' - applied as per manufacturers instructions. Infill is to be finished flush with surrounding concrete surface to the Superintendents requirements. A test sample is to be submitted for approval and used for acceptance/rejection criteria.
- The contractor shall provide records that demonstrate steps 3,4,5 & 6 have been satisfactorily completed at each anchor recess.
- Alternative products may be used as follows:
SikaTop 110 in lieu of Nitopriime Zincrich and Nitobond EP Sika MonoTop 615 in lieu of Renderoc HB40



STRUCTURAL STEELWORK NOTES

- Provide temporary bracing to maintain stability of steelwork during construction.
- Do not grout under base plates until first level steelwork is plumb and fixed by welding or bolting.
- Submit all shop drawings to the Superintendent before commencing fabrication.

GENERAL UNO

- All Steelwork to be fabricated and erected in accordance with AS/NZS 5131.
 - Use 10mm thick gusset, fin and end plates welded all round.
 - Provide 6mm seal plate to all open ends of tube members.
 - Provide all cleats and holes necessary for fixing Timber and other elements to the steel whether or not detailed on the Structural drawings.
 - Studs are to be fabricated to AS1554.2
 - Shear studs (composite slab to steel) to be grade 410 MPa.
 - Threaded studs (steel to steel) grade 380 MPa.
 - Turnbuckles to be quality grade 'S' to AS2319.
- BOLTING UNO
- All bolts 20mm dia.
 - All bolts to be grade 8.8/S.
 - All holding down bolts to be grade 4.6.
 - All bolts, including holding down bolts are to be hot dip galvanized.
 - All connections to have a minimum of 2 bolts.
 - Washers are to be in accordance with AS4100.
Holes 3mm or more greater than the bolt diameter and slotted holes are to have plate washers of minimum 8mm thickness and are to extend a minimum of 0.5 the bolt diameter past the edge of the hole.
 - A minimum of two threads shall extend past the nut.

Bolting categories are identified on the drawings in the following manner.

- 4/S Commercial bolts of grade 4.6 snug tightened.
- 8/S High strength bolts of grade 8.8 snug tightened.
- 8/8TB High strength bolts of grade 8.8 fully tensioned to AS4100 as a bearing type joint.
- 8.8/TF High strength bolts of grade 8.8 fully tensioned to AS4100 as a friction type joint with faying surfaces left uncoated.

Note: Grade 8.8 bolts are NOT to be welded. /TB and /TF bolt categories shall be installed using the direct tension indicator method to AS/NZS 5131.

WELDING UNO

- All welds to be continuous all round fillet UNO. as defined in table below

Plate Thickness less than or equal to	Weld Size
16mm	6mm
24mm	8mm
32mm	12mm

- All welds to be category SP.
- All weld metal is to have a nominal tensile strength as defined in table below

Nominal yield strength of steel to be welded	Nominal tensile strength of weld metal - f _{we}
All Steel with Grade ≤ 300 MPa	430 MPa
All Steel > 300 MPa & ≤ 450 MPa	490 MPa
Quenched & tempered steel to Grade 690 MPa	760 MPa

- Butt weld all flanges at end plates and at all mitre cuts.
- Gussets to end plates to be butt welded.
- All butt welds shall be full penetration, grade SP.
- Chip all welds free of slag.
- The contractor is to confirm with Architect as to where exposed welds are to be ground flush / smooth.
- Refer to Structural Steel Specification and AS/NZS 5131 for NDE weld testing requirements.

STEEL GRADES

Refer to Strcutural Steel Specification / Steel member schedule.

PURLINS AND GIRTS

- All purlins to be grade AS1397/G450-G550 UNO
- Unless noted otherwise, the fixing of purlins, girts, bridging, sheeting and any other component shall be in accordance with the manufacturer's specification and recommendations.
- Sheeting / cladding is to be screw fixed to the purlins / girts to provide lateral restraint to the purlins/girts in accordance with the manufacturer's requirements.
- All purlin and girt bolts to be in accordance with purlin manufacturers requirements and as defined in table below UNO.

Purlin Depth	Bolt Size
100mm to 250mm	M12 4.6/S
300mm to 350mm	M16 4.6/S

Grade 8.8/S bolts to be used where nominated on drawings.

- Provide double purlins at expansion joints in roof sheeting.
- Purlin / girt sizes shown are based on the current BLUESCOPE LYSAGHT purlins and girts design data, including restraint from roof sheeting and bridging. The manufacturer should confirm any alternative systems used are equivalent or redesign the purlins / girts to provide an equivalent system.
- Purlin / girt cleats are to be 8mm minimum thick & in accordance with the Manufacturers details.
Where the distance between the bottom flange of the purlin and the rafter is greater than 100mm use 75 x 75 x 8 EA cleats.
- Provide 75 x 75 x 4 duragal galvanized angle trimmers to support roof sheeting edges at all hips, valleys and angled sheet edges.
Fix to each purlin with one No. 14 Tek screw.
- Bridging shall be designed and erected in accordance with the manufacturer's requirements. Rod bridging is not acceptable unless approved in writing.
- For bridging members to purlins at curved roof areas provide bridging suitable for curved roofs to manufacturer's details.

STEELWORK FINISHES

Refer to Structural Steel Specification

This drawing is copyright and is the property of TTW and must not be used without authorisation.

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING NO. S0002 & S0003

TYPICAL DETAILING NOTES

- ALL CHEMICAL ANCHORS TO BE HILTI HIT-V-F 8.8 RODS WITH HIT-RE 500-V3 ADHESIVE. INSTALL IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS. HOLES TO BE HAMMER DRILLED. 100mm MINIMUM EDGE DISTANCE. MINIMUM EMBEDMENT TO BE AS FOLLOWS. UNLESS NOTED OTHERWISE ON RESPECTIVE DETAIL.
A. M16 = 125mm
B. M20 = 170mm
C. M24 = 210mm
- ANCHOR INSTALLER TO PROVIDE WRITTEN CERTIFICATION THAT ALL ANCHORS HAVE BEEN INSTALLED IN ACCORDANCE WITH HILTI PROCEDURES AND SPECIFICATIONS.
- ALL DRILLED DOWELS TO BE EPOXIED USING HILTI HIT RE-500 V3 ADHESIVE. HOLES TO BE HAMMER DRILLED. REFER RESPECTIVE DETAILS FOR EMBEDMENT. DOWEL INSTALLER TO PROVIDE WRITTEN CERTIFICATION THAT ALL DOWELS HAVE BEEN INSTALLED IN ACCORDANCE WITH HILTI PROCEDURES AND SPECIFICATIONS.
- ALL DRY PACK GROUT TO BE NON-SHRINK AND 40 MPa MINIMUM.
- ALL CONSTRUCTION JOINTS TO BE SCABBLED TO REMOVE AND ROUGHEN EXISTING SURFACE FINISH AND APPLY SIKADUR-32 BONDING AGENT PRIOR TO CONCRETE PLACEMENT IN ACCORDANCE WITH SIKa SPECIFICATIONS. NOTE: IN HAS A SHORT POT LIFE AND CONCRETE NEEDS TO BE APPLIED WHEN IT IS STILL "TACKY".
- ALTERNATE PRODUCTS AND DETAILING ARE NOT TO BE USED WITHOUT PRIOR REVIEW AND APPROVAL BY TTW.
- ALL SITE WELDS TO BE FULL STRENGTH BUTT WELDS (FSBW) UNLESS NOTED OTHERWISE. ALL SITE BUTT WELDS TO BE TESTED WITH SUCCESSFUL TEST CERTIFICATES TO BE ISSUED TO TTW PRIOR TO ENGINEERS INSPECTION.
- PRIOR TO SHOP FABRICATION, MARK PROPOSED ANCHOR SETOUT ON SLAB SURFACE. SCAN SLAB TO LOCATE AS-BUILD REINFORCEMENT AND POST TENSIONING. IF ANCHORS CLASH SEND PROPOSED ALTERNATIVE SETOUT TO TTW FOR REVIEW.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1 Drawn Authorised

1 : 1 PSH GB

Job No Drawing No Revision

211523 S0002 P1

22/11/2021 12:48:45 PM

A1	0	1	2	3	4	5	6	7	8	9	10
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21							
Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date		



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectus™
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer
TTW
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject

STEEL WALL FRAMING NOTES

1. All design, materials and workmanship shall be in accordance with AS4680 Cold Formed Steel Structures Code.
2. Unless noted otherwise on the drawings all wall framing shall be designed and installed by the manufacturer in accordance with the specification and relevant Australian Standards. Refer to General Notes for Design Loads.
3. All framing shall be designed to carry the dead load of all framing members, cladding, lining, doors, folding doors, services etc. as shown on the Architects and other Consultants' drawings.
4. All framing dimensions shall be obtained from the Architectural drawings.
5. All wall framing shall be designed as loadbearing to resist all lateral loads. Sufficient bracing shall be provided to resist the full wind load effects from both the walls and roof of the building in all directions.
6. In addition to other design loads all wall framing shall be designed to support the following loads:
 - Up to two rows of 300mm wide shelves. Each row of shelves shall be designed to support a critical load of 150 kg per metre length of the shelf.
 - In compliance with the requirements of BCA Specification C1.8
7. In addition to the deflection limits specified in the relevant Australian Standards, wall framing shall be designed to achieve the following additional deflection limits:

ELEMENT	DEFLECTION
Supporting frame masonry walls	Span / 1000

8. The contractor must submit a design certificate to certify the wall framing design is in accordance with AS 4600 for the relevant loads signed by a NER registered engineer.

STRUCTURAL TIMBER NOTES

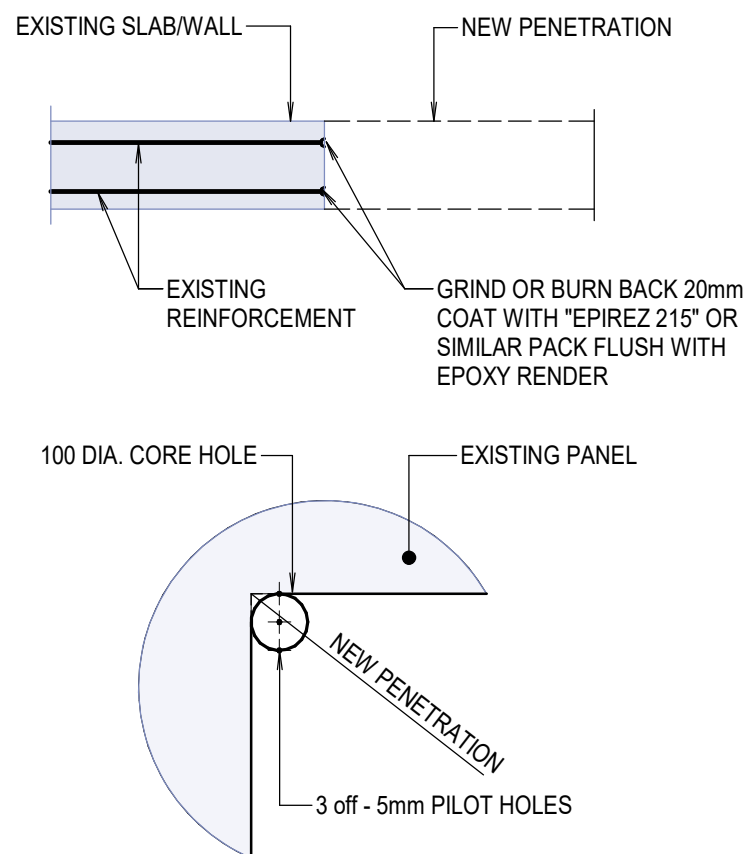
1. The manufacturer, supply and installation of structural timber are to be in accordance with AS1720.1 Timber Structures.
2. All timber supplied is to be in accordance with characteristic strengths labeled in the schedules on the drawings.
3. Alternative products are to be submitted to the engineer for review.
4. The manufacturer is to provide a moisture content of 10-12%. If moisture content of timber member exceeds 14% on site, the Engineer must be notified.
5. All timber dimensions are to be labeled depth first and breadth / thickness second.
6. Production tolerances are to be $\pm 3\text{mm}$ or to the manufacturers specifications, whichever is lesser.
7. The manufacturer is to provide temporary bracing to maintain stability of timber during lifting and installation.
8. Refer to Timber Specification and AS1604.1 for durability classifications and preservative treatments.
9. Submit all shop drawings to the engineer for review before commencing manufacture, a review period of a minimum of 10 working days is required. Drawings are to include all product specifications, including timber species, strength grade and adhesive product data.
10. All timber structures are to be designed to satisfy all durability fire requirements. The contractor is to provide fire lining to all timber elements to satisfy fire rating requirements, unless noted otherwise.

CROSS LAMINATED TIMBER (CLT) NOTES

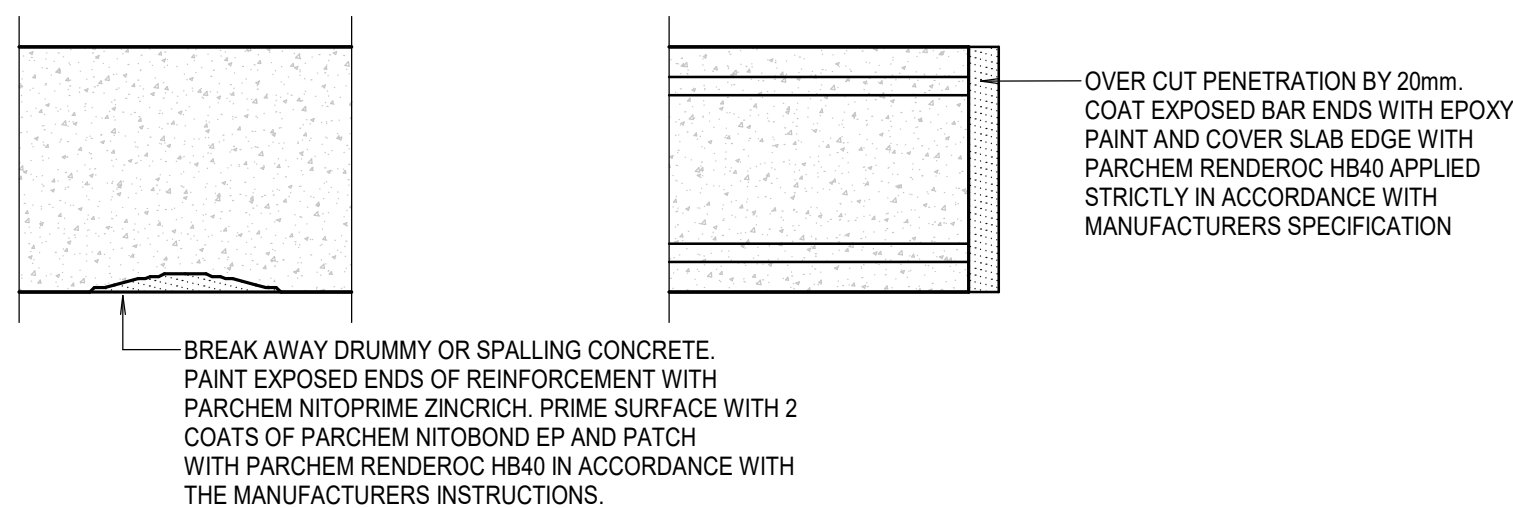
1. The manufacture, supply and installation of CLT panels and connection items are to be in accordance with Eurocode 5 and the manufacturers European Technical Approval (ETA) or other testing approval specifications.
2. All CLT panels to be manufactured at moisture content 12%, with variations of +/- 2%. If moisture content of CLT exceeds 14% on site, the engineer must be notified.
3. The contractor is to provide temporary bracing to maintain stability of CLT panels during lifting and installation.
4. CLT panels are to be protected from exposure to rain during transit, storage on site and erection as per manufacturers specifications. All CLT panels not to be exposed long-term to external environments.
5. Lifting and installation methodologies are to protect any permanently exposed CLT panel surfaces, contractor must keep these surfaces free from any marking or damage.
6. Submit all shop drawings to the engineer for review before commencing CLT panel manufacture, minimum of 10 Working days review period required.
7. CLT panels are to be laid with the face grain in the direction as labeled on the drawings.
8. All penetrations and/or service channels not shown on structural drawings and/or shop drawings must be given written approval of the engineer before cutting on site.
9. The tolerance is to maintain a vertical direction tolerance of 5mm. Production tolerances to be in accordance with AS1328.1 and manufacturers specifications, whichever is the lesser.
10. All CLT connections at fire rated locations must satisfy FRL requirements. The contractor is to provide fire lining to all CLT elements to satisfy fire rating requirements, unless noted otherwise.
11. Screw and nail edge distances, and minimum spacings to be in accordance with Eurocode 5 and European Technical Approval no. ETA-1100/03 and manufacturers specifications. Anchor points required for installation are to comply with edge distance requirements.

TYPICAL PENETRATION IN EXISTING SLAB/WALL REINFORCEMENT AND SAW CUTTING PROCEDURE

1. Penetrations to existing slab/wall to be saw cut. A 100dia hole is to be pre-drilled at each corner of the penetration prior to cutting. The saw cuts are to be stopped short of corners and trimmed by hand to achieve final profile. Under no conditions are saw cuts to be extended through the corners.
2. All exposed reinforcement to be ground or burnt back 20mm, coat with 'Epirez 215' or similar, pack flush with epoxy render.
3. Engineers office to be notified prior to saw cutting if proposed penetration sizes shown are increased.



SLAB/WALL NEW OPENING CUTTING DETAIL



CONCRETE REPAIR DETAIL AT UNDER SIDE OF SLAB

SCALE 1:5

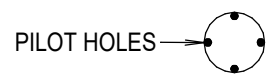
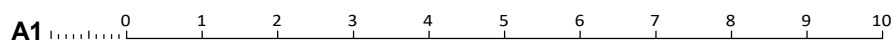
CONCRETE REPAIR DETAIL AT SLAB EDGE

SCALE 1:5

PROCEDURE FOR CORING THROUGH EXISTING REINFORCED SLAB

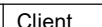
1. Approximately locate the position of the existing slab supports (beams, bands, columns, walls etc.) using the structural engineer's drawings.
 2. Confirm the exact location of slab supports by inspecting the underside of the slab.
 3. If precast floor system is encountered contact the Superintendent for instructions.
 4. Confirm that all core holes are clear of slab supports by drilling 4 pilot holes using a masonry drill bit around the perimeter of the proposed core hole location.
- 

PILOT HOLES
5. If the slab supports clashes with the core hole in any way contact the Architect / Superintendent for instructions.
 6. For new locations resulting from Item 4 re-drill pilot holes and repeat step 4.
 7. Provide fire rated material around penetration in accordance with BCA requirements.

Printed: 22/11/2021 12:48:46 PM C:\Users\paulh\Documents\MEC [R22]_Paul.Haigh@ttw.com.au.vnt

P1	SCHEMATIC DESIGN				GB	PSH	22.11.21				
Rev	Description		Eng	Draft	Date	Rev	Description		Eng	Draft	Date

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW Structural
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject

NOTES SHEET 2

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S0003	P1

22/11/2021 12:48:46 PM

UB	MARK	a	b	c	d	GRADE
UNIVERSAL BEAM	UB15	150 UB 14.0	150 UB 18.0	-	-	300 PLUS
	UB18	180 UB 16.1	180 UB 18.1	180 UB 22.2	-	
	UB20	200 UB 18.2	200 UB 22.3	200 UB 25.4	200 UB 29.8	
	UB25	250 UB 25.7	250 UB 31.4	250 UB 37.3	-	
	UB31	310 UB 32.0	310 UB 40.4	310 UB 46.2	-	
	UB36	360 UB 44.7	360 UB 50.7	360 UB 56.7	-	
	UB41	410 UB 53.7	410 UB 59.7	-	-	
	UB46	460 UB 67.1	460 UB 74.6	460 UB 82.1	-	
	UB53	530 UB 82.0	530 UB 92.4	-	-	
	UB61	610 UB 101	610 UB 113	610 UB 125	-	

WB	MARK	a	b	c	d	e	f	g	GRADE
WELDED BEAM	WB7	700 WB 115	700 WB 130	700 WB 150	700 WB 173	-	-	-	300 PLUS
	WB8	800 WB 122	800 WB 146	800 WB 168	800 WB 192	-	-	-	
	WB9	900 WB 175	900 WB 218	900 WB 257	900 WB 282	-	-	-	
	WB10	1000 WB 215	1000 WB 258	1000 WB 296	1000 WB 322	-	-	-	
	WB12	1200 WB 249	1200 WB 278	1200 WB 317	1200 WB 342	1200 WB 392	1200 WB 423	1200 WB 455	

UC	MARK	a	b	c	d	e	f	g	GRADE
UNIVERSAL COLUMN	UC10	100 UC 14.8	-	-	-	-	-	-	300 PLUS
	UC15	150 UC 23.4	150 UC 30.0	150 UC 37.2	-	-	-	-	
	UC20	200 UC 46.2	200 UC 52.2	200 UC 59.5	-	-	-	-	
	UC25	250 UC 72.9	250 UC 89.5	-	-	-	-	-	
	UC31	310 UC 96.8	310 UC 118	310 UC 137	310 UC 158	-	-	-	

WC	MARK	a	b	c	d	e	f	g	GRADE
WELDED COLUMN	WC35	350 WC 197	350 WC 230	350 WC 258	350 WC 280	-	-	-	300 PLUS
	WC40	400 WC 144	400 WC 181	400 WC 212	400 WC 270	400 WC 303	400 WC 328	400 WC 361	
	WC50	500 WC 228	500 WC 267	500 WC 290	500 WC 340	500 WC 383	500 WC 414	500 WC 440	

EA	MARK	a	b	c	d	e	f	g	GRADE
EQUAL ANGLE	EA02	25 x 25 x 3 EA	25 x 25 x 5 EA	25 x 25 x 6 EA	-	-	-	-	300 PLUS
	EA03	30 x 30 x 3 EA	30 x 30 x 5 EA	30 x 30 x 6 EA	-	-	-	-	
	EA04	40 x 40 x 3 EA	40 x 40 x 5 EA	40 x 40 x 6 EA	45 x 45 x 3 EA	45 x 45 x 5 EA	45 x 45 x 6 EA	-	
	EA05	50 x 50 x 3 EA	50 x 50 x 5 EA	50 x 50 x 6 EA	50 x 50 x 8 EA	55 x 55 x 5 EA	55 x 55 x 6 EA	-	
	EA06	65 x 65 x 5 EA	65 x 65 x 6 EA	65 x 65 x 8 EA	65 x 65 x 10 EA	-	-	-	
	EA07	75 x 75 x 5 EA	75 x 75 x 6 EA	75 x 75 x 8 EA	75 x 75 x 10 EA	-	-	-	
	EA09	90 x 90 x 6 EA	90 x 90 x 8 EA	90 x 90 x 10 EA	-	-	-	-	
	EA10	100 x 100 x 6 EA	100 x 100 x 8 EA	100 x 100 x 10 EA	100 x 100 x 12 EA	-	-	-	
	EA12	125 x 125 x 8 EA	125 x 125 x 10 EA	125 x 125 x 12 EA	125 x 125 x 16 EA	-	-	-	
	EA15	150 x 150 x 10 EA	150 x 150 x 12 EA	150 x 150 x 16 EA	150 x 150 x 19 EA	-	-	-	
	EA20	200 x 200 x 13 EA	200 x 200 x 16 EA	200 x 200 x 18 EA	200 x 200 x 20 EA	200 x 200 x 26 EA	-	-	

UA	MARK	a	b	c	d	e	f	g	GRADE
UNEQUAL ANGLE	UA06	65 x 50 x 5 UA	65 x 50 x 6 UA	65 x 50 x 8 UA	-	-	-	-	300 PLUS
	UA07	75 x 50 x 5 UA	75 x 50 x 6 UA	75 x 50 x 8 UA	-	-	-	-	
	UA10	100 x 75 x 6 UA	100 x 75 x 8 UA	100 x 75 x 10 UA	-	-	-	-	
	UA12	125 x 75 x 6 UA	125 x 75 x 8 UA	125 x 75 x 10 UA	125 x 75 x 12 UA	-	-	-	
	UA15	150 x 90 x 8 UA	150 x 90 x 10 UA	150 x 90 x 12 UA	150 x 90 x 16 UA	150 x 100 x 10 UA	150 x 100 x 12 UA	-	

COLD FORMED PURLIN AND GIRT SCHEDULES

Z	MARK	a	b	c	d	e	f	GRADE
PURLINS AND GIRTS	Z10	Z10010	Z10012	Z10015	Z10019	-	-	G450
	Z15	-	Z15012	Z15015	Z15019	Z15024	-	
	Z20	-	-	Z20015	Z20019	Z20024	-	
	Z25	-	-	-	Z25019	Z25024	-	
	Z30	-	-	-	-	Z30024	Z30030	
	Z35	-	-	-	-	-	Z35030	

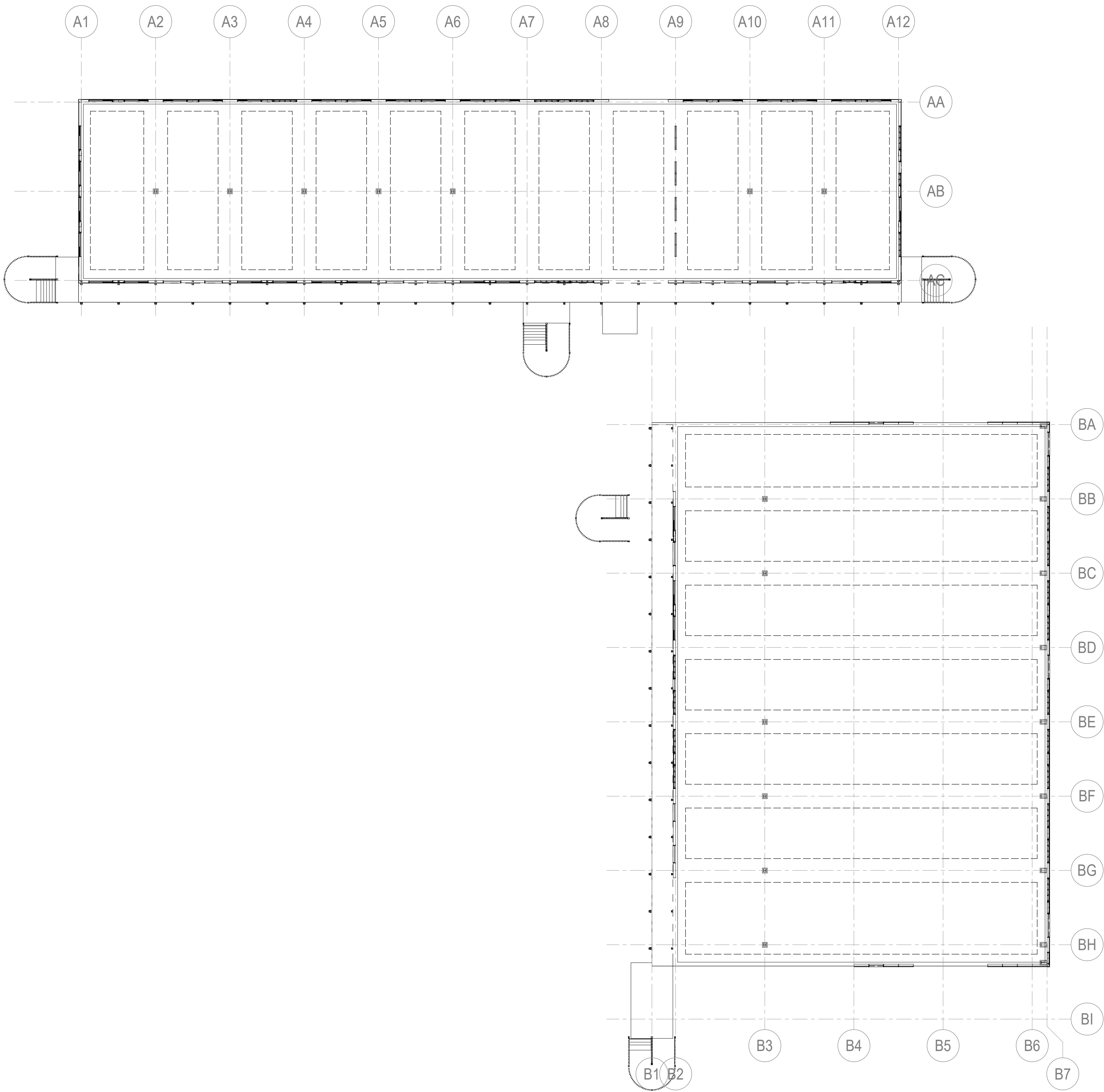
C	MARK	a	b	c	d	e	f	GRADE
PURLINS AND GIRTS	C10	C10010	C10012	C10015	C10019	-	-	G450
	C15	-	C15012	C15015	C15019	C15024	-	
	C20	-	-	C20015	C20019	C20024	-	
	C25	-	-	-	C25019	C25024	-	
	C30	-	-	-	-	C30024	C30030	
	C35	-	-	-	-	-	C35030	

BT	MARK	a	b	c	d	GRADE
TEES CUT FROM UB	BT07	75 BT 7.0	75 BT 9.0	-	-	300 PLUS
	BT09	90 BT 8.1	90 BT 9.1	90 BT 11.1	-	
	BT10	100 BT 9.1	100 BT 11.2	100 BT 12.7	100 BT 14.9	
	BT12	125 BT 12.9	125 BT 15.7	125 BT 18.7	-	
	BT15	155 BT 16.0	155 BT 20.2	155 BT 23.1	-	
	BT18	180 BT 22.4	180 BT 25.4	180 BT 28.4	-	
	BT20	205 BT 26.9	205 BT 29.9	-	-	
	BT23	230 BT 33.6	230 BT 37.3	230 BT 41.1	-	
	BT26	265 BT 41.0	265 BT 46.3	-	-	
	BT30	305 BT 50.5	305 BT 56.5	305 BT 62.5	-	

SHS	MARK	a	b	c	d	e	f	g	h	GRADE
SQUARE HOLLOW SECTION	SH02	20 x 20 x 1.6 SHS	-	-	-	-	-	-	-	C350
	SH025	25 x 25 x 1.6 SHS	25 x 25 x 2.0 SHS	25 x 25 x 2.5 SHS	25 x 25 x 3.0 SHS	-	-	-	-	
	SH03	30 x 30 x 1.6 SHS	30 x 30 x 2.0 SHS	30 x 30 x 2.5 SHS	30 x 30 x 3.0 SHS	-	-	-	-	
	SH035	35 x 35 x 1.6 SHS	35 x 35 x 2.0 SHS	35 x 35 x 2.5 SHS	35 x 35 x 3.0 SHS	-	-	-	-	
	SH04	40 x 40 x 1.6 SHS	40 x 40 x 2.0 SHS	40 x 40 x 2.5 SHS	40 x 40 x 3.0 SHS	40 x 40 x 4.0 SHS	-	-	-	
	SH05	50 x 50 x 1.6 SHS	50 x 50 x 2.0 SHS	50 x 50 x 2.5 SHS	50 x 50 x 3.0 SHS	50 x 50 x 4.0 SHS	50 x 50 x 5.0 SHS	50 x 50 x 6.0 SHS	-	C450
	SH06	65 x 65 x 1.6 SHS	65 x 65 x 2.0 SHS	65 x 65 x 2.5 SHS	65 x 65 x 3.0 SHS	65 x 65 x 4.0 SHS	65 x 65 x 5.0 SHS	65 x 65 x 6.0 SHS	-	
	SH07	75 x 75 x 2.0 SHS	75 x 75 x 2.5 SHS	75 x 75 x 3.0 SHS	75 x 75 x 3.5 SHS	75 x 75 x 4.0 SHS	75 x 75 x 5.0 SHS	75 x 75 x 6.0 SHS	-	
	SH08	89 x 89 x 2.0 SHS	89 x 89 x 2.5 SHS (3)	89 x 89 x 3.5 SHS	89 x 89 x 5.0 SHS	89 x 89 x 6.0 SHS	-	-	-	
	SH10	100 x 100 x 2.0 SHS	100 x 100 x 2.5 SHS (3)	100 x 100 x 3.0 SHS	100 x 100 x 4.0 SHS	100 x 100 x 5.0 SHS	100 x 100 x 6.0 SHS	100 x 100 x 9.0 SHS	-	
	SH12	125 x 125 x 4.0 SHS	125 x 125 x 5.0 SHS	125 x 125 x 6.0 SHS	125 x 125 x 9.0 SHS	-	-	-	-	
	SH15	150 x 150 x 5.0 SHS	150 x 150 x 6.0 SHS	150 x 150 x 9.0 SHS	-	-	-	-	-	
	SH20	200 x 200 x 5.0 SHS	200 x 200 x 6.0 SHS	200 x 200 x 9.0 SHS	200 x 200 x 12.5 SHS	200 x 200 x 16.0 SHS (3)	-	-	-	
	SH25	250 x 250 x 6.0 SHS	250 x 250 x 9.0 SHS	250 x 250 x 12.5 SHS	250 x 250 x 16.0 SHS (3)	-	-	-	-	
	SH30	300 x 300 x 6.0 SHS (3)	300 x 300 x 8.0 SHS	300 x 300 x 9.0 SHS (3)	300 x 300 x 10.0 SHS	300 x 300 x 12.5 SHS	300 x 300 x 16.0 SHS	-	-	
	SH35	350 x 350 x 9.0 SHS (3)	350 x 350 x 10.0 SHS	350 x 350 x 12.5 SHS	350 x 350 x 16.0 SHS	-	-	-	-	
	SH40	400 x 400 x 9.0 SHS (3)	400 x 400 x 10.0 SHS	400 x 400 x 12.5 SHS	400 x 400 x 16.0 SHS	-	-	-	-	

