CONSULTING EARTH SCIENTISTS

01 June 2020

CES Document Reference:
CES180704-IDC-AC

Ibiz Design and Constructions Pty Ltd
Level 4, 64 Clarence Street
Sydney NSW 2000

For the attention of Mr. Tony Whaling

Re: 6A Watsford Road, Campbelltown – Preliminary Geotechnical Assessment of Potential Development Impacts on Railway Infrastructure

1) INTRODUCTION

Consulting Earth Scientists Pty Ltd (CES) has been requested by Ibiz Design and Constructions Pty Ltd (Ibiz (the Client)) to provide a preliminary geotechnical assessment with regards to the potential impact on nearby railway infrastructure of the proposed development at 6A Watsford Road, Campbelltown, NSW (the Site).

The development comprises the construction of the Warakirri College Learning Centre, which is proposed to comprise a two-storey building with one level of basement carpark.

This letter has been prepared in response to comments received from Transport for NSW (TfNSW) in TfNSW document entitled "*New Request for Advice – Warakirri College (SSD-0420) (Campbelltown)"* dated 08 April 2020 and specifically the following comments/requests:

1. *Geotechnical and Structural report/drawings that meet Sydney Trains requirements. The Geotechnical Report must be based on actual borehole testing conducted on the site closest to the rail corridor, including a rail specific section on any potential impacts and mitigation measures.*

2. *Construction methodology with construction details pertaining to structural support during excavation. The Applicant is to be aware that Sydney Trains will not permit*

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any rock anchors/bolts (whether temporary or permanent) within its land or easements.

In reply to these comments/requests with regards to the geotechnical aspects of the proposed development, we provide the following information.

2) GEOTECHNICAL INVESTIGATION

A geotechnical investigation for the Site was undertaken by CES in August 2018. The results of this investigation are presented in the following report.

- *Preliminary Geotechnical Investigation Report, 6A Watsford Road, Campbelltown, New South Wales*. (CES Document Reference CES180704-IDC-AB dated 18 October 2018).

A copy of this geotechnical report is attached to this correspondence in Annexure A.

Based on the results of the geotechnical investigation, the following geotechnical model for the Site is assessed:

- Ground Level to 0.1 m: Unit 1 – Topsoil.
- 0.1 m to 4.8 m: Unit 2 - Alluvium: Very stiff to hard, low plasticity sandy gravelly Clay.
- 4.8 m to 5.7 m: Unit 3 - Residual Soil: Very stiff to hard, low plasticity, silty Clay.
- 5.7 m to 7.1 m: Unit 4 - Shale (Class IV): Extremely and highly weathered, very low to low strength Shale.
- 7.1 m to >8.4 m (termination depth of deepest borehole): Unit 5 - Shale (Class III): Moderately and slightly weathered, medium strength.

Groundwater was not observed in the boreholes during auger drilling to the base of Unit 3 Residual Soils. Rotary core drilling was used to progress the boreholes through the Unit 4 and Unit 5 Shale. Significant groundwater inflows were not observed.

Please refer to the afore mentioned geotechnical report for further details.

3) GEOTECHNICAL REVIEW OF THE PROPOSED DEVELOPMENT PLANS

Architectural drawings for the proposed development have been prepared by Koturic & Co Pty Ltd entitled "*New Learning Centre, 6A Watsford Road, Campbelltown, Job No. 1901"*. Architectural drawings pertinent to the geotechnical aspects of the development are shown in the following drawings, copies of which are included in Annexure B:

- *Site Plan*, Drawing No. A-01, Amendment P1, April 2019.
- *Lower Ground Floor Plan*, Drawing No. A-02, Amendment P1, November 2019.
- *Elevations*, Drawing No. A-06, Amendment P1, November 2019.
- *Sections*, Drawing No. A-07, Amendment P1, November 2019.
- *Sections Retaining Wall Elevations*, Drawing No. A-08, Amendment P1, November 2019.

In addition to the above, we have been provided with drawings prepared by the Structural Engineers Henry and Hymas Pty Ltd (*New Learning Centre, 6A Watsford Road, Campbelltown*, dated December 2019). The drawing pertinent to this geotechnical assessment is as follows, a copy of this drawing is enclosed in Annexure C:

- *Footing Plan*, Drawing No. 19712-S2.00, Revision 1.

Review of the above referenced drawings and consideration of available information for the Site indicates the following:

1. The Site elevation varies from approximately RL 61.2 m in the north to approximately RL 64 m at the southern boundary of the Site.

2. A Sydney Trains easement is located to the south of the Site with a Sydney Trains acoustic wall (approximately 4 m in height) located within a distance of approximately 0.5 m of the southern boundary of the Site. The acoustic wall appears to be constructed on pile footings, the foundation depths of the piles are currently not known.

3. Other railway infrastructure in proximity to the Site include four railway lines laid on sleepers and ballast. The closest rail track is located approximately 6 m south of the acoustic wall. The elevation of the rail track is considered to be similar to that of the ground near the acoustic wall, being approximately RL 64 m.

4. The basement carpark proposed as part of the development is located between 9.5 m and 12 m north of the southern Site boundary. The base elevation of the proposed basement is RL 57.885 m, which will require an excavation approximately 6.1 m in depth.

5. It is proposed to excavate the basement by battering the excavation sides at slope ratios of approximately 1.5 Horizontal to 1 Vertical (1.5H:1V) in the southeast part of the Site and approximately 2H:1V in the southwest part of the Site.

6. Footings for the proposed building are to comprise spread footings for the basement retaining walls and interior columns. These footings are to be founded with a minimum embedment of 500 mm below the final basement pad level. The footing design assumes an allowable bearing pressure of 150 kPa, bearing at an approximate elevation of RL 57.2 m. Based on the geotechnical model for the site, it is anticipated that these footings will be founded in Unit 3 Residual Soil (very stiff to hard Clay) or Unit 4 Class IV Shale.

7. The proposed outdoor and garden area is to be covered by a canopy. The canopy is to be supported on four support columns located at approximate 5 m spacings, centre to centre. The canopy support columns are to be founded using 450 mm diameter bored piles. The piles will be located between approximately 6.5 m and 8 m from the southern site boundary and between approximately 7.0 m and 8.5 m from the acoustic wall.

   The piles are to be socketed a minimum 300 mm into Class IV Shale with an allowable end bearing pressure of at least 1,000 kPa and allowable shaft adhesion of at least 150 kPa. Based on the results of the geotechnical investigation, it is anticipated that these piles will require to be founded approximately 6.0 m or deeper below current ground level at approximate RL 56.5 m, which is approximately 7.5 m or deeper below ground level at the southern Site boundary.

8. The outdoor and garden area between the proposed building and southern site boundary is to be constructed at an elevation of RL 61.150 m. This will require an excavation approximately 2.8 m deep at its maximum depth that will be situated

approximately between 2 m and 4 m from the southern Site boundary and approximately between 2.5 m and 4.5 m from the acoustic wall.

The ground between the outdoor and garden area and the Site boundary is to be supported by the construction of two retaining walls in a tiered configuration. The excavation for the upper tier retaining wall is shown to be approximately 1.5 m deep and indicated to commence less than 0.5 m and up to approximately 2 m from the southern Site boundary and approximately between 0.5 m and 2.5 m from the acoustic wall.

The tiered retaining walls shown on the design drawings are proposed to be concrete masonry block walls with reinforcement to the Engineers details. The upper and lower retaining walls are approximately 1.5 m and 2.5 m in height, respectively, and are not proposed to require lateral support by ground anchors.

4) CONSTRUCTION METHODOLOGY

As described above, the excavation for the basement car park will be approximately 6.1 m in total depth at a distance of between 9.5 m and 12 m from the southern Site boundary and a distance of between 10 m and 12.5 m from the acoustic wall. Excavation for the outdoor and garden area will be approximately 2.8 m deep at a distance of between 2 m and 4 m from the southern Site boundary and approximately between 2.5 m and 4.5 m from the acoustic wall. It is anticipated that the batter for the outdoor and garden area will commence approximately at the Site boundary which is within 0.5 m of the acoustic wall.

Based on the geotechnical investigation for the Site, the materials expected to be encountered during excavation of the basement and outdoor and garden area are the Unit 1: Topsoil, Unit 2 Alluvium, Unit 3 Residual Soil and Unit 4 Extremely and Highly Weathered Shale. Excavation plant such as hydraulic excavators and backhoes are considered adequate for the excavation of these materials. The use of rippers, impact hammers and rock saws is not likely to be required for the bulk excavation works.

The proposed outdoor and garden area canopy is to be supported on 450 mm diameter bored piles located approximately between approximately 6.5 m and 8 m from the southern Site boundary and between approximately 7.0 m and 8.5 m from the acoustic wall. Based on the geotechnical report and pile requirements, the piles are anticipated to be required to be bored

to a depth of about 6 m or deeper below current ground level and about 7.5 m or deeper below ground level at the southern Site boundary and acoustic wall.

5) ASSESSMENT OF POTENTIAL IMPACTS ON RAILWAY INFRASTRUCTURE

5.1 ASSESSED POTENTIAL IMPACTS

In consideration of the above, the following potential impacts on adjacent railway infrastructure from the proposed development works are provided:

a) Potential movement and disturbance to railway infrastructure due to ground movements associated with excavations at the Site.

b) Potential disturbance or undermining of the footings of the Sydney Train acoustic wall during excavation work at the Site.

c) Potential movement of, and disturbance to railway infrastructure due to ground movements associated with dewatering during and following excavation and construction of the basement.

d) Potential impact on railway infrastructure from vibrations induced by excavation and piling plant during construction.

e) Potential impact on railway infrastructure from building loads.

The assessed potential risk to railway infrastructure from the above potential impacts is as follows.

5.2 ASSESSMENT OF RISK OF ADVERSE IMPACT TO RAILWAY INFRASTRUCTURE

5.2.1 Assessment of Risk of Adverse Impact Due to Ground Movement (Items a), b) and c))

The ground investigation indicates that competent material comprising very stiff to hard, low plasticity Clays (Unit 2 Alluvium and Unit 3 Residual Soil) are present at the Site to a depth of approximately 5.7 m, below which lies Shale rock. Excavation for the proposed development commences a distance of less than 0.5 m and up to approximately 2 m from the southern Site boundary and approximately between 0.5 m and 2.5 m from the acoustic wall.

For preliminary estimation purposes, published data suggests that lateral movements of an adequately designed and installed retaining system in soils will be between 0.2% and 0.5% of the retained height for adequately engineered walls. In consideration of this, the anticipated movement behind the retaining walls to be constructed between the outdoor and garden area and the Site boundary would be expected to be in the range of 6 mm to 14 mm.

