Address PO Box 1201
Windsor NSW 2756
Tel 02 4587 7000
Fax 02 4587 9044
Email info@urbancityconsulting com au
Web www urbancityconsulting com au

21 January 2010

Our ref 090174

Loquat Valley Anglican School C/- Midson Group Pty Ltd
P O Box 671
Epping NSW 1710

Attention Graham Bunn

Dear Graham,

Re 1973 Pittwater Rd Bayview - Construction Certificate No 090174

Enclosed is a copy of the approved **Construction Certificate and Stamped Plans** for the subject development One copy of each has been forwarded directly to Pittwater Council for their records

It is important that you read and understand all of the documentation attached Prior to works commencing on site the following items and conditions of the Development Consent issued by Council must be satisfied,

1 All sedimentation controls are to be installed
2 Sanitary accommodation for all building contractors is to be provided
3 Install Builders signage in a prominent position

On the 1st of July 2004 the State Government amended the Environmental Planning & Assessment Act and Regulation 2000 to require mandatory inspections being carried out by the Principal Certifying Authority at critical stages of construction

The critical Stages of construction for this project are,

a Piers
b Storm water drainage inspection
c Disabled Access
d Compartment & Seperation C2
e Final inspection

Under the Act you are required to notify your building contractor of all Mandatory Inspections that are required to be
carried out by Urban City Consulting Pty Ltd during the construction of the development

A minimum of 48 hours notice is required when requesting that a mandatory inspection to be carried out When booking an inspection please call our office on (02) 4587 7000 and advise a staff member of the time and type of inspection
required

Should you need to discuss any issues, please do not hesitate to contact the undersigned on the above numbers

Yours faithfully,

Troy Myers
Accredited Certifier

R 274175
25/1/10

RECEIVED MONA VALE
25 JAN 2010
CUSTOMER SERVICE

Address PO Box 1201
Windsor NSW 2756
Tel 02 4587 7000
Fax 02 4587 9044
Email info@urbancityconsulting com au
Web www urbancityconsulting com au

CONSTRUCTION CERTIFICATE 090174 (COMMERCIAL)

Issued under Part 4A of the Environmental Planning and Assessment Act 1979 Sections 109C and 81A(5)

APPLICANT DETAILS

Applicant	Loquat Valley Anglican School C/ Midson Group Pty Ltd
Address	P O Box 671 Epping NSW 1710
Contact Details	**Phone** 9868 6923 **Fax** 9868 6924

OWNER DETAILS

Name of person having benefit of the development consent	Loquat Valley Anglican School C/ Midson Group Pty Ltd
Address	P O Box 671 Epping NSW 1710
Contact Details	**Phone** 9868 6923 **Fax** 9868 6924

RELEVANT CONSENTS

Consent Authority/Local Government Area	Pittwater Council
Development Consent No	DA0363/09 **Date issued** 24/11/2009

PROPOSAL

Address of Development	1973 Pittwater Rd Bayview NSW 2104 Lot A DP 360274
Building Classification	9b
Type of Construction	C
Scope of building works covered by this Notice	Additions & Alterations to existing school including a new lift
Value of Construction Certificate (Incl GST)	
Plans and Specifications approved	Schedule 1
Fire Safety Schedule	Schedule 2
Exclusions	
Critical stage inspections,	See attached Notice
Conditions (Cls 187 or 188 of EPA Regs 2000)	

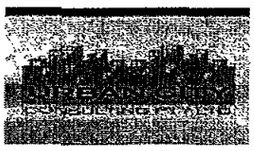
CERTIFYING AUTHORITY

Certifying Authority	Troy Myers
Accreditation Body	Building Professionals Board **Registration No** BPB 0284

I Troy Myers as the certifying authority certify that the work if completed in accordance with the plans and specifications identified in Schedule 1 (with such modifications verified by the certifying authority as may be shown on that documentation) will comply with the requirements of the Environmental Planning & Assessment Regulation 2000 as referred to in section 81A(5) of the Environmental Planning and Assessment Act 1979

Dated 21/01/2010

Troy Myers
Accredited Certifier
NB Prior to the commencement of work S81A (2) (b) and (c) of the Environment Planning and Assessment Act 1979 must be satisfied



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SCHEDULE 1 APPROVED PLANS AND SPECIFICATIONS

1 *Endorsed Architectural plans*

PREPARED BY	DOCUMENT	DRAWING No	REV	DATE
Midson Architecture	Site Plan	MM0804 A01	E	15/01/2010
Midson Architecture	Classroom Alterations Lift Plans & Elevations	MM0804 A13	E	15/01/2010
Birzulis Associates P/L	Construction Notes	4412 S01	D	13/01/2010
Birzulis Associates P/L	Key Plan	4412 S02	D	27/11/2009
Birzulis Associates P/L	Lift Plans Sections & Details	4112 S08	B	27/11/2009
Birzulis Associates P/L	Plans Sections & Details (Area E Area F Area G & Area H	4412 S11	B	27/11/2009
DBA Pty Ltd	Hydraulic Services Legend Location Plan and Drawing Schedule	2743-H00	1	27/11/2009
DBA Pty Ltd	Hydraulic Services Site Plan & Drawing Key Plan	2743-H01	1	27/11/2009
DBA Pty Ltd	Hydraulic Services 02 New Ramps Access WC & Lift 03 New Lift 04 & 05 New Stores	2743-H03	1	27/11/2009
DBA Pty Ltd	Hydraulic Services 01 New Classrooms and Access Ramps	2743-H02	1	27/11/2009
DBA Pty Ltd	Hydraulic Services Detail Sheet	2743-H04	1	27/11/2009
Shelmerdines Consulting Engineers	*Electrical Services Legend*	5337 ES 1	C	27/11/2009
Shelmerdines Consulting Engineers	Electrical Services Site Plan	5337-ES 2	C	27/11/2009
Shelmerdines Consulting Engineers	Electrical Miscellaneous Power & Lighting Layouts	5337-ES-4	C	27/11/2009
Shelmerdines Consulting Engineers	Electrical Services Lift A & Lift B Power & Lighting Layouts	5337-ES-5	C	27/11/2009
Shelmerdines Consulting Engineers	Electrical Services Single Line Diagrams	5337-ES-6	C	27/11/2009
Shelmerdines Consulting Engineers	Electrical Services Details Sheet	5337-ES-7	C	27/11/2009
Master Lifts	Lift Detail	1 of 1	A	23/12/2009
Nick Johnston Landscapes	Planting Detail to Screen Lift	LDA 01	B	13/01/2010
Jeffery & Katauskas P/L	Geotechnical Assessment	22636SB1		12/01/2010
Jeffery & Katauskas P/L	Geotechnical Investigation	22636SBrpt		30/01/2009
Midson Architecture	Architectural Specification			13/01/2010
Shelmerdines Consulting Engineers	Specification	5337ESP		18/12/2009
David Buckle & Associates	Technical Specification	2743		27/11/2009
Jeffery & Katauskas P/L	Geotechnical Review Drawings	22636SB		13/01/2010
Master Lifts Pty Ltd	Specifications			5/10/2009
Shelmerdines Consulting Engineers	Certification of Electrical	5337E		11/01/2010
Birzulis Associates	*Structural Certificate*			13/01/2010