RHS	MARK	a	b	c	d	e	f	g	h	GRADE
RECTANGULAR HOLLOW SECTION	RH05	50 x 25 x 1.6 RHS	50 x 25 x 2.0 RHS	50 x 25 x 2.5 RHS	50 x 25 x 3.0 RHS	-	-	-	-	C450
	RH06	65 x 35 x 1.6 RHS	65 x 35 x 2.0 RHS	65 x 35 x 2.5 RHS	65 x 35 x 3.0 RHS	65 x 35 x 4.0 RHS	-	-	-	
	RH072	75 x 25 x 1.6 RHS	75 x 25 x 2.0 RHS (3)	75 x 25 x 2.5 RHS	-	-	-	-	-	
	RH075	75 x 50 x 1.6 RHS	75 x 50 x 2.0 RHS	75 x 50 x 2.3 RHS	75 x 50 x 2.5 RHS	75 x 50 x 3.0 RHS	75 x 50 x 4.0 RHS	75 x 50 x 5.0 RHS	75 x 50 x 6.0 RHS	
	RH100	100 x 50 x 1.6 RHS	100 x 50 x 2.0 RHS	100 x 50 x 2.5 RHS	100 x 50 x 3.0 RHS	100 x 50 x 3.5 RHS (3)	100 x 50 x 4.0 RHS	100 x 50 x 5.0 RHS	100 x 50 x 6.0 RHS	
	RH102	102 x 76 x 3.5 RHS	102 x 76 x 5.0 RHS	102 x 76 x 6.0 RHS	-	-	-	-	-	
	RH12	125 x 75 x 2.5 RHS	125 x 75 x 3.0 RHS	125 x 75 x 4.0 RHS	125 x 75 x 5.0 RHS	125 x 75 x 6.0 RHS	-	-	-	
	RH155	150 x 50 x 2.0 RHS	150 x 50 x 2.5 RHS	150 x 50 x 3.0 RHS	150 x 50 x 4.0 RHS	150 x 50 x 5.0 RHS	150 x 50 x 6.0 RHS	-	-	
	RH151	150 x 100 x 3.0 RHS	150 x 100 x 4.0 RHS	150 x 100 x 5.0 RHS	150 x 100 x 6.0 RHS	150 x 100 x 9.0 RHS	-	-	-	
	RH152	152 x 76 x 5.0 RHS (4)	152 x 76 x 6.0 RHS (4)	-	-	-	-	-	-	
	RH20	200 x 100 x 4.0 RHS	200 x 100 x 5.0 RHS	200 x 100 x 6.0 RHS	200 x 100 x 9.0 RHS	-	-	-	-	
	RH25	250 x 150 x 5.0 RHS	250 x 150 x 6.0 RHS	250 x 150 x 9.0 RHS	250 x 150 x 12.5 RHS	250 x 150 x 16.0 RHS	-	-	-	
	RH30	300 x 200 x 6.0 RHS	300 x 200 x 8.0 RHS	300 x 200 x 9.0 RHS	300 x 200 x 10.0 RHS	300 x 200 x 12.5 RHS	300 x 200 x 16.0 RHS	-	-	
	RH35	350 x 250 x 8.0 RHS	350 x 250 x 12.5 RHS	350 x 250 x 16.0 RHS	-	-	-	-	-	
	RH42	400 x 200 x 6.0 RHS	400 x 200 x 9.0 RHS	400 x 200 x 10.0 RHS	400 x 200 x 12.5 RHS	-	-	-	-	
	RH43	400 x 300 x 9.0 RHS	400 x 300 x 12.5 RHS	400 x 300 x 16.0 RHS	-	-	-	-	-	

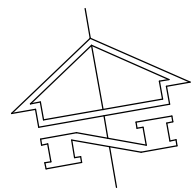
CHS	MARK	a	b	c	d	e	GRADE
CIRCULAR HOLLOW SECTION	CH02	^o 25.4 x 2.0 CHS	^o 26.9 x 2.6 CHS *				C350
	CH03	33.7 x 2.0 CHS	33.7 x 2.6 CHS	33.7 x 3.2 CHS (2)	33.7 x 4.0 CHS (2)	-	
	CH042	42.4 x 2.0 CHS	42.4 x 2.6 CHS	42.4 x 3.2 CHS (2)	42.4 x 4.0 CHS (2)	-	
	CH048	^o 48.3 x 2.3 CHS	48.3 x 2.9 CHS	48.3 x 3.2 CHS (2)	48.3 x 4.0 CHS (2)	^A 48.3 x 5.4 CHS (2)	
	CH06	60.3 x 2.3 CHS	60.3 x 2.9 CHS	60.3 x 3.6 CHS (2)	60.3 x 4.5 CHS (2)	^A 60.3 x 5.4 CHS (2)	
	CH07	^o 76.1 x 2.3 CHS	^o 76.1 x 3.2 CHS	76.1 x 3.6 CHS (2)	76.1 x 4.5 CHS (2)	^A 76.1 x 5.9 CHS (2)	
	CH08	^o 88.9 x 2.6 CHS	88.9 x 3.2 CHS	88.9 x 4.0 CHS (2)	88.9 x 5.0 CHS (2)	^A 88.9 x 5.9 CHS (2)	
	CH10	^o 101.6 x 2.6 CHS	101.6 x 3.2 CHS	101.6 x 4.0 CHS (2)	101.6 x 5.0 CHS (2)		
	CH11	^o 114.3 x 3.2 CHS	114.3 x 3.6 CHS	114.3 x 4.5 CHS (2)	114.3 x 5.4 CHS (2)		
	CH13	^o 139.7 x 3.0 CHS	139.7 x 3.5 CHS	139.7 x 5.0 CHS (2)	139.7 x 5.4 CHS (2)		
	CH16	^o 165.1 x 3.0 CHS	165.1 x 3.5 CHS	165.1 x 5.0 CHS (2)	165.1 x 5.4 CHS (2)		
	CH17	168.3 x 4.8 CHS	168.3 x 6.4 CHS	168.3 x 7.1 CHS	^o 168.3 x 11.0 CHS		
	CH21	219.1 x 4.8 CHS	219.1 x 6.4 CHS	219.1 x 8.2 CHS	219.1 x 12.5 CHS		
	CH27	273.1 x 4.8 CHS	273.1 x 6.4 CHS	273.1 x 9.3 CHS	273.1 x 12.7 CHS		
	CH32	323.9 x 6.4 CHS	323.9 x 9.5 CHS	323.9 x 12.7 CHS	-		
	CH35	355.6 x 6.4 CHS	355.6 x 9.5 CHS	355.6 x 12.7 CHS	-		
	CH40	406.4 x 6.4 CHS	406.4 x 9.5 CHS	406.4 x 12.7 CHS	-		
	CH45	457.0 x 6.4 CHS	457.0 x 9.5 CHS	457.0 x 12.7 CHS	-		
CH50	508.0 x 6.4 CHS	508.0 x 9.5 CHS	508.0 x 12.7 CHS	-			
						^o ORRCON STEEL ^A AUSTUBE STEEL (2) - Grade 250 only (3) - Grade 350 only (4) - Grade 450 only DENOTES BEAM ORIENTED HORIZONTAL BEAM TYPE AND SIZE	



SLAB LOADING LEGEND

LL		SDL	
1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5.0 kPa

LOADING NOTES:			
• FOR ALL LEVELS THAT ARE SUSPENDED CONCRETE	• FOR CLT FLOORS	• FOR CLT LIBRARY	
DESIGN LOAD: SDL = 1.5 kPa, LL = 5.0 kPa	DESIGN LOADS: SDL = 1.5 kPa, LL = 3.0 kPa	DESIGN LOADS: SDL = 1.5 kPa, LL = 4.0 kPa	
• FOR WOOD & METAL STORE ROOMS	• FOR CLT LIBRARY		
DESIGN LOADS: SDL = 1.5 kPa, LL = 10 kPa U.N.O	DESIGN LOADS: SDL = 1.5 kPa, LL = 4.0 kPa		



BUILDING 1 & 2 GROUND FLOOR LOADING PLAN
SCALE 1:200

1. LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
2. SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
3. FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

S0901 P1
Printed : 22/11/2021 12:48:55 PM
C:\Users\paulh\Documents\MSC_R02L_Prelim\p1.dwg

A1				0 1 2 3 4 5 6 7 8 9 10			
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21			
Rev	Description	Eng	Draft	Date	Rev	Description	Eng



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectus™
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

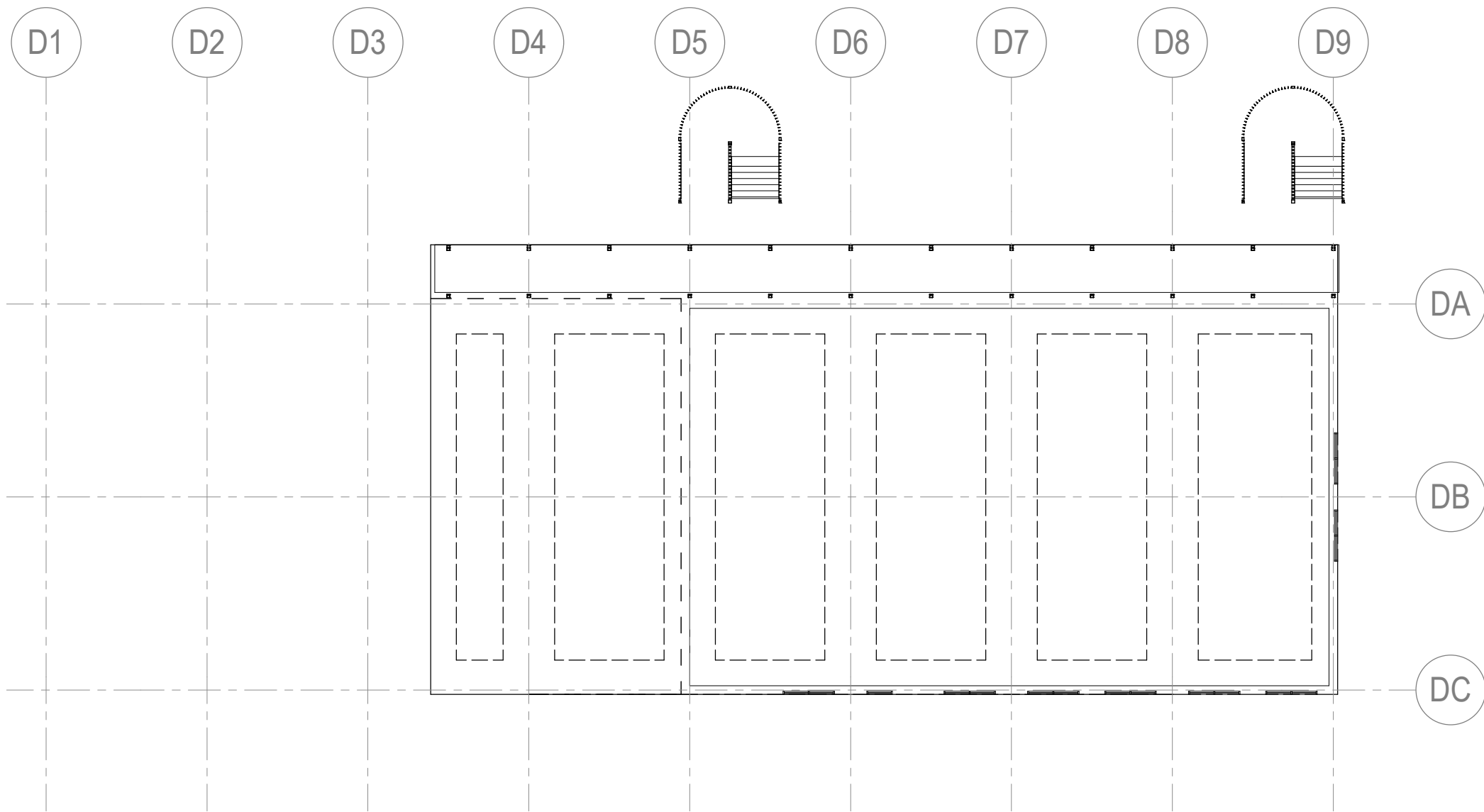
Structural Engineer
TTW Structural Civil Traffic Façade
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject
BUILDING 1 & 2 GROUND FLOOR LOADING PLAN

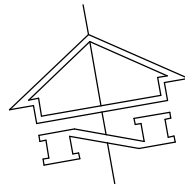
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S0901	P1
22/11/2021 12:48:55 PM		



SLAB LOADING LEGEND

LL		SDL	
1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5.0 kPa



BUILDING 4 GROUND FLOOR LOADING PLAN

- SCALE 1:200
- LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
 - SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
 - FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

- LOADING NOTES:
- FOR ALL LEVELS THAT ARE SUSPENDED CONCRETE
DESIGN LOAD: SDL = 1.5 kPa, LL = 5.0 kPa
 - FOR WOOD & METAL STORE ROOMS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 10 kPa U.N.O
 - FOR CLT FLOORS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 3.0 kPa
 - FOR CLT LIBRARY
DESIGN LOADS: SDL = 1.5 kPa, L.L = 4.0 kPa

S0902 P1
Printed : 22/11/2021 12:48:57 PM
C:\Users\paulh\Documents\MSC\PS2L_Plan\slab\slab.dwg

A1 0 1 2 3 4 5 6 7 8 9 10

P1	SCHEMATIC DESIGN	GB	PSH	22.11.21			
Rev	Description	Eng	Draft	Date	Rev	Description	Eng



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

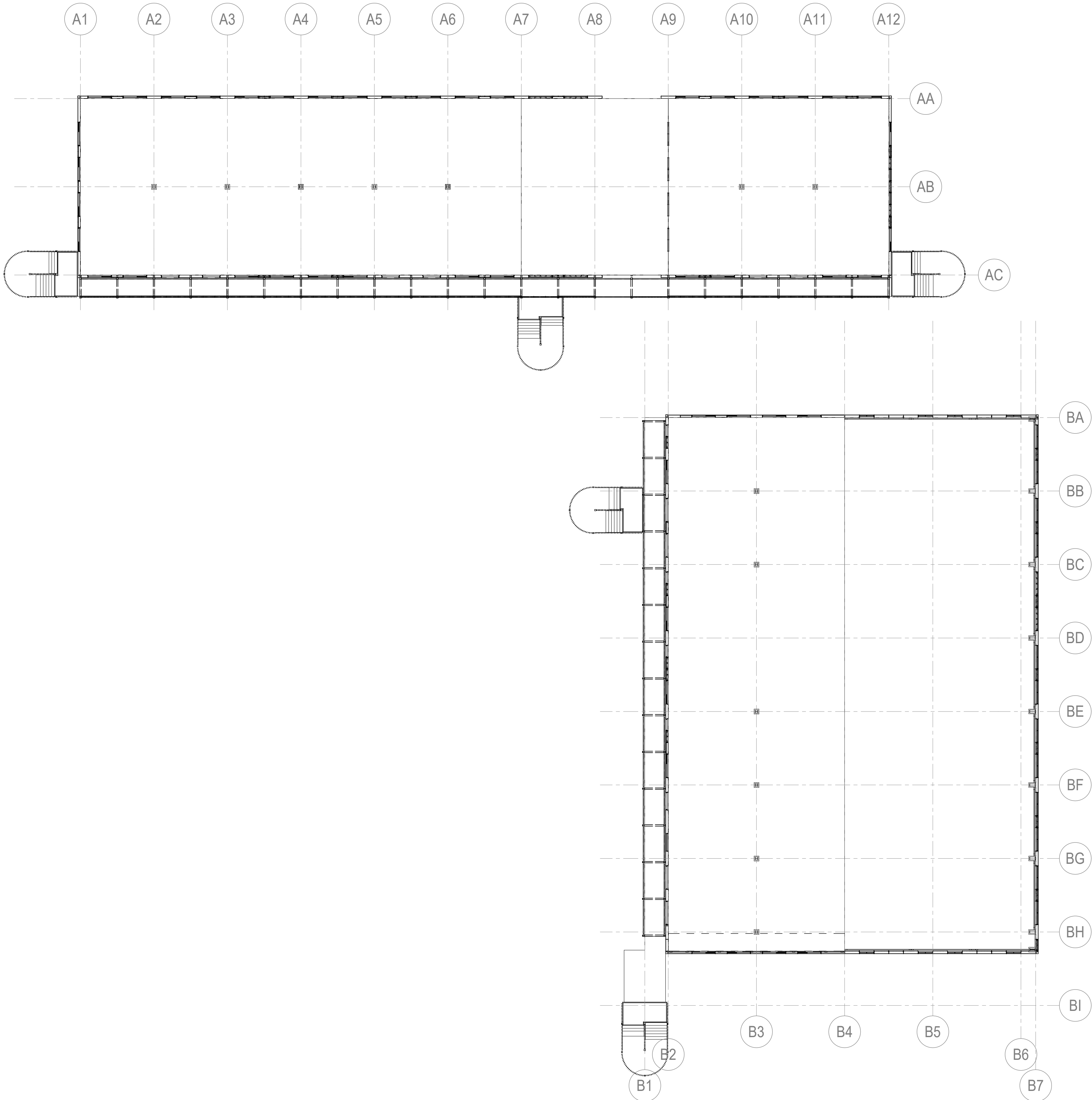
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 3 & 4 GROUND
FLOOR LOADING PLAN**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

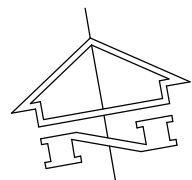
Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S0902	P1
22/11/2021 12:48:57 PM		



SLAB LOADING LEGEND

LL		SDL	
1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5.0 kPa

- LOADING NOTES:
- FOR ALL LEVELS THAT ARE SUSPENDED CONCRETE
DESIGN LOAD: SDL = 1.5 kPa, LL = 5.0 kPa
 - FOR WOOD & METAL STORE ROOMS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 10 kPa U.N.O
 - FOR CLT FLOORS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 3.0 kPa
 - FOR CLT LIBRARY
DESIGN LOADS: SDL = 1.5 kPa, L.L = 4.0 kPa



BUILDING 1 & 2 LEVEL 1 LOADING PLAN

- SCALE 1:200
- LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
 - SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
 - FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

S0911 P1
Printed : 22/11/2021 12:49:13 PM
C:\Users\paulh\Documents\MSC_R02L_Prelim\p1.dwg
psh.com.au\p1

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectus
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

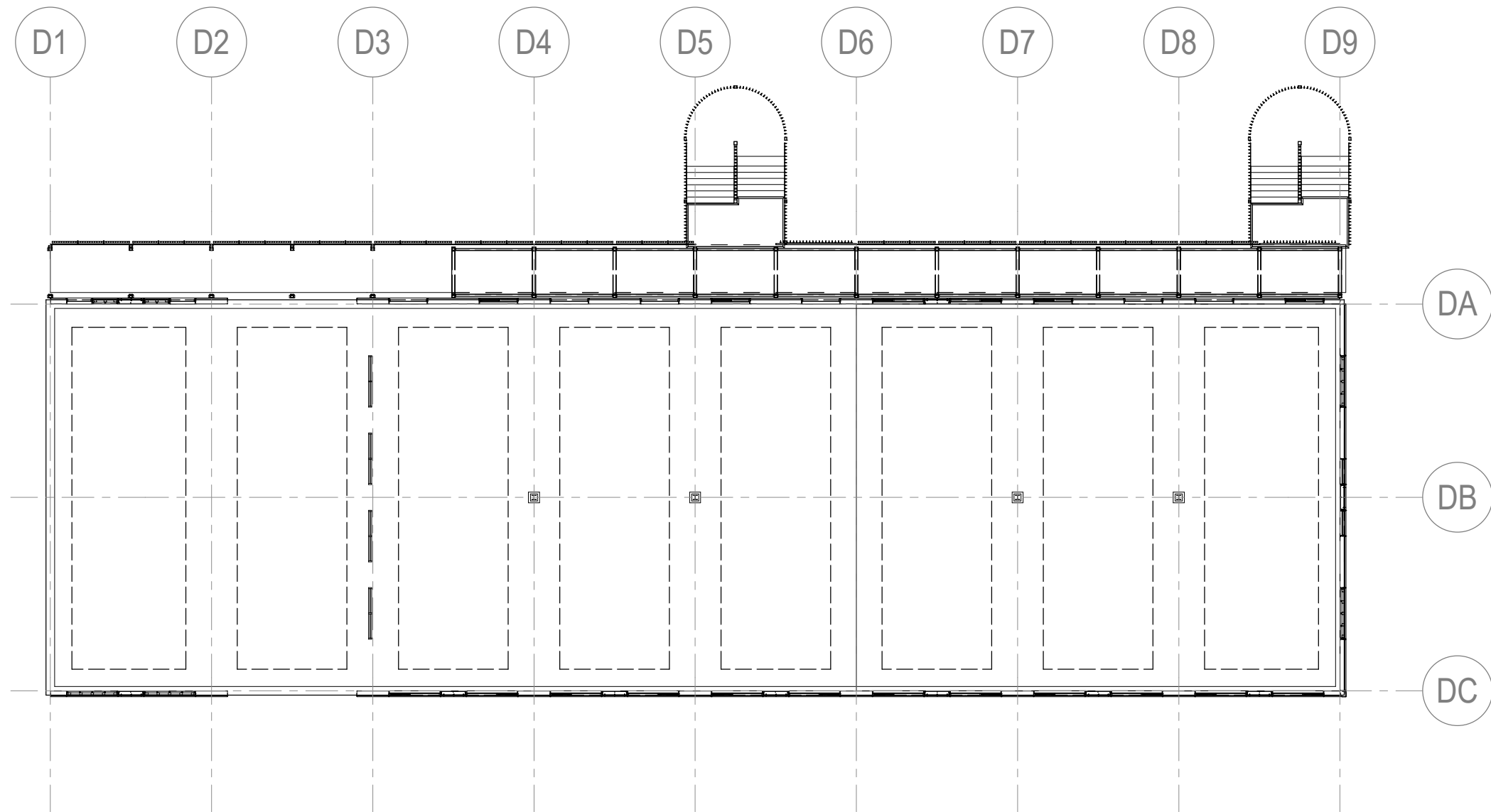
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 1 & 2 LEVEL 1
LOADING PLAN**

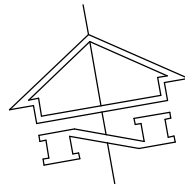
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S0911	P1
22/11/2021 12:49:13 PM		



SLAB LOADING LEGEND

LL		SDL	
1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5.0 kPa



BUILDING 4 LEVEL 1 LOADING PLAN

- SCALE 1:200
- LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
 - SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
 - FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

- LOADING NOTES:
- FOR ALL LEVELS THAT ARE SUSPENDED CONCRETE
DESIGN LOAD: SDL = 1.5 kPa, LL = 5.0 kPa
 - FOR WOOD & METAL STORE ROOMS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 10 kPa U.N.O
 - FOR CLT FLOORS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 3.0 kPa
 - FOR CLT LIBRARY
DESIGN LOADS: SDL = 1.5 kPa, L.L = 4.0 kPa

S0912 P1
Printed : 22/11/2021 12:49:17 PM
C:\Users\paulh\Documents\MSC_R02L_Prelim.dwg@pau.com.au.rvt

A1 0 1 2 3 4 5 6 7 8 9 10

P1	SCHEMATIC DESIGN	GB	PSH	22.11.21	
Rev	Description	Eng	Draft	Date	Rev Description Eng Draft Date



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject
BUILDING 3 & 4 LEVEL 1
LOADING PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S0912	P1
22/11/2021 12:49:17 PM		



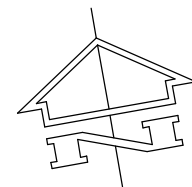
1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5.0 kPa

SCALE 1:200

1. LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
2. SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
3. FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

LOADING NOTES:

- FOR ALL LEVELS THAT ARE SUSPENDED CONCRETE
DESIGN LOAD: SDL = 1.5 kPa, LL = 5.0 kPa
- FOR CLT FLOORS
DESIGN LOADS: SDL = 1.5 kPa, LL = 3.0 kPa
- FOR WOOD & METAL STORE ROOMS
DESIGN LOADS: SDL = 1.5 kPa, LL = 10 kPa U.N.O
- FOR CLT LIBRARY
DESIGN LOADS: SDL = 1.5 kPa, LL = 4.0 kPa



S0921 P1

A1 

P1	SCHEMATIC DESIGN				GB	PSH	22.11.21					
Rev	Description				Eng	Draft	Date	Rev	Description	Eng	Draft	Date

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 1 & 2 LEVEL 2
LOADING PLAN**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

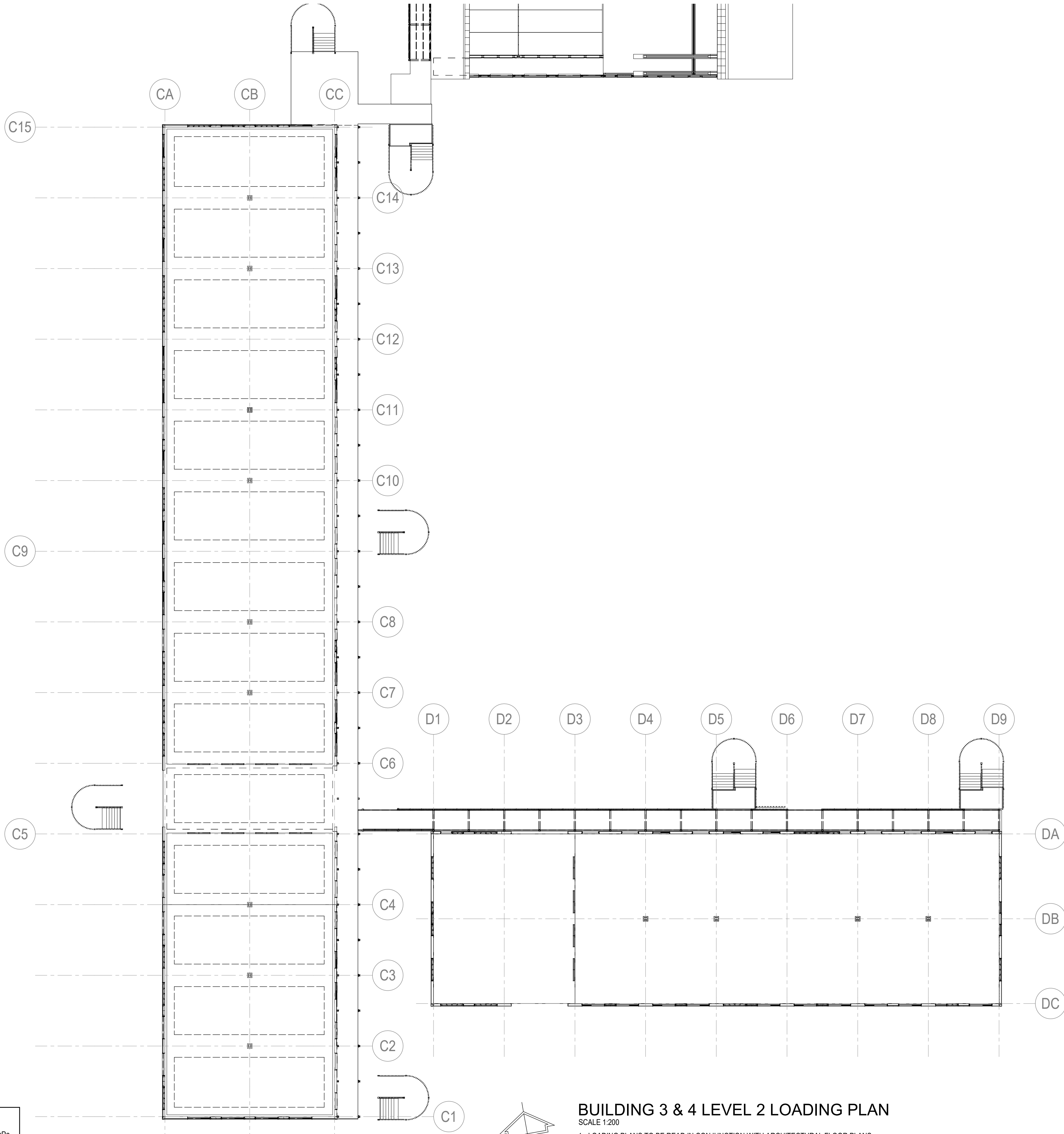
Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S0921	P1

22/11/2021 12:49:33 PM

SLAB LOADING LEGEND

LL		SDL	
1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5.0 kPa



- LOADING NOTES:
- FOR ALL LEVELS THAT ARE SUSPENDED CONCRETE
DESIGN LOAD: SDL = 1.5 kPa, LL = 5.0 kPa
 - FOR WOOD & METAL STORE ROOMS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 10 kPa U.N.O
 - FOR CLT FLOORS
DESIGN LOADS: SDL = 1.5 kPa, L.L = 3.0 kPa
 - FOR CLT LIBRARY
DESIGN LOADS: SDL = 1.5 kPa, L.L = 4.0 kPa

BUILDING 3 & 4 LEVEL 2 LOADING PLAN
SCALE 1:200

- LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
- SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
- FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

S0922 P1
Printed : 22/11/2021 12:49:45 PM
C:\Users\paulh\Documents\MSC_R022_Prelim\psh\psh.com.au.rvt

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectus™
Level 4
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

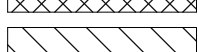
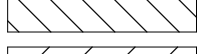
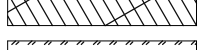
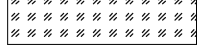
Project
MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject
BUILDING 3 & 4 LEVEL 2 LOADING PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale	Drawn	Authorised
A1	PSH	GB
As indicated		
Job No	Drawing No	Revision
211523	S0922	P1
22/11/2021 12:49:45 PM		



LL		SDL	
①	1.5 kPa		0.25 kPa
②	2.0 kPa		0.35 kPa
③	2.5 kPa		0.5 kPa
④	3.0 kPa		1.0 kPa
⑤	4.0 kPa		1.5 kPa
⑥	5.0 kPa		2.0 kPa
⑦	7.5 kPa		2.5 kPa
⑧	10.0 kPa		3.5 kPa
⑨	12.5 kPa		5.0 kPa
⑩	15.0 kPa		7.5 kPa



SCALE 1:200

1. LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
2. SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
3. FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

LOADING NOTES:

- FOR ALL LEVELS THAT ARE SUSPENDED CONCRETE
DESIGN LOAD: SDL = 1.5 kPa, LL = 5.0 kPa
- FOR CLT FLOORS
DESIGN LOADS: SDL = 1.5 kPa, LL = 3.0 kPa
- FOR WOOD & METAL STORE ROOMS
DESIGN LOADS: SDL = 1.5 kPa, LL = 10 kPa U.N.O
- FOR CLT LIBRARY
DESIGN LOADS: SDL = 1.5 kPa, LL = 4.0 kPa