Given the close proximity of the acoustic wall footings to the proposed excavation, there is a risk that ground movement could impact on the footings of the acoustic wall if the acoustic wall footings are founded at shallow depth. However, the acoustic wall footings appear to be founded on piles. If theses piles are deep footings founded in competent material below the proposed depth of the excavation, the ground movements anticipated due to excavation work would be expected to be of low risk to the Sydney Trains acoustic wall.

It is recommended that as part of the detailed design stage of the proposed development, that the design and construction method of the acoustic wall footings and condition of the footings be ascertained and a further assessment undertaken to confirm expected ground movements based on the finalised retaining wall design and to confirm that support or underpinning of the acoustic wall footings is not required

Groundwater was not observed in the boreholes during drilling to the base of Unit 3 Residual Soils and significant groundwater inflows were not detected in the rock formation. Significant dewatering and groundwater abstraction is therefore not anticipated to be required during excavation of the basement and outdoor and garden area. Construction of the four, 450 mm diameter bored piles for the outdoor and garden area canopy will also not require significant dewatering during construction. Ground movements due to drawdown of the groundwater is therefore considered to be unlikely.

5.2.2 Assessment of Risk of Adverse Impact Due to Vibration (Items d))

As described in Section 4, conventional plant such as hydraulic excavators and backhoes should be adequate to undertake the excavation work. The use of equipment known to induce significant ground vibration such as rippers and impact hammers are not anticipated to be used during the excavation works.

The ground investigation indicates that competent material comprising very stiff to hard, low plasticity Clays overlying rock are present at the Site. This material is not susceptible to disturbance or volume change due to vibration.

Bored pile construction works do not typically generate significant ground vibration (assuming that down the hole percussive hammer drilling techniques are not employed). Review of published information (New Zealand Transport Agency research report 485, Ground vibration from road construction, May 2012 (NZ TA 2012)) and our experience, indicates that vibrations produced during boring of piles are typically low with peak particle velocities (PPV) of less than 3 mm/s beyond a distance of 8 m from the piling works. The bored piles are located a distance between approximately 7 m and 8.5 m from the acoustic wall, ground vibrations of the magnitude sufficient to cause damage to railway infrastructure are therefore not anticipated.

In consideration of the above, it is assessed that the risk of adverse impact on railway infrastructure from ground vibrations due to bored pile construction is considered to be low risk.

5.2.3 Assessment of Risk of Adverse Impact Due to Completed Building Loads

The spread footings for the basement car park will be approximately 6.8 m in total depth at a distance of between 9.5 m and 12 m from the southern Site boundary and a distance of between 10 m and 12.5 m from the acoustic wall. The proposed outdoor and garden area canopy piles will be bored approximately 7.5 m or deeper in total depth at a distance of between approximately 6.5 m and 8 m from the southern Site boundary and between approximately 7.0 m and 8.5 m from the acoustic wall. The position, size and loading of the spread and pile footings proposed for the project are such that adverse impact from post construction building loads on railway infrastructure are considered to be low risk.

6) SUMMARY

In consideration of the ground conditions assessed during the geotechnical investigation, the development proposal presented in the above referenced design drawings, assuming appropriate and good quality workmanship is undertaken during construction and assuming the Sydney Trains acoustic wall is founded on deep piles in competent material, it is preliminarily assessed that the risk of adverse impact on TfNSW infrastructure due to the proposed construction works is low risk.

Notwithstanding this, it is recommended that further detailed assessment be undertaken as part of the detailed design stage of the project once the design of the retaining walls and proposed construction sequence are determined and once the construction details and footing system of the Sydney Trains acoustic wall are confirmed. An appropriate geotechnical monitoring programme should also be prepared once development details and TfNSW requirements are finalised.

7) CLOSING

We trust that the above is in order, should you require further information or clarification of any matter described in this correspondence, please do not hesitate to contact the undersigned on 8569 2200.

For and on behalf of Consulting Earth Scientists Pty Ltd,

Max Kemnitz
Senior Geotechnical Engineer

Enclosed:

Annexure A: *Preliminary Geotechnical Investigation Report, 6A Watsford Road, Campbelltown, New South Wales,* Consulting Earth Scientists Pty Ltd Document Reference CES180704-IDC-AB, dated 18 October 2018.

Annexure B: Copy of Koturic & Co Pty Ltd Drawings Nos. A-02, A-06, A-07 and A-08.

Annexure C: Copy of Henry and Hymas Pty Ltd Drawing No. 19712-S2.00

Note 1: References:

New Zealand Transport Agency research report 485, *Ground vibration from road construction*, May 2012

ANNEXURE A

***PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT, 6A WATSFORD ROAD, CAMPBELLTOWN, NEW SOUTH WALES*, CES DOCUMENT REF. CES180704-IDC-AB, DATED 18 OCTOBER 2018.**

CONSULTING EARTH SCIENTISTS

PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT

6A WATSFORD ROAD, CAMPBELLTOWN, NEW SOUTH WALES

PREPARED FOR IBIZ DESIGN AND CONSTRUCTION PTY LTD

CES DOCUMENT REFERENCE: CES180704-IDC-AB

Written by: Henry Noakes

Reviewed by: D. Lowe

Authorised by: **Duncan Lowe**

Client: Ibiz Design and Construction Pty Ltd

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PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT

6A WATSFORD ROAD, CAMPBELLTOWN, NEW SOUTH WALES

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1 INTRODUCTION

Consulting Earth Scientists Pty Ltd (CES) was commissioned by Ibiz Design and Construction Pty Ltd (the Client) to undertake a Preliminary Geotechnical Investigation (PGI) at 6A Watsford Road, Campbelltown, New South Wales (the Site). The Site is currently in due diligence phase and intended for development. Based on correspondence with the Client, CES understands that the development will consist of an approximately 15 metre-high building with a single level basement car park.

The purpose of this preliminary geotechnical investigation is to assess the subsurface ground conditions and provide information on the following:

- The subsurface conditions for the Site;
- Expected groundwater conditions;
- Likely excavation conditions and support;
- Suitable foundation system and allowable bearing pressures; and
- Potential presence of Acid Sulfate Soils

This report presents findings of the preliminary geotechnical investigation which was undertaken in general accordance with CES proposal reference CES180704-IBC-AA dated 04 July 2018. Contemporaneous with the PGI, a preliminary environmental investigation was also undertaken; the results of this preliminary environmental investigation are presented in CES document reference CES180704-IBC-AC, dated 27 September 2018. This report should be read in conjunction with the preliminary environmental site investigation

2 THE SITE

2.1 SITE LOCATION & DESCRIPTION

The Site is located at 6A Watsford Road, Campbelltown, NSW. The Site is bounded to the north by Watsford Road, to the east and west by a single storey warehouse/office building and to the south by the Campbelltown to Central Station railway. The total site area is 1,747 m^2 and is identified as Lot 113 in Deposited Plan (DP) 1183297. At the time of investigation, the Site was

vacant and covered in landscaped grasses and included a garden bed in the south-west corner of the Site containing some evenly spaced 3 to 4 metre trees. The Site location is shown in Figure 1.

2.2 SURROUNDING LAND USE

Based on observations made during the fieldwork and through a review of available aerial photographs, the land surrounding the Site is classified by Campbelltown City Council as B5-Business Development.

2.3 REGIONAL GEOLOGY

A review of the Wollongong-Port Hacking 1:100,000 scale map for the area, Geological Series, Sheets 9029 to 9129 (Geological Survey of NSW, Department of Mineral Resource, 1985) indicates that the Site is underlain by Quaternary alluvial deposits comprising quartz and lithic fluvial sand, silt and clay.

2.4 ACID SULFATE SOILS

A review of the Atlas of Australian Acid Sulfate Soils (ASS) maps provided by the Department of Planning and Environment shows the Site has an extremely low probability of ASS occurring.

2.5 TOPOGRAPHY

A review of the NATMAP Digital Topographical – Zone 56 Mosaic for Campbelltown and Nearmap aerial imagery indicated the area around the Site to be sloping very gently down to the southwest. Georges River lies approximately 4 kilometres east and the Nepean river approximately 8 kilometres west of the Site.

3 METHOD OF INVESTIGATION

3.1 FIELDWORK

3.1.1 Borehole Drilling

Two boreholes were drilled across the Site on 29 August 2018 using a Hanjin track mounted geotechnical drilling rig. Table 1 provides a summary of borehole coordinates, interpolated ground levels and termination depths. The ground levels have been interpolated using Near-map software and the borehole coordinates were determined using a hand-held GPS. The boreholes were not surveyed.

Table 1: Borehole Summary

Borehole Reference	Easting (MGA 56)	Northing (MGA 56)	Elevation (m AHD)	Termination	
				Depth (m)	Lithology
BH01	298532.79	6228905.86	62.5	8.5	Low strength Shale
BH02	298504.26	6228930.33	61.5	8.4	Low strength Shale

4 RESULTS OF THE INVESTIGATION

4.1 SUMMARY OF SUBSURFACE CONDITIONS

An inferred geotechnical model has been prepared for the Site based on the geotechnical boreholes. The inferred geotechnical model is presented in Table 2. The depths of the various strata are based on the depths encountered at the borehole locations and may be different at other parts of the Site. Detailed descriptions and depths of materials encountered are presented on the geotechnical borehole logs enclosed in Appendix A.

Table 2: Geotechnical Model of the Site

Unit	Geotechnical Unit	Approximate Depth to base of Unit (m)	Estimated Thickness (m)	Typical Description
Unit 1	Topsoil	0.1 to 0.15	0.1 to 0.15	Sandy Clay, low plasticity, pale brown. Sands fine grained, sub-rounded with some silt and fine gravels. Trace organics including fine roots.
Unit 2	Alluvium	4.8 to 5.4	4.7 to 5.25	Sandy Gravelly Clay, low plasticity, mottled brown, grey and pale orange. Sands typically fine grained and sub-rounded. Gravels sub-rounded. Trace silt. Stiff to very stiff.

Unit	Geotechnical Unit	Approximate Depth to base of Unit (m)	Estimated Thickness (m)	Typical Description
Unit 3	Residual Soil	5.5 to 5.7	0.1 to 0.9	Silty Clay, low plasticity, dark grey. Residual soil from extremely weathered rock underlying the site, fragments of very low strength Shale present. Very stiff to hard.
Unit 4	Extremely and Highly Weathered Shale (Class IV) *	6.2 to 7.1m	0.7 to 1.4m	Shale, fine grained, highly to extremely weathered and low to very low strength [Ashfield Shale]
Unit 5	Moderately and Slightly Weathered Shale (Class III) *	Greater than 8.4m	Greater than 2.1m	Shale, fine grained, slightly to moderately weathered and medium strength [Ashfield Shale]

*Shale classification in accordance with P.J.N Pells et al[1]

4.2 GROUNDWATER OBSERVATIONS

Groundwater inflow was not observed in the boreholes during auger drilling to the base of Unit 3 residual soils, core drilling was used to progress through the Unit 4 and Unit 5 shale formation and large groundwater inflows were not observed. It should be noted that groundwater levels may vary over time due to changes in climatic conditions.