2 Endorsed Structural plans

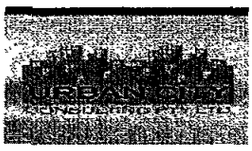
PREPARED BY	DOCUMENT	DRAWING No	REV	DATE
DBA	Confirmation of Hyraulics Design	2743		13/01/2010

3 Endorsed Landscape plans

PREPARED BY	DOCUMENT	DRAWING No	REV	DATE
Nick Johnston Landscapes	Confirmation of Condition 7			17/01/2010

4 Endorsed Other documents

PREPARED BY	DOCUMENT	DRAWING No	REV	DATE
Sydney Water	Approved Building Plan	D09/0-04249		27/08/2009
NSW Police Force	Comments			25/09/2009
Midson Group Pty Ltd	Condition confirmations	MM0804 3 02		18/01/2010
Access Associates	Access confirmation for lift	A08021		15/01/2010
Master Lifts	Lift installation confirmation	4386		4/12/2009



Address	PO Box 1201 Windsor NSW 2756
Tel	02 4587 7000
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Email	info@urbancityconsulting com au
Web	www urbancityconsulting com au

Michael Grogan	Geotechnical Risk Management		13/01/2010
Premier Building Group	Demolition Confirmation		22/12/2009
Jeffery & Katauskas Pty Ltd	Geotechnical Review of Drawings	22636SB1	13/01/2010

Address PO Box 1201
Windsor NSW 2756
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Fax 02 4587 9044
Email info@urbancityconsulting com au
Web www urbancityconsulting com au

NOTICE OF APPOINTMENT OF PRINCIPAL CERTIFYING AUTHORITY

Made under Part 4 of the Environmental Planning and Assessment Act 1979 Sections 81A(2)(b1)(i) & 86(1)(a1)(i)

OWNER DETAILS

Name of person having benefit of the development consent	Loquat Valley Anglican School C/ Midson Group Pty Ltd
Address	P O Box 671 Epping NSW 1710
Contact Details	**Phone** 9868 6923

RELEVANT CONSENTS

Consent Authority/Local Government Area	Pittwater Council
Development Consent No	DA0363/09 **Date issued** 24/11/2009
Construction Certificate Number 090174	**Date issued** 21/01/2010

PROPOSAL

Address of Development	1973 Pittwater Rd Bayview NSW 2104
Scope of building works covered by this Notice	Additions & Alterations to existing school including a new lift

PRINCIPAL CERTIFYING AUTHORITY

Certifying Authority	Troy Myers
Accreditation Body	Building Professionals Board
	Registration No BPB 0284

The owner has appointed Troy Myers as the Principal Certifying Authority as stated in the Construction Certificate Application lodged with Urban City Consulting for the building works identified in this Notice

I Troy Myers Accredited Certifier of Urban City Consulting located at PO Box 1201 Windsor NSW 2756 accept the appointment as the Principal Certifying Authority for the building works identified and covered under the relevant Construction Certificate as stated in this Notice

Dated 21/01/2010

Troy Myers
Principal Certifying Authority

Address PO Box 1201
Windsor NSW 2756
Tel 02 4587 7000
Fax 02 4587 9044
Email info@urbancityconsulting com au
Web www urbancityconsulting com au

NOTICE TO APPLICANT OF MANDATORY CRITICAL STAGE INSPECTIONS

Made under Part 4 of the Environmental Planning and Assessment Act 1979 Sections 81A(2)(b1)(ii)

OWNER DETAILS

Name of person having benefit of the development consent	Loquat Valley Anglican School C/ Midson Group Pty Ltd
Address	P O Box 671 Epping NSW 1710
Contact Details	**Phone** 9868 6923

RELEVANT CONSENTS

Consent Authority/Local Government Area	Pittwater Council
Development Consent No	DA0363/09 **Date issued** 24/11/2009
Construction Certificate Number 090174	**Date issued** 21/01/2010

PROPOSAL

Address of Development	1973 Pittwater Rd Bayview NSW 2104
Scope of building works covered by this Notice	Additions & Alterations to existing school including a new lift

CERTIFICATION DETAILS

Principal Certifying Authority	Troy Myers
Accreditation Body	Building Professionals Board
	Registration No BPB 0284

Please telephone **02 4587 7000** to book a critical stage inspection A minimum period of 48 hours is to be provided

*I **Troy Myers** **Urban City Consulting** located at PO Box 1201 Windsor NSW 2756 acting as the principal certifying authority hereby give notice in accordance with Section 81A(2)(b1)(ii) of the Environmental Planning and Assessment Act 1979 to the person having the benefit of the development consent that the mandatory critical stage inspections identified in Schedule 1 & Schedule 2 are to be carried out in respect of the building work*

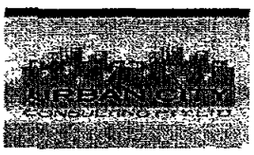
The applicant being the person having benefit of the development consent is required under Section 81A(2)(b2)(ii) of the Environmental Planning and Assessment Act 1979 to notify the principal contractor (if not an owner-builder) of the applicable mandatory critical stage inspections specified under this notice

To allow a principal certifying authority or another certifying authority time to carry out mandatory critical stage inspections the principal contractor for the building site or the owner builder must notify the principal certifying authority at least 48 hours before building work is commenced at the site if a mandatory critical stage inspection is required before the commencement of the work in accordance with Clause 163 of the Environmental Planning & Assessment Regulation 2000

Failure to request a mandatory critical stage inspections will prohibit the principal certifying authority under with Section 109E(3)(d) of the Environmental Planning and Assessment Act 1979 to issue an occupation certificate

Dated 21/01/2010

Troy Myers
Principal Certifying Authority



Address	PO Box 1201 Windsor NSW 2756
Tel	02 4587 7000
Fax	02 4587 9044
Email	info@urbancityconsulting com au
Web	www urbancityconsulting com au

SCHEDULE 1
MANDATORY CRITICAL STAGE INSPECTIONS

NO	CRITICAL STAGE INSPECTION	INSPECTOR
1	At commencement of building work	Certifying Authority
2	Prior to covering of waterproofing in any wet areas for a minimum of 10% of rooms with wet areas within a building At least 1 units are to be inspected	Certifying Authority
3	Prior to covering any stormwater drainage connections	Certifying Authority
4	After the building work has been completed & prior to any occupation certificate being issued in relation to the building	Certifying Authority

Address PO Box 1201
Windsor NSW 2756
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Fax 02 4587 9044
Email info@urbancityconsulting com au
Web www urbancityconsulting com au

SCHEDULE 2
FIRE SAFETY SCHEDULE

FIRE SAFETY MEASURES	EXISTING STANDARD OF PERFORMANCE	PROPOSED STANDARD OF PERFORMANCE
Emergency Lifts	BCA E3 4 Appendix A AS 1735 1 2003 & AS1735 2-1997	BCA E3 4 Appendix A AS 1735 1 2003 & AS1735 2-1997
Exit signs	*BCA E4 5 E4 6 & E4 8 AS/NZS 2293 1-2005*	*BCA E4 5 E4 6 & E4 8 AS/NZS 2293 1-2005*
Fire hydrant systems	BCA E1 3 AS2419 1 2005	BCA E1 3 AS2419 1 2005

NJL
NICK JOHNSTON
LANDSCAPES
PTY LTD
RESIDENTIAL & COMMERCIAL DESIGNERS & CONTRACTORS
14/1-3 Jubilee Ave, Warriewood, NSW 2102
Telephone (02) 9979 8885
Facsimile (02) 9979 8591
ABN 48 051 475 097

17th January 2010

Loquat Valley School
1973 Pittwater Road Bayview
C/o Midson Group

Dear Sir,

Attn Mr Graham Bunn

Re: Confirmation of Qualifications and Condition 7 inclusion

I am a qualified Landscape Designer I hold a Bachelor of Applied Science (Horticulture) Degree My certification number is 121633C My landscape Contractors Association number is F352

All conditions of the DA consent (DA N0363/09) have been incorporated into the design/included as required.