P1	SCHEMATIC DESIGN				GB	PSH	22.11.21					
Rev	Description				Eng	Draft	Date	Rev	Description	Eng	Draft	Date

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 1 LEVEL 3
LOADING PLAN**

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1 Drawn Authorised

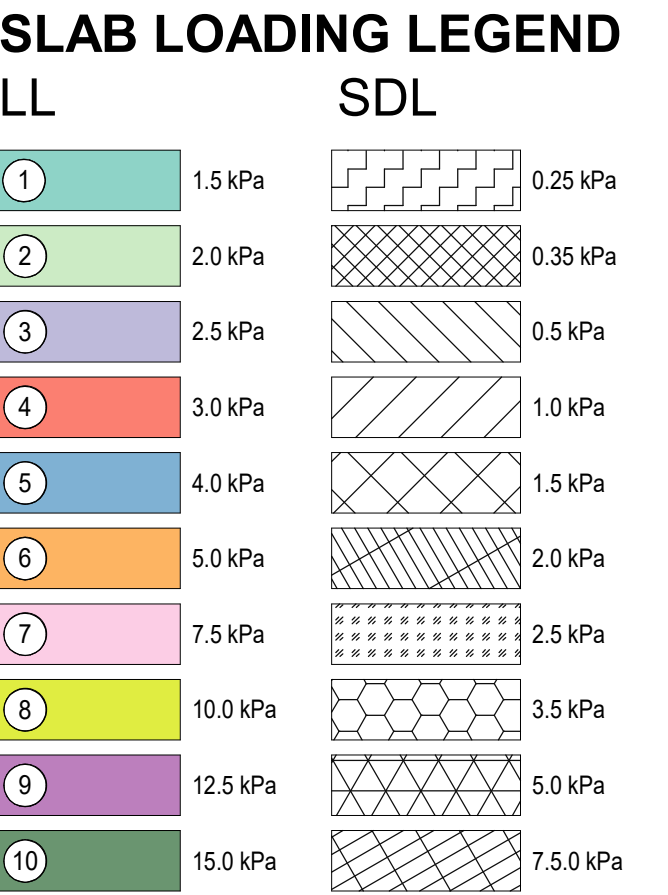
As indicated	PSH	GB
--------------	-----	----

Job No.	Drawing No.	Revision
---------	-------------	----------

Job No	Drawing No	Revision
211533	S0031	B1

211523 30931 FI

22/11/2021 12:49:53 PM



BUILDING 3 & 4 LEVEL 3 LOADING PLAN

SCALE 1:200

1. LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
2. SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
3. FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

P1	SCHMATIC DESIGN	GB	PSH	22.11.21					
Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 3 & 4 LEVEL 3
LOADING PLAN**

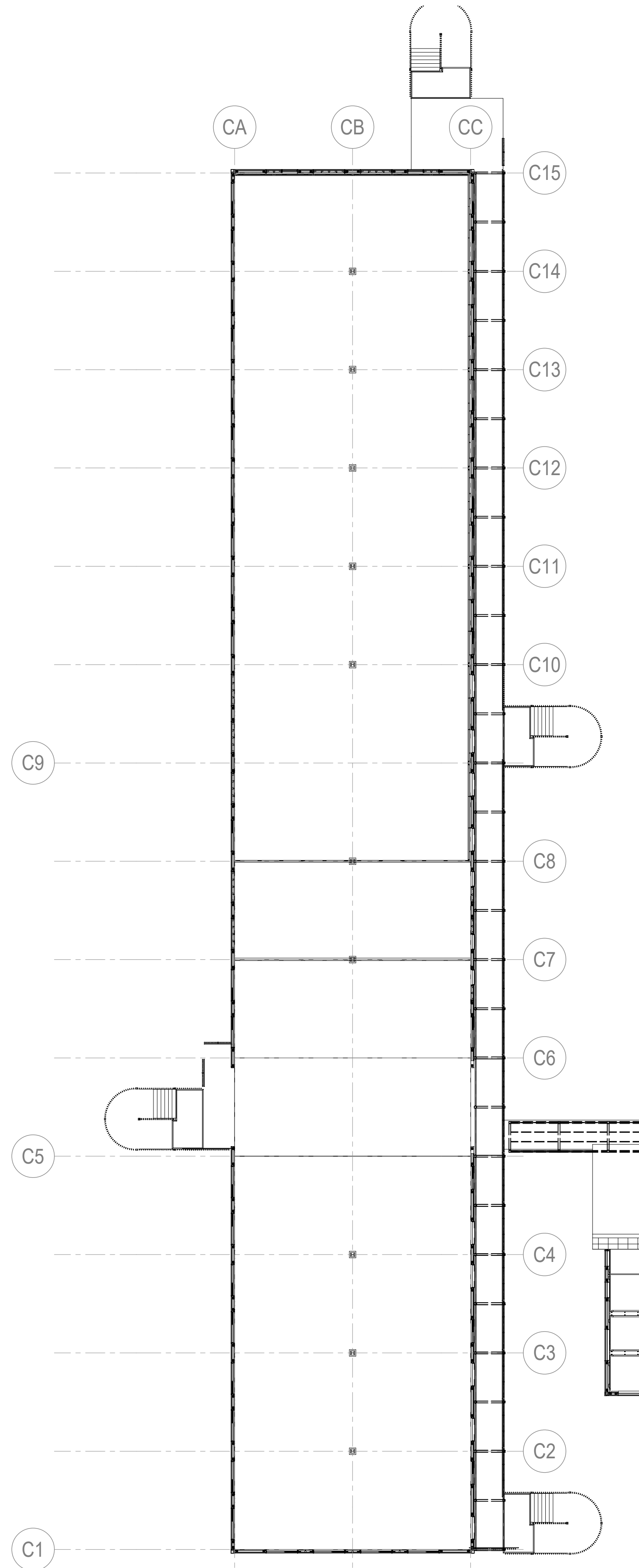
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S0932	P1
22/11/2021 12:50:10 PM		

LL

1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5 kPa

SDL



SCALE 1:200

1. LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
2. SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
3. FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

NOT TO BE USED FOR CONSTRUCTION

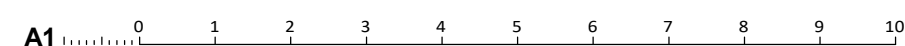
Male : A1	Drawn	Authorised
Indicated	PSH	GB

No	Drawing No	Revision
11523	S0941	P1

/11/2021 12:50:23 PM

S0941 P1
Printed : 22/11/2021 12:50:23 PM
C:\Users\paulh\Documents\MEC R221 Paul.Haigh@ttw.com.au.rvt

S0941 P1
Printed :

[illegible]

Client

 **NSW**
GOVERNMENT

Education
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject
**BUILDING 3 & 4 LEVEL 4
LOADING PLAN**

NOT TO BE USED FOR CONSTRUCTION

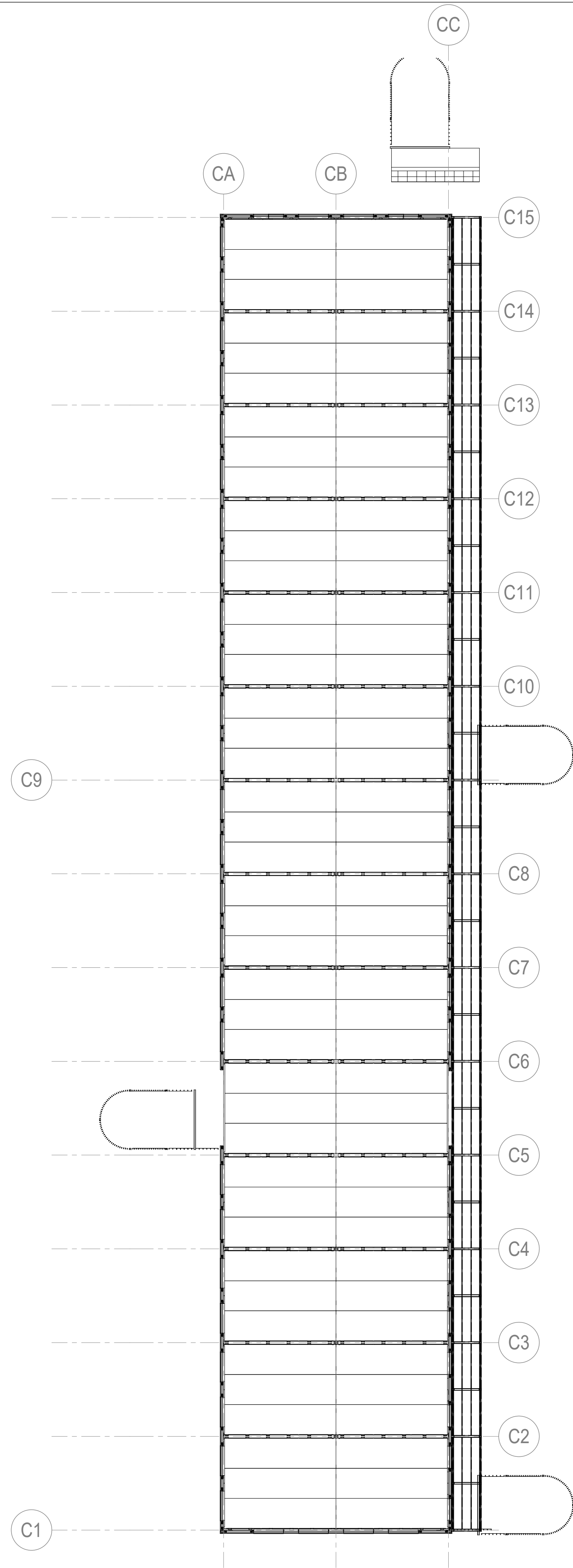
Male : A1	Drawn	Authorised
Indicated	PSH	GB

No	Drawing No	Revision
11523	S0941	P1

/11/2021 12:50:23 PM

LL SDL

1	1.5 kPa		0.25 kPa
2	2.0 kPa		0.35 kPa
3	2.5 kPa		0.5 kPa
4	3.0 kPa		1.0 kPa
5	4.0 kPa		1.5 kPa
6	5.0 kPa		2.0 kPa
7	7.5 kPa		2.5 kPa
8	10.0 kPa		3.5 kPa
9	12.5 kPa		5.0 kPa
10	15.0 kPa		7.5.0 kPa



SCALE 1:200

1. LOADING PLANS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL FLOOR PLANS.
2. SLABS AND BEAMS TO BE DESIGNED TO CARRY APPROPRIATE FACADE LOAD.
3. FACADE LOAD MAY VARY, REFER TO ARCHITECTS DRAWINGS FOR TYPE AND LOCATION.

S0951 P1
Printed : 22/11/2021 12:50:31 PM
C:\Users\paul\Documents\MEC [R22]_Paul Haight@tw.com.au.rvt

S0951 P1
Printed :

A1 

P1	SCHEMATIC DESIGN				GB	PSH	22.11.21				
Rev	Description		Eng	Draft	Date	Rev	Description		Eng	Draft	Date

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 3 & 4 LEVEL 5
LOADING PLAN**

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1 Drawn Authorised

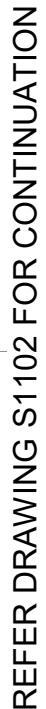
As indicated	PSH	GB
--------------	-----	----

Job No.	Drawing No.	Revision
---------	-------------	----------

Job No	Drawing No	Revision
211533	S0051	B1

211523 30931 FI

22/11/2021 12:50:31 PM



1. TOP OF FOOTINGS TO BE DETERMINED BY THE CONTRACTOR.
2. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND SETOUT OF ALL COLUMNS AND WALLS.
3. ALL LIFT PIT BASES AND WALLS BELOW GROUND LEVEL ARE TO HAVE XYPEX ADMIXTURE.
4. ALLOW ADDITIONAL CLEARANCE TO TOP OF FOOTINGS FOR HYDRAULIC SERVICES WHERE REQUIRED.
5. CONTRACTOR TO ALLOW FOR GEOTECHNICAL ENGINEER TO INSPECT AND CERTIFY THAT THE REQUIRED BEARING CAPACITIES HAVE BEEN ACHIEVED BEFORE CASTING FOOTINGS.
6. DENOTES BOREHOLE LOCATIONS. REFER TO GEOTECHNICAL REPORT 202033.00.R.001 REV 0 BY DOUGLAS PARTNERS DATED MAY 2021

1. ALL PILES TO BE SOCKETED INTO VERY STIFF CLAY WITH AN ALLOWABLE END BEARING OF 3000 kPa MINIMUM AND ALLOWABLE SHAFT ADHESION OF 20 kPa MINIMUM.
2. ALL LOCATIONS TO TOP OF SOCKET HAVE BEEN RATIONALISED AND AVERAGED FOR CONCEPTUAL DESIGN PURPOSES.
3. ADDITIONAL GEOTECHNICAL INVESTIGATION REQUIRED. SOME AREAS HAVE MINIMAL INVESTIGATION DATA. SOME LOCATIONS STOP AT DEPTHS BEFORE REACHING
4. VERY STIFF CLAY AND MAY YIELD HIGHER CAPACITY CLAYS OR METASTABLE TOP AT LOWER DEPTHS.
5. THE TOP OF 1.5 DIA DEPTH OF PILE SOCKET HAS BEEN IGNORED AS PER GEOTECHNICAL ADVICE
6. PILE GROUPS WILL REQUIRE PILE CAPS. FOR PILES UNDER SUSPENDED GROUND FLOOR SLABS, THE PILE CAP CAN BE CONSTRUCTED INTEGRAL WITH SLAB BANDS.
7. ALL GROUND FLOOR LEVELS ASSIGNED TO BE SUSPENDED FOR CONCEPT DESIGN
8. PILE CONCRETE STRENGTH TO BE 40 MPa
9. PILE REINFORCEMENT 100 Kg/m³

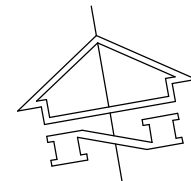
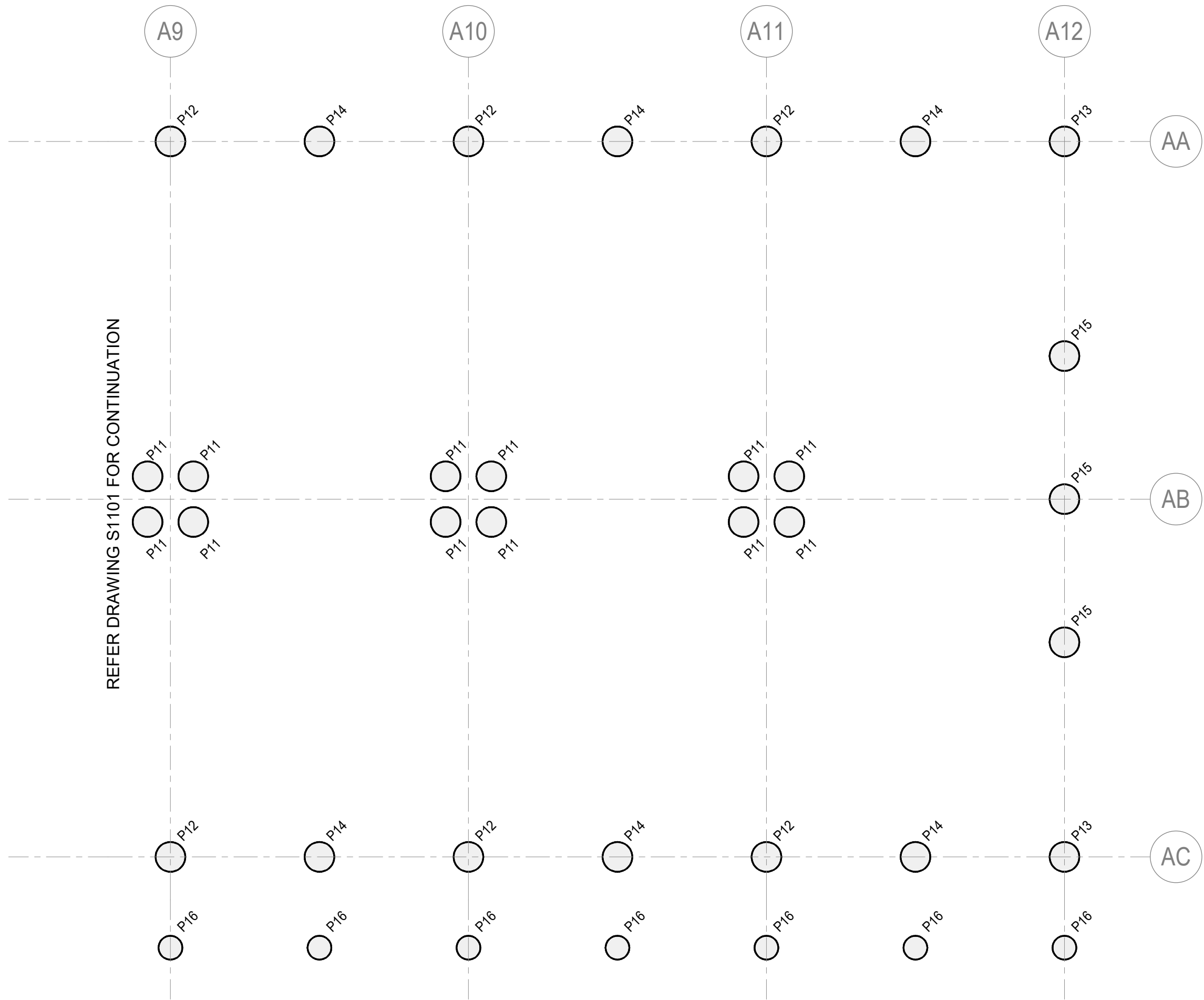
Scale : A1

Scale : A1 Drawn Authorised

211523 S1101 P1

22/11/2021 12:50:33 PM

[illegible]



BUILDING 1 EAST FOOTING PLAN

SCALE 1:100

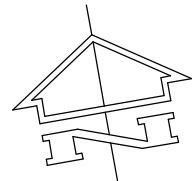
1. TOP OF FOOTINGS TO BE DETERMINED BY THE CONTRACTOR.
2. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND SETOUT OF ALL COLUMNS AND WALLS.
3. ALL LIFT PIT BASES AND WALLS BELOW GROUND LEVEL ARE TO HAVE XYPEX ADMIXTURE.
4. ALLOW ADDITIONAL CLEARANCE TO TOP OF FOOTINGS FOR HYDRAULIC SERVICES WHERE REQUIRED.
5. CONTRACTOR TO ALLOW FOR GEOTECHNICAL ENGINEER TO INSPECT AND CERTIFY THAT THE REQUIRED BEARING CAPACITIES HAVE BEEN ACHIEVED BEFORE CASTING FOOTINGS.
6. DENOTES BOREHOLE LOCATIONS - REFER TO GEOTECHNICAL REPORT 202033.00.R.001 REV 0 BY DOUGLAS PARTNERS DATED MAY 2021

PILE SCHEDULE ASSUMING 750 DIA MAX INTO VERY STIFF CLAY							
MARK	DEAD LOAD (kN)	LIVE LOAD (kN)	LATERAL LOAD (kN)	DIAMETER (mm)	SOCKET LENGTH (mm)	ASSUMED AVERAGE DEPTH TO TOP OF SOCKET (mm)	TOTAL PILE LENGTH (mm)
P11	1203	817	153	750	9031	5000	14031
P12	473	311	60	750	14942	5000	19942
P13	166	105	21	750	4055	5000	9055
P14	186	121	23	750	4825	5000	9825
P15	328	190	40	750	9305	5000	14305
P16	56	58	8	600	1663	5000	6663
P21	520	278	63	750	6775	4500	11275
P22	473	311	60	750	14942	4501	19443
P23	166	105	21	750	4055	4502	8557
P24	186	121	23	750	4825	4503	9328
P25	608	338	74	750	8339	4504	12843
P26	56	58	8	600	1663	4505	6168
P27	407	193	90	750	11045	4506	15551
P28	365	177	90	750	9819	4507	14326
P29	213	93	45	750	4906	4508	9314
P31	1305	962	173	750	10577	1000	11577
P32	578	406	74	750	19212	1000	20212
P33	217	146	28	750	6023	1000	7023
P34	241	166	31	750	6947	1000	7947
P35	393	240	40	750	8434	1000	9434
P36	83	86	12	600	3115	1000	4115
P41	1350	962	173	750	10557	2500	13077
P42	578	406	74	750	19212	2500	21712
P43	217	146	61	750	6023	2500	8523
P44	241	166	31	750	6947	2500	9447
P45	393	240	49	750	11746	2500	14246
P46	83	86	12	600	3115	2500	5617

- NOTES:
1. ALL PILES TO BE SOCKETED INTO VERY STIFF CLAY WITH AN ALLOWABLE END BEARING OF 3000 kPa MINIMUM AND ALLOWABLE SHAFT ADHESION OF 20 kPa MINIMUM.
 2. DEPTHS TO TOP OF SOCKET HAVE BEEN RATIONALISED AND AVERAGED FOR CONCEPTUAL DESIGN PURPOSES.
 3. ADDITIONAL GEOTECHNICAL INVESTIGATION REQUIRED: SOME AREAS HAVE MINIMAL INVESTIGATION DATA. SOME LOCATIONS STOP AT DEPTHS BEFORE REACHING
 4. VERY STIFF CLAY AND MAY YIELD HIGHER CAPACITY CLAYS OR METASILTSTONE AT LOWER DEPTHS.
 5. THE TOP OF 1.5 DIA DEPTH OF PILE SOCKET HAS BEEN IGNORED AS PER GEOTECHNICAL ADVICE
 6. PILE GROUPS WILL REQUIRE PILE CAPS. FOR PILES UNDER SUSPENDED GROUND FLOOR SLABS, THE PILE CAP CAN BE CONSTRUCTED INTEGRAL WITH SLAB BANDS.
 7. ALL GROUND FLOOR LEVELS ASSUMED TO BE SUSPENDED FOR CONCEPT DESIGN
 8. PILE CONCRETE STRENGTH TO BE 40 MPa
 9. PILE REINFORCEMENT 100 Kg/m3

A1 0 1 2 3 4 5 6 7 8 9 10																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
---------------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION



SCALE 1:100

1. SLABS ON GROUND TO BE CAST ON A CONCRETE UNDERLAY (0.2mm THICK HIGH IMPACT RESISTANCE FILM TO AS/NZS 4347) OVER A 100mm BASECOURSE BLINDED WITH SAND.
2. REINFORCE SLABS ON GROUND WITH 1 LAYER OF S182 FABRIC TOP THROUGHOUT 30 COVER.
3. ALL LEVELS AND FALLS TO ARCHITECTS DETAILS.
4. REFER TO HYDRAULIC ENGINEERS DETAILS FOR ALL SUB SOIL DRAINAGE, TRENCHES, SUMPS, PITS AND GRATED DRAINS UNO
5. REFER TO THE GEOTECHNICAL ENGINEER FOR ALL SUBBASE REQUIREMENTS.

Client

 **Education**
School Infrastructure

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Project

MURWILLUMBAH
EDUCATION CAMPUS

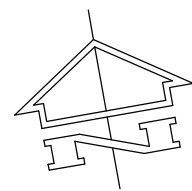
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1 Drawn Authorised

Job No	Drawing No	Revision
211523	S1201	P1

22/11/2021 12:50:37 PM



SCALE 1:100

1. SLABS ON GROUND TO BE CAST ON A CONCRETE UNDERLAY (0.2mm THICK HIGH IMPACT RESISTANCE FILM TO AS/NZS 4347) OVER A 100mm BASECOURSE BLINDED WITH SAND.
2. REINFORCE SLABS ON GROUND WITH 1 LAYER OF S182 FABRIC TOP THROUGHOUT 30 COVER.
3. ALL LEVELS AND FALLS TO ARCHITECTS DETAILS.
4. REFER TO HYDRAULIC ENGINEERS DETAILS FOR ALL SUB SOIL DRAINAGE, TRENCHES, SUMPS, PITS AND GRATED DRAINS UNO
5. REFER TO THE GEOTECHNICAL ENGINEER FOR ALL SUBBASE REQUIREMENTS.

[illegible]

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW Structural
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

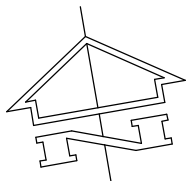
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 1 GROUND
FLOOR OUTLINE PLAN -
EAST**

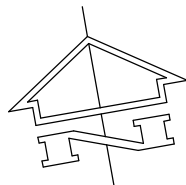
Scale : A1 Drawn Authorised

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S1202	P1
22/11/2021 12:50:38 PM		



SCALE 1:100

1. DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECTS DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

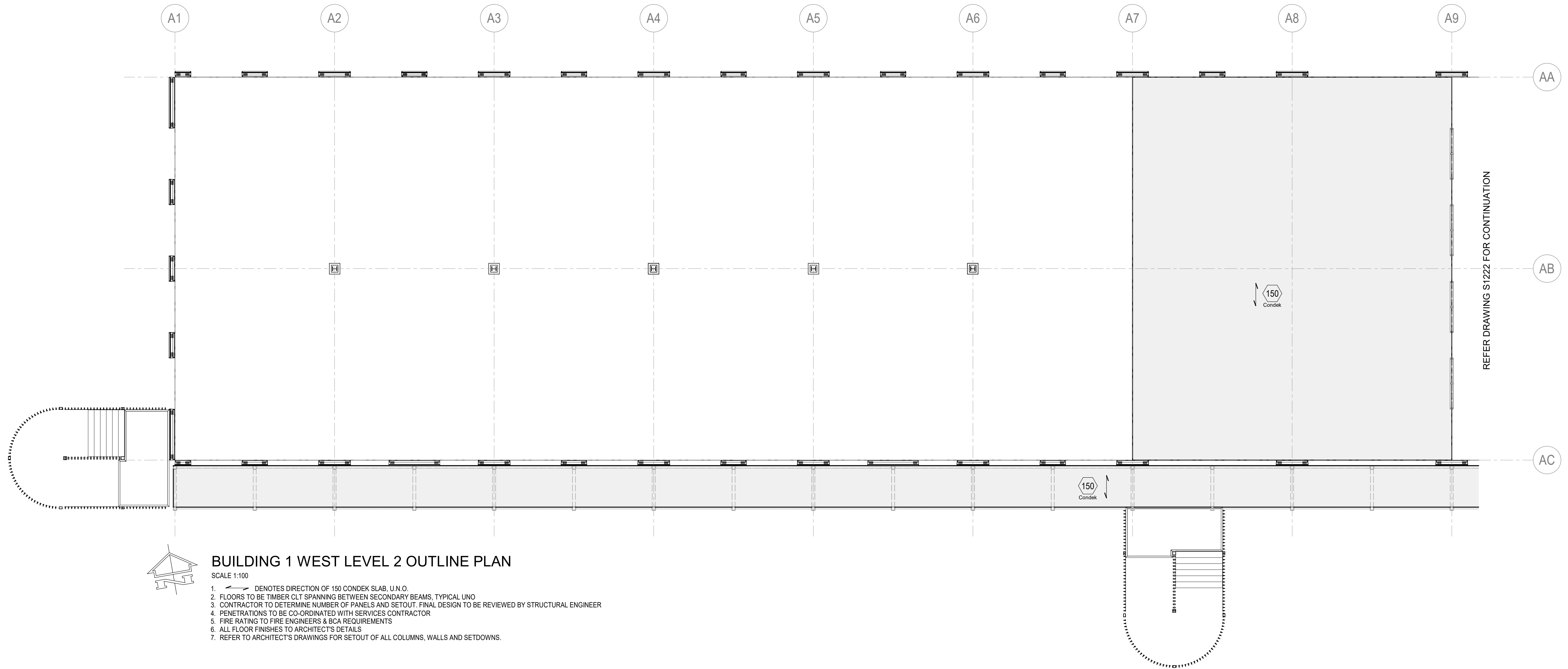


SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

A1 0 1 2 3 4 5 6 7 8 9 10

				 Education School Infrastructure			Built. Level 4 185 Clarence Street Sydney NSW 2000 T +61 2 8332 4111			architectus™ Level 18 MLC Centre 19 Martin Place Sydney NSW 2000 T (61 2) 8252 8400			TTW Structural Civil Traffic Façade +61 2 9439 7288 L6 73 Miller Street North Sydney NSW 2060			Project MURWILLUMBAH EDUCATION CAMPUS			Sheet Subject BUILDING 1 LEVEL 1 OUTLINE PLAN - EAST			Scale : A1 As indicated Job No 211523 22/11/2021 12:50:44 PM			Drawn PSH Drawing No S1212			Authorised GB Revision P1		
P1 SCHEMATIC DESIGN GB PSH 22.11.21				Rev Description Eng Draft Date																										



BUILDING 1 WEST LEVEL 2 OUTLINE PLAN

SCALE 1:100

1. DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECTS DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

A1	0	1	2	3	4	5	6	7	8	9	10
P1	SCHMATIC DESIGN					GB	PSH	22.11.21			
Rev	Description					Eng	Draft	Date		Rev	Descr

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

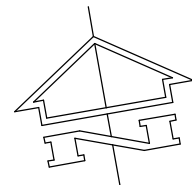
Sheet Subject

**BUILDING 1 LEVEL 2
OUTLINE PLAN - WEST**

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S1221	P1
22/11/2021 12:50:46 PM		



SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U N O.
2. FLOORS TO BE TIMBER GLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT, FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATINGS TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

[illegible]

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW Structural
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

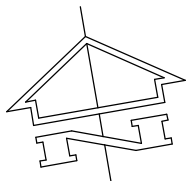
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 1 LEVEL 2
OUTLINE PLAN - EAST**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S1222	P1
22/11/2021 12:50:48 PM		



SCALE 1:100

1. DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECTS DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

P1	SCHEMATIC DESIGN				GB	PSH	22.11.21								
Rev	Description				Eng	Draft	Date	Rev	Description				Eng	Draft	Date



Education
School Infrastructure

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

TTW

**Structura
Civil
Traffic
Facade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

MURWILLUMBAH
EDUCATION CAMPUS

BUILDING 1 LEVEL 3
OUTLINE PLAN - WEST

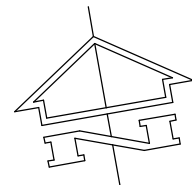
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S1231	P1

22/11/2021 12:50:50 PM



SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U N O.
2. FLOORS TO BE TIMBER GLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT, FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATINGS TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

[illegible]

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW Structural
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

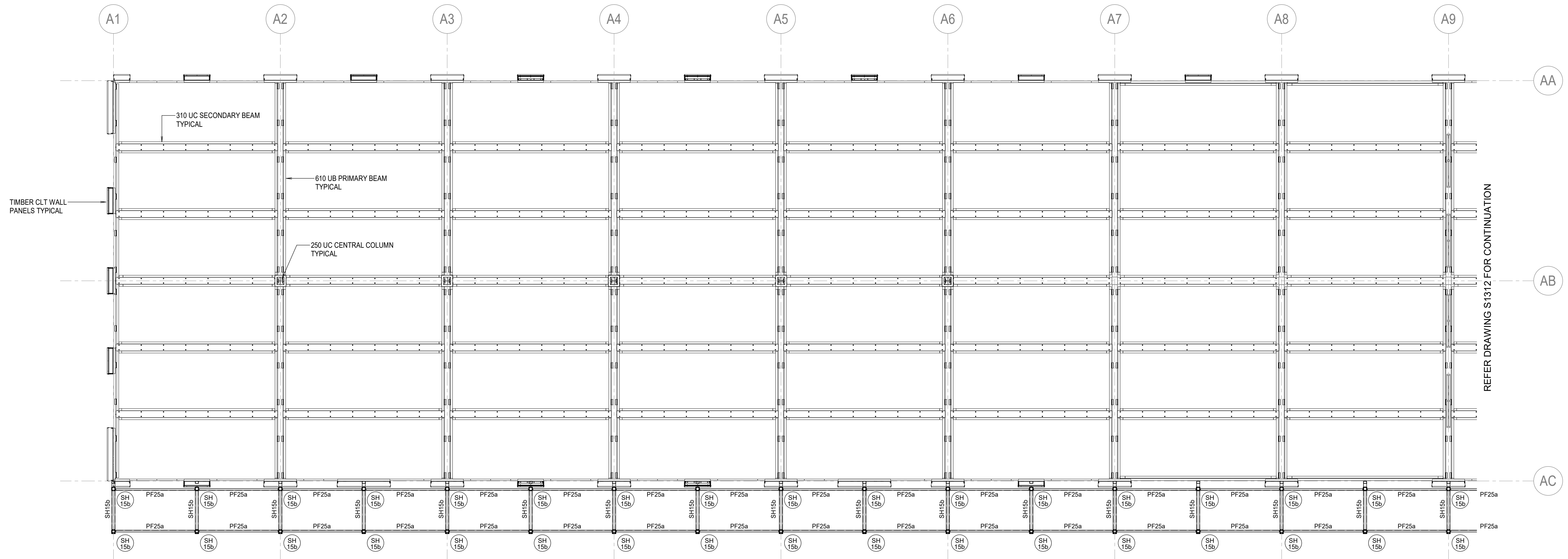
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