4.3 EARTHWORKS AND SITE PREPARATION

Topsoil and unsuitable materials including soils with high organic or silt content should be stripped from the Site area to be developed. Topsoil should be stockpiled for re-instatement of landscaped areas requiring re-vegetation. Where trees are required to be removed, stumps should be grubbed out and root systems cleared.

If areas are required to be raised as part of the development, filling will be required. The nominated areas should be filled using suitable geotechnical material obtained from excavations on the Site or imported fill. Suitable geotechnical material is a fill that is capable of being compacted to form a homogeneous mass capable of supporting structural elements of the proposed development and which does not contain the following unsuitable materials:

- Organic soils such as topsoil, severely root affected subsoils and peat;
- Offsite derived material that is not assessed as Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) or materials not subject to a General or Specific Resource Recovery Exception as approved by the NSW Environment Protection Authority. Imported fill should be accompanied by documentation adequately demonstrating the material's compliance with the exemption conditions;
- Materials containing substances which can be dissolved or leached out in the presence of moisture, or which undergo volume change or loss of strength when disturbed and exposed to moisture;
- Silts or materials that have the deleterious engineering properties of silt;
- Fill which contains wood, metal, plastic, boulders or other deleterious material;
- Loose, soft, wet or unstable soil or rock; and
- Material deemed unsuitable by the geotechnical practitioner.

Suitable fill should be placed in near horizontal layers of uniform thickness systematically across the fill area. The fill should be placed in layers no greater than 250mm compacted thickness and compacted to a minimum density ratio of 98% based on the Standard Maximum Dry Density Ratio (SMDDR) to ± 2 % of Optimum Moisture Content (OMC). Fill within 0.5m of slab or pavement subgrade level should be compacted to a minimum of 100% SMDDR to within ± 2 % of OMC.

Erosion and sediment controls should be implemented during the earthworks to avoid sediment discharge into the stormwater utilities on Watsford Road. Controls should be implemented in accordance with the requirements of Landcom Publication "Managing Urban Stormwater: Soils and Construction".

4.4 EXCAVATION CONDITIONS AND SUPPORT

4.4.1 Excavatability

Conventional plant such as bulldozers, hydraulic excavators and backhoes should be adequate for excavation of the Unit 2 Alluvium, Unit 3 Residual Soil and Unit 4 Extremely and Highly Weathered Shale. The excavation of Unit 5 Moderately and Slightly Weathered Shale may require more effort such as using rippers, impact hammers and rock saws. Vibration damages or structural stress on neighbouring structures should be considered if using these methods.

Contractors should be required to examine borehole records to make their own assessment of excavation plant and production rates.

4.4.2 Permanent and Temporary Batter Slopes

Excavations in the Unit 2 Alluvium should stand at temporary slopes of 2 horizontal to 1 vertical (2H:1V) and 2.5H:1V for permanent batter slopes, if unprotected. Protected slopes should stand at 1.75H:1V if temporary and 2.25H:1V if permanent.

Safe batter angles of temporary excavations in the Unit 4 Shale will be dependent upon the nature and orientation of discontinuities such as joints and bedding and groundwater ingress.

Cut slope batters in the Unit 4 and Unit 5 Shale should be finalised during detailed investigation and design, but as a preliminary guide these materials should stand at 0.5H:1V if temporary.

The relatively small site may potentially restrict basement excavations to be cut back to safe batter angles without the need for excavation support. Potential support methods include temporary shoring or an engineered retaining solution.

Soil and weathered rock stability characteristics are time dependent and the method of excavation and support should be considered in conjunction with the design and construction methodology. The depth of the water table will have an impact upon the temporary and permanent works design and may require further investigation as construction details develop.

Surcharge loads should be kept well clear of the crests of excavations, approximately at a distance equivalent to the slope height or better. If a batter of steeper gradient than recommended above is required, or a surcharge is required to be placed close to the crest of the batter, an engineered retaining solution is recommended.

4.5 FOOTINGS

4.5.1 Strip or Pad Footings

Strip or pad footings may be founded in the Unit 2 alluvium. This material is considered suitable as a bearing stratum for flexible structures.

The bearing capacity of a pad or strip footing constructed on the Unit 2 alluvium will be dependent on the geometry of the footing. To limit settlement, it is suggested that a factor of safety of 3 be applied to the ultimate bearing capacity calculated for the particular footing geometry. The maximum allowable bearing pressure should be limited to 150kPa.

Exposed materials in footing excavations should be assessed by a suitably qualified and experienced geotechnical engineer prior to blinding and construction of the footings.

4.5.2 Deep Footings

Pile footings may be considered and appropriate pile types are summarised below. Noise and vibration should however be considered when selecting the pile design and construction methodology appropriate for the Site. Piles should be founded in the Unit 4 or Unit 5 Shale.

4.5.2.1 Bored Piles

Open bored piles or Continuous Flight Auger (CFA) piles could be adopted. It would be expected that with appropriate capacity, piling rigs should be able to penetrate into the Unit 4 and Unit 5 Shale. An experienced geotechnical engineer should observe boring of the piles to assess the rock levels and to confirm that the rock is suitable for the adopted design parameters and depths. Preliminary allowable design parameters for bored piles are provided in Table 3. The use of the recommended allowable bearing pressures would be expected to result in pile settlement of about 1% of the pile diameters.

For uplift capacity, the shaft adhesion value should be multiplied by 0.6. In addition to shaft adhesion, the uplift capacity should be checked for a cone pull-out failure mode assuming a cone angle of 70° considering the submerged weight of the soil or rock and adopting a factor of safety of 1.0 against pull-out.

Table 3: Preliminary Design Parameters for Piles

Geotechnical Unit	Unit End Bearing Resistance (kPa)	Unit Shaft Adhesion (kPa)
Unit 2 Alluvium	Not Applicable	20
Unit 3 Residual Soil	Not Applicable	20
Unit 4: Extremely and Highly Weathered Shale (Class IV)	1000	150
Unit 5: Moderate and Slightly Weathered Shale (Class III)	2000	200

Notes:

(a) Shaft adhesion should only be assumed where piles have a minimum embedment of at least 3 pile diameters into the nominated stratum and a rough socket (at least grooves of depth 1mm to 4mm and width greater than 5mm spacing of 50mm to 200mm). The socket should be cleaned and roughened by a suitable scraper such as a tooth, orientated perpendicular to the auger shaft.

4.5.2.2 Displacement Piles

Displacement piles such as driven precast piles, driven cast-in situ piles and displacement screw piles can provide high shaft and end bearing resistances. Displacement piles could be installed to bear on the Unit 4 or Unit 5 shale. Consideration should be given to potential difficulties of driving piles through the Unit 3, stiff to very stiff alluvium observed during the investigation.

The design ultimate geotechnical strength of a piles or pile groups should be determined as per AS2159 – 2009 by considering factors including negative friction, soil swelling, cyclic loading and earthquake loading. The piles should be designed in consideration of serviceability requirements including settlement, lateral deflection and rotation such that they are within the appropriate limit for the structures and their intended use.

As a preliminary guide, piles designed using the limit state or working stress approach could be proportioned using the geotechnical parameters provided below in Table 3. A geotechnical reduction factor (Øg) of 0.5 should be adopted in accordance with AS2159-2009 for preliminary design.

If piles are required to penetrate to the Unit 4 Shale (Class III) or better to adopt the higher associated bearing pressures, additional boreholes should be drilled and inspected by a qualified geotechnical engineer to confirm the level of the Unit 4 Shale (Class III).

4.6 RETAINING WALLS AND SHORING

Where retaining walls are cantilevered or supported by a single row of anchors and some wall movement can be tolerated (flexible wall), retaining walls can be designed assuming a triangular earth pressure distribution. Flexible retaining wall design parameters for the different soil units are provided in Table 4.

Table 4: Preliminary Retaining Structure Design Parameters

Geotechnical Unit	Bulk Density (kN/m^3)	Cu Undrained Shear Strength (kPa)	c' Effective Cohesion (kPa)	Effective Friction Angle (degrees)	Active Earth Pressure Coefficient (Ka)	Passive Earth Pressure Coefficient (Kp)
Unit 2 Alluvium	20	50	20	26	0.39	2.6
Unit 3 Residual Soil	22	80	50	28	0.36	2.8

The active pressure coefficient shown above (Ka) assumes that the ground behind the wall will be horizontal. Where ground anchors or internal props restrain retaining wall movement, or where significant movements cannot be tolerated (rigid wall), an 'at-rest' earth pressure coefficient (Ko) of 0.5 should be adopted with a trapezoidal pressure distribution. However, it should be noted that walls designed for this 'at rest' coefficient will still undergo some lateral movements, depending on the wall used and construction sequence.

The design of any retaining structures should make allowance for all applicable surcharge loading including construction activities around the perimeter of the excavation and adjacent buildings. In addition to lateral earth pressures and surcharge loads, consideration should be given to the possibility of a hydrostatic pressure due to build-up of water behind the wall (e.g. from broken services) unless permanent subsurface drainage can be provided.

5 GEOTECHNICAL CONSTRAINTS

- Excavation and footing installation methodology should consider potential impacts to the adjacent properties and infrastructure resulting from ground movement and/or vibration; and
- Further investigation works may be required at the detailed design stage and a suitably qualified and experienced geotechnical practitioner should be engaged during the construction phase to assess the stability of batter slopes and suitability of footing foundations.

6 LIMITATIONS OF THIS REPORT

This report has been prepared for use by the client who commissioned the works in accordance with the project brief and based on information provided by the client. The advice contained in this report relates only to the current project and all results, conclusions and recommendations should be reviewed by a competent person with experience in geotechnical and environmental investigations before being used for any other purpose. Consulting Earth Scientists Pty Ltd (CES) accepts no liability for use or interpretation by any person or body other than the client. This report must not be reproduced except in full and must not be amended in any way without prior approval by the client and CES.