With Thanks

Nick Johnston Landscapes Pty Limited.

Nick Johnston Ba App Sc Hort
Managing Director

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

Urban City Consulting Pty Ltd
PO Box 1201
WINDSOR NSW 2756

18 January 2010
MM0804 3 02

Attn Mr Troy Myers

Dear Troy,

LOQUAT VALLEY ANGLICAN SCHOOL
Construction Certificate Application

We refer to the Development Consent conditions listed below and advise as follows -

Condition B6
Refers to the recommendations contained in the report prepared by the NSW Police Force

- We confirm that appropriate external lighting on the exterior areas of the lift at ground level will be provided
- Newly painted walls are to be painted with a graffiti resistant paint Notation specifying an appropriate coating is included on the drawings
- We confirm that quality mortice deadlocks are to be installed which meet relevant Australian Standards and satisfy the requirements of the BCA in respect of egress
- We advise that windows are specified to receive key operated locks and that glass to be installed in the works is specified as laminated safety glass which, in our opinion, satisfies the criteria noted in the report
- We confirm that the lift will be fitted with an emergency phone

Condition B9
We confirm that the specified glazing does not exceed a reflectivity value of 25%

Condition B10
We confirm that colours and textures of the proposed works will match that of the existing adjoining buildings

Should you require any further information please contact the undersigned

Yours sincerely
midson architecture

Geoff Gillman

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

midson group pty ltd

New South Wales Office
L3 51 Rawson Street Epping NSW 2121
PO Box 671 Epping NSW 1710
t +61 2 9868 6923 f +61 2 9868-6924

ABN 67 107 976 312
w www midsongroup com au
e enquiries@midsongroup com au

Queensland Office
PO Box 1290
Noosaville BC QLD 4566
t +61 7 5471-1107 f +61 7 5471 1107

Urban City Consulting Pty Ltd
PO Box 1201
WINDSOR NSW 2756

18 January 2010
MM0804 3 02

Attn Mr Troy Myers

Dear Troy,

LOQUAT VALLEY ANGLICAN SCHOOL
Construction Certificate Application

We refer to the Development Consent conditions listed below and advise as follows -

Condition B6

Refers to the recommendations contained in the report prepared by the NSW Police Force

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Condition B10

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midson architecture

Geoff Gillman

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w www midsongroup com au
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PO Box 1290
Noosaville BC QLD 4566
t +61 7 5471 1107 f +61 7 5471-1107

David Buckle & Associates (NSW) Ptv Ltd
ABN 33 106 282 875
38 Rowe St Eastwood NSW 2122
Phone 02 9804-8086 **Facsimile** 02 9804-8685

DBA

Ref 2781

4 January 2010

Midson Management
Po Box 671
Epping NSW 1710

Attention Ian Thompson

Dear Sir

Re Proposed Alterations & Additions at Loquat Valley Anglican School
Development Applicataion DANO363/09 Consent Conditions

Certificate of Compliance – Stormwater Drainage

WE HEREBY CERTIFY THAT the design of the stormwater drainage system complies with the requirements of the above development consent conditions specifically

B2 C2 C3 C5 E2 & E3 all relating to stormwater management and onsite detention are not applicable in this case as the net increase in building area is less than 50 square meters

Scheduled Codes
Council s Stormwater Management policy P21 DCP Part B Cl 5 7

Scheduled Drawings
David Buckle & Associates (NSW) Pty Ltd drawing
2781-H01 Rev P1

For and on behalf of
David Buckle & Associates (NSW) Pty Ltd

David Buckle
Director Member AHSCA

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

g \1work-dba active jobs\2781 loquat valley classroom extension\2781 design compliance certificate stormwater doc

SYDNEY WATER CORPORATION

SYDNEY WATER
BUILDING PLAN APPROVED
SUBJECT TO REQUIREMENTS

Dolfin No D09/0-04249 Quick Check Ref No 264681

Property Location

Street No 1977 Lot No

Street Name Pittwater Rd

Suburb Bayview

Building/Structure Description Classroom

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No. BPB0284

Building Plan No 2743-H01 Engineers Plan No Midson Group – Drawing 'A' and S03

Proposed building/structure is **APPROVED** to construct **OVER/ADJACENT TO** a Sydney Water sewer/asset, subject to the following requirements
(NB Delete non applicable requirements)

1 The foundations/piers are to be founded below sewerr zone of influence,clay strata
2 No part of the building/structure or its foundations to be less than a minimum0 6 metre, horizontal distance from the centreline of the sewer
3 No part of the building/structure or swimming pool coping to be less than 1 m horizontal distance from outside edge of maintenance hole rim / maintenance shaft rim / lamphole rim / vertical rim / rodding point or edge of ventshaft.
4 No piering of building/structure to be less than 2 m horizontal distance from centreline of maintenance hole /maintenance shaft / lamphole / vertical / rodding point to edge of piers
5 Foundations/piers are constructed in accordance with Engineers detail plans (stated above) as submitted to Sydney Water
6 All foundations/piers are to be founded to below the zone of influence or to solid rock
7 Concrete encase approximately 16 metres of sewer Concrete encasement to be carried out by an Accredited Constructor of Minor Works (Sewer) / Constructor and a Minor Works Agreement signed prior to commencement of works
8 Concrete encasement must extend a minimum of 600mm past the external walls of the building/structure
9 Minimum of 150mm vertical clearance between top of concrete encasement to underside of concrete slab
10 Minimum of 50mm of compressible membrane between top of concrete encasement to underside of concrete slab

SPECIAL REQUIREMENTS

(a) Sydney Wide Coordinators to inspect piers and concrete encasement – contact Kim Mrazek ph 8850 6283 giving minimum 72 hrs notice to book inspection

NOTE

Above requirements must be inspected/supervised by an Accredited Supplier or Sydney Water to enable the issue of a satisfactory compliance letter

Permits are required to fill all new swimming pools with a capacity greater than 10,000 litres To arrange for a permit please contact Sydney Water on 13 20 92 during business hours Fines will apply for filling swimming pools without a permit.