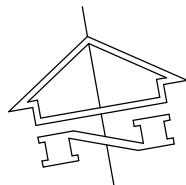
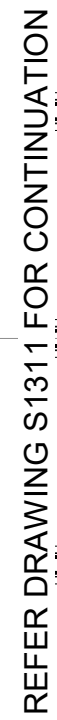
**BUILDING 1 LEVEL 3
OUTLINE PLAN - EAST**

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S1232	P1
22/11/2021 12:50:51 PM		



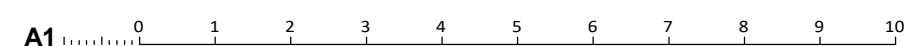
BUILDING 1 WEST LEVEL 1 MARKING PLAN



SCALE 1:100

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

S1312 P1

[illegible]

Education
School Infrastructure

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

architectus™
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

TTW Structu
Civil
Traffic
Facade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

MURWILLUMBAH
EDUCATION CAMPUS

BUILDING 1 LEVEL 1
MARKING PLAN - EAST

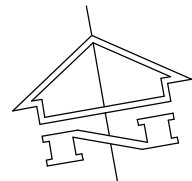
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S1312	P1

22/11/2021 12:50:59 PM



SCALE 1:100

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

A1 0 1 2 3 4 5 6 7 8 9 10

[illegible]

Education
School Infrastructure

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

TTW

**Structura
Civil
Traffic
Facade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

MURWILLUMBAH
EDUCATION CAMPUS

BUILDING 1 LEVEL 2
MARKING PLAN - WEST

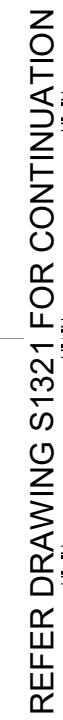
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

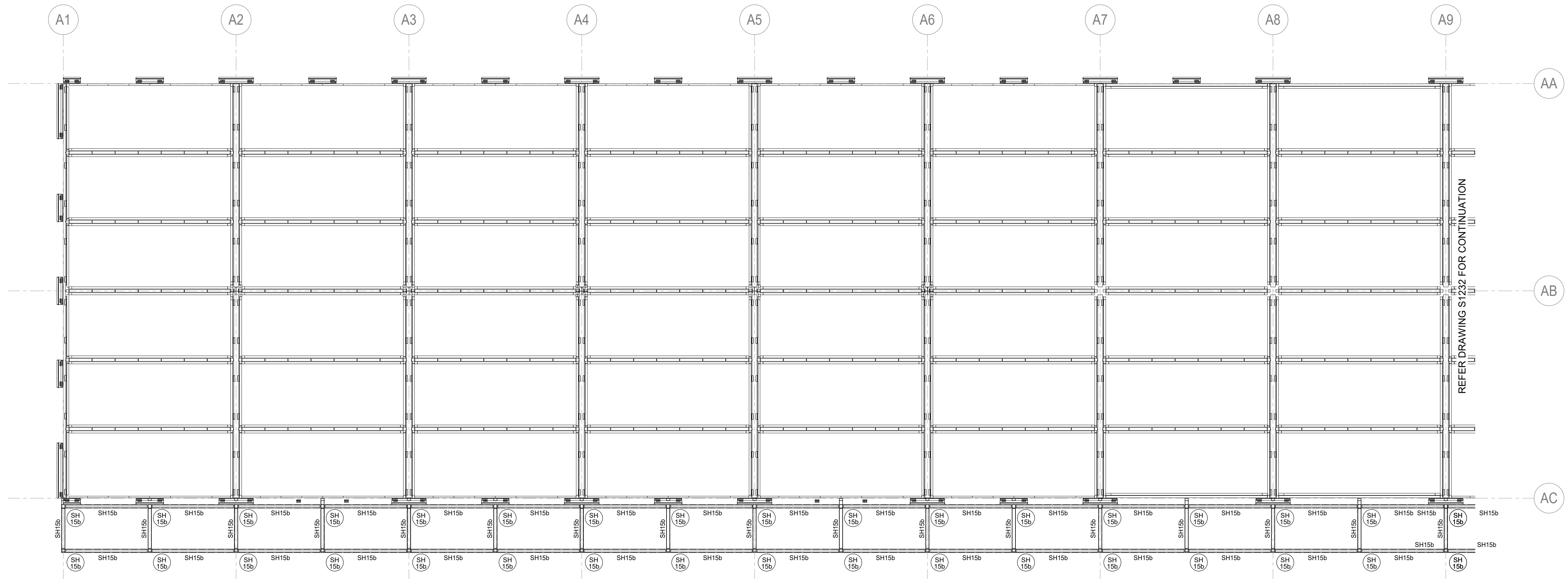
Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S1321	P1

22/11/2021 12:51:04 PM



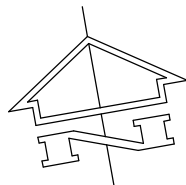
1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.



BUILDING 1 WEST LEVEL 3 MARKING PLAN

SCALE 1:100

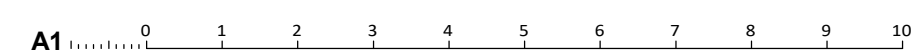
1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.



SCALE 1:100

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES

S1332 P1
Printed: 22/11/2021 12:51:15 PM
C:\Users\paulh\Documents\MEC R221_Paul.Haigh@ntw.com.au.rvt

[illegible]

Education
School Infrastructure

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

architectus™
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

TTW

**Structura
Civil
Traffic
Facade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

MURWILLUMBAH
EDUCATION CAMPUS

BUILDING 1 LEVEL 3
MARKING PLAN - EAST

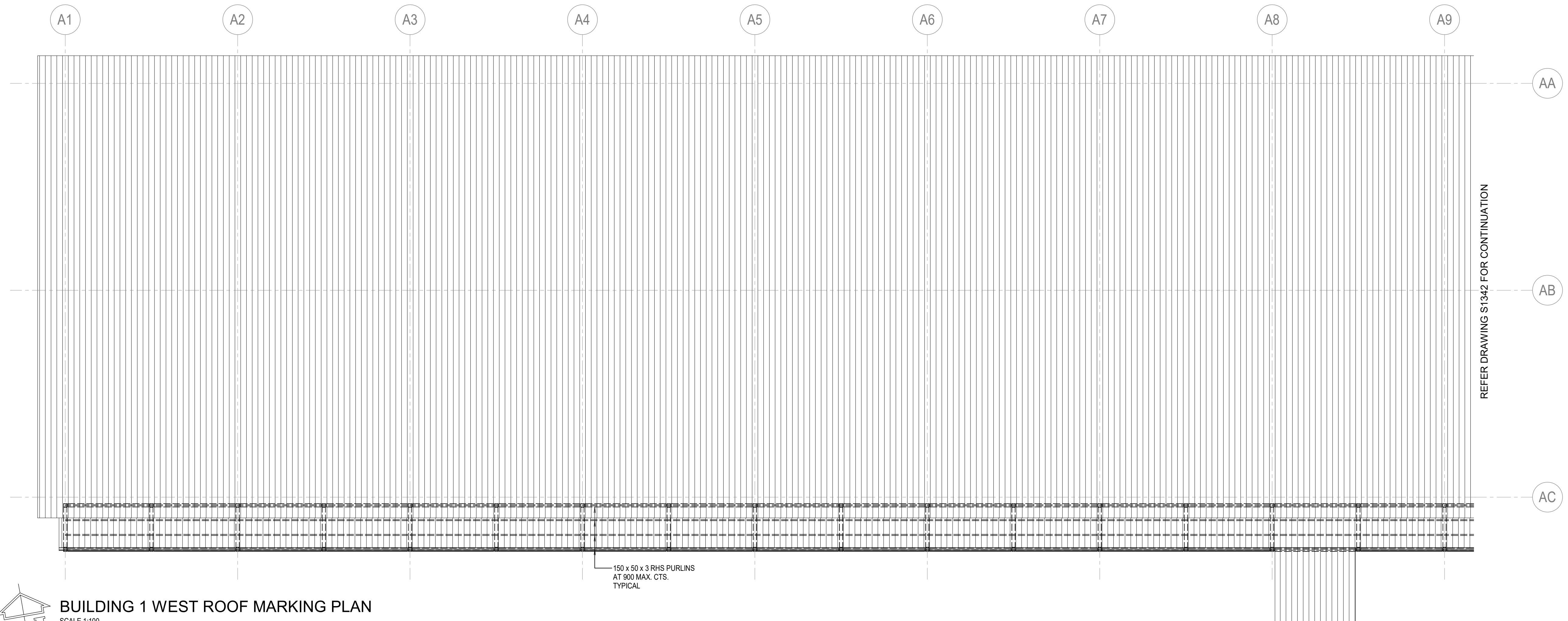
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S1332	P1

22/11/2021 12:51:15 PM

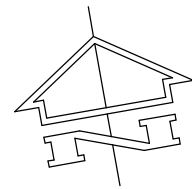


BUILDING 1 WEST ROOF MARKING PLAN

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES

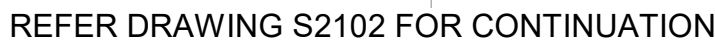
150 x 50 x 3 RHS PURLINS
AT 900 MAX. CTS.
TYPICAL

REFER DRAWING S1342 FOR CONTINUATION



SCALE 1:100

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

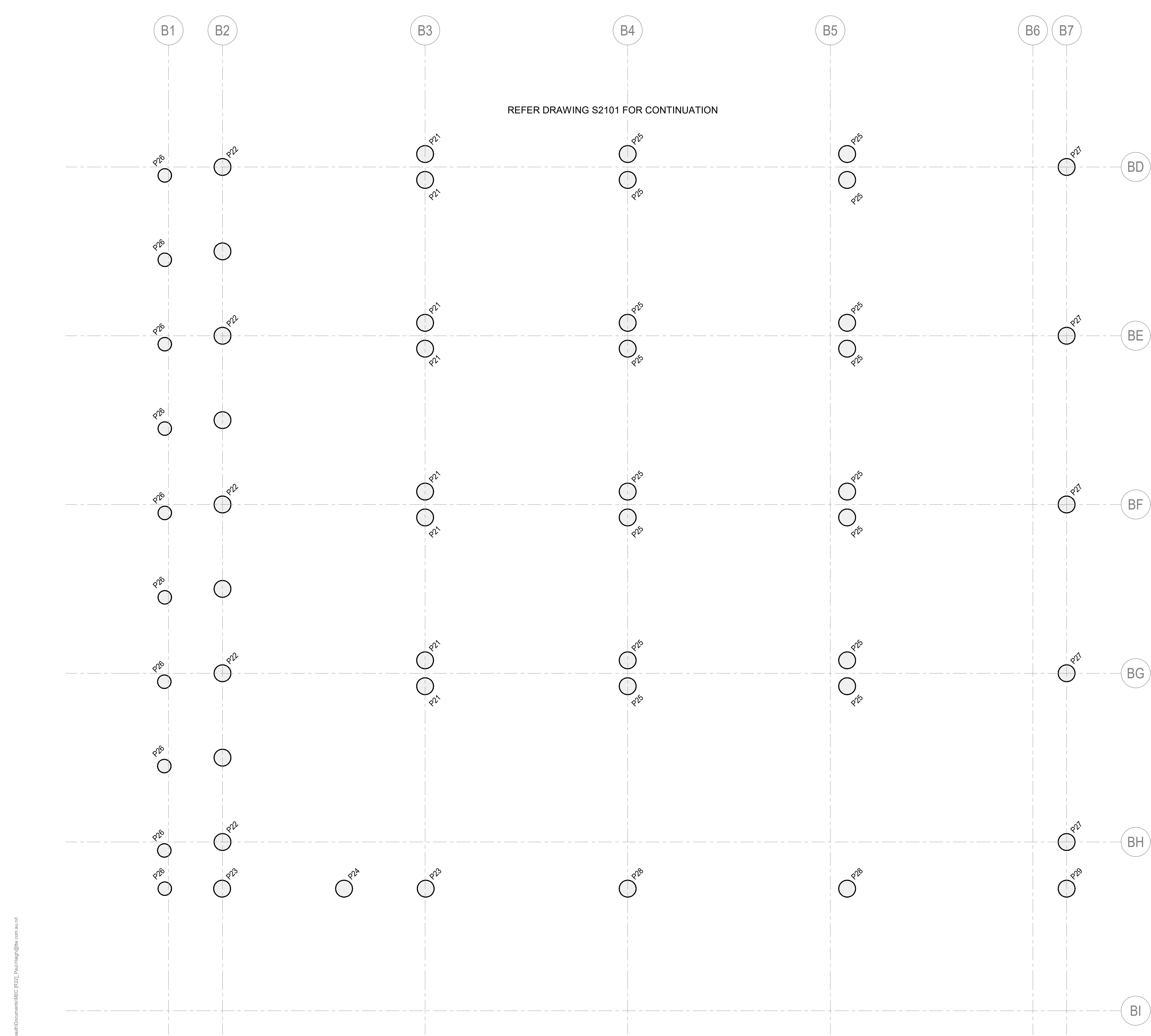


NOTES:

1. ALL PILES TO BE SOCKETED INTO VERY STIFF CLAY WITH AN ALLOWABLE END BEARING OF 3000 kPa MINIMUM AND ALLOWABLE SHAFT ADHESION OF 20 kPa MINIMUM
2. PILES TO TOP OF SOCKET HAVE BEEN RATIONALISED AND AVERAGED FOR CONCEPTUAL DESIGN PURPOSES
3. ADDITIONAL GEOTECHNICAL INVESTIGATION REQUIRED: SOME AREAS HAVE MINIMAL INVESTIGATION DATA, SOME LOCATIONS STOP AT DEPTHS BEFORE REACHING
4. VERY STIFF CLAY MAY YIELD HIGHER CAPACITY CLAYS OR METASILTSTONE AT LOWER DEPTHS.
5. THE TOP OF 1.5 DIA DEPTH OF PILE SOCKET HAS BEEN IGNORED AS PER GEOTECHNICAL ADVICE
6. PILE GROUPS WILL REQUIRE PILE CAPS, FOR PILES UNDER SUSPENDED GROUND FLOOR SLABS, THE PILE CAP CAN BE CONSTRUCTED INTEGRAL WITH SLAB BANDS.
7. GROUND FLOOR LEVELS ASSUMED TO BE SUSPENDED FOR CONCEPT DESIGN
8. PILE CONCRETE STRENGTH TO BE 40 MPa
9. PILE REINFORCEMENT 100 Kg/m³

BUILDING 2 NORTH FOOTING PLAN

1. TOP OF FOOTINGS TO BE DETERMINED BY THE CONTRACTOR.
2. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND SETOUT OF ALL COLUMNS AND WALLS.
3. ALL LIFT PIT BASES AND WALLS BELOW GROUND LEVEL ARE TO HAVE XYPEX ADMIXTURE.
4. ALLOW ADDITIONAL CLEARANCE TO TOP OF FOOTINGS FOR HYDRAULIC SERVICES WHERE REQUIRED.
5. CONTRACTOR TO ALLOW FOR GEOTECHNICAL ENGINEER TO INSPECT AND CERTIFY THAT THE REQUIRED BEARING CAPACITIES HAVE BEEN ACHIEVED BEFORE CASTING FOOTINGS.
6.  DENOTES BOREHOLE LOCATIONS. REFER TO GEOTECHNICAL REPORT 202033.00.R.001 REV 0 BY DOUGLAS PARTNERS DATE MAY 2021

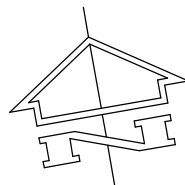


REFER DRAWING S2101 FOR CONTINUATION

PILE SCHEDULE ASSUMING 750 DIA MAX INTO VERY STIFF CLAY							
MARK	DEAD LOAD (kN)	LIVE LOAD (kN)	LATERAL LOAD (kN)	DIAMETER (mm)	SOCKET LENGTH (mm)	ASSUMED AVERAGE DEPTH TO TOP OF SOCKET (mm)	TOTAL PILE LENGTH (mm)
P11	1203	817	153	750	9031	5000	14031
P12	473	311	60	750	14942	5000	19942
P13	166	105	21	750	4055	5000	9055
P14	186	121	23	750	4825	5000	9825
P15	328	190	40	750	9305	5000	14305
P16	56	58	8	600	1663	5000	6663
P21	520	278	63	750	6775	4500	11275
P22	473	311	60	750	14942	4501	19443
P23	166	105	21	750	4055	4502	8557
P24	186	121	23	750	4825	4503	9328
P25	608	338	74	750	8339	4504	12843
P26	56	58	8	600	1663	4505	6168
P27	407	193	90	750	11045	4506	15551
P28	365	177	90	750	9819	4507	14326
P29	213	93	45	750	4906	4508	9314
P31	1305	962	173	750	10577	1000	11577
P32	578	406	74	750	19212	1000	20212
P33	217	146	28	750	6023	1000	7023
P34	241	166	31	750	6947	1000	7947
P35	393	240	40	750	8434	1000	9434
P36	83	86	12	600	3115	1000	4115
P41	1350	962	173	750	10557	2500	13077
P42	578	406	74	750	19212	2500	21712
P43	217	146	61	750	6023	2500	8523
P44	241	166	31	750	6947	2500	9447
P45	393	240	49	750	11746	2500	14246
P46	83	86	12	600	3115	2500	5617

- NOTES:
- ALL PILES TO BE SOCKETED INTO VERY STIFF CLAY WITH AN ALLOWABLE END BEARING OF 3000 kPa MINIMUM AND ALLOWABLE SHAFT ADHESION OF 20 kPa MINIMUM.
 - DEPTHS TO TOP OF SOCKET HAVE BEEN RATIONALISED AND AVERAGED FOR CONCEPTUAL DESIGN PURPOSES.
 - ADDITIONAL GEOTECHNICAL INVESTIGATION REQUIRED. SOME AREAS HAVE MINIMAL INVESTIGATION DATA. SOME LOCATIONS STOP AT DEPTHS BEFORE REACHING
 - VERY STIFF CLAY AND MAY YIELD HIGHER CAPACITY CLAYS OR METASILTSTONE AT LOWER DEPTHS.
 - THE TOP OF 1.5 DIA DEPTH OF PILE SOCKET HAS BEEN IGNORED AS PER GEOTECHNICAL ADVICE
 - PILE GROUPS WILL REQUIRE PILE CAPS. FOR PILES UNDER SUSPENDED GROUND FLOOR SLABS, THE PILE CAP CAN BE CONSTRUCTED INTEGRAL WITH SLAB BANDS.
 - ALL GROUND FLOOR LEVELS ASSUMED TO BE SUSPENDED FOR CONCEPT DESIGN
 - PILE CONCRETE STRENGTH TO BE 40 MPa
 - PILE REINFORCEMENT 100 Kg/m3

S2102 P1
Printed : 22/11/2021 12:51:24 PM
C:\Users\paulh\Documents\MSC P22L_Paulh\p22l@nsw.com.au.rvt



BUILDING 2 SOUTH FOOTING PLAN

SCALE 1:100

- TOP OF FOOTINGS TO BE DETERMINED BY THE CONTRACTOR.
- REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND SETOUT OF ALL COLUMNS AND WALLS.
- ALL LIFT PIT BASES AND WALLS BELOW GROUND LEVEL ARE TO HAVE XYPEX ADMIXTURE.
- ALLOW ADDITIONAL CLEARANCE TO TOP OF FOOTINGS FOR HYDRAULIC SERVICES WHERE REQUIRED.
- CONTRACTOR TO ALLOW FOR GEOTECHNICAL ENGINEER TO INSPECT AND CERTIFY THAT THE REQUIRED BEARING CAPACITIES HAVE BEEN ACHIEVED BEFORE CASTING FOOTINGS.
- DENOTES BOREHOLE LOCATIONS - REFER TO GEOTECHNICAL REPORT 202033.00 R.001 REV 0 BY DOUGLAS PARTNERS DATED MAY 2021

BH2-6

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

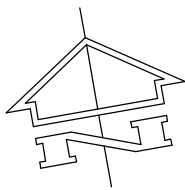
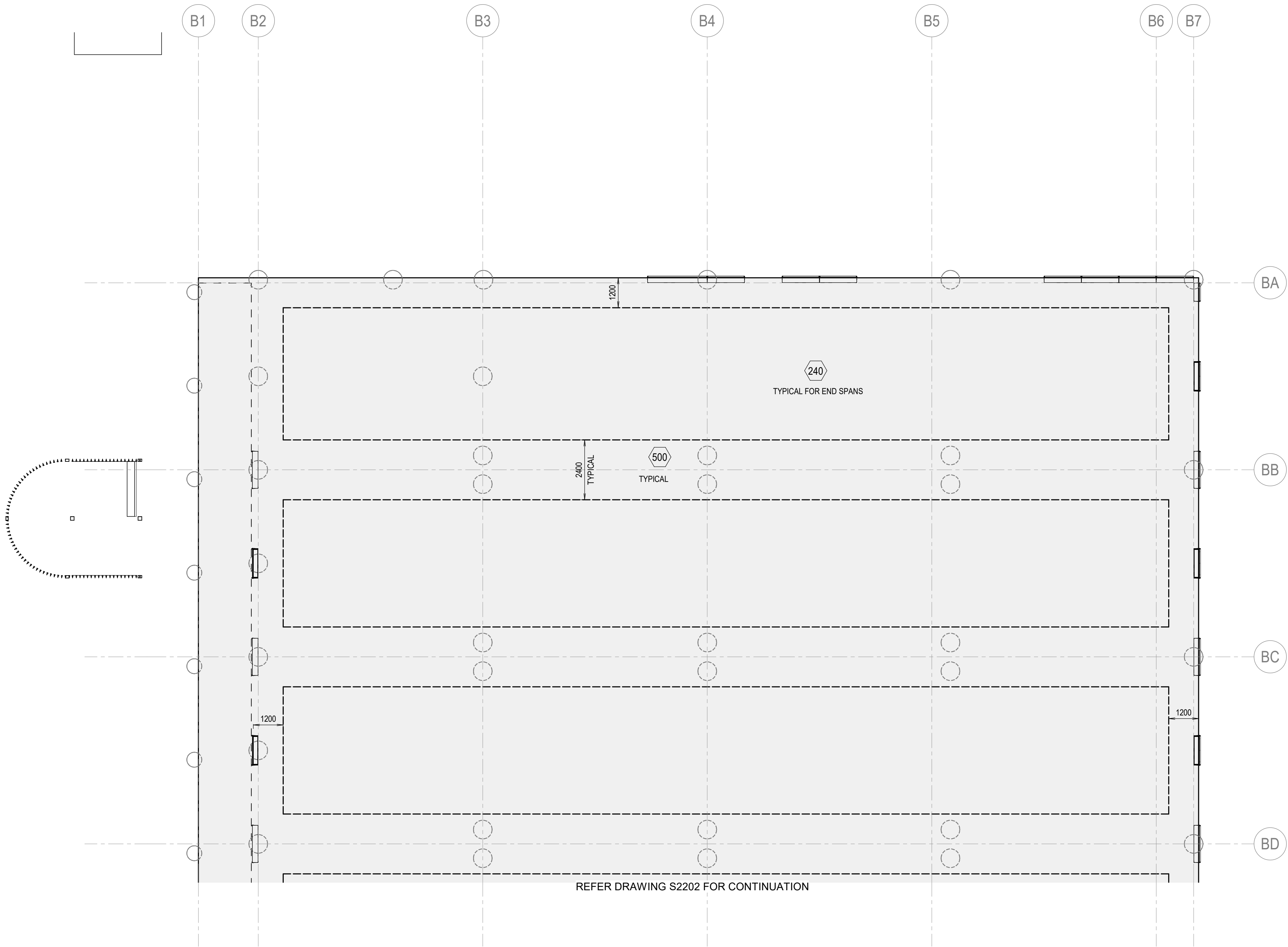
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject
BUILDING 2 FOOTING PLAN - SOUTH

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S2102	P1
22/11/2021 12:51:24 PM		



BUILDING 2 NORTH GROUND FLOOR OUTLINE PLAN - 200 SLAB U.N.O.

SCALE 1:100

1. SLABS ON GROUND TO BE CAST ON A CONCRETE UNDERLAY (0.2mm THICK HIGH IMPACT RESISTANCE FILM TO ASINZS 4347) OVER A 100mm BASECOURSE BLINDED WITH SAND.
2. REINFORCE SLABS ON GROUND WITH 1 LAYER OF SL82 FABRIC TOP THROUGHOUT 30 COVER.
3. ALL LEVELS AND FALLS TO ARCHITECTS DETAILS.
4. REFER TO HYDRAULIC ENGINEERS DETAILS FOR ALL SUB SOIL DRAINAGE, TRENCHES, SUMPS, PITS AND GRATED DRAINS UNO
5. REFER TO THE GEOTECHNICAL ENGINEER FOR ALL SUBBASE REQUIREMENTS.

S2201 P1
Printed : 22/11/2021 12:51:25 PM
C:\Users\paulh\Documents\MISC\R02L_PSH\slab\slab.dwg

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

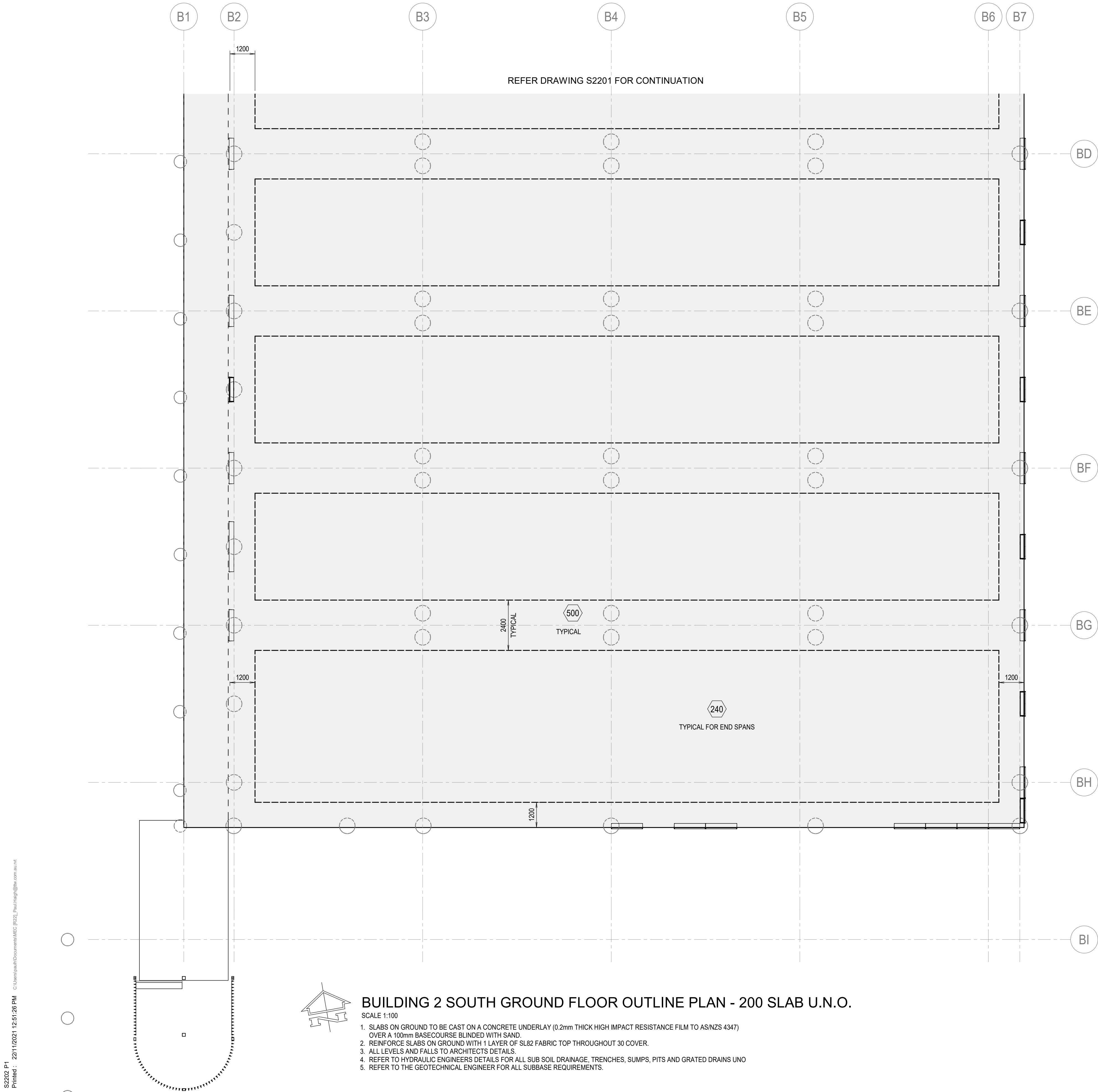
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject
BUILDING 2 GROUND FLOOR OUTLINE PLAN - NORTH

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S2201	P1
22/11/2021 12:51:25 PM		



S2202 P1
Printed : 22/11/2021 12:51:26 PM
C:\Users\paulh\Documents\MSC_R02L_Plan\p1.dwg@psh.com.au.rvt

A1		0	1	2	3	4	5	6	7	8	9	10
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21								
Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date			



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectus™
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

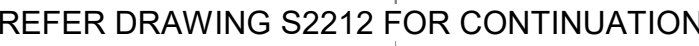
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject
BUILDING 2 GROUND FLOOR OUTLINE PLAN - SOUTH

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S2202	P1
22/11/2021 12:51:26 PM		



1.  DENOTES DIRECTION OF 150 CONCRETE SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

S2211 P1
Printed: 22/11/2021 12:51:29 PM

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

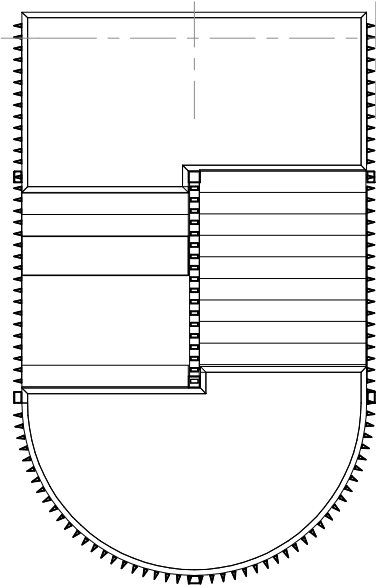
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 2 LEVEL 1
OUTLINE PLAN - NORTH**