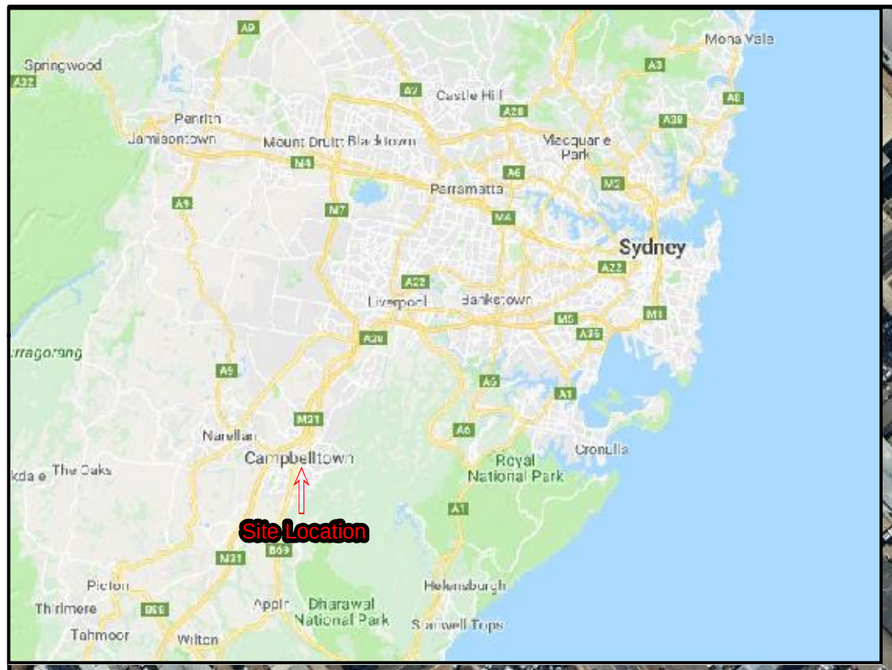
It should be noted that boreholes were drilled within the site during the investigation. Therefore, the geotechnical model was inferred only and may not fully represent the accuracy of the overall ground conditions across the site. Spatial variability in ground conditions within the site can occur even at very small distance between any two test points. Excavation for footings, pavement and retaining walls construction will confirm the likelihood of such ground variability.

This report does not provide a complete assessment of the geotechnical or environmental status of the site and is limited to the scope defined therein. Should information become available regarding conditions at the site including previously unknown sources of contamination, CES reserves the right to review the report in the context of the additional information.

7 REFERENCES

- Geological Series sheet 9029 to 9129, Geological Survey of NSW, Department of Mineral Resource published in 198.
- Standard Australia, 2017. AS1726- Geotechnical Site Investigation.
- Pells, P.J.N., Mostyn, G., and Walker, B.F. (1998), Foundations on Sandstone and Shale in the Sydney Region, Australian Geomechanics Journal. [1]

FIGURE 1: SITE LOCATION PLAN



Legend

Site Boundary

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble NSW, 2073
ph 8569 2200 fax 9983 0682

Title

Figure 1: Site Location Plan

CES Project ID:	Date:
CES180704-IDC	11/09/2018
Prepared By: H.Noakes	Checked By; D.Lowe

FIGURE 2: SITE LAYOUT PLAN

N

BH2

BH1

0 1.5 3 6 9 12 15
Metres

Source: Nearmap

Legend

- Borehole Locations
- Fill Mound
- Site Boundary

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55 Grandview Street, Pymble NSW, 2073
ph 8569 2200 fax 9983 0582

Title

Figure 2: Site Layout Plan

CES Project ID:	Date:
CES180704-IDC	11/09/2018
Prepared By: H.Noakes	Checked By; D.Lowe

APPENDIX A: GEOTECHNICAL BOREHOLE LOGS

Project ID:	CES180704-IDC
Client:	Ibiz Design & Construction
Project:	Preliminary Geotechnical Investigation
Location:	6A Watsford Rd, Campbelltown

CONSULTING EARTH SCIENTISTS
Jones Bay Wharf 19-21, Suite 55
26-32 Pirrama Road, Pyrmont NSW 2009
PH: (02) 8569 2200 FAX: (02) 9552 4399
www.consultingearth.com.au

LOG ID: BH01

Sheet: 1 of 1

X-Coord:	298504.3	**Date Commenced:**	29/08/2018	**Logged by:**	H.N.
Y-Coord:	6228930.3	**Date Completed:**	29/08/2018	**Checked by:**	D.L.
Surface Elevation (R.L) :	61.5 m AHD	**Hole Diameter (mm):**	115mm		

Drilling Information				LITHOLOGY					Samples	Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor component	Consistency / Density	Moisture	Sample ID	SPT	Pocket Penetrometer (kPa)	Notes and additional observations
0.0	62	125mm Auger			CL	TOPSOIL: Sandy CLAY, low plasticity, pale grey/brown. Sand is fine grained, sub rounded, with gravel, fine, angular, with silt, trace fine roots.	Soft	MC<PL				[TOPSOIL]
0.5						Sandy CLAY: low plasticity, pale grey/orange/brown mottled. Sand is fine grained, sub rounded, with silt and fine gravel, angular, trace fine roots in top 0.5m.	Hard					[ALLUVIAL]
1.0									ENV (1.0m-1.45m)	SPT at 1-1.45m 10,11,24 N=35		
1.5	61											
2.0					CI	CLAY: medium plasticity, pale grey, with sand, fine grained, angular.	Stiff					
2.5	60				CL	Sandy CLAY: Low plasticity, mottled pale grey/brown, sand is fine grained, sub-angular, with gravels, fine grained, sub-rounded and rounded, iron rich gravels.	V.Stiff			SPT at 2.5-2.95m 6,10,13 N=23		
3.0												
3.5	59											
4.0									ENV (4.0m-4.45m)	SPT at 4-4.45m 5,9,15 N=24		
4.5	58											
5.0					CL	Silty CLAY: Low plasticity, dark grey, (extremely weathered shale, fragments present).						[RESIDUAL]
5.5	57									SPT at 5.5-5.95m 19,>30 Refusal, hammer bounce at 5.7m		
6.0		NMLC				Begin core drilling at 5.7m bgl. Refer to BH01 corelog for details.						

Project ID: CES180704-IDC
Client: Ibiz Design & Construction
Project: Geotechnical and Enviormental Investigation
Location: 6A Watsford Rd, Campbelltown

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26 - 32 Pirrama Road, Pyrmont, NSW 2009
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Corehole ID: BH01

Sheet: 1 of 1

X-Coord: 298504.3
Y-Coord: 6228930.3
Surface Elevation (R.L.): 62.5 mAHD

Date Commenced: 29/08/2018
Date Completed: 29/08/2018
Hole Diameter (mm): 75mm

Logged by: H.N.
Checked by: D.L.

Drilling Information					LITHOLOGY						Natural Defects		
Depth (mBGL)	R.L. (m)	Method (Support)	% Coreloss	Water	Symbol	Rock Description ROCK TYPE: grain characteristics, colour structure, minor components	Weathering	Estimated Strength MPa (0.03 EL, 0.1 VL, 0.3 L, 1 M, 3 H, 10 VH, EH)	Is (50) MPa	RQD %	Spacing (mm) (20, 60, 200, 600, 2000)	Description
5.0												5
5.5	57					Refer to BH01 borelog for details.						
		NMLC	0%			SHALE: fine grained, grey, very low strength, extremely weathered, broken core.	EW			47%		
6.0						SHALE: fine grained, grey, low strength, highly weathered, laminated, 1-2mm spacing.	HW					6 6.03-6.5m, Joint set, J85-90, Sl,Pl, Cl 6.15-6.2m, Sm, C, Co (clay)
6.5	56					SHALE: fine grained, low strength, moderately weathered, fine sandstone, 2-5mm thick, 40-50mm spacing.	MW					6.59-6.61m, CS90, C 6.74-6.76m, CS90, C
7.0						SHALE: fine grained, grey, medium strength, slightly weathered, medium strength, laminations of fine grained sandstone.	SW					7 7.15m, P90, C, Sm, St
7.5	55											
8.0												8
8.5	54					End of hole at 8.5m. Target depth. Water not observed						
9.0												9

Project ID:	CES180704-IDC
Client:	Ibiz Design & Construction
Project:	Preliminary Geotechnical Investigation
Location:	6A Watsford Rd, Campbelltown

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LOG ID: BH02

Sheet: 1 of 1

X-Coord:	298532.8	**Date Commenced:**	29/08/2018	**Logged by:**	H.N.
Y-Coord:	6228905.9	**Date Completed:**	29/08/2018	**Checked by:**	D.L.
Surface Elevation (R.L) :	61.5 m AHD	**Hole Diameter (mm):**	115mm		

Drilling Information				LITHOLOGY					Samples	Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor component	Consistency / Density	Moisture	Sample ID	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Notes and additional observations
0.0	61	125mm Auger			CL	TOPSOIL: Sandy CLAY, low plasticity, pale brown, sand is fine grained, sub rounded, with silt and fine grained gravels, angular, trace fine roots.	Soft V.Stiff	MC<PL				[TOPSOIL] [ALLUVIAL]
0.5					CL	Gravelly CLAY: low plasticity, pale orange/brown, gravel is fine grained, sub-rounded, with silt and fine grained sand.						
1.0						Sandy CLAY: low plasticity, mottled pale grey/orange. Sand is fine, angular to rounded, with silt.			ENV (1.0m-1.45m)	SPT at 1-1.45m 6,10,13 N=23		
1.5	60											
2.0												
2.5	59									SPT at 2.5-2.95m 6,8,10 N=18		
3.0												
3.5	58											
4.0									ENV (4.0m-4.45m)	SPT at 4-4.45m 5,10,14 N=24		
4.5	57											
5.0					CI	CLAY: Medium plasticity, pale grey. Sand is fine grained, sub-angular, with gravel, fine grained, sub-rounded and rounded with iron staining evident on gravel.	Stiff					
5.5	56	NMLC Core			CL	Silty CLAY: low plasticity, dark grey, (extremely weathered shale, fragments present).	V.stiff			SPT at 5.5-5.95m N>30 Refusal, hammer bounce at 5.5m		[RESIDUAL]
6.0						Begin core drilling at 5.5m bgl. Refer to BH02 corelog for details.						

Project ID: CES180704-IDC
Client: Ibiz Design & Construction
Project: Geotechnical and Enviormental Investigation
Location: 6A Watsford Rd, Campbelltown

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PH: (02) 8569 2200 FAX: (02) 9552 4399
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Corehole ID: BH02

X-Coord: 298532.8
Y-Coord: 6228905.9
Surface Elevation (R.L.): 62.5 mAHD
Date Commenced: 29/08/2018
Date Completed: 29/08/2018
Hole Diameter (mm): 75mm
Logged by: H.N.
Checked by: D.L.