CENTRAL CORRESPONDANCE OFFICE
Suite 22, 1 Pitt Street, Loftus NSW 2232
Phone (02) 95457474 Fax (02) 95457478
Phone 1300 4 LIFTS (1300 4 54687)
ABN 69 123 169 906 www masterlifts com au

MASTER LIFTS SYDNEY

When it absolutely has to go Up and Down

Friday 4 December 2009

Premier Building Group
P O Box 1072
Warriewood, NSW 2102

Attention Mr Frank Tropea

Phone 99798377
Email ftropea@premierbuild com au

Dear Frank

Our Reference 4386 – Two off Contessa 2000 BCA for Loquat Valley Anglican School
Lift A – three stop, western boundary,
Lift B – two stop, front entrance

Thank you for your call, this letter is to confirm that the two lifts to be installed in the Loquat Valley Anglican School project are designed, manufactured and will be installed in accordance with the Australian Lift code AS1735 Part 16 The design also incorporates the features of the BCA Part E3 6

Please call me on **95457474** if you have any questions or need any further information You may also like to have a look at our web site **masterlifts com au** for examples of this lift and many others we have available

We look forward to being of service to you

Kind Regards

Charles Fritchley
B E MIEAust , CPEng
Regional Manager Regional Manager
Enc

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

Sydney Anglican Schools Corporation
C/- Midsongroup
PO Box 671
EPPING NSW 1710

15 January 2010

Job No A08021

Att Peter Maskiell

Dear Peter

Loquat Valley Anglican School
Review of Lift Accessibility Compliance

Access Associates Sydney in our capacity as experienced access consultants accredited with ACAA, have reviewed the proposed design of the passenger Lift A proposed to link the existing three levels of school facilities located in the northern area of the Loquat Valley School campus The lift is proposed to provide vertical access to facilitate a continuous accessible path of travel to meet the requirements of BCA part D3 2 to the library, staff room and general learning areas in this section of the campus

It is our understanding that the proposed Master Lifts Contessa 2000 BCA meets compliance with AS1735 16 The lift is proposed to include facilities for people with a disability to meet the requirements of AS1428 1, AS1735 12 and BCA part E3 6 including (a) a handrail, (b) internal floor dimensions of 1100mm x 1400mm, (c) a clear door opening of 900mm and (e) control buttons that include tactual and include Braille characters The lift is proposed to include an automated hinged door with remote call buttons to be located to meet the circulation space requirements of AS1428 1 at each level, to facilitate access by a person using a wheelchair

It is our understanding that in this primary school setting in an area of the school where general public access is not permitted, it is proposed to maintain the lift in a secure mode and to develop an operational management strategy to facilitate access to the lift by staff and accompanied students or visitors with a disability as required In our opinion this strategy in addition to the provision of the circulation space and accessible features detailed for the lift, will provide a suitable alternative solution to providing full compliance with AS1428 1 clause 8 which requires lift facilities to comply with AS1735 12 and will meet the BCA performance requirement EP3 4 to be suitable for use by occupants with disabilities It is our understanding that Pittwater Council DA Condition C7 requiring the lift to comply with AS1428 and AS1735 is also addressed

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

Yours faithfully,

Robyn Thompson
access associates sydney

Qualifications Diploma of Occupational Therapy Cumberland College of Heath Sciences (Sydney) 1976

Affiliations Member OT Australia (No 200195)
Accredited member Association of Consultants in Access Australia (No 150)
Affiliate member Australian Institute Building Surveyors (No 4233)
OHS Construction Induction Training Certificate CG100925535SEQ1

NSW Office
L3 51 Rawson Street Epping NSW 2121
PO Box 671 Epping NSW 1710
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f +61 2 9868-6924

a trading name of
midson group pty ltd
ABN 67 107 976 312
w www midsongroup com au
e enquiries@midsongroup com au

QLD Office
PO Box 1290
Noosaville BC QLD 4566
t +61 7 5471 1107
f +61 7 5471 1107

access associates sydney

David Buckle & Associates (NSW) Pty Ltd
Suite 8, 38 Rowe St. Eastwood NSW 2122
Phone 02 9804-8086 **Facsimile** 02 9804-8685

DBA

Ref 2743

13 January 2010

Midson Management
Suite 302, 51 Rawson Street
Epping 2121

Attention Graham Bunn

Dear Graham,

Re **LOQUAT VALLEY ANGLICAN COLLEGE**

We have reviewed the geotechnical report prepared by Jeffery and Katouskas for the above project
We confirm that the hydraulics design we prepared for the project addresses the issues raised in the report
These issues include the required sub-soil drainage around the lift shaft and that the roof and surface waters have been directed to the storm water system as required
Should any further information be required please contact the undersigned

Regards

Len Hutton

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

document4

BIRZULIS ASSOCIATES Pty Ltd
CONSULTING CIVIL + STRUCTURAL ENGINEERS
ACN 003 797 911
ABN 99 003 797 911

583 Darling Street Rozelle NSW 2039
Telephone 9555 7230
Facsimile 9555 7239
Email birzulis@tpg com au

13 January 2010

Principal Certifying Authority
c/- Midson Group Pty Ltd
Attention Mr Ian Thompson
P O Box 671
EPPING NSW 1710

Dear Sir,

STRUCTURAL CERTIFICATE

LOQUAT VALLEY ANGLICAN SCHOOL
NEW LIFT AND CLASSROOM

This is to certify that we prepared structural engineering drawing No 4412 – S01, S02, S08, S11 of the structural details for the above building works The structural engineering design and detailing was carried out in accordance with the relevant Australian Standards and the Building Code of Australia The design also includes the recommendations of the geotechnical assessment report prepared by Jeffery & Katauskas Pty Ltd

Yours faithfully

M GROGAN
Associate Director

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
ABN 17 003 550 801

AS/NZS ISO 9001
Certified
Davis Langdon Certification Services

PO BOX 976 NORTH RYDE BC NSW 1670
Tel 02 9888 5000 • Fax 02 9888 5001
Email engineers@jkgroup net au

13 January 2010
Ref 22636SB1let

Sydney Anglican Schools Corporation
C/- Midson Group
PO Box 671
EPPING NSW 1710

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

ATTENTION Mr Graham Bunn

Dear Sirs

GEOTECHNICAL REVIEW OF DRAWINGS
PROPOSED LIFT AND CLASSROOM ALTERATIONS
LOQUAT VALLEY ANGLICAN PREPARATORY SCHOOL
1977 PITTWATER ROAD, BAYVIEW, NSW

As requested, we have reviewed the supplied structural and hydraulic drawings for the above development in relation to our geotechnical slope stability risk assessment report dated 12 January 2010 (Ref 22636SB1rpt) The drawings reviewed were as follows

- Structural drawings by Birzulis Associates, Job No 4412, Drawing Nos S01, Issue C, dated 20/11/09, S02, Issue D, dated 27/11/09, S08, Issue B, dated 27/11/09, and S11, Issue B, dated 27/1/09 In addition, the structural engineer has supplied a signed copy of Pittwater Council's Form 2 – Part A confirming that the structural design meets the requirements of our geotechnical assessment report and has advised that the design life of the structural elements is 50 years We understand that the structural design life is to be added to the structural notes (Drawing No S01), but at the time of preparation of this letter the revised drawing had not been received
- Hydraulic drawings by David Buckle & Associates (NSW) Pty Ltd, Drawing Nos 2743-H00 to H04, Revision 1, dated 27/11/09 In addition, the hydraulic

engineer has confirmed in a letter dated 13 January 2010 (Ref 2743) that they have reviewed our geotechnical assessment report and confirm that the hydraulic design addresses the issues raised in the geotechnical assessment report