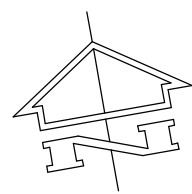
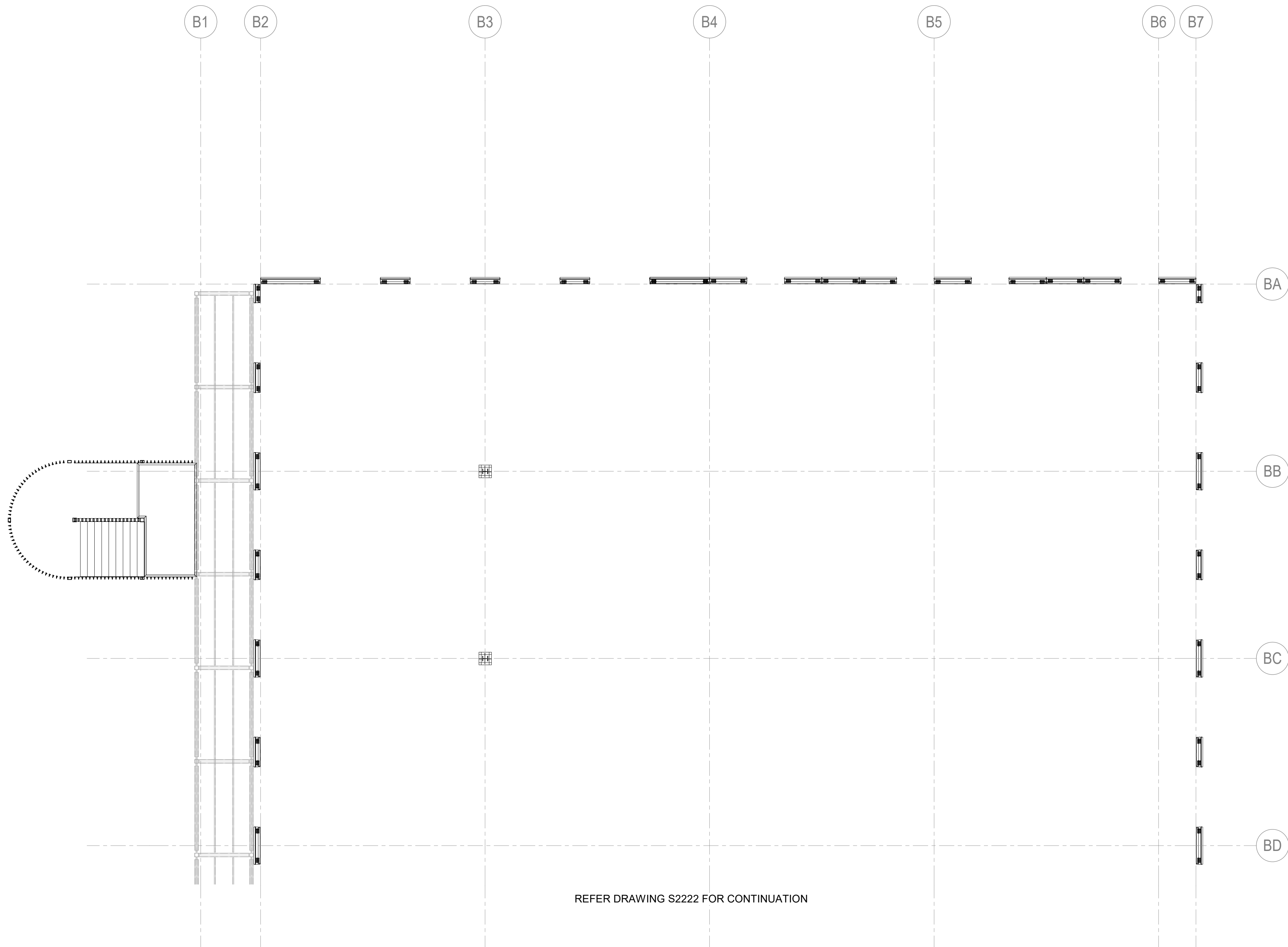
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S2211	P1
22/11/2021 12:51:29 PM		



SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

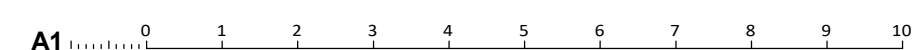


SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

REFER DRAWING S2222 FOR CONTINUATION

S2221 P1
Printed: 22/11/2021 12:51:32 PM
C:\Users\paulh\Documents\MEC R221_Paul.Haigh@ntw.com.au.rvt

[illegible]

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 2 LEVEL 2
OUTLINE PLAN - NORTH**

PRELIMINARY

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S2221	P1

22/11/2021 12:51:32 PM



P1	SCHEMATIC DESIGN	GB	PSH	22.11.21	
Rev	Description	Eng	Draft	Date	Rev Description Eng Draft Date

SCALE 1:100

1. DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structura**
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 2 LEVEL 2
OUTLINE PLAN - SOUTH**

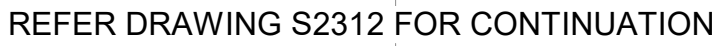
PRELIMINARY

Scale : A1 Drawn Authorised

As indicated	PSH	GB
--------------	-----	----

Job No	Drawing No	Revision
211523	S2222	P1

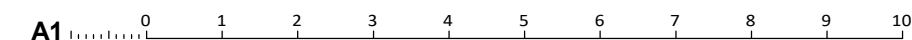
22/11/2021 12:51:35 PM



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES

8 PM

S23 Prin



P1	SCHMATIC DESIGN	GB	PSH	22.11.21					
Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date

Client

 **NSW**
GOVERNMENT

Education
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 2 LEVEL 1
MARKING PLAN - NORTH**

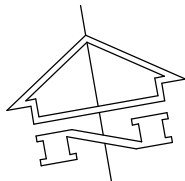
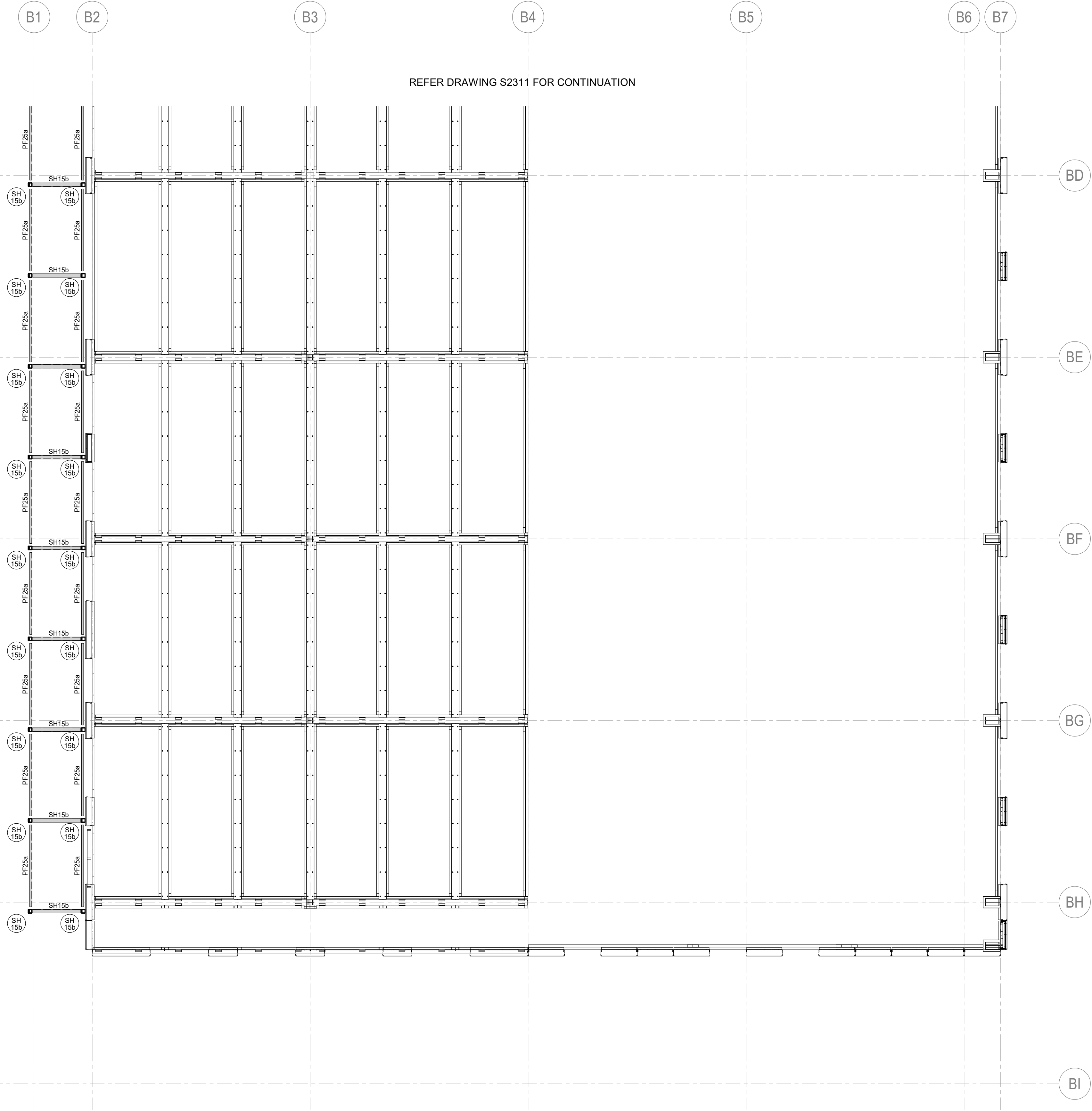
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S2311	P1

22/11/2021 12:51:38 PM

REFER DRAWING S2311 FOR CONTINUATION



BUILDING 2 SOUTH LEVEL 1 MARKING PLAN

SCALE 1:100
1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

S2312 P1
Printed : 22/11/2021 12:51:41 PM
C:\Users\paulh\Documents\MSC_R22L_Plan\tag@ttw.com.au.rvt

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

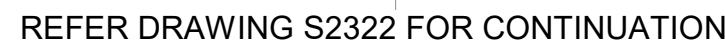
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject
BUILDING 2 LEVEL 1 MARKING PLAN - SOUTH

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S2312	P1
22/11/2021 12:51:41 PM		



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES

S2321 P1

--	--



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

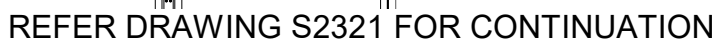
**BUILDING 2 LEVEL 2
MARKING PLAN - NORTH**

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S2321	P1

22/11/2021 12:51:43 PM



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

S2322 P1

P1	SCHEMATIC DESIGN				GB	PSH	22.11.21								
Rev	Description				Eng	Draft	Date	Rev	Description				Eng	Draft	Date



Education
School Infrastructure

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

TTW Structura
Civil
Traffic
Facade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

MURWILLUMBAH
EDUCATION CAMPUS

BUILDING 2 LEVEL 2
MARKING PLAN - SOUTH

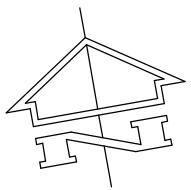
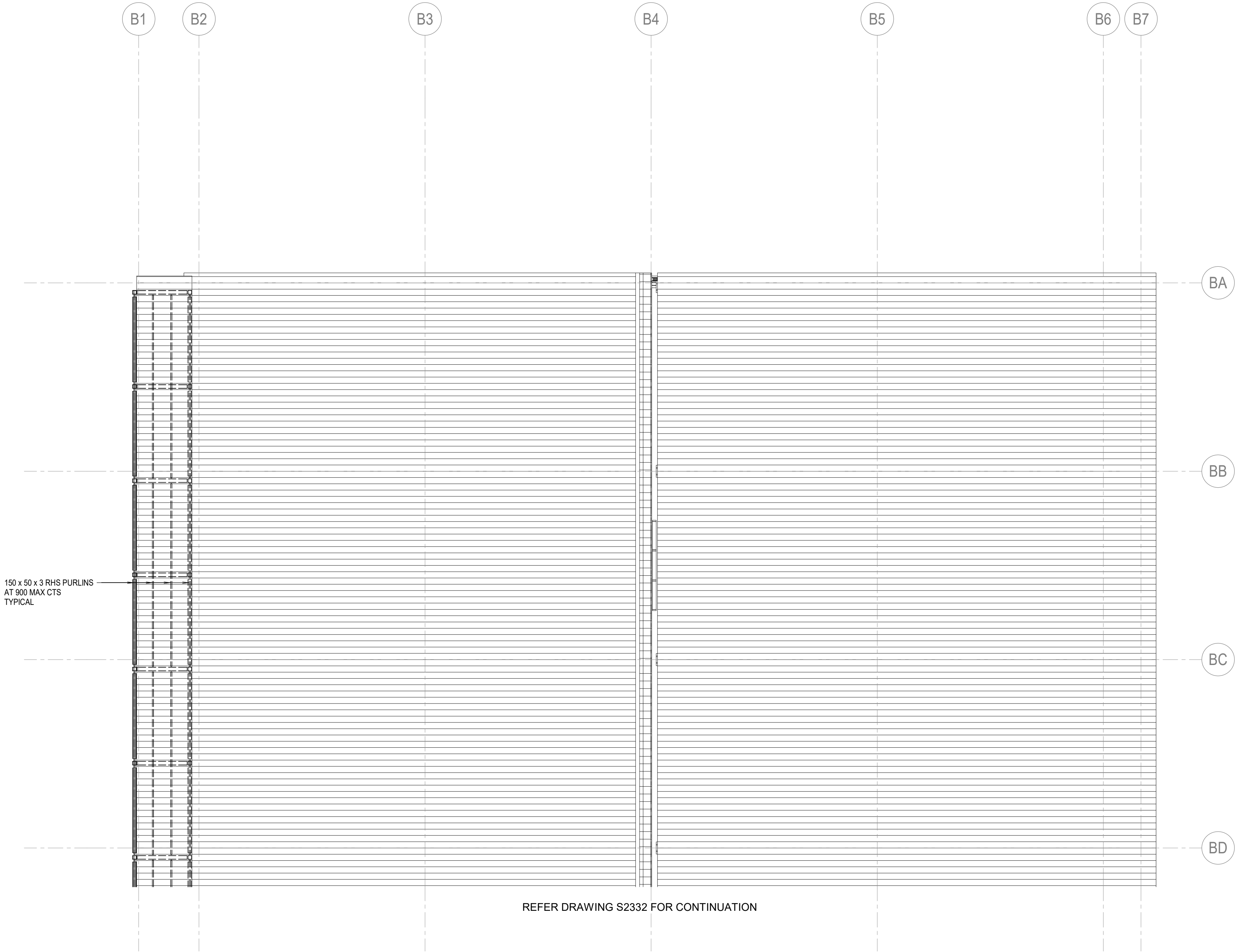
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S2322	P1

22/11/2021 12:51:46 PM



BUILDING 2 NORTH ROOF MARKING PLAN
SCALE 1:100
1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

S2331 P1
Printed : 22/11/2021 12:51:49 PM
C:\Users\paulh\Documents\MSC (R22)_P1\p1.dwg

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					

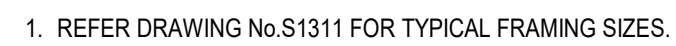
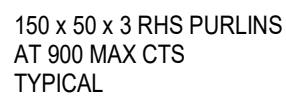


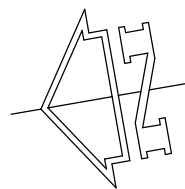
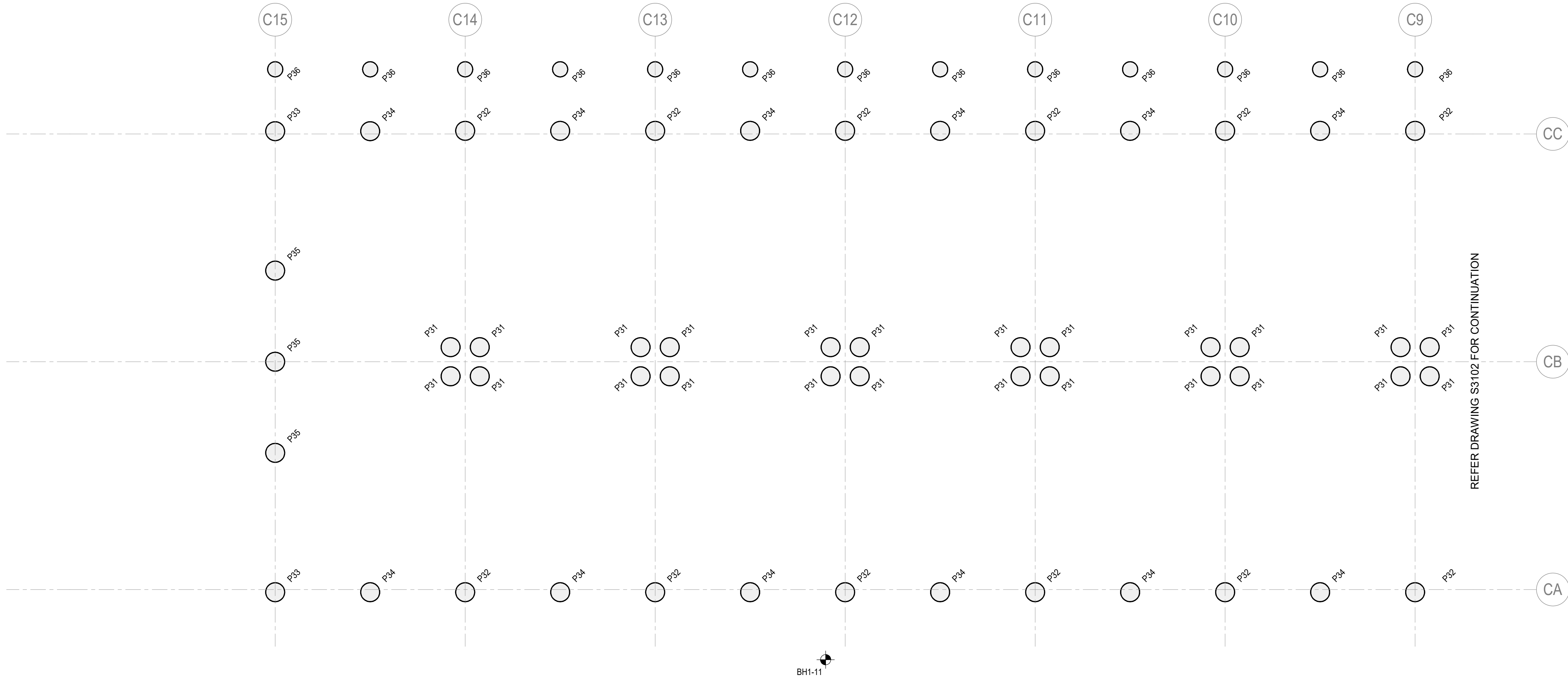
Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 2 ROOF
MARKING PLAN - NORTH**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S2331	P1
22/11/2021 12:51:49 PM		





BUILDING 3 NORTH FOOTING PLAN

- SCALE 1:100
1. TOP OF FOOTINGS TO BE DETERMINED BY THE CONTRACTOR.
 2. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND SETOUT OF ALL COLUMNS AND WALLS.
 3. ALL LIFT PIT BASES AND WALLS BELOW GROUND LEVEL ARE TO HAVE XYPEX ADMIXTURE.
 4. ALLOW ADDITIONAL CLEARANCE TO TOP OF FOOTINGS FOR HYDRAULIC SERVICES WHERE REQUIRED.
 5. CONTRACTOR TO ALLOW FOR GEOTECHNICAL ENGINEER TO INSPECT AND CERTIFY THAT THE REQUIRED BEARING CAPACITIES HAVE BEEN ACHIEVED BEFORE CASTING FOOTINGS.
 6. DENOTES BOREHOLE LOCATIONS. REFER TO GEOTECHNICAL REPORT 202033.00.R.001 REV 0 BY DOUGLAS PARTNERS DATED MAY 2021

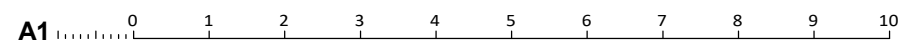
PILE SCHEDULE ASSUMING 750 DIA MAX INTO VERY STIFF CLAY							
MARK	DEAD LOAD (kN)	LIVE LOAD (kN)	LATERAL LOAD (kN)	DIAMETER (mm)	SOCKET LENGTH (mm)	ASSUMED AVERAGE DEPTH TO TOP OF SOCKET (mm)	TOTAL PILE LENGTH (mm)
P11	1203	817	153	750	9031	5000	14031
P12	473	311	60	750	14942	5000	19942
P13	166	105	21	750	4055	5000	9055
P14	186	121	23	750	4825	5000	9825
P15	328	190	40	750	9305	5000	14305
P16	56	58	8	600	1663	5000	6663
P21	520	278	63	750	6775	4500	11275
P22	473	311	60	750	14942	4501	19443
P23	166	105	21	750	4055	4502	8557
P24	186	121	23	750	4825	4503	9328
P25	608	338	74	750	8339	4504	12843
P26	56	58	8	600	1663	4505	6168
P27	407	193	90	750	11045	4506	15551
P28	365	177	90	750	9819	4507	14326
P29	213	93	45	750	4906	4508	9314
P31	1305	962	173	750	10577	1000	11577
P32	578	406	74	750	19212	1000	20212
P33	217	146	28	750	6023	1000	7023
P34	241	166	31	750	6947	1000	7947
P35	393	240	40	750	8434	1000	9434
P36	83	86	12	600	3115	1000	4115
P41	1350	962	173	750	10557	2500	13077
P42	578	406	74	750	19212	2500	21712
P43	217	146	61	750	6023	2500	8523
P44	241	166	31	750	6947	2500	9447
P45	393	240	49	750	11746	2500	14246
P46	83	86	12	600	3115	2500	5617

- NOTES:
1. ALL PILES TO BE SOCKETED INTO VERY STIFF CLAY WITH AN ALLOWABLE END BEARING OF 3000 kPa MINIMUM AND ALLOWABLE SHAFT ADHESION OF 20 kPa MINIMUM.
 2. DEPTHS TO TOP OF SOCKET HAVE BEEN RATIONALISED AND AVERAGED FOR CONCEPTUAL DESIGN PURPOSES.
 3. ADDITIONAL GEOTECHNICAL INVESTIGATION REQUIRED. SOME AREAS HAVE MINIMAL INVESTIGATION DATA. SOME LOCATIONS STOP AT DEPTHS BEFORE REACHING
 4. VERY STIFF CLAY AND MAY YIELD HIGHER CAPACITY CLAYS OR METASILTSTONE AT LOWER DEPTHS.
 5. THE TOP OF 1.5 DIA DEPTH OF PILE SOCKET HAS BEEN IGNORED AS PER GEOTECHNICAL ADVICE
 6. PILE GROUPS WILL REQUIRE PILE CAPS. FOR PILES UNDER SUSPENDED GROUND FLOOR SLABS, THE PILE CAP CAN BE CONSTRUCTED INTEGRAL WITH SLAB BANDS.
 7. ALL GROUND FLOOR LEVELS ASSUMED TO BE SUSPENDED FOR CONCEPT DESIGN
 8. PILE CONCRETE STRENGTH TO BE 40 MPa
 9. PILE REINFORCEMENT 100 Kg/m3

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

S3101 P1
Printed : 22/11/2021 12:51:53 PM
C:\Users\paulh\Documents\MSC (P32)_Paulhag@ttw.com.au\vt



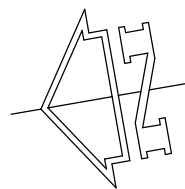
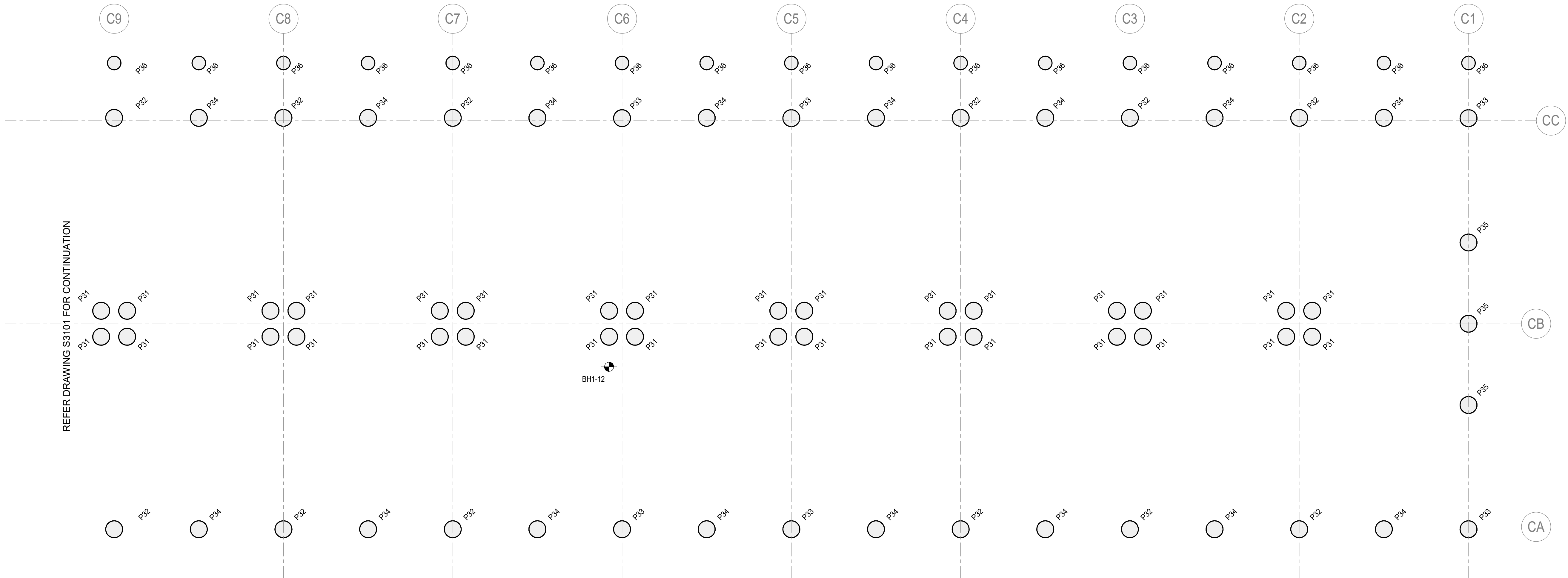
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21			
Rev	Description	Eng	Draft	Date	Rev	Description	Eng



Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 3 FOOTING PLAN
- NORTH**

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S3101	P1
22/11/2021 12:51:53 PM		



BUILDING 3 SOUTH FOOTING PLAN

- SCALE 1:100
1. TOP OF FOOTINGS TO BE DETERMINED BY THE CONTRACTOR.
 2. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND SETOUT OF ALL COLUMNS AND WALLS.
 3. ALL LIFT PIT BASES AND WALLS BELOW GROUND LEVEL ARE TO HAVE XYPEX ADMIXTURE.
 4. ALLOW ADDITIONAL CLEARANCE TO TOP OF FOOTINGS FOR HYDRAULIC SERVICES WHERE REQUIRED.
 5. CONTRACTOR TO ALLOW FOR GEOTECHNICAL ENGINEER TO INSPECT AND CERTIFY THAT THE REQUIRED BEARING CAPACITIES HAVE BEEN ACHIEVED BEFORE CASTING FOOTINGS.
 6. DENOTES BOREHOLE LOCATIONS. REFER TO GEOTECHNICAL REPORT 202033.00.R.001 REV 0 BY DOUGLAS PARTNERS DATED MAY 2021

PILE SCHEDULE ASSUMING 750 DIA MAX INTO VERY STIFF CLAY

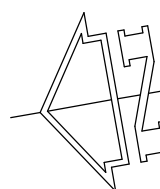
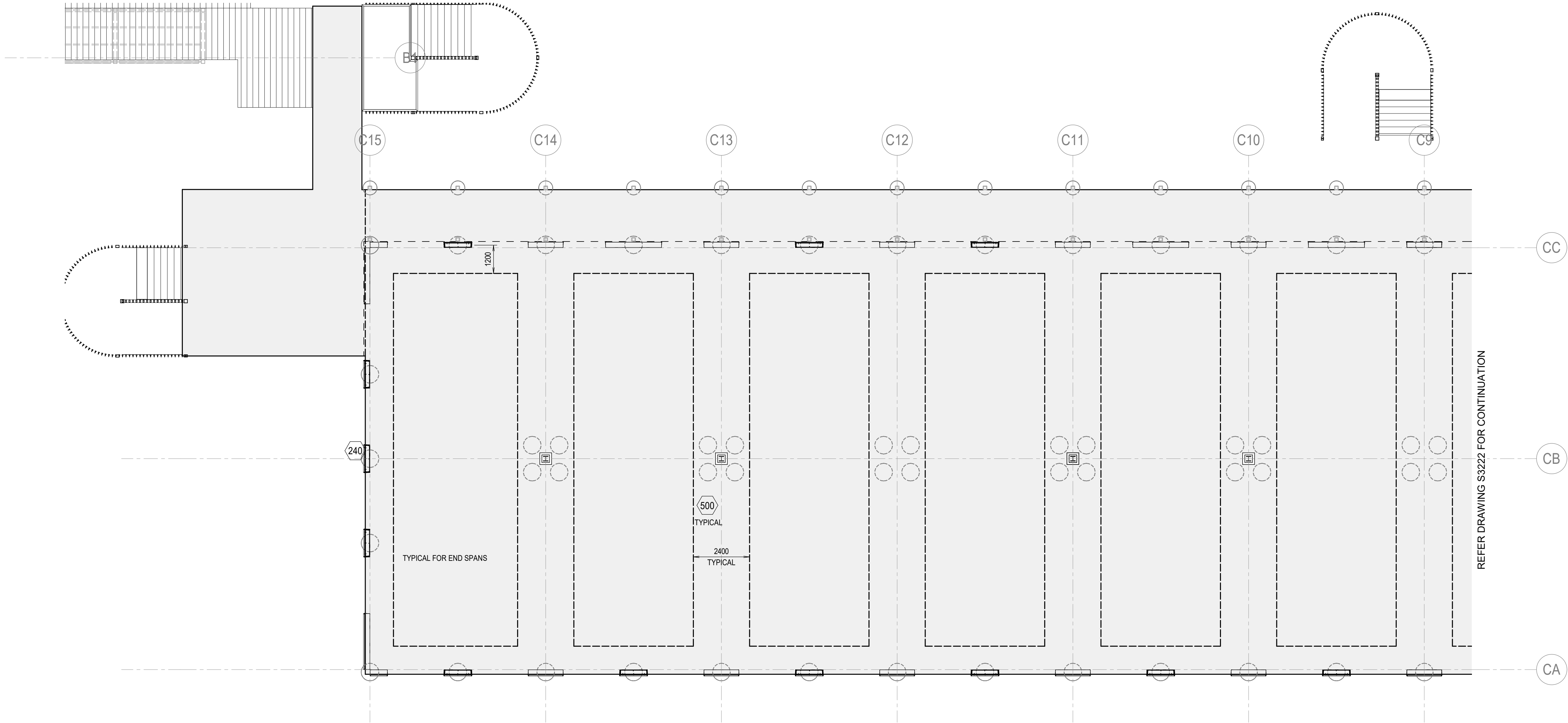
MARK	DEAD LOAD (kN)	LIVE LOAD (kN)	LATERAL LOAD (kN)	DIAMETER (mm)	SOCKET LENGTH (mm)	ASSUMED AVERAGE DEPTH TO TOP OF SOCKET (mm)	TOTAL PILE LENGTH (mm)
P11	1203	817	153	750	9031	5000	14031
P12	473	311	60	750	14942	5000	19942
P13	166	105	21	750	4055	5000	9055
P14	186	121	23	750	4825	5000	9825
P15	328	190	40	750	9305	5000	14305
P16	56	58	8	600	1663	5000	6663
P21	520	278	63	750	6775	4500	11275
P22	473	311	60	750	14942	4501	19443
P23	166	105	21	750	4055	4502	8557
P24	186	121	23	750	4825	4503	9328
P25	608	338	74	750	8339	4504	12843
P26	56	58	8	600	1663	4505	6168
P27	407	193	90	750	11045	4506	15551
P28	365	177	90	750	9819	4507	14326
P29	213	93	45	750	4906	4508	9314
P31	1305	962	173	750	10577	1000	11577
P32	578	406	74	750	19212	1000	20212
P33	217	146	28	750	6023	1000	7023
P34	241	166	31	750	6947	1000	7947
P35	393	240	40	750	8434	1000	9434
P36	83	86	12	600	3115	1000	4115
P41	1350	962	173	750	10557	2500	13077
P42	578	406	74	750	19212	2500	21712
P43	217	146	61	750	6023	2500	8523
P44	241	166	31	750	6947	2500	9447
P45	393	240	49	750	11746	2500	14246
P46	83	86	12	600	3115	2500	5617

- NOTES:
1. ALL PILES TO BE SOCKETED INTO VERY STIFF CLAY WITH AN ALLOWABLE END BEARING OF 3000 kPa MINIMUM AND ALLOWABLE SHAFT ADHESION OF 20 kPa MINIMUM.
 2. DEPTHS TO TOP OF SOCKET HAVE BEEN RATIONALISED AND AVERAGED FOR CONCEPTUAL DESIGN PURPOSES.
 3. ADDITIONAL GEOTECHNICAL INVESTIGATION REQUIRED. SOME AREAS HAVE MINIMAL INVESTIGATION DATA. SOME LOCATIONS STOP AT DEPTHS BEFORE REACHING
 4. VERY STIFF CLAY AND MAY YIELD HIGHER CAPACITY CLAYS OR METASILTSTONE AT LOWER DEPTHS.
 5. THE TOP OF 1.5 DIA DEPTH OF PILE SOCKET HAS BEEN IGNORED AS PER GEOTECHNICAL ADVICE
 6. PILE GROUPS WILL REQUIRE PILE CAPS. FOR PILES UNDER SUSPENDED GROUND FLOOR SLABS, THE PILE CAP CAN BE CONSTRUCTED INTEGRAL WITH SLAB BANDS.
 7. ALL GROUND FLOOR LEVELS ASSUMED TO BE SUSPENDED FOR CONCEPT DESIGN
 8. PILE CONCRETE STRENGTH TO BE 40 MPa
 9. PILE REINFORCEMENT 100 Kg/m3

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

S3102 P1
Printed : 22/11/2021 12:51:55 PM
C:\Users\paulh\Documents\MISC\PS2L_Phuu\tag@ttw.com.au.vrt

A1 0 1 2 3 4 5 6 7 8 9 10				Client  Education School Infrastructure		Contractor  Built. Level 4 185 Clarence Street Sydney NSW 2000 T +61 2 8332 4111		Architect  architectus ™ Level 18 MLC Centre 19 Martin Place Sydney NSW 2000 T (61 2) 8252 8400		Structural Engineer  TTW Structural Civil Traffic Façade +61 2 9439 7288 L6 73 Miller Street North Sydney NSW 2060		Project MURWILLUMBAH EDUCATION CAMPUS		Sheet Subject BUILDING 3 FOOTING PLAN - SOUTH		Scale : A1 As indicated Drawn PSH Authorised GB		
P1 SCHEMATIC DESIGN GB PSH 22.11.21																Job No 211523		
Rev Description Eng Draft Date				Rev Description Eng Draft Date												Drawing No S3102		
																Revision P1		
																22/11/2021 12:51:55 PM		



BUILDING 3 NORTH LEVEL 2 OUTLINE PLAN

SCALE 1:100

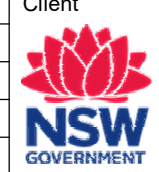
1. SLABS ON GROUND TO BE CAST ON A CONCRETE UNDERLAY (0.2mm THICK HIGH IMPACT RESISTANCE FILM TO AS/NZS 4347) OVER A 100mm BASECOURSE BLINDED WITH SAND.
2. REINFORCE SLABS ON GROUND WITH 1 LAYER OF SL82 FABRIC TOP THROUGHOUT 30 COVER.
3. ALL LEVELS AND FALLS TO ARCHITECTS DETAILS.
4. REFER TO HYDRAULIC ENGINEERS DETAILS FOR ALL SUB SOIL DRAINAGE, TRENCHES, SUMPS, PITS AND GRATED DRAINS UNO
5. REFER TO THE GEOTECHNICAL ENGINEER FOR ALL SUBBASE REQUIREMENTS.