Drilling Information					LITHOLOGY						Natural Defects		
Depth (mBGL)	R.L. (m)	Method (Support)	% Coreloss	Water	Symbol	Rock Description ROCK TYPE: grain characteristics, colour structure, minor components	Weathering	Estimated Strength MPa (0.03 EL, 0.1 VL, 0.3 L, 1 M, 3 H, 10 VH, EH)	Is (50) MPa	RQD %	Spacing (mm) (20, 60, 200, 600, 2000)	Description
5.0	-5	NMLC	0%			Refer to BH02 borelog for details.				78%		
5.5						SHALE: fine grained, grey, low strength, moderately weathered.	MW					5.53m, J90, Sm, U, Co (clay) 5.54m, J10, Sm, C, Co (clay)
6.0	-6					SHALE: fine grained, pale grey, medium strength with sandstone laminations, moderately weathered, 5-10mm spacing, 1-2mm thick.						
6.5						SHALE: fine grained, pale grey, medium strength, moderately weathered, laminations more frequent, 2-3mm thick, 5-10mm spacing.						6.65-6.68m, CS90, R, St, Cl
7.0	-7					SHALE: fine grained, pale grey, medium strength, 2-3mm thick, 5-10mm spacing.						7.15-7.21m, CS90, R, St, Cl
7.5						SHALE: fine grained, grey, medium strength, slightly weathered, laminations of sandstone.	SW					
8.0	-8											
8.5						End of hole at 8.4m. Target depth. Water not observed.						
9.0	-9											

APPENDIX B: SITE PHOTOGRAPHS

Site Walkover Photograph 1

Client Name:	Site Location:	Project Number:
Ibiz Design and Construction	6A Watsford Road, Campbelltown, New South Wales	CES180704-IDC

Date:	Plate 1
28/08/2018	

Description:
Site before drilling works commenced, photograph taken from western end of the Site facing northeast.

Site Walkover Photograph 2

Client Name:	Site Location:	Project Number:
Ibiz Design and Construction	6A Watsford Road, Campbelltown, New South Wales	CES180704-IDC

Date:	Plate 2
29/08/2018	

Description:
Geotechnical drilling rig aligned over Borehole 01, ready to commence drilling.

Drilling Progress Photograph 1

Client Name:	Site Location:	Project Number:
Ibiz Design and Construction	6A Watsford Road, Campbelltown, New South Wales	CES180704-IDC

Date:	Plate 3
29/08/2018	

Description:
Typical SPT sample taken from the fill layer consistent across the Site.

Drilling Progress Photograph 2

Client Name:	Site Location:	Project Number:
Ibiz Design and Construction	6A Watsford Road, Campbelltown, New South Wales	CES180704-IDC

Date:	Plate 4
29/08/2018	

Description:
Typical SPT sample taken from the residual silty clay layer consistent across the Site.

Drilling Progress Photograph 3

Client Name:	Site Location:	Project Number:
Ibiz Design and Construction	6A Watsford Road, Campbelltown, New South Wales	CES180704-IDC

Date:	Plate 5
29/08/2018	

Description:
Ashfield Shale sample core drilled from Borehole 01, note the high fracture frequency in the shallow component of the hole.

Drilling Progress Photograph 4

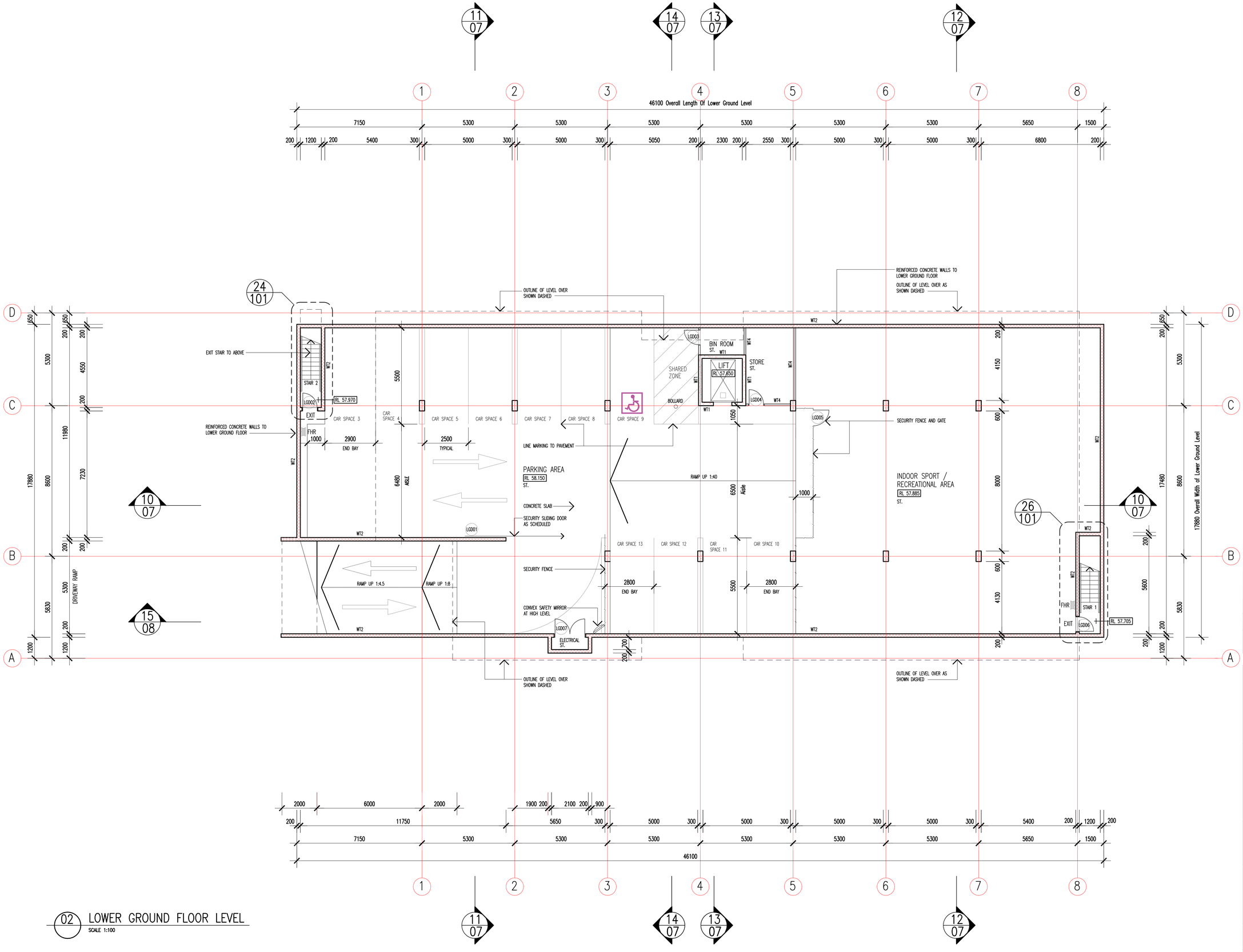
Client Name:	Site Location:	Project Number:
Ibiz Design and Construction	6A Watsford Road, Campbelltown, New South Wales	CES180704-IDC

Date:	Plate 6
29/08/2018	

Description:
Ashfield Shale sample core drilled from Borehole 02. Note the increased frequency of fine, sandstone laminations at the base of the hole.

ANNEXURE B

COPY OF KOTURIC & CO PTY LTD DRAWING NOS. A-02, A-06, A-07, & A-08



02 LOWER GROUND FLOOR LEVEL

SCALE 1:100

PRELIMINARY ISSUE

NOTES:

ALL DIMENSIONS TO BE VERIFIED PRIOR TO COMMENCEMENT OF WORK.

USE FIGURED DIMENSIONS ONLY. DO NOT SCALE.

ALL STRUCTURAL WORK, DRAINAGE AND LANDSCAPING TO CONSULTANTS DETAILS.

ALL WORK TO COMPLY WITH CURRENT REGULATIONS AND S.A.A. STANDARDS.

LEGEND:

- INDICATES PRE-CAST CONCRETE WALL PANELS TO ENG'S DETAILS
- INDICATES DINCEL WALL CONSTRUCTION TO ENG'S DETAILS
- INDICATES CONCRETE BLOCK WALL REINFORCING TO ENG'S DETAILS.
- INDICATES STUD WALL FRAME PLASTERBOARD LINED
- + RL XX.XXX — EXISTING SPOT REDUCED LEVEL. VERIFY ON SITE.
- FFL XX.XXX — PROPOSED FINISH FLOOR LEVEL.
- RL XX.XXX — PROPOSED TOP OF CONCRETE SURFACE.
- + RL XX.XXX — PROPOSED FINISH LEVEL OR SPOT RL.

ABBREVIATIONS:

AW	AWNING WINDOW
BO	BULKHEAD OVER
CA	CARPET
CFC	COMPRESSED FIBRECEMENT
CJ	CONTROL JOINT
CM	CEMENT RENDER AND PAINTED
CR	COLORBOND ROOFING
CT	CERAMIC TILES
DP	DOWNPIPE
F	FIXED WINDOW
FC	FIBRECEMENT
FF	FLOATING TIMBER FLOORING AS SCHEDULED
FH	FIRE HYDRANT
FW	FLOOR WASTE
HYD.	HYDRANT VALVE
MC	METAL CLADDING
OFC	OFF FORM CONCRETE
OFO	OVERFLOW OUTLET
OG	OBSCURE GLASS
SC	STONE CLADDING
SF	STONE FLOORING
T.O.W.	TOP OF WALL
V.O.S.	VERIFY ON SITE
WM	WATERPROOF MEMBRANE

NO.	DATE	REVISION / ISSUE DETAILS
	12-12-2019	PRELIMINARY ISSUE

AMENDMENT / ISSUE LOG:

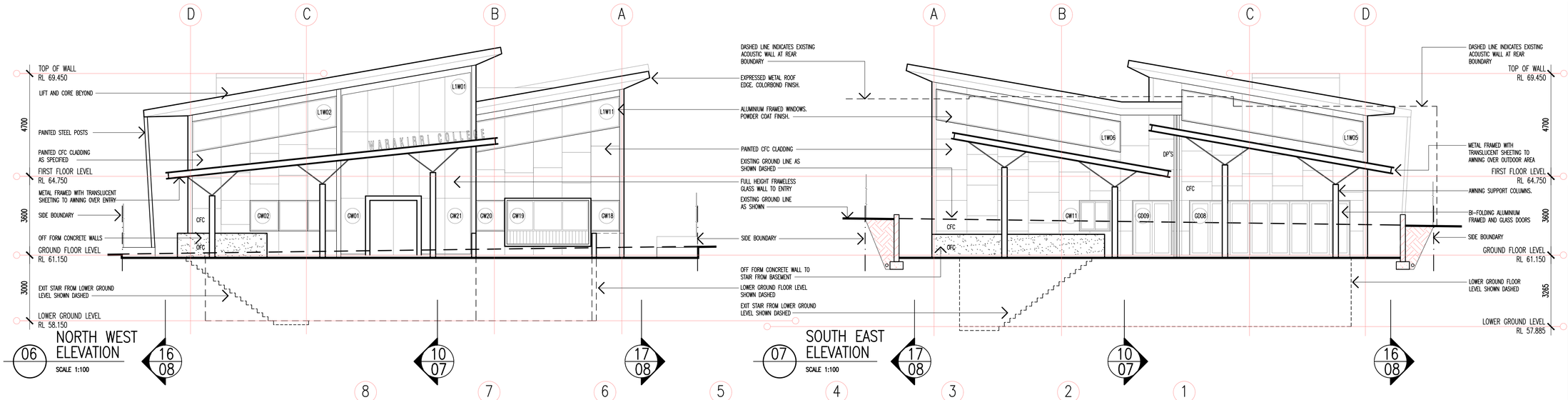
ARCHITECTS:
Koturic+Co.
STEVEN KOTURIC – NOM. ARCHITECT NSW REG. 9442
P.O. BOX 580 CONCORD NSW 2137
E: architects@koturicandco.com M: 0414 953 091