The drawings and other information were reviewed regarding geotechnical aspects of the proposed development and no calculation checks or structural assessments were made The review does not relieve the structural or hydraulic engineers of their responsibility for the design shown on the drawings

Following our review of the structural and hydraulic drawings as detailed above, it is considered that the drawings have been prepared taking into account the intent of the recommendations provided within our geotechnical slope stability risk assessment report dated 12 January 2010 (Ref 22636SB1rpt)

A completed copy of Pittwater Council's Form 2 – Part B, cross referenced to this letter, is attached

Geotechnical Inspections During Construction

Geotechnical inspections will be required during construction, which are detailed in Section 5 3 of our previous report The geotechnical inspections will need to be completed in order for the geotechnical engineer to complete Pittwater Council's Form 3 at the end of construction If all geotechnical inspections are not completed during construction, then only the issue of a qualified Form 3 would be able to be provided We recommend that the builder be made aware of the geotechnical inspections that are required during construction

Should you require any further information regarding the above please do not hesitate to contact the undersigned

Yours faithfully
For and on behalf of
JEFFERY AND KATAUSKAS PTY LTD

Daniel Bliss
Senior Associate

Encl Form 2 - Part B

PITTWATER COUNCIL

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO 2 – PART B – To be submitted with detailed design for Construction Certificate

PART B Declaration made by Geotechnical Engineer or Engineering Geologist and/or Coastal Engineer (where applicable) in relation to the incorporation of the Geotechnical issues into the project design

I, Daniel Bliss (insert name) on behalf of Jeffery & Katauskas Pty Ltd (trading or company name)

on this the 13 January 2010 (date)

certify that I am a Geotechnical Engineer or Engineering Geologist and/or Coastal Engineer as defined by the Geotechnical Risk Management Policy for Pittwater 2099 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least $2million I also certify that I have reviewed the design plans and structural design plans for the Construction Certificate Stage and that I am satisfied that

Please mark appropriate box

☑ the structural design meets the intent of the recommendations as set out in the Geotechnical Report or any revision thereto
☐ the structural design has considered the requirements set out in the Geotechnical Report for Excavation and Landfill both for the excavation/construction phase and the final installation in accordance with Clause 3 2 (b)(iv) of the Geotechnical Risk Management Policy

Geotechnical Report Details

Report Title	Geotechnical Assessment for Proposed Lift and classroom Alterations
Report Date	12 January 2010 Report Ref No 226365B/rpt
Author	Daniel Bliss

Documentation which relates to or is relied upon in report preparation

Birzulis structural drawings as detailed in letter dated 13 January 2010 (Ref 226365B/let).

We/ I am also aware that Pittwater Council relies on the processes covered by the Geotechnical Risk Management Policy including this are certification as the basis for ~~ensuring~~ confirming that the geotechnical risk management aspects of the proposed development have been adequately addressed to achieve an Acceptable Risk Management level for the life of the structure taken as at least 100 years unless otherwise stated and justified

Signature
Name Daniel Bliss
Chartered Professional Status MIEAust CPEng
Membership No 969495
Company Jeffery & Katauskas Pty Ltd

This form to be read in conjaction with letter dated 13 January 2010 (Ref. 226365B/let) by Jeffery and Katauskas Pty Ltd.

MASTER LIFTS PTY LTD

SPECIFICATIONS FOR THE *CONTESSA – 2000 BCA SPACE SAVER*

Client	Loquat Valley Anglican School
Installation Site	1977 Pittwater Road, Bayview
Location	External to the building
Lift Installation	Lift to be craned in **Please note that if this lift cannot be craned in and has to be dismantled, and reassembled on site, this will constitute a cost variation to the purchase value**
Lift Model	***Contessa – 2000 BCA Space Saver*** - featuring the completed lift inside its prefabricated shaft enclosure made of aluminium and steel extrusions and sections
Manufacturer	Master Lifts Pty Ltd
Lift Designer	***Contessa Lifts***
Lift Standard	AS 1735 Part 16 Lifts for persons with limited mobility restricted use
Control	Automatically controlled
BCA Compliance Part E3 6	• Two stainless steel handrails of approved manufacture mounted at approved height above car floor • Internal car floor dimensions of 1100 mm wide x 1400 mm deep • Clear door opening(s) of 900 mm • 'Curtain of Light' sensory devices protect the door opening(s) (Photoelectric sensors that will detect a 75 mm diameter rod across the door opening between 50 mm and 1550 mm above the floor) • Illuminated tactile Braille operating buttons at approved height above the floor • Two control panels in positions that are accessible, one to the left and one to the right of the person entering the car

	Please Note The above BCA lift specifications have proved to be acceptable to the many Building Certifiers, Developers, Building Owners and Builders Master Lifts have supplied lifts for However, it will be the purchaser's responsibility to see that the above specifications meet the requirements of your Building Certifier
Drive System	A VVVF controlled Low Resonance Eco Screw Drive system, located in its own mast/shroud
Carrying Capacity	340 kg 3 – 4 persons or 1 person in a wheelchair plus and attendant
Speed of Travel	0 15 m/sec (approximately)
No of Levels Served	**Lift A – 3 stops, Lift B – two stops**
Total Lift Travel	**Lift A – 3010mm, Lift B – 3070mm**3010 mm (distance between finished floors on lower level and upper level)
Shaft height above Upper FLL	2600 mm
Mast Location	Left or Right side as viewed facing the lift entrance on the lower level
Shaft Dimensions	1515 mm wide x 1585 mm deep
Set Down Depth	60mm below FFL of the lower level
Set Down Dimensions	1565 mm wide x 1635mm deep
Penetration Dimensions Of Upper Floor(s)	1565 mm wide x 1635 mm deep
Roof Penetration Dimensions if lift is craned in	1615 mm wide x 1685 mm deep Mast (left or right side)
Shaft Roof	See "Work by Other Trades" list
Landing Door Frames	Folded mild steel, zinc plated, supplied and fitted as part of the ***Contessa's*** lift shaft Landing door frames are not fire rated

Landing Doors	Hinged aluminium doors with or without a centre mullion and laminated safety glass – Finish, natural anodised aluminium The doors have a concealed hydraulic door closer and a stainless steel pull handle
Landing Door Hinging	As viewed facing the lift entrance on each landing Lower level - Right – Lift A Left – Lift B Level 1 - Right – Lift A Right – Lift B Level 2 - Right – Lift A **Door hinging to be confirmed at time of order** As indicated above I confirm that I and my building advisers have considered the direction of traffic flow to the lift as well as other effects of the doors opening in these directions and that these are the correct sides for the doors to be hinged
Clear Door Opening	900 mm
Car Entrances	Two – Front and Rear
Lift Car Door(s)	There are no car doors - full curtain(s) of light guard(s) the doorway(s)
Lift Car Dimensions	1100 mm wide x 1400 mm deep
Lift Car Walls	• 2045 mm high, 2 walls • Standard finish – 'Mist Grey' melamine on MDF • 2 stainless steel code compliant handrails fitted on the walls housing the control panels
Car Ceiling	Off White laminate covered plywood panel fitted with four (4) recessed down lights that also operate as emergency lights
Car Floor Covering	Non-slip floor covering supplied and installed by "Other Trades" **Please Note** Master Lifts allows a depth in the car of 10mm for floor covering If a thicker covering is being considered it will be necessary to advise Master Lifts before manufacturing to ensure that the lift floor levelling adjustments are not compromised