S3221 P1
Printed : 22/11/2021 12:51:58 PM
C:\Users\paulh\Documents\MSC (P22)_Paulh\p22\p22.dwg

A1 0 1 2 3 4 5 6 7 8 9 10

P1	SCHEMATIC DESIGN	GB	PSH	22.11.21			
Rev	Description	Eng	Draft	Date	Rev	Description	Eng

Client



Education
School Infrastructure

Contractor



Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect



Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer



Structural
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

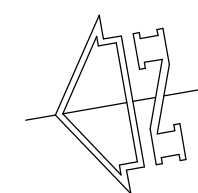
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

BUILDING 3 LEVEL 2
OUTLINE PLAN - NORTH

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S3221	P1
22/11/2021 12:51:58 PM		



SCALE 1:100

1. SLABS ON GROUND TO BE CAST ON A CONCRETE UNDERLAY (0.2mm THICK HIGH IMPACT RESISTANCE FILM TO AS/NZS 4347) OVER A 100mm BASECOURSE BLINDED WITH SAND.
2. REINFORCE SLABS ON GROUND WITH 1 LAYER OF S182 FABRIC TOP THROUGHOUT 30 COVER.
3. ALL LEVELS AND FALLS TO ARCHITECTS DETAILS.
4. REFER TO HYDRAULIC ENGINEERS DETAILS FOR ALL SUB SOIL DRAINAGE, TRENCHES, SUMPS, PITS AND GRATED DRAINS UNO
5. REFER TO THE GEOTECHNICAL ENGINEER FOR ALL SUBBASE REQUIREMENTS.

A1 0 1 2 3 4 5 6 7 8 9 10

Client

 **Education**
School Infrastructure

Architect

architectus™

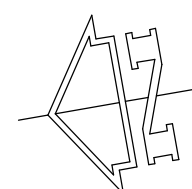
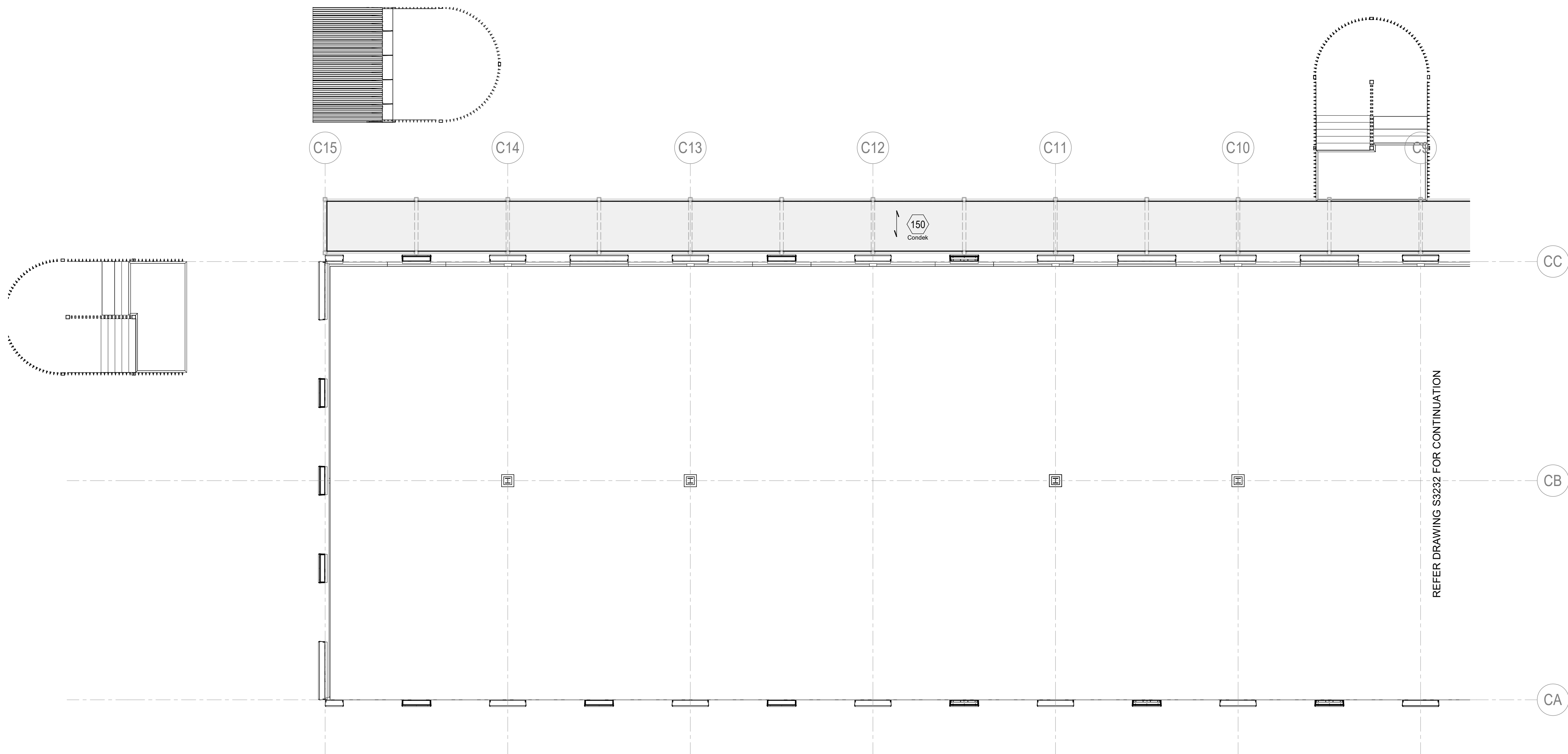
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Project

MURWILLUMBAH
EDUCATION CAMPUS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S3222	P1
22/11/2021 12:52:00 PM		



SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

[illegible]

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

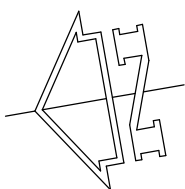
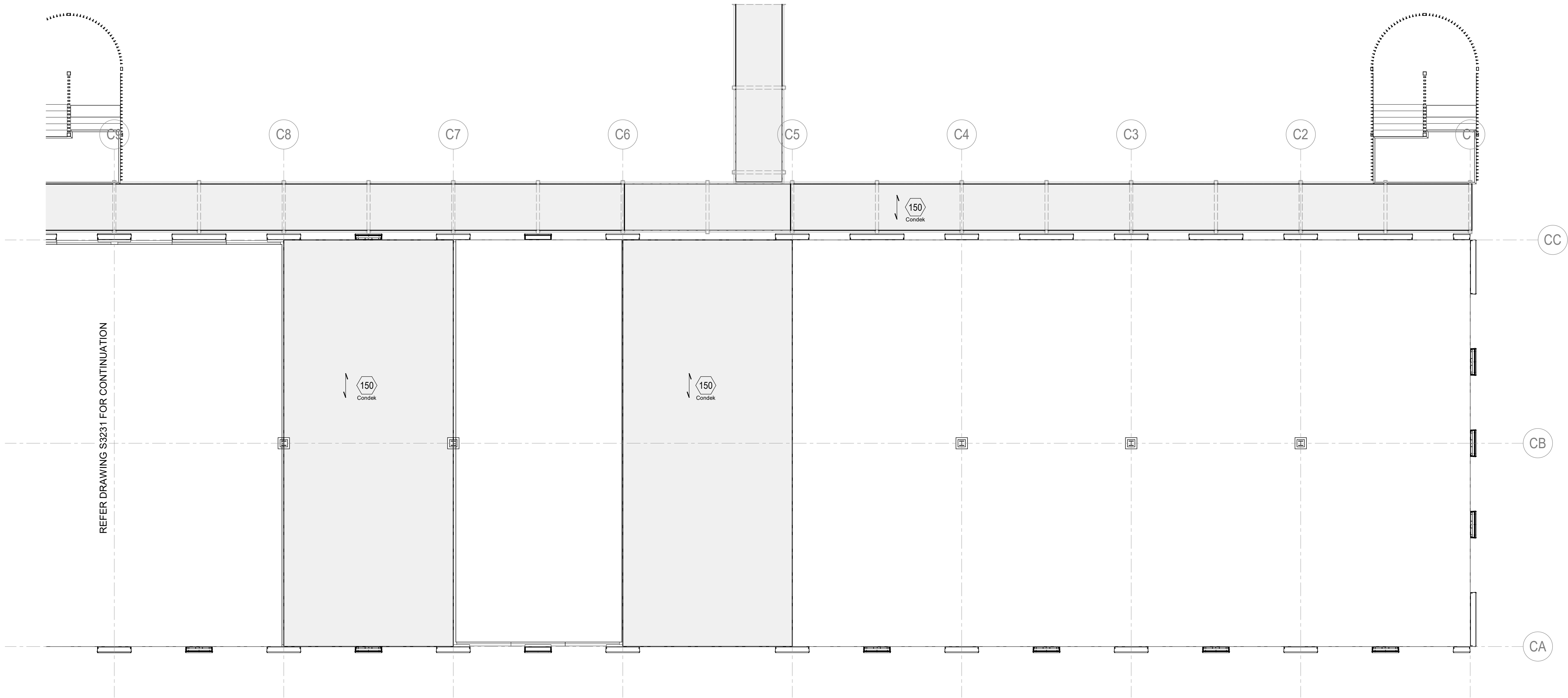
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject

**BUILDING 3 LEVEL 3
OUTLINE PLAN - NORTH**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S3231	P1
22/11/2021 12:52:03 PM		



BUILDING 3 SOUTH LEVEL 3 OUTLINE PLAN

SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

S3232 P1
Printed : 22/11/2021 12:52:07 PM
C:\Users\paulh\Documents\MSC_P02L_Plan\tag@ttw.com.au.vnt

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

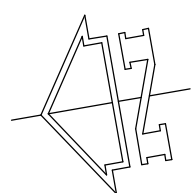
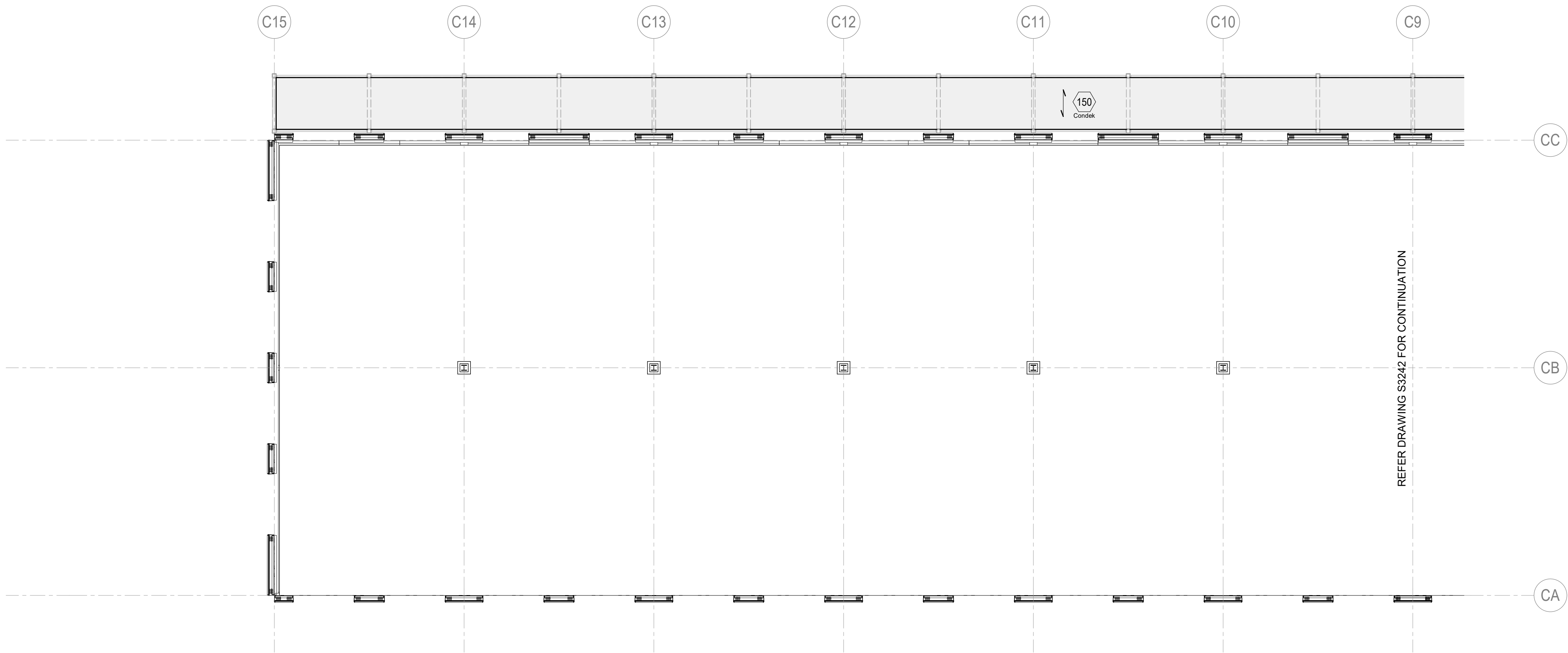
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 3 LEVEL 3
OUTLINE PLAN - SOUTH**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S3232	P1
22/11/2021 12:52:07 PM		



BUILDING 3 NORTH LEVEL 4 OUTLINE PLAN

SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

S3241 P1
Printed : 22/11/2021 12:52:09 PM
C:\Users\paulh\Documents\MSC_R02L_Plan\tag@ttw.com.au.rvt

A1 0 1 2 3 4 5 6 7 8 9 10

P1	SCHEMATIC DESIGN	GB	PSH	22.11.21			
Rev	Description	Eng	Draft	Date	Rev	Description	Eng



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

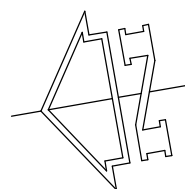
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 3 LEVEL 4
OUTLINE PLAN - NORTH**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S3241	P1
22/11/2021 12:52:09 PM		



SCALE 1:100

- A1** 1000000 0 1 2 3 4 5 6 7 8 9 10

Client

 **Education**
School Infrastructure

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Project

MURWILLUMBAH
EDUCATION CAMPUS

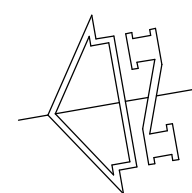
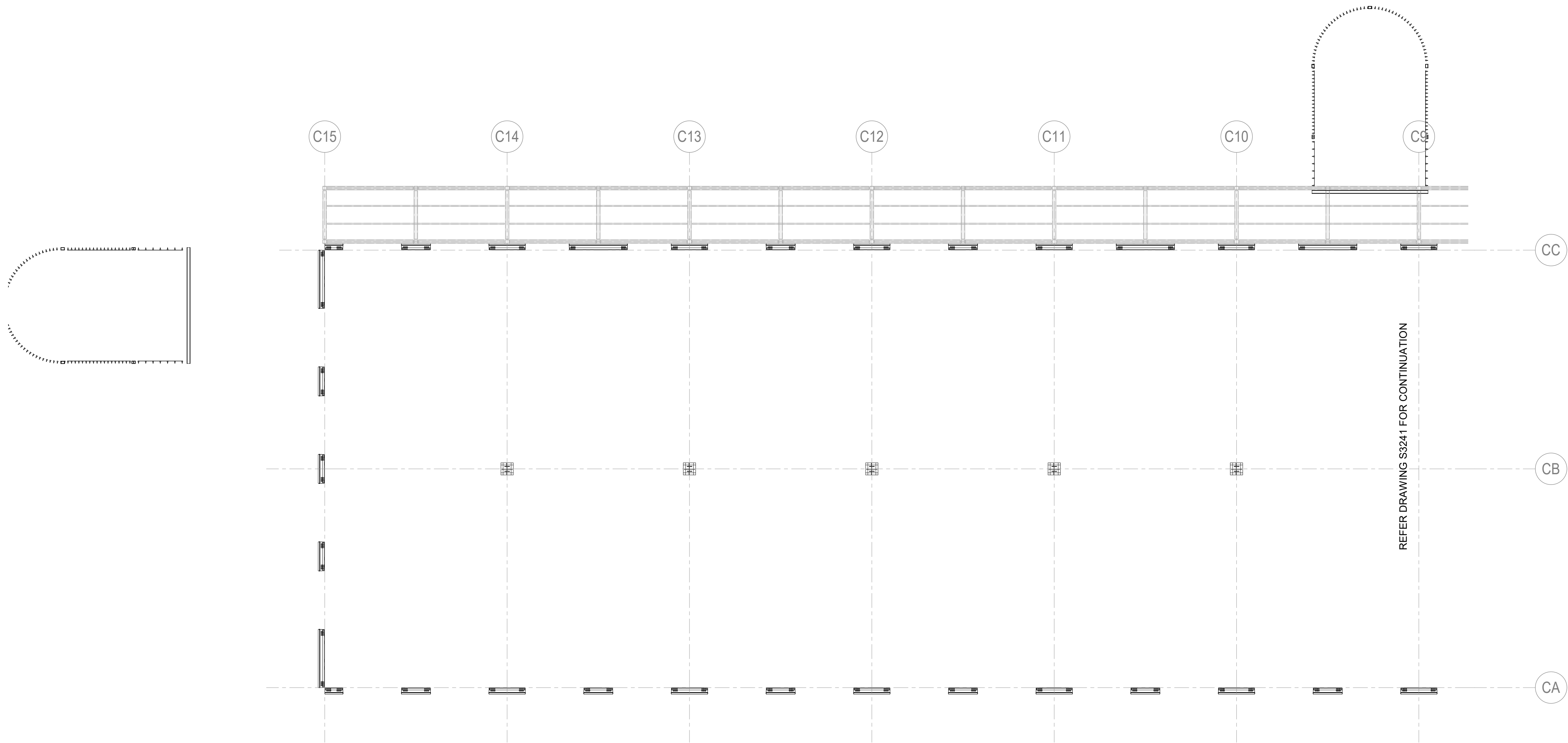
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S3242	P1

22/11/2021 12:52:13 PM



SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

A1 freelance 0 1 2 3 4 5 6 7 8 9 10

[illegible]

Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

architectus™
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

MURWILLUMBAH
EDUCATION CAMPUS

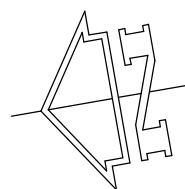
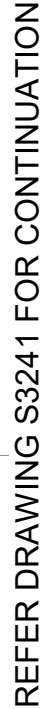
BUILDING 3 LEVEL 5
OUTLINE PLAN - NORTH

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S3251	P1

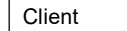
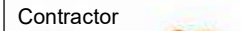
22/11/2021 12:52:14 PM

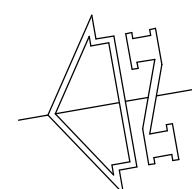


SCALE 1:100

1. DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT, FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATINGS TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECTS DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

S3252 P1

01 02 03 04 05 06 07 08 09 10 A1 1 2 3 4 5 6 7 8 9 10										Client  Education School Infrastructure Contractor  Level 4 185 Clarence Street Sydney NSW 2000 T +61 2 8332 4111 Architect  Level 18 MLC Centre 19 Martin Place Sydney NSW 2000 T (61 2) 8252 8400 Structural Engineer  +61 2 9439 7288 L6 73 Miller Street North Sydney NSW 2060 Project MURWILLUMBAH EDUCATION CAMPUS Sheet Subject BUILDING 3 LEVEL 5 OUTLINE PLAN - SOUTH										NOT TO BE USED FOR CONSTRUCTION Scale : A1 Drawn Authorised As indicated PSH GB Job No 211523 Drawing No S3252 Revision P1 22/11/2021 12:52:16 PM									
P1 SCHEMATIC DESIGN GB PSH 22.11.21										Rev Description Eng Draft Date										Rev Description Eng Draft Date									



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

Client

 **Education**
School Infrastructure

Architect

architectus™

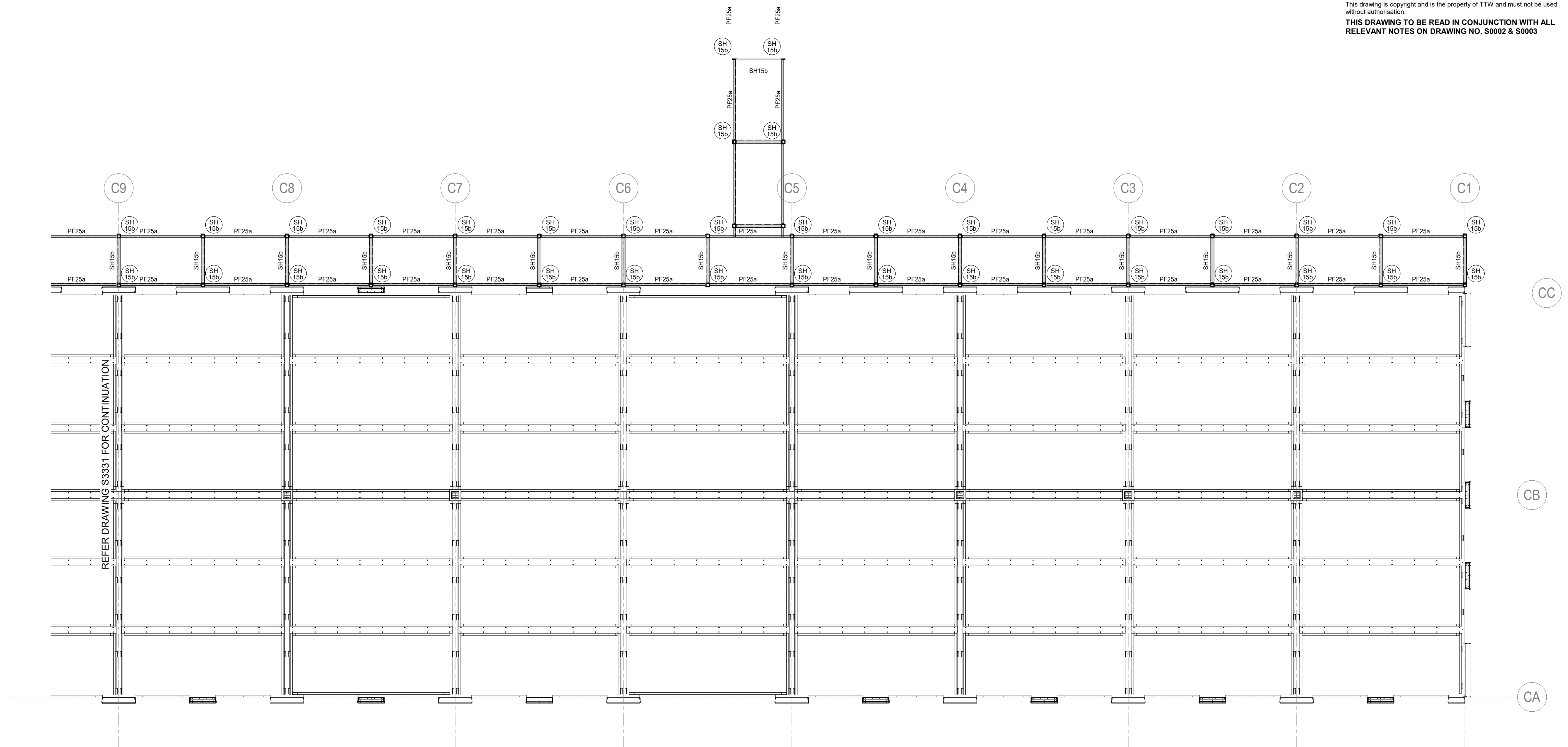
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Project

MURWILLUMBAH
EDUCATION CAMPUS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Job No	Drawing No	Revision
211523	S3331	P1
22/11/2021 12:52:21 PM		



BUILDING 3 SOUTH LEVEL 3 MARKING PLAN

SCALE 1:100

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

P1	SCHEMATIC DESIGN			GB	PSH	22.11.21	
Rev	Description			Eng	Draft	Date	Rev Description Eng Draft Date

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 3 LEVEL 3
MARKING PLAN - SOUTH**

PRELIMINARY

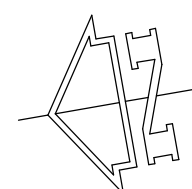
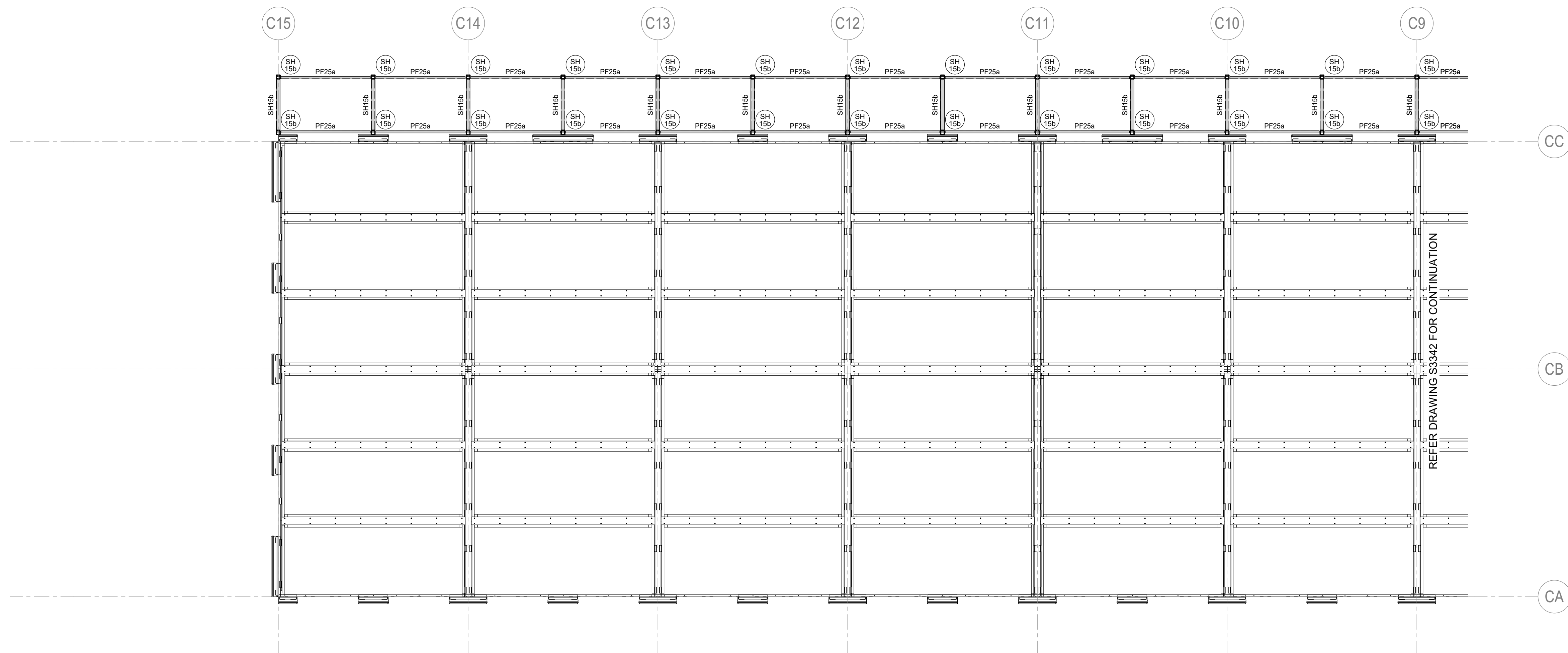
Scale : A1 Drawn Authorised

As indicated PSH GB

Job No	Drawing No	Revision
--------	------------	----------

211523 S3332 P1

22/11/2021 12:52:26 PM

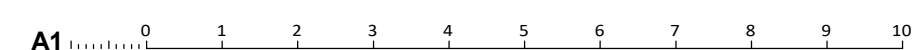


BUILDING 3 NORTH LEVEL 4 MARKING PLAN

SCALE 1:100

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

S3341 P1
Printed : 22/11/2021 12:52:30 PM
C:\Users\paulh\Documents\MEC [R22]_Paul.Haigh@tw.com.au.rvt

[illegible]

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

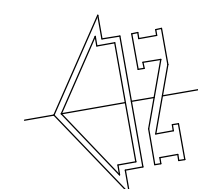
**BUILDING 3 LEVEL 4
MARKING PLAN - NORTH**

PRELIMINARY

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S3341	P1

22/11/2021 12:52:30 PM



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES

P1	SCHEMATIC DESIGN				GB	PSH	22.11.21								
Rev	Description				Eng	Draft	Date	Rev	Description				Eng	Draft	Date

Client

 **Education**
School Infrastructure

Contractor

Built.

Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structural
Civil
Traffic
Façade**

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

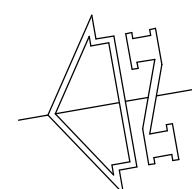
Project

MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject

**BUILDING 3 LEVEL 4
MARKING PLAN - SOUTH**

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S3342	P1
22/11/2021 12:52:35 PM		



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

Client

 **Education**
School Infrastructure

Architect

architectus™

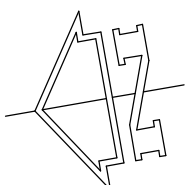
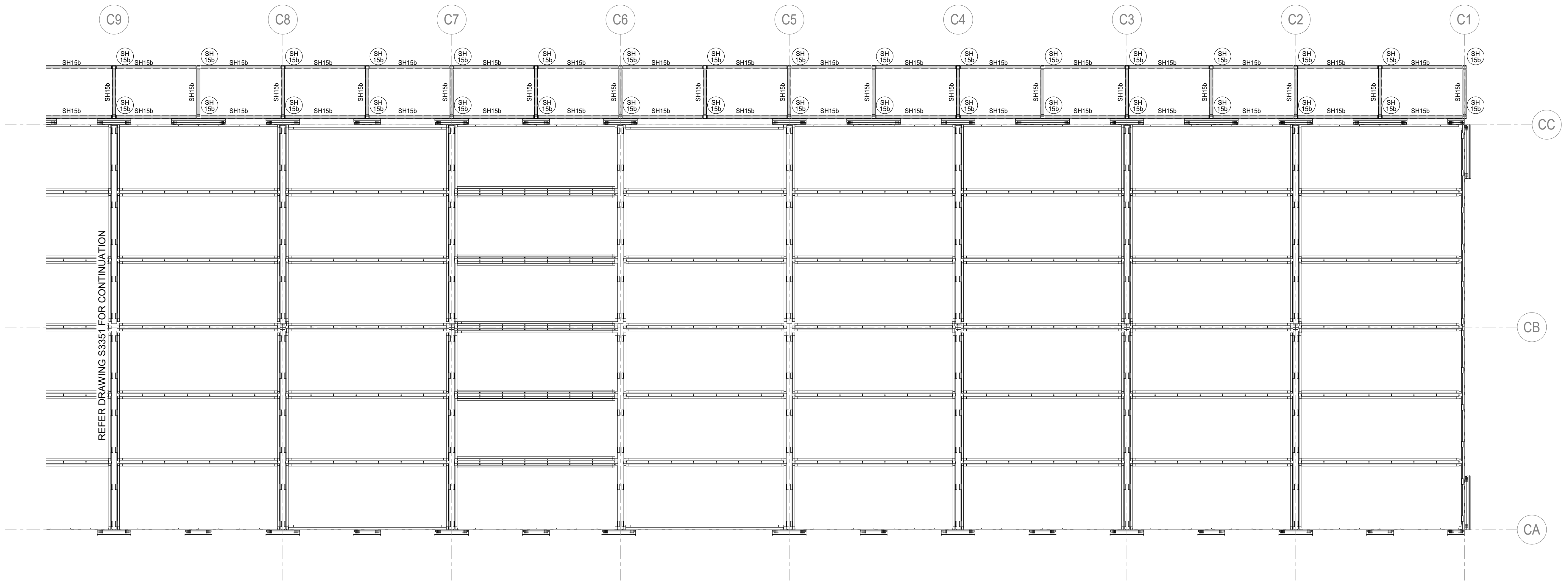
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Project

MURWILLUMBAH
EDUCATION CAMPUS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Job No	Drawing No	Revision
211523	S3351	P1
22/11/2021 12:52:37 PM		



BUILDING 3 SOUTH LEVEL 5 OUTLINE PLAN
SCALE 1:100
1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

S3352 P1
Printed : 22/11/2021 12:52:41 PM
C:\Users\paul\Documents\MSC_R02L_Plan\tag@nsw.au.vnt

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

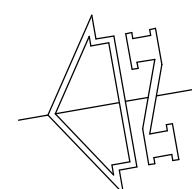
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
MURWILLUMBAH EDUCATION CAMPUS

Sheet Subject
BUILDING 3 LEVEL 5 MARKING PLAN - SOUTH

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1
As indicated
Drawing No
211523
Revision
P1
22/11/2021 12:52:41 PM



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

A1 0 1 2 3 4 5 6 7 8 9 10

Client

 **Education**
School Infrastructure

Architect

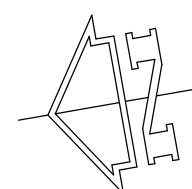
architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Project

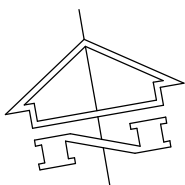
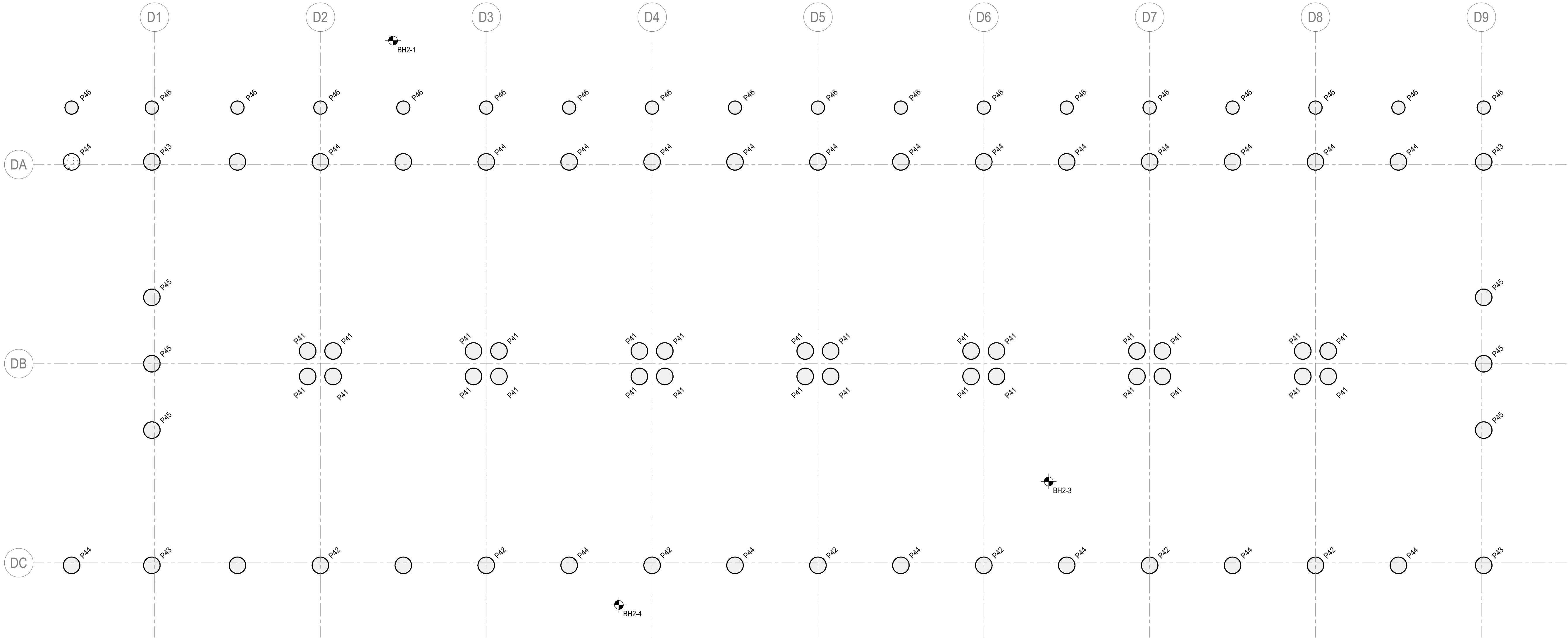
MURWILLUMBAH
EDUCATION CAMPUS

22/11/2021 12:52:43 PM



1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

22/11/2021 12:52:47 PM



BUILDING 4 FOOTING PLAN

SCALE 1:100

1. TOP OF FOOTINGS TO BE DETERMINED BY THE CONTRACTOR.
2. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION AND SETOUT OF ALL COLUMNS AND WALLS.
3. ALL LIFT PIT BASES AND WALLS BELOW GROUND LEVEL ARE TO HAVE XYPEX ADMIXTURE.
4. ALLOW ADDITIONAL CLEARANCE TO TOP OF FOOTINGS FOR HYDRAULIC SERVICES WHERE REQUIRED.
5. CONTRACTOR TO ALLOW FOR GEOTECHNICAL ENGINEER TO INSPECT AND CERTIFY THAT THE REQUIRED BEARING CAPACITIES HAVE BEEN ACHIEVED BEFORE CASTING FOOTINGS.
6.  DENOTES BOREHOLE LOCATIONS. REFER TO GEOTECHNICAL REPORT 202033.00.R.001 REV 0 BY DOUGLAS PARTNERS DATED MAY 2021

PILE SCHEDULE ASSUMING 750 DIA MAX INTO VERY STIFF CLAY

MARK	DEAD LOAD (kN)	LIVE LOAD (kN)	LATERAL LOAD (kN)	DIAMETER (mm)	SOCKET LENGTH (mm)	ASSUMED AVERAGE DEPTH TO TOP OF SOCKET (mm)	TOTAL PILE LENGTH (mm)
P11	1203	817	153	750	9031	5000	14031
P12	473	311	60	750	14942	5000	19942
P13	166	105	21	750	4055	5000	9055
P14	186	121	23	750	4825	5000	9825
P15	328	190	40	750	9305	5000	14305
P16	56	58	8	600	1663	5000	6663
P21	520	278	63	750	6775	4500	11275
P22	473	311	60	750	14942	4501	19443
P23	166	105	21	750	4055	4502	8557
P24	186	121	23	750	4825	4503	9328
P25	608	338	74	750	8339	4504	12843
P26	56	58	8	600	1663	4505	6168
P27	407	193	90	750	11045	4506	15551
P28	365	177	90	750	9819	4507	14326
P29	213	93	45	750	4906	4508	9314
P31	1305	962	173	750	10577	1000	11577
P32	578	406	74	750	19212	1000	20212
P33	217	146	28	750	6023	1000	7023
P34	241	166	31	750	6947	1000	7947
P35	393	240	40	750	8434	1000	9434
P36	83	86	12	600	3115	1000	4115
P41	1350	962	173	750	10557	2500	13077
P42	578	406	74	750	19212	2500	21712
P43	217	146	61	750	6023	2500	8523
P44	241	166	31	750	6947	2500	9447
P45	393	240	49	750	11746	2500	14246
P46	83	86	12	600	3115	2500	5617

- NOTES:
1. ALL PILES TO BE SOCKETED INTO VERY STIFF CLAY WITH AN ALLOWABLE END BEARING OF 3000 kPa MINIMUM AND ALLOWABLE SHAFT ADHESION OF 20 kPa MINIMUM.
 2. DEPTHS TO TOP OF SOCKET HAVE BEEN RATIONALISED AND AVERAGED FOR CONCEPTUAL DESIGN PURPOSES.
 3. ADDITIONAL GEOTECHNICAL INVESTIGATION REQUIRED. SOME AREAS HAVE MINIMAL INVESTIGATION DATA. SOME LOCATIONS STOP AT DEPTHS BEFORE REACHING
 4. VERY STIFF CLAY AND MAY YIELD HIGHER CAPACITY CLAYS OR METASILTSTONE AT LOWER DEPTHS.
 5. THE TOP OF 1.5 DIA DEPTH OF PILE SOCKET HAS BEEN IGNORED AS PER GEOTECHNICAL ADVICE
 6. PILE GROUPS WILL REQUIRE PILE CAPS. FOR PILES UNDER SUSPENDED GROUND FLOOR SLABS, THE PILE CAP CAN BE CONSTRUCTED INTEGRAL WITH SLAB BANDS.
 7. ALL GROUND FLOOR LEVELS ASSUMED TO BE SUSPENDED FOR CONCEPT DESIGN
 8. PILE CONCRETE STRENGTH TO BE 40 MPa
 9. PILE REINFORCEMENT 100 Kg/m3

S4201 P1
Printed : 22/11/2021 12:52:48 PM
C:\Users\paul\Documents\MSC\PS2L_PSH\tag@ttw.com.au.vnt

A1 0 1 2 3 4 5 6 7 8 9 10

P1	SCHEMATIC DESIGN	GB	PSH	22.11.21	
Rev	Description	Eng	Draft	Date	Rev Description Eng Draft Date

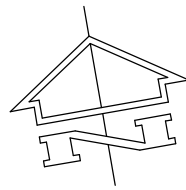
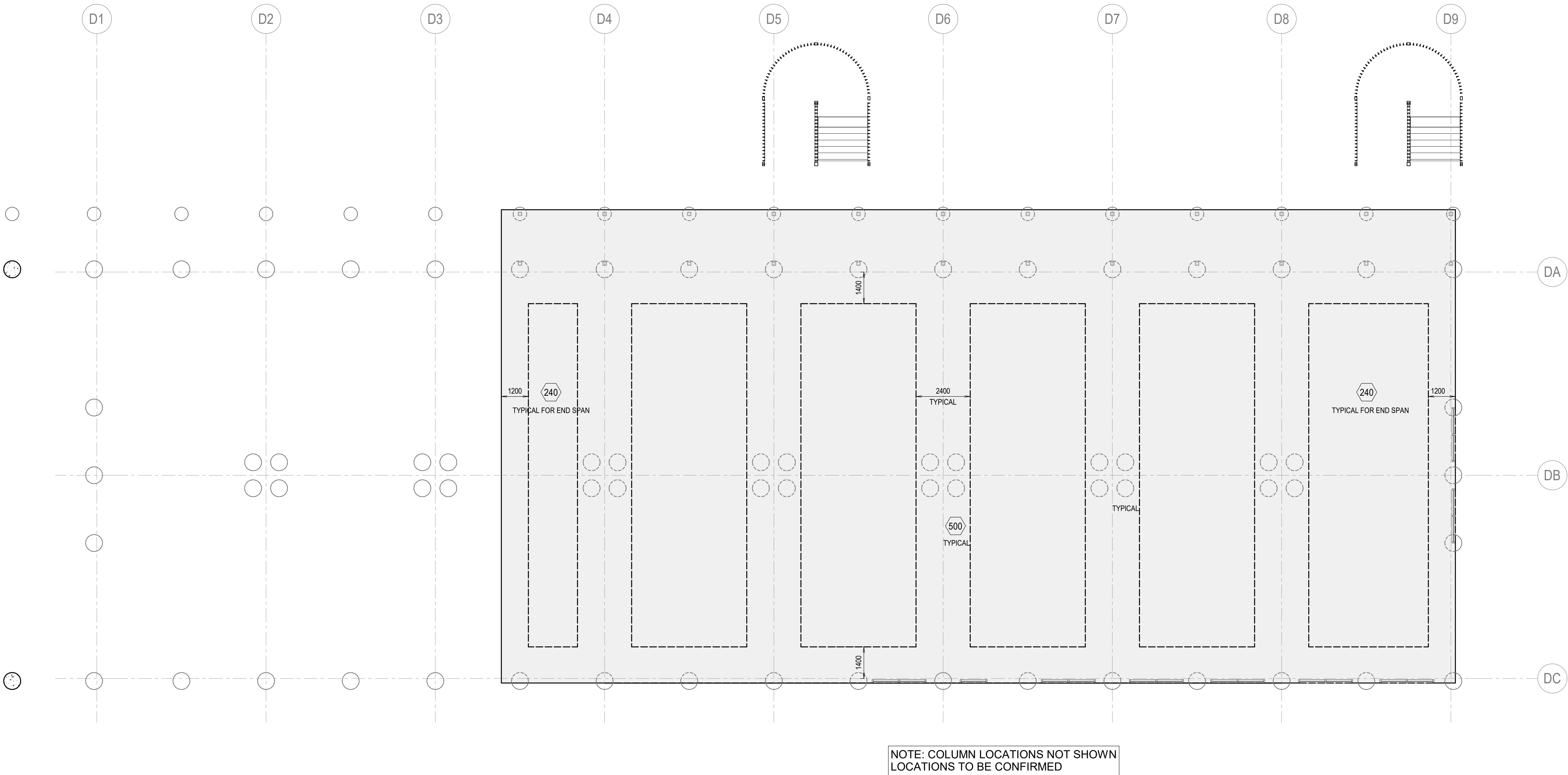


Project
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject
BUILDING 4 FOOTING PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S4201	P1
22/11/2021 12:52:48 PM		



BUILDING 4 GROUND FLOOR OUTLINE PLAN

SCALE 1:100

1. SLABS ON GROUND TO BE CAST ON A CONCRETE UNDERLAY (0.2mm THICK HIGH IMPACT RESISTANCE FILM TO AS/NZS 4347) OVER A 100mm BASECOURSE BLINDED WITH SAND.
2. REINFORCE SLABS ON GROUND WITH 1 LAYER OF SL82 FABRIC TOP THROUGHOUT 30 COVER.
3. ALL LEVELS AND FALLS TO ARCHITECTS DETAILS.
4. REFER TO HYDRAULIC ENGINEERS DETAILS FOR ALL SUB SOIL DRAINAGE, TRENCHES, SUMPS, PITS AND GRATED DRAINS UNO
5. REFER TO THE GEOTECHNICAL ENGINEER FOR ALL SUBBASE REQUIREMENTS.

S4211 P1
Printed : 22/11/2021 12:52:50 PM
C:\Users\paulh\Documents\MSC (P2)_Paulh\p2\p2.dwg

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

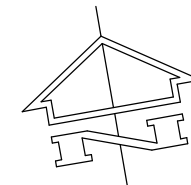
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 4 GROUND
FLOOR OUTLINE PLAN**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S4211	P1
22/11/2021 12:52:50 PM		



SCALE 1:100

1. SLABS ON GROUND TO BE CAST ON A CONCRETE UNDERLAY (0.2mm THICK HIGH IMPACT RESISTANCE FILM TO AS/NZS 4347).
2. OVER A 100mm BASECOURSE BLINDED WITH SAND.
3. REINFORCE SLABS ON GROUND WITH 1 LAYER OF SL82 FABRIC TOP THROUGHOUT 30 COVER.
4. ALL LEVELS AND FALLS TO ARCHITECTS DETAILS.
5. REFER TO HYDRAULIC ENGINEERS DETAILS FOR ALL SUB SOIL DRAINAGE, TRENCHES, SUMPS, PITS AND GRATED DRAINS UNO
6. REFER TO THE GEOTECHNICAL ENGINEER FOR ALL SUBBASE REQUIREMENTS.

A1 0 1 2 3 4 5 6 7 8 9 10

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structura**
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

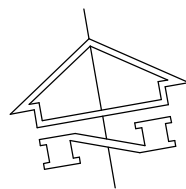
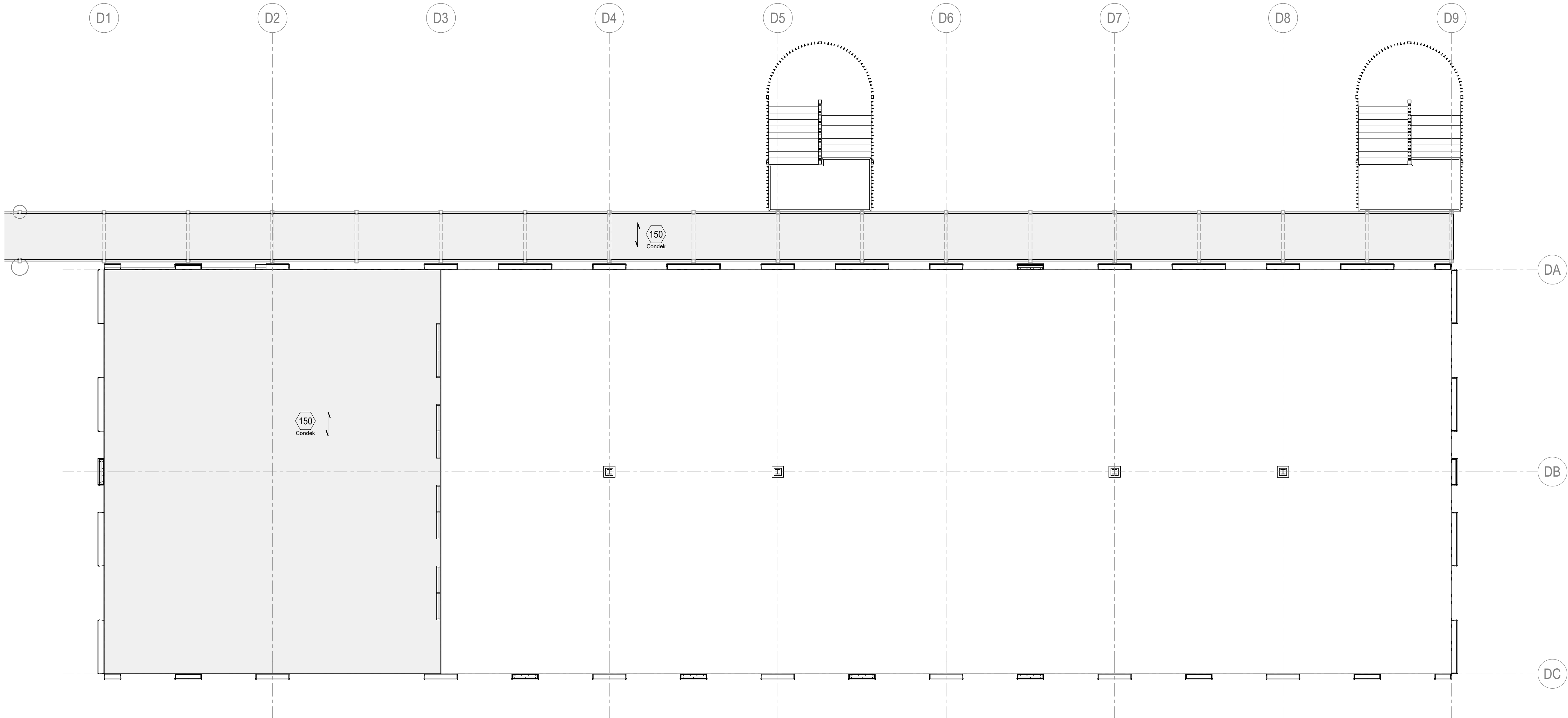
MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 4 LEVEL 1
OUTLINE PLAN**

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION			
Scale : A1	Drawn	Authorised	
As indicated	PSH	GB	
Job No	Drawing No	Revision	
211523	S4221	P1	
22/11/2021 12:52:52 PM			



BUILDING 4 LEVEL 2 OUTLINE PLAN

- SCALE 1:100
1. DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
 2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
 3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
 4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
 5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
 6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
 7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

S4231 P1
Printed : 22/11/2021 12:52:56 PM
C:\Users\paulh\Documents\MSC_R02L_Plan\tag@ttw.com.au.rvt

A1 0 1 2 3 4 5 6 7 8 9 10

P1	SCHEMATIC DESIGN	GB	PSH	22.11.21			
Rev	Description	Eng	Draft	Date	Rev	Description	Eng

Client

 **Education**
School Infrastructure

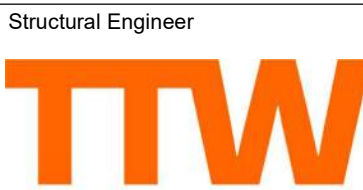
Contractor


Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect


Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

 **Structural**
Civil
Traffic
Façade
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

BUILDING 4 LEVEL 2
OUTLINE PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1
As indicated

Drawn
PSH

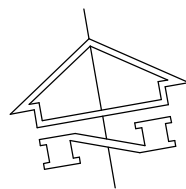
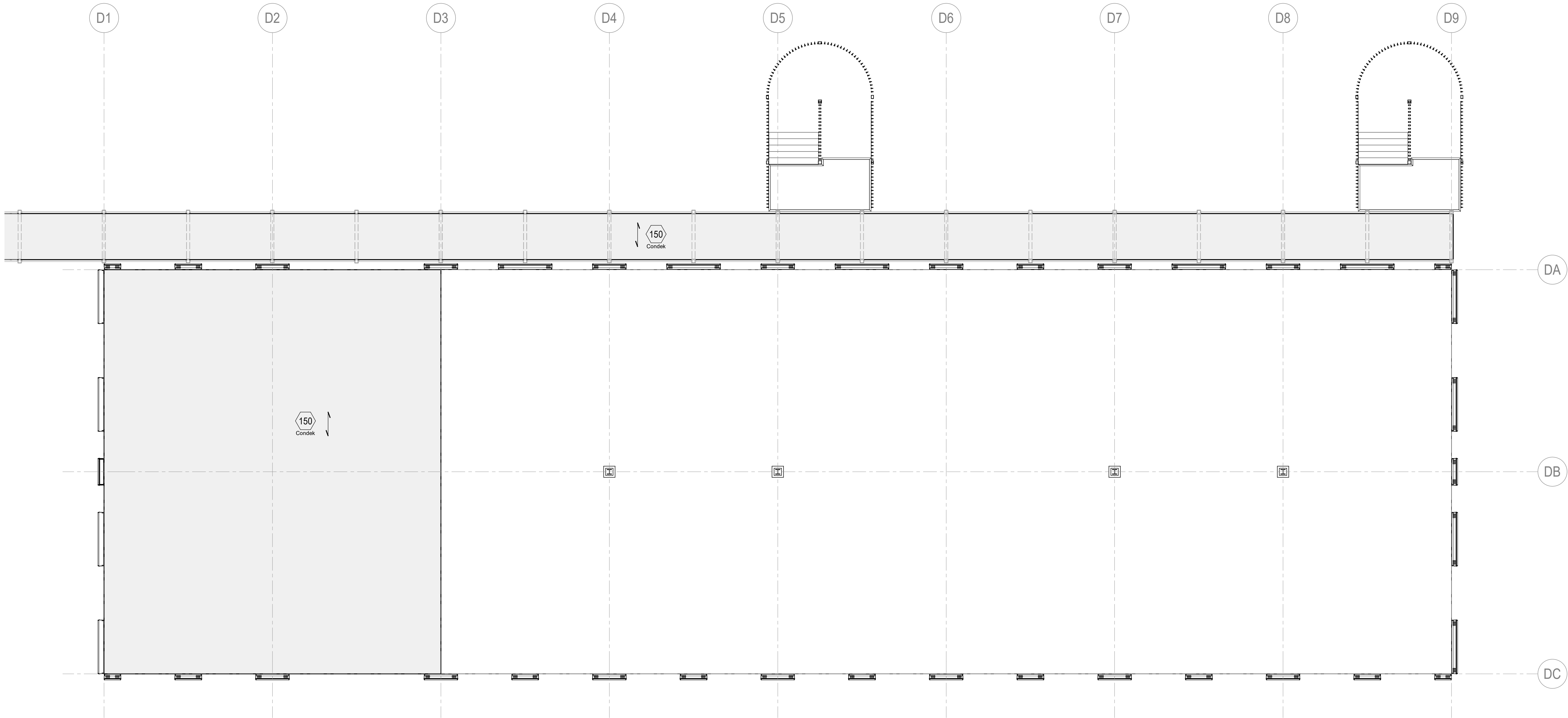
Authorised
GB

Job No
211523

Drawing No
S4231

Revision
P1

22/11/2021 12:52:56 PM



BUILDING 4 LEVEL 3 OUTLINE PLAN

SCALE 1:100

1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

S4241 P1
Printed : 22/11/2021 12:53:00 PM
C:\Users\paulh\Documents\MSC_R02L_Plan\tag@nsw.com.au.rvt

A1 0 1 2 3 4 5 6 7 8 9 10

P1	SCHEMATIC DESIGN	GB	PSH	22.11.21			
Rev	Description	Eng	Draft	Date	Rev	Description	Eng



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

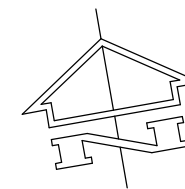
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 4 LEVEL 3
OUTLINE PLAN**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S4241	P1
22/11/2021 12:53:00 PM		



SCALE 1:100

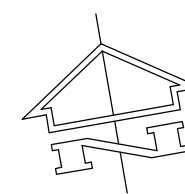
1.  DENOTES DIRECTION OF 150 CONDEK SLAB, U.N.O.
2. FLOORS TO BE TIMBER CLT SPANNING BETWEEN SECONDARY BEAMS, TYPICAL UNO
3. CONTRACTOR TO DETERMINE NUMBER OF PANELS AND SETOUT. FINAL DESIGN TO BE REVIEWED BY STRUCTURAL ENGINEER
4. PENETRATIONS TO BE CO-ORDINATED WITH SERVICES CONTRACTOR
5. FIRE RATING TO FIRE ENGINEERS & BCA REQUIREMENTS
6. ALL FLOOR FINISHES TO ARCHITECT'S DETAILS
7. REFER TO ARCHITECT'S DRAWINGS FOR SETOUT OF ALL COLUMNS, WALLS AND SETDOWNS.

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S4261	P1

22/11/2021 12:53:01 PM



A1 0 1 2 3 4 5 6 7 8 9 10

Client

 **Education**
School Infrastructure

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

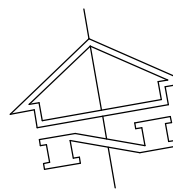
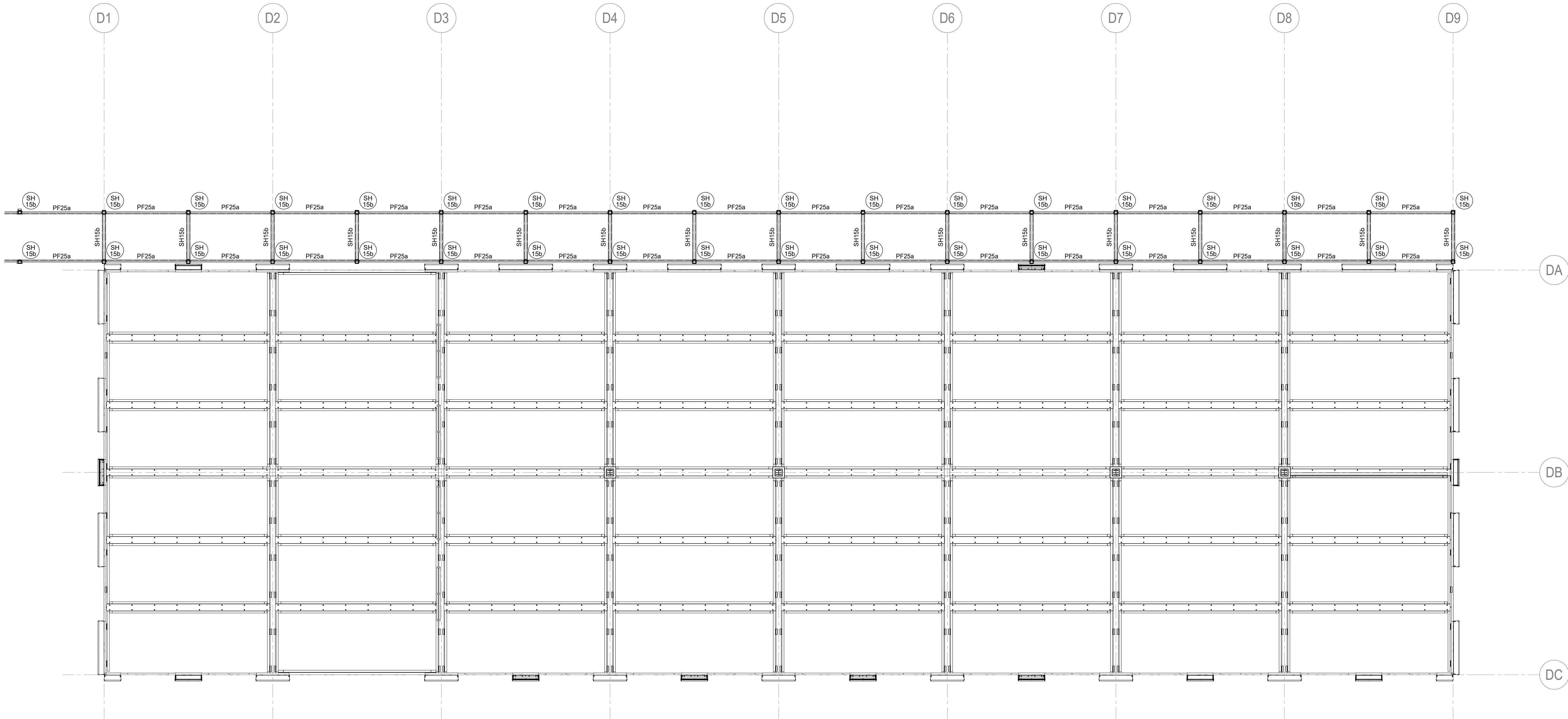
Project

MURWILLUMBAH
EDUCATION CAMPUS

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
1 : 100	PSH	GB
Job No 211523	Drawing No S4311	Revision P1

22/11/2021 12:53:04 PM



BUILDING 4 LEVEL 2 MARKING PLAN

SCALE 1:100
1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES.