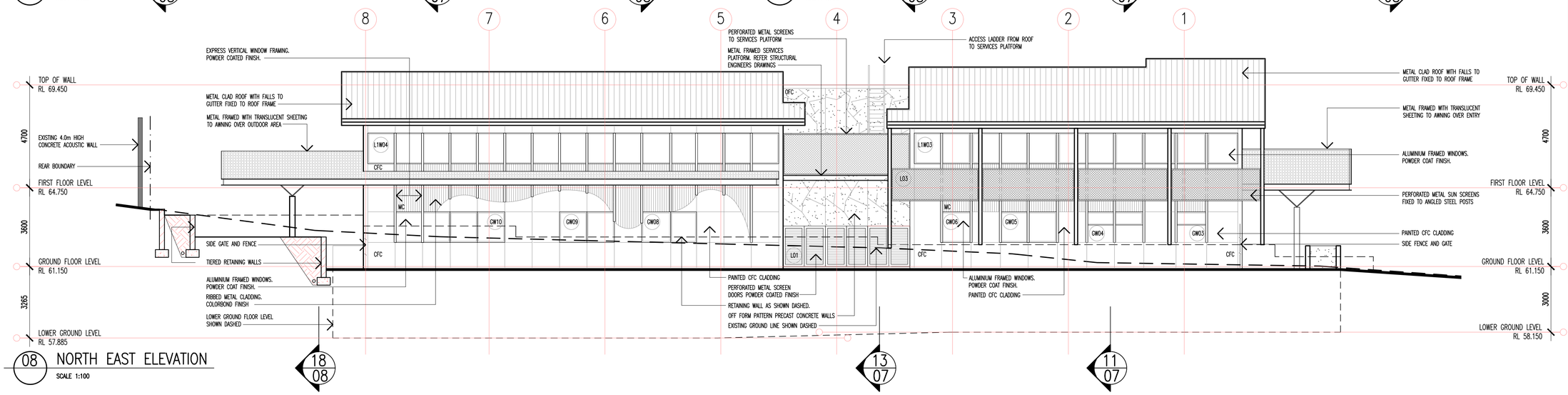
CLIENT:
WARAKIRRI COLLEGE
L2, 138 QUEEN STREET
CAMPBELLTOWN

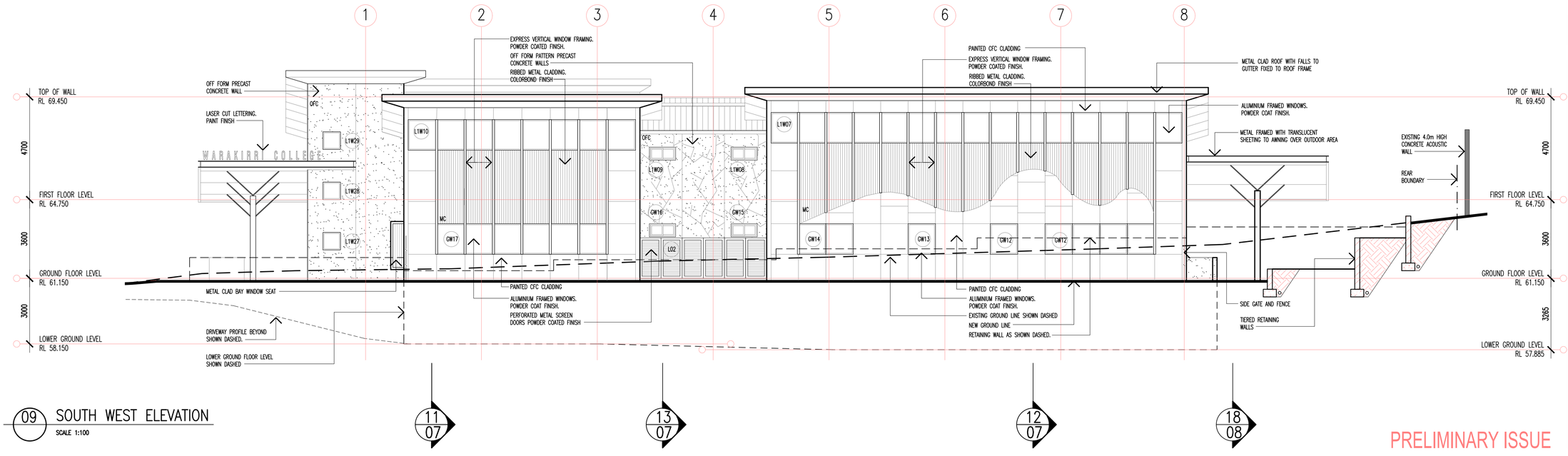
PROJECT:
NEW LEARNING CENTRE
6A WATSFORD ROAD, CAMPBELLTOWN

DRAWING:
LOWER GROUND FLOOR PLAN

JOB NO:	SCALE:	DRG NO:	AMEND:
1901	1:100 @ A1	A-02	P1
DRAWN: DFP	DATE: NOV.2019		







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BO	BULKHEAD OVER
CA	CARPET
CFC	COMPRESSED FIBRECEMENT
CJ	CONTROL JOINT
CM	CEMENT RENDER AND PAINTED
CR	COLORBOND ROOFING
CT	CERAMIC TILES
DP	DOWNPIPE
F	FIXED WINDOW
FC	FIBRECEMENT
FF	FLOATING TIMBER FLOORING AS SCHEDULED
FH	FIRE HYDRANT
FW	FLOOR WASTE
HYD.	HYDRANT VALVE
MC	METAL CLADDING
OFC	OFF FORM CONCRETE
OFO	OVERFLOW OUTLET
OG	OBSCURE GLASS
SC	STONE CLADDING
SF	STONE FLOORING
T.O.W.	TOP OF WALL
V.O.S.	VERIFY ON SITE
WM	WATERPROOF MEMBRANE

NO.	DATE	REVISION / ISSUE DETAILS
	12-12-2019	PRELIMINARY ISSUE

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ARCHITECTS:
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STEVEN KOTURIC – NOM. ARCHITECT NSW REG. 9442
P.O. BOX 580 CONCORD NSW 2137
E: architects@koturicandco.com M: 0414 953 091

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NEW LEARNING CENTRE
6A WATSFORD ROAD, CAMPBELLTOWN

DRAWING:
ELEVATIONS

JOB NO:	SCALE:	DRG NO:	AMEND:
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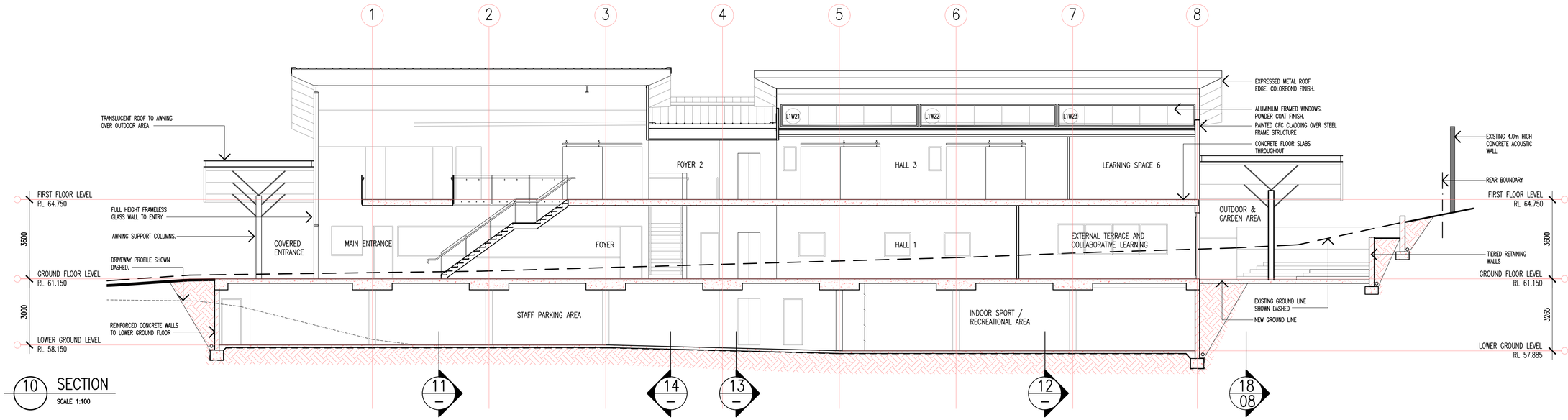
DRAWN: DFP	DATE: NOV.2019		



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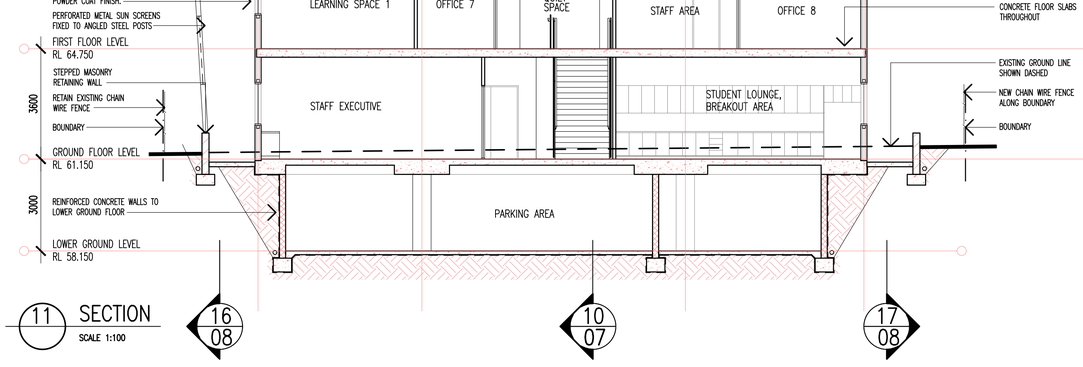