Lift Car Controls	There are two stainless steel car control stations that include a keyed on/off switch, a stop button, an emergency alarm button, and a push button for each landing
Landing Controls	All landings are supplied with a keyed stainless steel control station that has an illuminated call button
Safety Equipment	• A safety support nut capable of supporting the entire lift car and passengers is fitted to the drive system • An electro mechanical interlocking device that prevents the landing doors from being opened when the lift is not resting at that landing • 'Curtain of Light' sensory devices protect the door opening(s) (Photoelectric sensors that will detect a 75mm diameter rod across the door opening(s) between 50mm and 1550mm above the floor) • Uninterrupted Power Supply (UPS) Emergency battery backup for lowering the car • Stop and alarm buttons • Emergency car lights • An emergency telephone is fitted to the lift car
Drive Voltage	240 volt, Single phase Controls 24 volts
Power Supply Required	240 volt, 20 amp dedicated circuit as per AS 3000

22 October 2009
In the never-ending pursuit of product improvement, Master Lifts Pty Ltd reserves the right to alter Specifications without notice

Shelmerdines
Consulting Engineers

11 January 2010
DT/ST 5337E_DC

Midson Group
Level 3
51 Rawson Street
EPPING NSW 2121

Attention Mr Graham Bunn

Dear Sir

LOQUAT VALLEY ANGLICAN SCHOOL – NEW CLASSROOMS
ELECTRICAL SERVICES

We confirm that the design of the electrical services installation for the above project has been designed to the Building Code of Australia, the relevant Australian Standards and in particular, the following standards and clauses

Australian Standards

- Emergency and Exit Lighting in accordance with AS/NZS 2293 1
- Artificial Lighting complying with AS/NZS 1680 and AS/NZS 1158

Building Code of Australia

- Part E4 Emergency Lighting, Exit Signs and Warning Systems, Clauses E4 2, E4 4, E4 6 and E4 8
- Part J6 Artificial Lighting and Power

We trust the above is of assistance

Yours faithfully
SHELMERDINES

David Taylor

David Taylor

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No BPB0284

E. Shelmerdine & Partners
Engineering Pty Ltd
ABN 40 003 331 879

55 Hume Street
Crows Nest NSW 2065

PO Box 1345
Crows Nest NSW 1585

Phone 02 9436 3021
Fax 02 9439 8709
Email mail@shelmerdines.com.au

David Buckle & Associates (NSW) Pty Ltd
ABN 33 106 282 875
38 Rowe St Eastwood NSW 2122
Phone 02 9804-8086 **Facsimile** 02 9804-8685

DBA

Ref 2781

4 January 2010

Midson Management
Po Box 671
Epping NSW 1710

Attention Ian Thompson

Dear Sir,

Re Proposed Alterations & Additions at Loquat Valley Anglican School
Development Applicataion DANO363/09 Consent Conditions

Certificate of Compliance – Stormwater Drainage

WE HEREBY CERTIFY THAT the design of the stormwater drainage system complies with the requirements of the above development consent conditions, specifically

B2, C2, C3, C5, E2 & E3, all relating to stormwater management and onsite detention are not applicable in this case as the net increase in building area is less than 50 square meters

Scheduled Codes
Council's Stormwater Management policy P21 DCP Part B Cl 5 7

Scheduled Drawings
David Buckle & Associates (NSW) Pty Ltd drawing
2781-H01 Rev P1

For and on behalf of,
David Buckle & Associates (NSW) Pty Ltd

David Buckle
Director Member AHSCA

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No BPB0284

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Shelmerdines
Consulting Engineers

ELECTRICAL SERVICES SPECIFICATION

for

LOQUAT VALLEY ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 PITTWATER ROAD, BAYVIEW

Prepared by

SHELMERDINES
Consulting Engineers
ABN 40 003 331 879
55 Hume Street
Crows Nest NSW 2065
Telephone 9436 3021
Facsimile 9439 8709
Email mail@shelmerdines com au

On behalf of

SYDNEY ANGLICAN SCHOOLS CORPORATION
Suite 102
9 Gloucester Road
HURSTVILLE NSW 2220
Telephone 9579 5663
Facsimile 9570 2220

Project Manager

MIDSON MANAGEMENT PTY LTD
Level 3
51 Rawson Street
EPPING NSW 2121
Telephone 9868 6923
Facsimile 9868 6924

Architect

MIDSON ARCHITECTURE
Level 3
51 Rawson Street
EPPING NSW 2121
Telephone 9868 6923
Facsimile 9868 6924

Construction Issue
18 December 2009
Job No 5337ESP

TABLE OF CONTENTS

Revision Table		
Revision	**Date**	**Description**
A	25-9-2009	Tender Issue
B	19-10-2009	Complying Development Application
C	18-12-2009	Construction Issue

E1 GENERAL ELECTRICAL REQUIREMENTS

E1 1 GENERAL

Cross References

Refer to the following sections

- *ARCHITECTURAL SPECIFICATION*

E1 2 SCOPE OF WORK

Outline Description

The works to be carried out under this section of the contract comprise the supply, installation, testing, commissioning and maintenance of the complete electrical services installation and include the following

- New submains cabling
- Modifications to existing main switchboard
- New distribution board
- Luminaires lamps and tubes
- Final subcircuits for lighting and power
- Facilities for future audio visual systems
- Modifications and extensions to security and fire alarm system
- Data cabling system
- Roof mounted Solar Power system
- Sundry minor works as specified herein

All works shall be carried out generally as shown on the accompanying drawings and shall comply with the relevant clauses of this specification The complete installation shall meet all requirements of the Governing Authorities

E1 3 ELECTRICAL SUBCONTRACTORS

Requirement

The services form a vital aspect of this contract and it is imperative that the electrical subcontractor is experienced in Educational Facility electrical services

Barnwell Cambridge Pty Ltd	Telephone 9556 1666
Ferrett & Ives Pty Ltd	Telephone 9525 9288
Cavanagh Electrical	Telephone 9773 3073
Ron Bateman Electrical	Telephone 9796 7111
NOS Electrical	Telephone 9531 1232
Tony Miller Electrical	Telephone 9907 0333
Advance Solutions	Telephone 9527 2728

Tenderers shall submit a conforming tender based on one of the above companies However, if alternative subcontractors are desired, details of the nominated subcontractor shall be submitted for approval demonstrating the benefit to the Superintendent

Tenderers will be required to complete the Schedule of Prices and Schedule of Technical Data to allow the proper assessment of the tender submission

E1 4 STANDARDS

Requirement

The works shall be in complete accordance with the current editions of the following standards