S4321 P1
Printed : 22/11/2021 12:53:08 PM
C:\Users\paulh\Documents\MSC_P02L_Plan\tag@ttw.com.au.vnt

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date	Rev	Description	Eng	Draft	Date
P1	SCHEMATIC DESIGN	GB	PSH	22.11.21					



Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect
architectusTM
Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

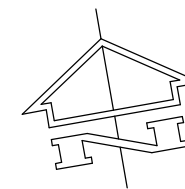
Structural Engineer
TTW **Structural Civil Traffic Façade**
+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project
**MURWILLUMBAH
EDUCATION CAMPUS**

Sheet Subject
**BUILDING 4 LEVEL 2
MARKING PLAN**

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB
Job No	Drawing No	Revision
211523	S4321	P1
22/11/2021 12:53:08 PM		



A1 0 1 2 3 4 5 6 7 8 9 10

Client

 **Education**
School Infrastructure

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Project

MURWILLUMBAH
EDUCATION CAMPUS

PRELIMINARY

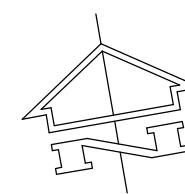
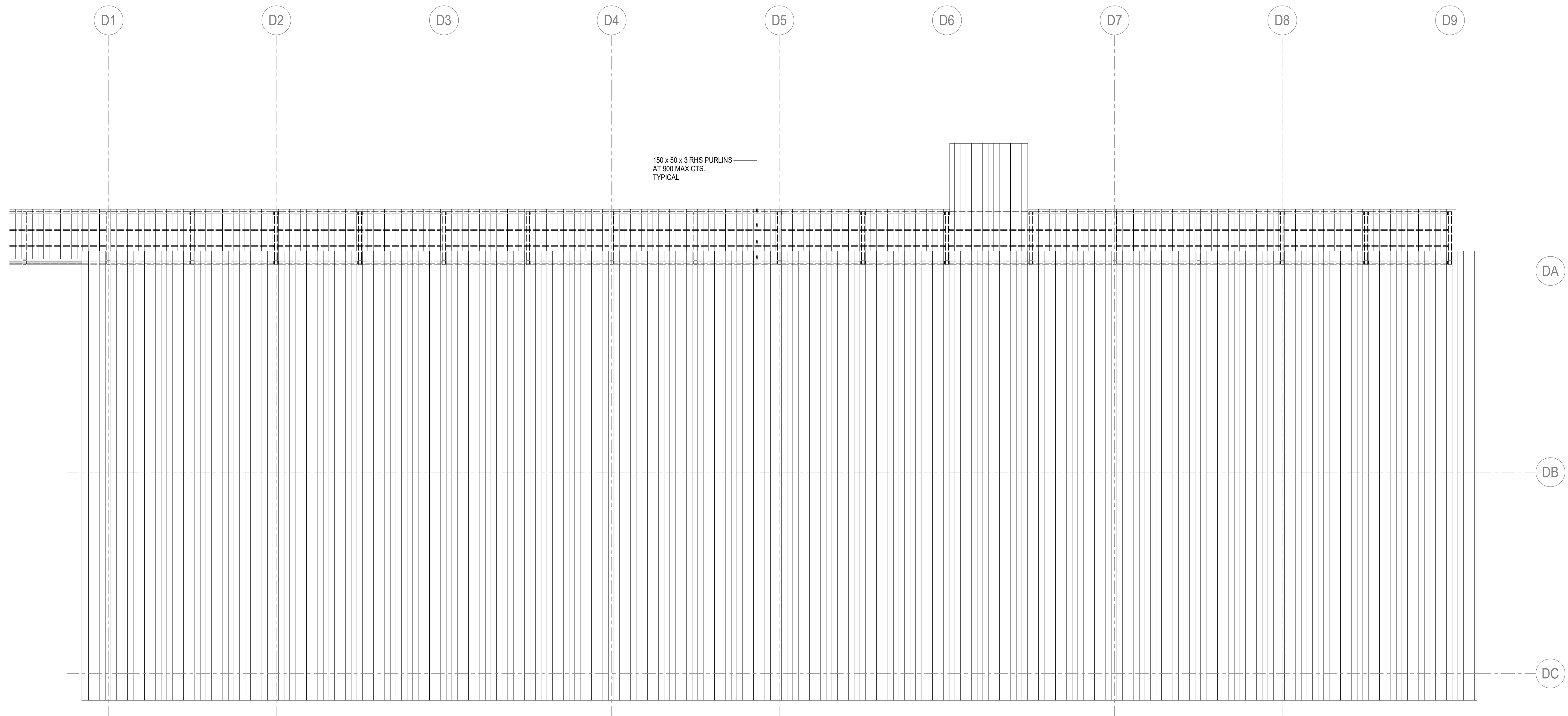
NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S4331	P1

22/11/2021 12:53:13 PM





SCALE 1:100

1. REFER DRAWING No.S1311 FOR TYPICAL FRAMING SIZES

[illegible]

Client

 **Education**
School Infrastructure

Contractor
Built.
Level 4
185 Clarence Street Sydney NSW 2000
T +61 2 8332 4111

Architect

architectus™

Level 18 MLC Centre
19 Martin Place Sydney NSW 2000
T (61 2) 8252 8400

Structural Engineer

TTW **Structura**
Civil
Traffic
Façade

+61 2 9439 7288 | L6 73 Miller Street North Sydney NSW 2060

Project

MURWILLUMBAH
EDUCATION CAMPUS

Sheet Subject

**BUILDING 4 ROOF
MARKING PLAN**

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Scale : A1	Drawn	Authorised
As indicated	PSH	GB

Job No	Drawing No	Revision
211523	S4351	P1

22/11/2021 12:53:21 PM

Appendix B

Structural Concept Risks and Solutions Register

31/03/2021

201603 SAAA

School Infrastructure NSW
Level 8, 259 George Street
Sydney NSW 2000

Attention: Matt Arnett

Dear Matt,

As part of Safe Work Australia's 'Safe Design of Structures Code of Practice' (July 2012) which endeavours to foster safer work places, we have recently undertaken a Safety in Design review of our design on the Murwillumbah Education Campus (MEC) project.

Our review is limited to our scope on the project, namely the Structural Design of the works described in our agreement.

Attached is a summary of the findings of our review which identifies potential hazards and risks with the project and provides a method to address those hazards and risks relating to the design.

It is a requirement of the Code of Practice for this information to be provided to the Principal Contractor for his review and incorporation into the project's safety report.

Any items designed by a Contractor for the Principal Contractor should be assessed for Safety in Design by the Contractor.

For our scope of work shown on the TTW project documentation, we confirm that all hazards/risks have been identified, reviewed and managed, as listed in the following risk register, So Far As Is Reasonably Practicable (SFAIRP).

For and on behalf of,
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST

Geoff BILLS
Technical Director

Identification	Initial Risk Rating	Risk Mitigation	Residual Risk Rating	Responsibility
Demolition Hazard: Premature collapse of the structure during demolition Causes: Lack of support @ risk: Workers	High 4 likelihood 5 consequence	- Identify critical load bearing elements ie walls / columns prior to demolition - Provide appropriate demolition sequence - Provide temporary propping and bracing prior demolition - Demolition drawings prepared showing extent of works	Medium 1 likelihood 4 consequence	Demolition Engineer
Hazard: Demolish section of structure that is not to be demolished Causes: Not understanding the scope of works @ risk: Workers	Significant 2 likelihood 4 consequence	- Meeting with demolition contractor - Builder to mark on site the area to be demolished - Engineer to inspect prior demolition	Low 1 likelihood 2 consequence	To be discussed with Builder / Contractor
Hazard: Overloading existing slab Causes: Heavy construction loads @ risk: Workers	High 4 likelihood 4 consequence	- Demolisher to provide work method statement - Provide floor loading diagram - Check capacity of existing structures - Limit size/speed of construction equipment - Provide temporary propping if required	Medium 1 likelihood 3 consequence	To be discussed with Builder / Contractor

Identification	Initial Risk Rating	Risk Mitigation	Residual Risk Rating	Responsibility
Shoring / Excavation Hazard: Shoring / excavation collapse Causes: - Inadequate support - Not constructed in accordance with documentation @ risk: Workers	High 4 likelihood 5 consequence	- Provide appropriate type of shoring and temporary ground anchor - Provide recommended construction sequence and specification	Medium 1 likelihood 3 consequence	Shoring / piling engineer in coordination with builder / contractor
Hazard: Presence of existing services Causes: Shoring or anchors clash with underground services @ risk: Workers	Significant 4 likelihood 3 consequence	- Request site investigation to determine all underground services - Request and review all available information - Position shoring and temporary ground anchor to avoid services - Relocate services prior to shoring works	Medium 2 likelihood 3 consequence	To be resolved with Builder / Contractor, Project Manager and Architect
Hazard: Undermine and destabilise any adjacent structures Causes: - Lack of support - Ground movement @ risk: Workers and Public	High 4 likelihood 4 consequence	- Structural inspection, site investigation, obtain and review existing drawings - Provide temporary shoring / underpinning sequence - Detail new slab / footings so that excavation is not below base of adjoining foundations	Low 1 likelihood 2 consequence	Structural Engineer + shoring / piling engineer
Hazard: Risk of falling/tripping into open excavation Causes: @ risk: Workers	Significant 2 likelihood 5 consequence	Ensure the contractor is aware of this risk and precautions are included in the work method statement to prevent this to happen.	Significant 1 likelihood 5 consequence	Contractor
Hazard: Injury due to noise, vibration, dust & from falling debris including Causes: - Inadequate technique - Safety equipment not used @ risk: Workers	Medium 2 likelihood 2 consequence	- Ensure all safety equipment used. - Review method statement prior to works - Supervision by qualified staff	Medium 2 likelihood 2 consequence	Builder

Identification	Initial Risk Rating	Risk Mitigation	Residual Risk Rating	Responsibility
Foundations Hazard: Poor quality of rock Causes: - Latent site conditions - Insufficient geotechnical advice @ risk: Client	Significant 3 likelihood 3 consequence	- To be advised following geotechnical advice - Insure there are sufficient boreholes for the site	Low 2 likelihood 1 consequence	Geotechnical Engineer
Hazard: Building loads increased Causes: Change in design and floor layout @ risk: Client	Medium 2 likelihood 2 consequence	Confirm design loads early	Low 1 likelihood 1 consequence	Client / Structural Engineer

Identification	Initial Risk Rating	Risk Mitigation	Residual Risk Rating	Responsibility
Concrete works Hazard: Temporary construction penetrations Causes: Lack of support around the temporary penetrations @ risk: Workers	Significant 4 likelihood 3 consequence	Design floor for both temporary case with penetration and final case with infill slab	Low 1 likelihood 1 consequence	Builder / Contractor to confirm temporary penetrations so floor designer can incorporate in to design
Hazard: Early stripping formwork that results in structural failure Causes: Lack of concrete strength @ risk: Workers	Significant 3 likelihood 4 consequence	- Concrete test required - All PT to be fully stressed and approved prior to formwork stripping - Follow concrete specification and relevant codes	Medium 1 likelihood 3 consequence	Builder / Contractor
Hazard: Structural failure of cantilevered sections of slab Causes: Lack of temporary support @ risk: Workers	Significant 3 likelihood 4 consequence	Propping requirements to engineer's details	Medium 1 likelihood 3 consequence	Builder / Contractor
Hazard: Structural failure at column transfers Causes: Lack of temporary support @ risk: Workers	High 4 likelihood 4 consequence	Propping needs to stay to engineer's instruction	Medium 1 likelihood 3 consequence	Builder / Contractor
Hazard: Failure of PT anchorage Causes: - Lack of cover - Inadequate concrete strength at stressing - Overhead stressing @ risk: Workers	Significant 4 likelihood 3 consequence	- Provide adequate cover and anti burst reo - Request concrete test results prior to stressing - Avoid specifying overhead stressing	Low 1 likelihood 2 consequence	PT floor plate design engineer in coordination with Builder / Contractor, Project Manager and Architect
Hazard: Fall into deep beam Causes: Lack of safe walking platform @ risk: Workers	Significant 4 likelihood 3 consequence	Provide protection mesh over beam deeper than 350mm	Low 1 likelihood 2 consequence	Structural Engineer

Identification	Initial Risk Rating	Risk Mitigation	Residual Risk Rating	Responsibility
Hazard: Lifting heavy reinforcement bars Causes: Heavy Bars @ risk: Workers	Significant 4 likelihood 2 consequence	Limit length of large diameter reinforcement bars	Low 1 likelihood 2 consequence	Structural Engineer / reinforcement scheduler
Hazard: Prefabricated structural elements Causes: Fall during erection @ risk: Workers	High 4 likelihood 4 consequence	- Design prefabricated structural elements so they can be erected from above - Limit size of prefabricated elements	Medium 1 likelihood 3 consequence	Structural Engineer
Hazard: Damage to structure due to penetrations being installed after structure is built Causes: Cutting tendons or reinforcement @ risk: Workers	Significant 4 likelihood 3 consequence	- Coordinate all penetrations prior to construction - Builder to receive approval from design engineer for any new penetrations prior to installation	Low 1 likelihood 2 consequence	Services Engineer and builder / contractor
Hazard: Failure of Mechanical/Chemical anchors. Causes: Anchors not installed in accordance with manufacturer specification @ risk: Workers	High 4 likelihood 4 consequence	- Anchors installation to be carried out by experienced staff - Obtain manufacturer documents for use on site - Involve manufacturer engineer for testing & supervision	Significant 2 likelihood 4 consequence	Builder
Hazard: Injury from reinforcement bars Causes: Cuts/abrasions/impaling @ risk: Contractors, Operatives, Workers and Public	Significant 3 likelihood 3 consequence	- Length of reinforcement to be kept as short as possible. Minimise projections - Provide bar end caps - Provide fence protection to temporary pour strips	Low 1 likelihood 1 consequence	Contractor to provide safety ends to projecting bars.
Hazard: Risk associated with stressing of tendon Causes: - Fall of height slip - Accidental breakage of strands @ risk: Workers	High 4 likelihood 4 consequence	- Ensure safe platform for stressing - Provide adequate barrier when stressing is carried out - Do not stand behind stressing equipment during stressing operations	Significant 2 likelihood 4 consequence	Builder

Identification	Initial Risk Rating	Risk Mitigation	Residual Risk Rating	Responsibility
Hazard: PT Tendon / Reinforcement / Damage / Moved during concreting Causes: - Inadequate support for tendons / reinforcement - Inadequate support for concrete pump pipeline @ risk: Workers	High 4 likelihood 4 consequence	- Carry out final inspection prior to concreting - Concreting process to be supervised by experienced staff	Significant 2 likelihood 4 consequence	Builder
Structural Steel				
Hazard: Fall at height during erection of steelwork Causes: - Lack of safe working platform - Complicated connections requiring large amounts of work at height @ risk: Workers	High 4 likelihood 4 consequence	- Maximise prefabrication - Simple connections - Limit site welds - Provide scaffolding - Use fall arrest systems	Low 1 likelihood 2 consequence	Structural Engineer / Builder
Hazard: Collapse of steelwork during erection Causes: Insufficient bracing and or propping @ risk: Workers	High 4 likelihood 4 consequence	Provide temporary bracing until permanent component installed	Low 1 likelihood 2 consequence	Builder / Contractor
Facade				
Hazard: Fall at height during building maintenance Causes: - Access for maintenance not considered during design - No fall arrest system provided @ risk: End Users	High 4 likelihood 4 consequence	- Structure to be designed for fall arrest loads - In designing facade consideration given to how facade will be maintained	Medium 1 likelihood 3 consequence	Architect, Structural Engineer and Facade Engineer

Identification	Initial Risk Rating	Risk Mitigation	Residual Risk Rating	Responsibility
Structural Adequacy				
Hazard: Integrity of the structure in strength and stability Causes: Insufficient design @ risk: Workers and Public	Significant 2 likelihood 4 consequence	- Follow design brief - Work to be carried out in accordance with TTW design procedure and QA system	Medium 1 likelihood 3 consequence	Structural Engineer
Hazard: Overloading structure during construction Causes: Construction loads exceed design loads @ risk: Workers	High 4 likelihood 4 consequence	- Provide temporary bracing/propping if required - Construction loads to be checked by engineer - Loading information for all hoist, cranes, forklifts etc to be submitted to design engineer for checking prior to use	Medium 1 likelihood 3 consequence	Builder / Contractor
General Siteworks				
Hazard: Disruption to the adjoining owners or users during construction Causes: Poor planning and lack of communication with all stakeholders @ risk: Public and Client	Significant 4 likelihood 2 consequence	- Keep all stakeholders informed - Provide staging and sequence documentation as required	Low 1 likelihood 1 consequence	Builder / Contractor
Hazard: Construction not in accordance with design documentation Causes: Misinterpreted drawings @ risk: Client and Workers	Significant 4 likelihood 2 consequence	- Regular site inspections - Clear and coordinated design documentation - Adequate site supervision	Low 1 likelihood 1 consequence	Structural Engineer, PT Engineer and Builder / Contractor

Prepared By:
Taylor Thomson Whitting (NSW) Pty Ltd
in its capacity trustee for the Taylor Thomson Whitting NSW Trust

Geoff BILLS

Taylor Thomson Whitting (NSW) Pty Ltd (ACN 113 578 377)
as trustee for the Taylor Thomson Whitting NSW Trust
(ABN 59 514 956 558) | Consulting Engineers
Level 6, 73 Miller Street North Sydney NSW 2060

Authorised By:
Taylor Thomson Whitting (NSW) Pty Ltd
in its capacity trustee for the Taylor Thomson Whitting NSW Trust

Geoff BILLS
Technical Director

Legend:

Consequence Likelihood	Insignificant = 1	Minor = 2	Moderate = 3	Major = 4	Catastrophic = 5
Almost Certain = 5	Significant	Significant	High	High	High
Likely = 4	Medium	Significant	Significant	High	High
Possible = 3	Medium	Medium	Significant	Significant	High
Unlikely = 2	Low	Medium	Medium	Significant	Significant
Rare = 1	Low	Low	Medium	Medium	Significant

Likelihood		Consequence	
Almost Certain	Is expected to occur in most circumstances	Catastrophic	Severe adverse impact - (Death)
Likely	Will probably occur in most circumstances	Major	Major adverse impact - (Extensive Injuries)
Possible	Might occur at some time	Moderate	Moderate adverse impact - (Medical treatment required)
Unlikely	Could occur at some time	Minor	Minor adverse impact - (First aid treatment)
Rare	May only occur in exceptional circumstances	Insignificant	Insignificant adverse impact - (No injuries)

	Risk Control Actions
High	The risk is unacceptable. Eliminate the design feature
Significant	High Priority for action
Medium	Responsibility to be allocated
Low	Manage by routine procedure and control

Appendix C

Heritage Wall Structural Condition Report

Heritage Wall Structural Condition Report

Murwillumbah High School

Built – Alec Christofides / 3 June 2021

201603 SBAA

Table of Contents

1.0	Introduction	3
2.0	Heritage Background.....	3
3.0	Condition Report Scope	3
4.0	Investigation Methodology.....	3
5.0	Findings and Recommendations.....	4
5.1	General Structural Condition.....	4
5.2	Mortar Deterioration	4
5.3	Vegetation Growth	4
5.4	Redundant Fixings	4
5.5	Existing Balustrade	4
	Appendix A - Site Investigation Marking Plan	6
	Appendix B - General Inspection Photos.....	7
	Appendix C - Retaining Wall Sketch Section.....	8

1.0 Introduction

This report has been prepared by Taylor Thomson Whitting at the request of Built. The purpose of the report is to record the inspected structural condition of the heritage wall located within Murwillumbah High School Grounds, 86 Kyogle Road, Murwillumbah, visited on 20th January 2021. The weather was cloudy on the day of inspection.

The particulars set out in this report are for the exclusive use of Built. No responsibility is accepted as a result of the use of this report by any other party. This report shall not be construed as a certificate or warranty of the heritage wall.

2.0 Heritage Background

As per the Heritage Impact Report, the Murwillumbah High School “Block A building and other extant elements connected with the original structure and its surrounds...is listed as an item of local heritage significance on Schedule 5 of the Tweed Local Environment Plan 2014 (TLEP)”. Block A and its surrounds were constructed in 1929; the age of the building is approximately 90 years.

The Block A Building is a large 3 storey brick building with school hall and stage complex situated on a sloped site. The basement level, ground floor and first floor levels are of concrete construction with traditional bearing brickwork to internal and external walls. The external façade is un-rendered, red face brick. The timber roof structure is pitched and comprises of timber truss elements and clad with corrugated sheeting.

The Heritage Wall is located to the northwest of the Block A Building structure. The Brick retaining wall and stairs have been graded as of high importance in the Heritage Report. The existing brick retaining wall is an original element, and the proposed masterplan aims to maintain and restore it as a structural element separating the main community and school street at a lower elevation and the integrated open space to the north of Block A, currently a parking zone.

The heritage retaining wall is approximately 220mm thick solid brick masonry with un-rendered red face brick. Constructed in 1929, it is probable that the mortar is a cement/lime/sand mortar. A metal handrail is attached to the top of the wall with steel fixings.

3.0 Condition Report Scope

The general scope of this structural condition survey consisted of the following:

- Inspect and report the condition of the existing heritage wall for the extent marked on the attached marking within Appendix A.
- Provide comments from a structural engineering point of view.
- Identify defects and recommend remediation or further investigations as required.

4.0 Investigation Methodology

The general investigation methodology consisted of the following:

- Carry out three test dig sites in front of the existing wall to investigate retaining wall base details and depths. An excavator subcontractor, a built representative, and a geotechnical engineer were also involved in this process. Refer Appendix A for marking plan identifying the approx. test dig locations.
- Non-destructive visual inspection of the wall and stair, taking measurements and photos.

5.0 Findings and Recommendations

Photographs were taken during the inspection. Refer Appendix B for general photos. Below is a summary of general types of findings and recommendations for remediation when required.

5.1 General Structural Condition

The heritage wall and stair are generally in good condition especially considering its age. The walls appeared plumb, and there were no significant signs of cracking or settlement worth noting. We recommend a surveyor be engaged to record and check wall alignment and plumbness. This could be carried out as part of a pre-construction dilapidation investigation.

No existing structural documentation has been made available for this wall. Specifics of the existing wall that could be seen were recorded during the inspection which were used to produce the sketch wall section in Appendix C in conjunction with some assumptions. Following the inspection, there is not enough information to be able to structurally analyse the existing wall to determine its structural capacity or the maximum allowable load on the upper retained level. However, we understand that the upper level has been used as a carpark for some time now and during the inspection there were no adverse effects or over stressing of the wall noticed.

For future development works and staging, careful consideration should be given to proposed loading within proximity of this wall. We suggest that a geotechnical engineer be consulted to advise the zone of influence to this wall and the required setback to prevent surcharging the wall. This would apply to any loading that would exceed general light vehicle car parking use, e.g., stacked material, plant and equipment, cranes, piling rigs, etc.

5.2 Mortar Deterioration

At some locations, mortar has deteriorated forming gaps and loose bricks. This is likely due to contraction and expansion of the brickwork over time which crumbles the mortar. The mortar then erodes with water ingress. We recommend repointing of the brickwork by a specialist.

5.3 Vegetation Growth

At some locations, the external face of the heritage wall has vegetation growing from mortar joints and weepholes. This may be caused by collection of water in the deteriorated mortar joints due to the erosion of the grout over time, and retention of moisture in weepholes. In the immediate term, the vegetation should be removed, and the roots treated with an herbicide to prevent re-establishment of growth. Any gaps in the brickwork should be filled.

5.4 Redundant Fixings

Any ferrous fixings that are no longer required should be removed to prevent corrosion which will crack the bricks into which they are fixed.

5.5 Existing Balustrade

The existing steel tube balustrade is expected not to form part of the heritage retaining wall. At some locations, the balustrade posts are loose due to either loosened fixings, failed fixings, or missing fixings. In the short term, these fixings should be reinstated or tightened to reinstate the existing condition.

The structural and safety requirements of this existing balustrade in the long term should be considered. Due to the potential fall of up to 3m from top of wall by person or vehicle, the restraint along the top of the wall may need to be a barrier rather, designed to prevent an off-course vehicle.

We note that the structural capacity of the observed balustrade has not been reviewed in any way. Our comments are purely based on observations during the inspection of a condition that does not form part of the condition survey scope. We suggest this is investigated further.

This report is a record of the existing condition of the heritage wall on the property known as Murwillumbah High School Grounds, 86 Kyogle Road, Murwillumbah.

In the best interest of all parties associated with this heritage wall a declaration for signing has been prepared below:

Signed on behalf of Owner

(Signature)

Date:

Prepared by:
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST



EMILY LOUIE
Engineer

Authorised by:
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST



GEOFF BILLS
Technical Director

\\ttwcloud2.ttw.net.au\Jobfiles\2020\2016\201603\Reports\TTW\210602 Heritage Wall Report\210603 Heritage Wall Structural Condition Report ELGB.docx

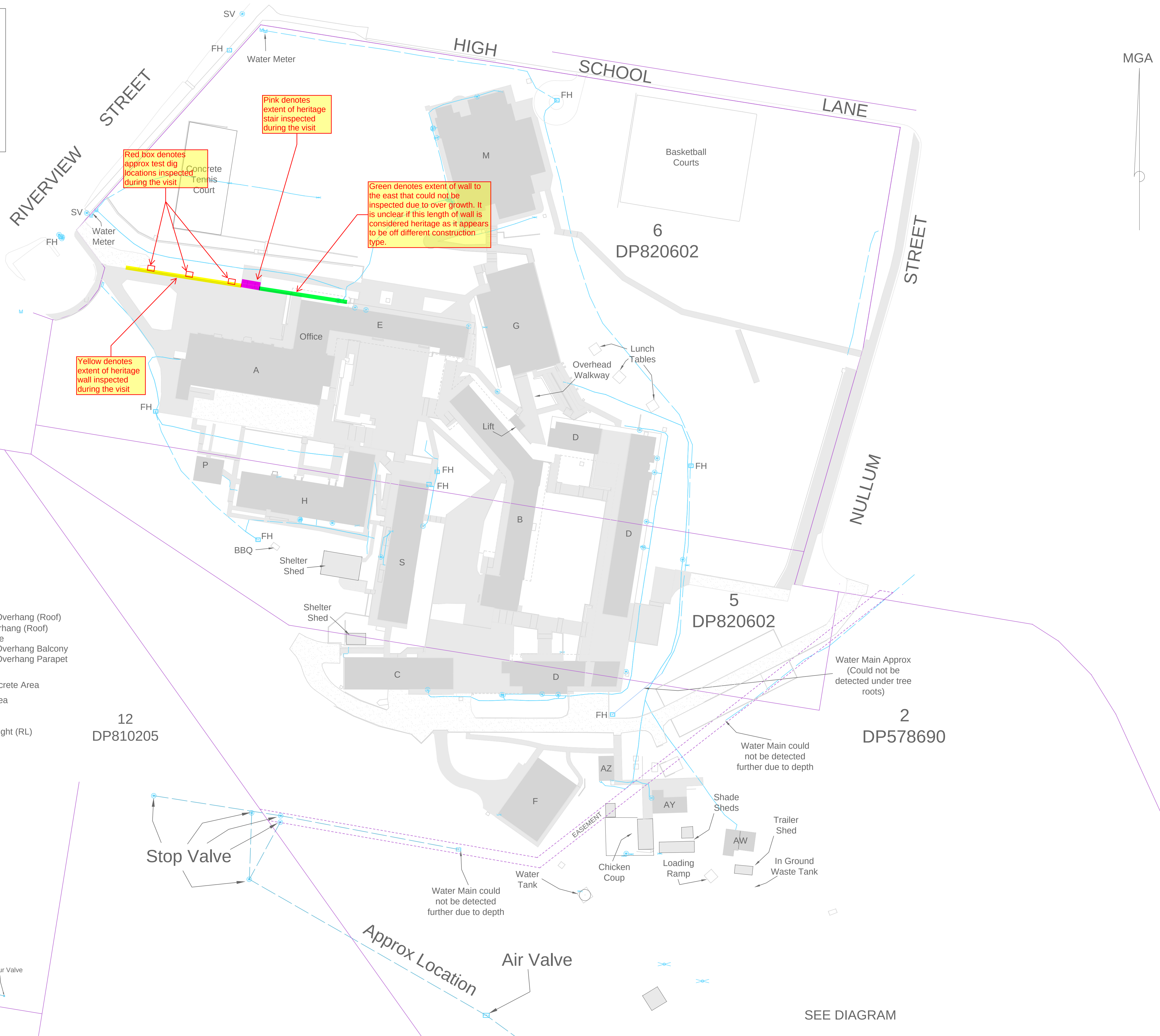
Appendix A

Site Investigation Marking Plan

Services shown as approximate hereon have been located by field survey and location of visible above ground features. Underground services shown as approximate have NOT been located. The approximate location of these services have been shown at the request of the client. The locations shown are based on field observations in pits and existing work as executed data. The directions of lines shown as approximate can only be relied upon as a 'best guess' of the infrastructures location. Prior to any excavation or construction, the relevant authority should be contacted for the possible location of further services and the exact location of all services.

GENERAL SITE INVESTIGATION MARKING PLAN

1
DP792983



Rev	Date	Amendment	Notes :	Design :	Newton Denny Chapelle Surveyors Planners Engineers Email: office@newtondennychapelle.com.au Lismore Suite 1 31 Carrington St. Lismore 2480 T: 66 221011 F: 66 224088 Casino 100 Barker St. Casino 2470 T & F : 66 625000 Client: School Infrastructure NSW Level 8, 259 George Street Sydney, NSW, 2000 Project : Detail Survey - Water Murwillumbah High School Stage 2 86 Kyogle Road, Murwillumbah Date: 13/08/2020 Ref No. 200188 Sheet 8
A				Survey : NDC	
B				Drawn : JJP	
C				Approved:	
D				Datum : AHD	Scale: 1:600@A1
E					
F					
G					

Appendix B

General Inspection Photos

PHOTO 1
Test pit no. 1 general photo



PHOTO 2
Test pit no. 1 existing retaining
wall base edge



PHOTO 3
Test pit no. 1 existing retaining
wall base edge



PHOTO 4
Test pit no. 1 existing retaining
wall base top edge



PHOTO 5
Test pit no. 1 existing retaining
wall base of wall above base



PHOTO 6
Test pit no. 1 sand under existing
retaining wall base



PHOTO 7
Test pit no. 2 general photo



PHOTO 8

Test pit no. 3 general photo, two
digs required due to tree roots



PHOTO 9
Existing wall beyond heritage wall
to the west



PHOTO 10
Top side of heritage wall general
photo



PHOTO 11
Top side of heritage wall general
photo





PHOTO 12
Top side of heritage wall general
photo

PHOTO 13
Top side of heritage wall general
photo



PHOTO 14
Top side of heritage wall balustrade
post with missing and loose fixings



PHOTO 15
Heritage wall elevation general
photo



PHOTO 16
Heritage wall elevation general
photo



PHOTO 17
Heritage wall elevation general
photo



PHOTO 18
Heritage wall elevation general
photo



PHOTO 19
Observed plant growth with
deteriorating brick mortar



PHOTO 20
Observed plant growth with
deteriorating brick mortar



PHOTO 21
Deteriorating mortar on op of
heritage wall



Appendix C

Retaining Wall Sketch Section

Sketch Section of Heritage Wall Based
Upon Survey Observations - NTS