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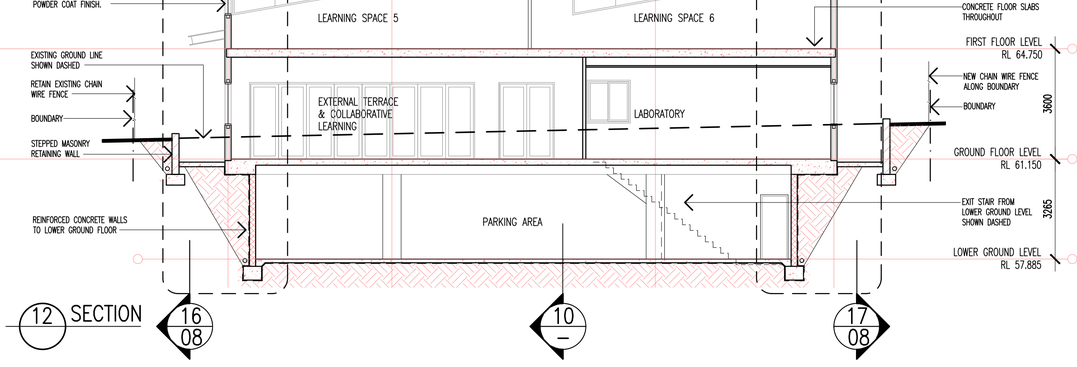
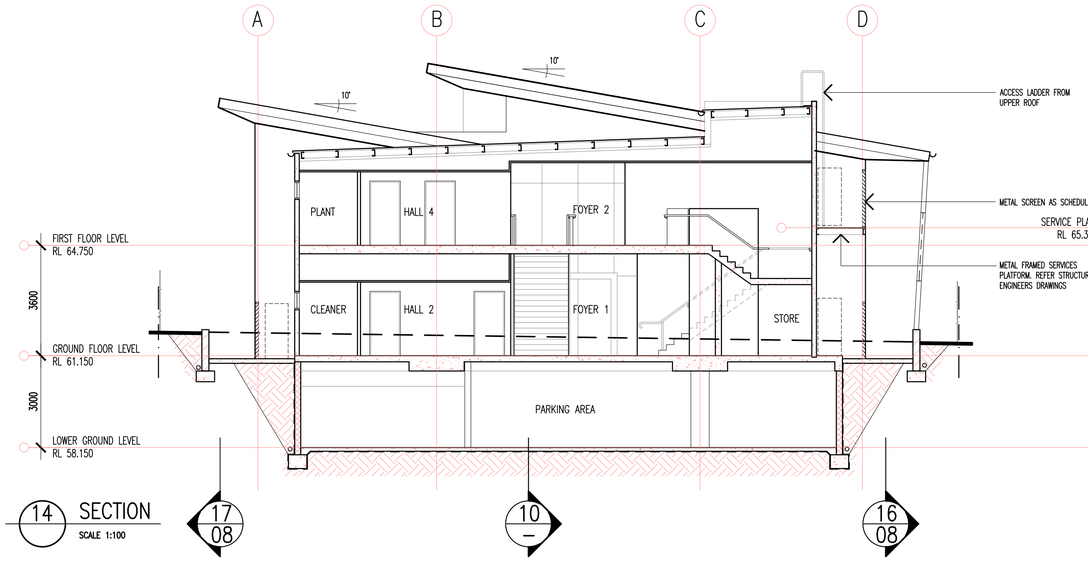
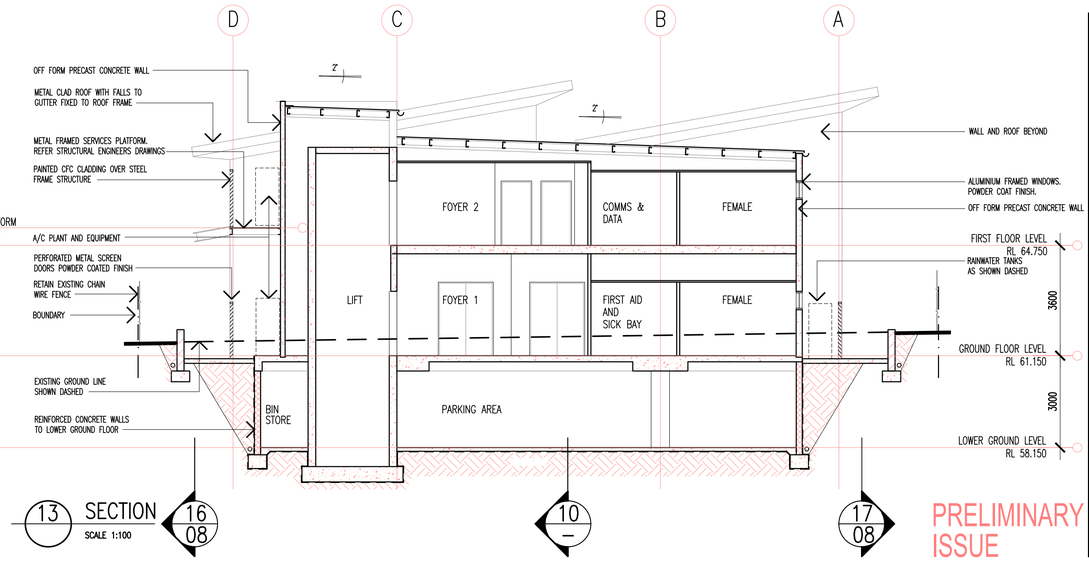
SCALE 1:100



12 SECTION



14 SECTION
SCALE 1:100



13 SECTION
SCALE 1:100

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T.O.W.	TOP OF WALL
V.O.S.	VERIFY ON SITE
WM	WATERPROOF MEMBRANE

NO.	DATE	REVISION / ISSUE DETAILS
	12-12-2019	PRELIMINARY ISSUE

AMENDMENT / ISSUE LOG:

ARCHITECTS:
Koturic+Co.
STEVEN KOTURIC – NOM. ARCHITECT NSW REG. 9442
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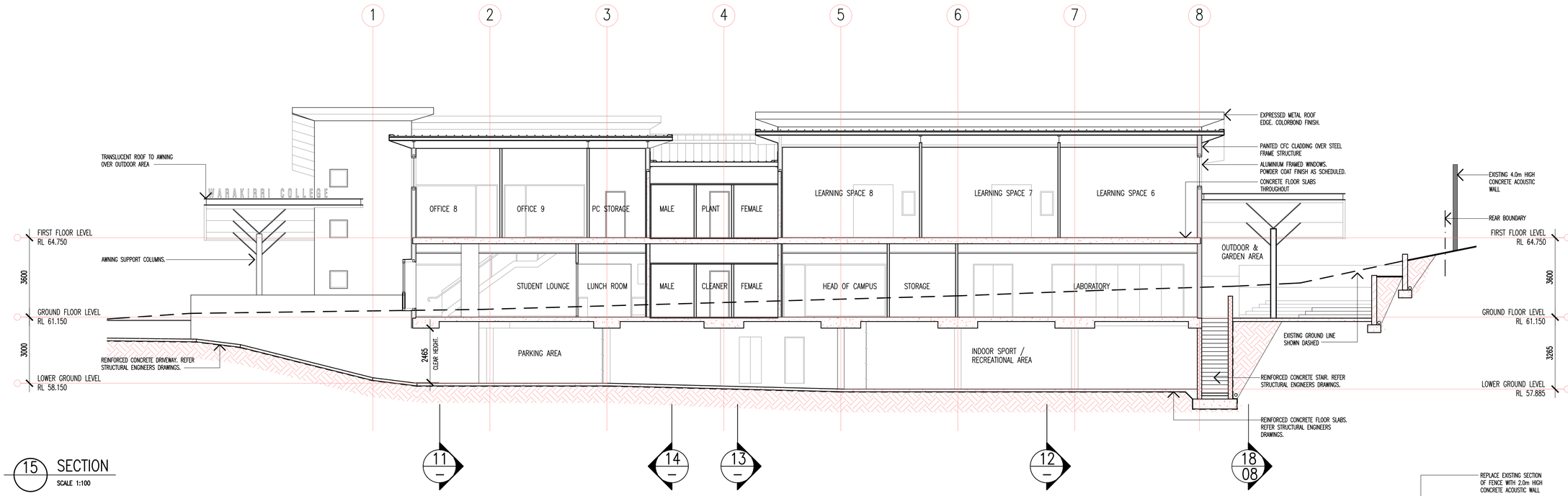
E: architects@koturicandco.com M: 0414 953 091

CLIENT:
WARAKIRRI COLLEGE
L2, 138 QUEEN STREET
CAMPBELLTOWN

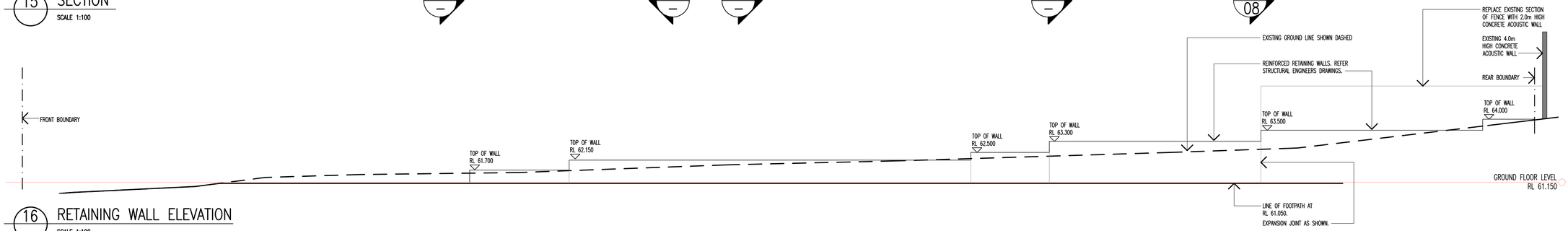
PROJECT:
NEW LEARNING CENTRE
6A WATSFORD ROAD, CAMPBELLTOWN

DRAWING:
SECTIONS

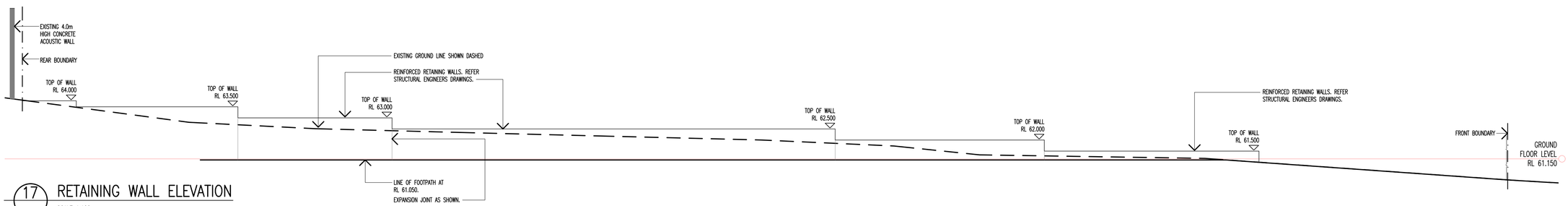
JOB NO:	SCALE:	DRG NO:	AMEND:
1901	1:100 @ A1	A-07	P1
DRAWN: DFP	DATE: NOV.2019		



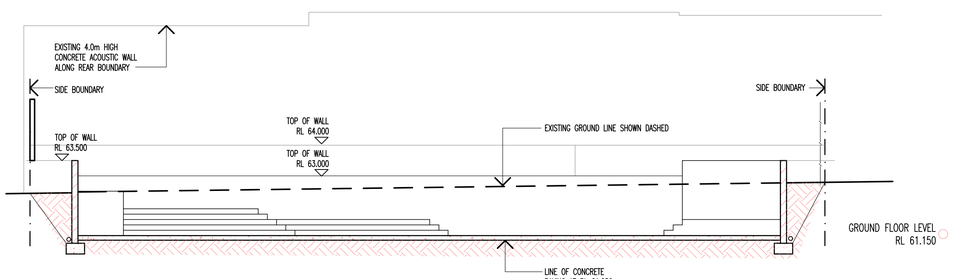
15 SECTION
SCALE 1:100



16 RETAINING WALL ELEVATION
SCALE 1:100



17 RETAINING WALL ELEVATION
SCALE 1:100



18 RETAINING WALL ELEVATION
SCALE 1:100

PRELIMINARY ISSUE

NOTES:

ALL DIMENSIONS TO BE VERIFIED PRIOR TO COMMENCEMENT OF WORK.