AS3000	SAA Wiring Rules
AS2293	Emergency Evacuation Lighting in Buildings Part 1 – Design and installation Part 2 – Inspection and Maintenance
AS3008	Electrical Installations – Selection of Cables Part 1 - Cables for alternating voltages up to and including 0 6/11kV
AS3439	Low voltage switchgear and control gear assemblies Part 1 - Type tested and partially type-tested assemblies

E1 5 AUTHORITIES

Requirement

The following is a minimum list of authorities having jurisdiction over the work and whose regulation shall apply

Energy Australia

Workcover Authority

Communications Cabling Authority

Pittwater Council

NSW Fire Brigade

Pay all fees payable to the above authorities with respect to the works of this contract

E1 6 WORKS BY OTHER TRADES

General

The following works are to be carried out by other trades within this Contract with respect to the electrical services works

- Fire rating enclosure around existing main switchboard
- Additional framing in roof structures where necessary for fixing luminaires
- Provision of openings in the building structure to detailed set-outs to be provided by the Electrical Trade
- Provision on door frames for the installation of security system microswitches
- Normal making good after the Electrical Trades installation of his services
- Signwriting of 'Danger' and other notices required by regulations

Works by Hydraulic Services Trade

- Provision of hot water system heaters
- Provision on hydraulic control panel for termination of submains cabling

Works by Lift Services Trade

- Provision on lift control panels for termination of submains cabling

All other work necessary for the complete electrical services installation shall be carried out by the electrical trade as part of the Contract

E1 7 WORKS BY PRINCIPAL

General

The following works will be carried out by the School

- All necessary patching of the voice/data system
- Supply and installation of all necessary active voice and data equipment at the voice/data patch panel
- Provision of wireless access active equipment
- Provision of audio visual systems

E1 8 ELECTRICAL LICENSE

Requirement

Any person or persons engaged in carrying out electrical wiring work shall hold an appropriate Electrician's license issued under relevant State regulation or carry out such work under the personal supervision of a person so licensed A person so licensed shall be on the site of the works at all times any electrical wiring is being performed

E1 9 ELECTRICAL INSPECTIONS

Requirement

The Contractor shall carry out all tests on completion of the electrical works, provide certification in accordance with Authority requirements that all works have been inspected and tested and comply with the regulations

Copies of all compliance certification shall be included in the as-installed documents

Testing shall include mandatory and optional tests outlined in Section 6 of AS/NZS 3000 2000 and AS/NZS 3017 2001 as applicable to the contract works

Certification shall be provided for those sections of the electrical installation which require Authority or independent inspections and sections which may be inspected and certified by the Installation Contractor

All parts of the electrical installation shall be inspected and certified by an independent and qualified Electrical inspector Self certification by the Installation Contractor is not acceptable

The name of the proposed inspector shall be submitted to the Superintendent for approval prior to the commencement of any inspections

E1 10 TENDER DRAWINGS

Requirement

The drawings as scheduled are issued as a guide only and shall be considered to be diagrammatic and approximate The drawings and specification are intended to be mutually explanatory and complete, but all work called for by one, even if not by the other, shall be fully executed Should the documents be in conflict, the Contractor will be deemed to have included for the larger quantity and/or the more expensive component(s), as applicable

E1 11 WORKSHOP DRAWINGS

Requirement

The Contractor shall be responsible for the preparation of all necessary co-ordinated manufacturing and installation shop drawings covering the services included under this contract Confirm the final installation dimensions by site measurement, to ensure satisfactory set out and co-ordination with the structure and new or existing services

All shop drawings shall be on A1 size sheets and one (1) copy and shall be submitted in plain paper format Such drawings shall be submitted to the Superintendent for comments and approval Manufacture and/or installation as applicable shall not be commenced prior to written approval of the drawings

The Superintendent is not to be regarded as the Contractor's checking agent Approvals of shop drawings will be given in principle only and without prejudice to the responsibility of the Contractor for the proper co-ordination, installation and operation of the services

The preparation of shop drawings shall be scheduled to enable the necessary approvals to be gained and for the Contractor to comply with the building programme for installation of the services Delays caused by late submission, incorrectness or inadequacy of shop drawings will not be recognised as a reason for variations to the Contract time or Contract sum

One (1) copy of the approved shop drawings shall be submitted for distribution and further copies shall be submitted to the appropriate Authorities as necessary for their approval

E1 12 AS-INSTALLED DRAWINGS

Requirement

On completion of the works the Contractor shall supply three (3) sets of approved plain paper drawings and two (2) CD's with AutoCAD 2008 and PDF drawings showing the complete electrical services installation "as-installed"

The drawings shall be to the same scale as those specified for "Workshop Drawings" and shall record details of the work actually installed and titled "as-installed"

Symbols legends shall be drawn on all "as-installed" drawings

In order to achieve accurate drawings, all relevant information relating to the contract works shall be entered onto drawing prints immediately it has been carried out The "as-installed" drawings shall appear "as new" No previous approval stamps, hand written notes or erase markings shall be evident New drawings shall be provided if necessary The preparation of the drawings shall proceed during the installation of the works as each section is completed To ensure these requirements, the Consulting Engineer shall inspect the drawings

The information shown on prints and final records shall be actually physically measured from permanent building boundaries or other permanent features and accurate distances shall be shown where deemed necessary by the Superintendent

E1 13 INFORMATION SUPPLIED ON MAGNETIC STORAGE MEDIA

Requirement

The provision of one copy of the tender documents in electronic form may be provided by Shelmerdines Consulting Engineers subject to the following

- All drawings will be supplied in Auto CAD format and/or Adobe PDF format as may be determined by Shelmerdines Consulting Engineers suitable for use with an IBM compatible computer
- Errors resulting from the accuracy of any information supplied in electronic form for any reason will be the responsibility of the recipient
- The information supplied by Shelmerdines Consulting Engineers is copyright, shall be used solely for this project and is not to be disclosed or sold to other parties
- The information supplied by Shelmerdines Consulting Engineers electronically may or may not form part of the contract documents as may be agreed by all parties
- A charge of $30 00 per drawing will be levied with a minimum charge of $125 00 for the issue of drawings in electronic form

Shelmerdines Consulting Engineers reserves the right to withhold the issue of electronic documentation of part or all of the information which forms part of these documents for any reason they may determine

E1 14 OPERATING AND MAINTENANCE INSTRUCTIONS

Requirement

The supply of all necessary information for the satisfactory operation and maintenance of the services shall form part of this Contract

The Contractor shall provide Operating and Maintenance Instruction Manuals which shall comprise a description of each installation, its operation and the regular operating and maintenance routines to be adopted

After obtaining the Consulting Engineer's approval, the Contractor shall arrange for the Operating and Maintenance Instruction Manuals to be handed over to the Superintendent

Three (3) sets of these Instruction Manuals shall be provided on A4 size paper adequately bound to the Superintendent's approval into volumes with rigid covers of plastic finish to withstand continual usage

Manuals shall include

i) Manufacturer's Literature

Include manufacturer's data or maintenance and operation of all equipment installed Do not include irrelevant data that does not pertain to the model of equipment actually installed Such irrelevant information shall be erased from data sheets etc

- Be of sufficient length to show at least one full thread beyond the nut when tightened to correct tension