USE FIGURED DIMENSIONS ONLY. DO NOT SCALE.

ALL STRUCTURAL WORK, DRAINAGE AND LANDSCAPING TO CONSULTANTS DETAILS.

ALL WORK TO COMPLY WITH CURRENT REGULATIONS AND S.A.A. STANDARDS.

LEGEND:

- INDICATES PRE-CAST CONCRETE WALL PANELS TO ENG'S DETAILS
- INDICATES DINCEL WALL CONSTRUCTION TO ENG'S DETAILS
- INDICATES CONCRETE BLOCK WALL REINFORCING TO ENG'S DETAILS.
- INDICATES STUD WALL FRAME PLASTERBOARD LINED
- RL XX.XXX — EXISTING SPOT REDUCED LEVEL. VERIFY ON SITE.
- FFL XX.XXX — PROPOSED FINISH FLOOR LEVEL.
- RL XX.XXX — PROPOSED TOP OF CONCRETE SURFACE.
- + RL XX.XXX — PROPOSED FINISH LEVEL OR SPOT RL.

ABBREVIATIONS:

AW	AWNING WINDOW
BO	BULKHEAD OVER
CA	CARPET
CFC	COMPRESSED FIBRECEMENT
CJ	CONTROL JOINT
CM	CEMENT RENDER AND PAINTED
CR	COLORBOND ROOFING
CT	CERAMIC TILES
DP	DOWNPIPE
F	FIXED WINDOW
FC	FIBRECEMENT
FF	FLOATING TIMBER FLOORING AS SCHEDULED
FH	FIRE HYDRANT
FW	FLOOR WASTE
HYD.	HYDRANT VALVE
MC	METAL CLADDING
OFC	OFF FORM CONCRETE
OFO	OVERFLOW OUTLET
OG	OBSCURE GLASS
SC	STONE CLADDING
SF	STONE FLOORING
T.O.W.	TOP OF WALL
V.O.S.	VERIFY ON SITE
WM	WATERPROOF MEMBRANE

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AMENDMENT / ISSUE LOG:

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PROJECT:
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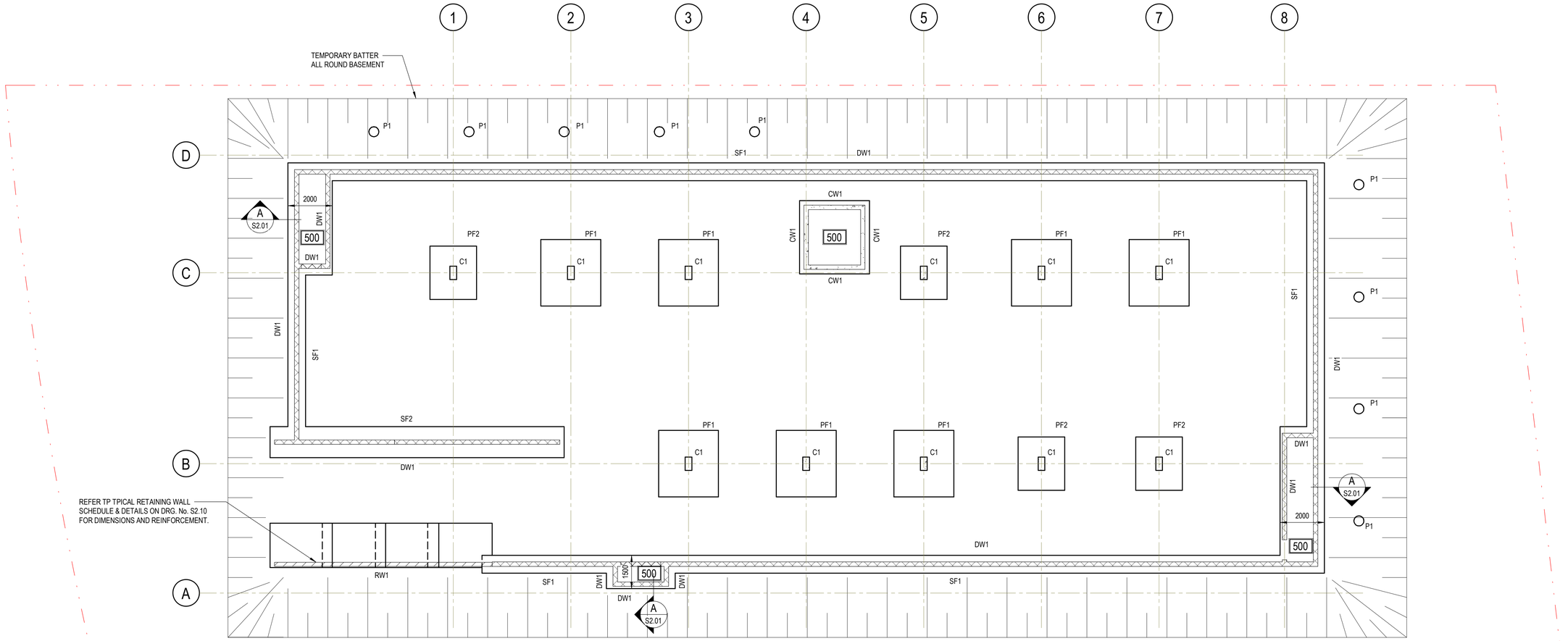
DRAWING:
SECTIONS RETAINING WALL ELEVATIONS

JOB NO:	SCALE:	DRG NO:	AMEND:
1901	1:100 @ A1	A-08	P1
DRAWN: DFP	DATE: NOV.2019		

ANNEXURE C

COPY OF HENRY AND HYMAS PTY LTD DRAWING NO. 19712-S2.00 1



FOOTING PLAN

SCALE 1 : 100

FOUNDATIONS:

F1 FOUNDATIONS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT No. CES180704_ZDC-AB DATED 18/10/2018 PREPARED BY CONSULTING EARTH SCIENTISTS.

F2 FOOTINGS AND FOUNDATIONS HAVE BEEN DESIGNED FOR THE FOLLOWING BEARING PRESSURES:

PAD FOOTINGS	- 150 kPa
STRIP FOOTINGS	- 150 kPa
BORED PILES	- 1000 kPa

FOUNDATION MATERIAL SHALL BE APPROVED BY THE CONSULTING GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF CONCRETE.

FOOTING NOTES:

1. FOUNDATION MATERIAL SHALL BE INSPECTED BY A QUALIFIED GEOTECHNICAL ENGINEER TO VERIFY THAT THE DESIGN AND SOIL PARAMETERS SCHEDULED HAVE BEEN ACHIEVED ON SITE.
2. REFER FOUNDATION NOTES FOR ALLOWABLE BEARING CAPACITY
3. ALL PADS TO COLUMNS SHALL BE SET OUT ON COLUMN CENTERLINE (REFER ARCHITECT'S DRAWINGS FOR SET OUT)
4. THE PROJECT DATUM AS NOMINATED BELOW SHALL BE ++ (REFER ARCHITECT'S DRAWING FOR FSL.)
5. PF +++++ SF +++++ (WHERE APPLICABLE) DENOTES TOP OF FOOTING LEVEL RELATIVE TO THE PROJECT DATUM LEVEL (REFER NOTE 5 ABOVE)
6. ALL TOP OF FOOTING LEVEL SHALL BE PF+ -400 SF+ -400 UNO.
7. PAD TAG DEFINITION:
   PF+ - (PAD NUMBER / TYPE) WHERE APPLICABLE
   SF+ - (STRIP FOOTING TYPE) WHERE APPLICABLE

PAD FOOTING SCHEDULE

MARK No.	SIZE DIM 'A'	SIZE DIM 'B'	SIZE DIM 'C' (DEPTH)	REINFORCEMENT 'X' BARS	REINFORCEMENT 'Y' BARS	f'c (MPa)	SOIL / ROCK ALLOWABLE BEARING CAPACITY
PF1	3000	2700	500	N16-200	N16-200	32.00	150 kPa
PF2	2400	2100	500	N16-200	N16-200	32.00	150 kPa

PIER SCHEDULE

MARK No.	DIAMETER	f'c (MPa)	REINFORCEMENT BARS	REINFORCEMENT LENGTH	REINFORCEMENT TIES / HELIX	SOCKET LENGTH	FOUNDING STRATA	ALLOWABLE END BEARING (MPa)	ALLOWABLE SKIN FRICTION (MPa)
P1	450	32	6 N24	6000 MIN.	N12-300 HELIX	300	ROCK CLASS IV	1000	150

NOTE:
ALL SHALLOW FOOTINGS (PAD & STRIP FOOTINGS) TO BE SOCKETED FOR MINIMUM 300mm INTO SOIL WITH ALLOWABLE BEARING CAPACITY OF150 kPa. GEOTECHNICAL BEGINNER TO CONFIRM.

ISSUED FOR TENDER

DIAL BEFORE YOU DIG www.1100.com.au

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
1	ISSUED FOR TENDER	K.S.	N.V.	19-12-2019

Client: WARAKIRRI COLLEGE

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henry&hymas

Project: NEW LEARNING CENTRE
64 WATSFORD ROAD, CAMPBELLTOWN

Title: FOOTING PLAN

Drawn	Designed	Date
H.W.	D.M.	DEC. 2019
Checked	Approved	Scale
D.M.	R.K.	As indicated

Drawing number: 19712-S2.00

Revision: 1