The following fixings are not acceptable

- Fixings made by the use of explosive powered tools
- Fixings made in the mortar joint in block or brickwork
- Fixings made into timber infills of concrete floor slabs
- Fixings into plasterboard, fibre cement, ceiling tiles or similar friable material
- Self tapping screws into sheet metal
- Nails
- Fixings which rely on expanding elements of nylon, plastics or similar synthetic material for wiring and equipment associated with emergency systems
- Nylon ties for all power sub-mains and feeders except where run in horizontal plane and weight of submains is directly supported by cable tray or ladder rack

E1 19 PRECAUTIONS

Requirement

The Contractor shall ensure that all conduits or conductors forming part of his electrical installation do not contact pipes or telephone and other wiring systems

E1 20 SAFETY FACILITIES

Requirement

Installations carried out under this section of the contract shall be provided with all normal safety facilities, for protection against personal hazard and damage to equipment and complying with the requirements of all Authorities having jurisdiction over the works

Facilities shall include guards, housings, shrouds, electrical overload devices, warning notices and similar provisions

E1 21 EQUIPMENT MANUFACTURE

Requirement

All electrical and mechanical control equipment and fittings supplied under this section of the contract shall, within their respective types, be of the same manufacture throughout the works

Where applicable, each piece of apparatus shall be fitted with a rating plate giving particulars of manufacturer's type number and serial number or other means of identification, together with full details of plant and equipment in readily visible and approved positions

E1 22 LABELLING

Requirement

All switchboards and equipment including circuit breakers, switches fuses, contactors, relays, circuits and similar items shall be labelled in an approved manner to clearly indicate their respective functions

Power outlets shall be labelled to identify distribution board and subcircuit number

Unless otherwise specified labels shall consist of black engraved lettering in polished white Traffolyte or similar approved materials The sizes of all labels and lettering thereon shall be to the approval of the Superintendent Labels shall be secured by adhesive and screw fixed to approval

Nameplates of the Contractor and equipment manufacturers used in the works shall be strictly to the approval of the Superintendent with respect to size and design and shall only be mounted in approved locations

E1 23 COLOUR CODE

Requirement

The following colour code shall be used throughout the installation

Busbars and cabling within switchboards and all submain cores and polyphase subcircuits shall be coloured red, white and blue in accordance with the Supply Authority's phase rotation

Single-phase subcircuits for lighting and power shall be coloured as follows

Active conductors	-	red, white, blue
Neutral conductors	-	black
Earth conductors	-	green/yellow

No departure from the colour code specified will be permitted without the written approval of the Superintendent

E1 24 PAINTING

Requirement

All switchboard and other sheet metal enclosures shall be paint finished as detailed in the relevant clauses of this specification

All wiring trunking, ducting, cable tray, supports, brackets, racks and similar fixings for attachment to the building structure shall be thoroughly cleaned free from rust and scale, and painted in one (1) coat of rust-inhibiting primer and one (1) undercoat before fixing

All galvanised surfaces shall be etch-primed before paint finishing The finishing colour for all metalwork will be selected by the Superintendent

E1 25 EARTHQUAKE RESISTANCE

Requirement

The building and all services are to be constructed to withstand earthquake loads in accordance with AS1170 4 In this regard, all major items of electrical services plant and equipment including switchboards, control panels, cable trays and luminaires together with the associated fixings shall be designed and installed to withstand horizontal forces as set out in AS1170

E1 26 ELECTROMAGNETIC COMPATIBILITY COMPLIANCE

Requirement

All equipment and/or appliances provided under this section of the Contract shall meet the requirements of the Australian Communications Authority (ACA) for Electromagnetic Compatibility (EMC) framework to prevent Electromagnetic Interference (EMI), by complying with the relevant standards nominated by the ACA relevant to the products and where required by the ACA, and are labelled with the C Tick mark to establish compliance with the EMC Framework

E1 27 MATERIALS AND WORKMANSHIP

Requirement

Unless indicated otherwise the whole of the material used in this work shall be new, of first quality and of approved manufacture and type All materials shall be to the approval of the Superintendent No approval of the Superintendent shall be deemed an acceptance of materials or workmanship not complying with the requirements of this contract

The whole of the workmanship shall be first class, neat and substantial and to the entire satisfaction of the Superintendent

The installation throughout shall comply in every respect with the various codes published by the Standards Association of Australia together with any additional requirements which may be specified herein

E1 28 ALTERNATIVES

Requirement

Generally tenderers shall adhere to the types of plant and equipment where detailed in the drawings and specification Where these requirements preclude tenderers from offering plant of their standard manufacture, alternatives may be submitted for approval

Unless such alternatives are accepted in writing by the Superintendent the Contractor shall comply with the detailed requirements of the specification

Tenderers shall submit a fully conforming tender allowing for the plant and equipment detailed in the specification and drawings Tenderers may, if so desired, tender also for similar type equipment of recognised and approved manufacture, but as an ALTERNATIVE

When alternatives to the base tender are submitted for approval, the submission shall include the following information which shall accompany the tender

Revised total lump sum tender price

Fully detailed comparison of the alternative item of plant or equipment offered with the specified item listing all areas of non-compliance

E1 29 SAMPLES

Requirement

The Contractor shall submit to the Superintendent for approval, samples of selected equipment and fittings to be used in the works

Samples of the following equipment shall be submitted for approval

- All luminaires
- Power outlets
- Light switches
- Security outlets
- Fire alarm outlets

Additional samples shall be provided as requested by the Superintendent

E1 30 ON COMPLETION

Requirement

The Contractor shall fully clean down the works of this section of the contract on completion Cleaning down shall include the removal of all cement, paint droppings, plaster and other foreign matter from conduit and pipework, plant equipment and fittings All damaged finishes shall be made good

E1 31 COMMISSIONING

Requirement

The Contractor shall be responsible for the commissioning of the installations carried out under the contract and in accordance with the building time programme Commissioning shall include all adjustments necessary to tube and lampholders, and to overload device settings and fuse cartridge ratings to suit the characteristics of the final loadings

The Contractor shall carry out circuit and submain adjustments as required to ensure the whole of the electrical installation is balanced over the three phases to the satisfaction of the Supply Authority and the Superintendent

E1 32 MAINTAIN SUPPLY

Requirement

The School will continue operation throughout the construction period and supply shall be maintained for all purposes as far as practicable Any unavoidable disconnection of supply shall be of minimum duration and shall only be carried out at times acceptable to the Superintendent

In this regard, the Contractor shall provide the Superintendent with five (5) days notice in writing of any planned disconnection of supply and shall not proceed with the disconnection without the approval of the Superintendent

Tenderers shall make due allowance for all works that will be required to be performed out of hours in order to comply with this clause

E1 33 EXISTING SERVICES

Requirement

Existing Services encountered, obstructed or damaged in the course of performing these works are to be dealt with as follows

- If the service is to be continued repair, divert, relocate as required
- If the service is to be abandoned cut and seal or disconnect and make safe

The Contractor shall advise the Superintendent of all existing services encountered and obtain approval of his proposed method of dealing with these services prior to commencing the work

E2 SUPPLY

E2 1 SOURCE OF SUPPLY

Requirement

Supply to the new building and new lifts shall be derived from the existing Energy Australia aerial supply from Pittwater Road and existing the main switchboard via submains as shown on the drawings

E2 2 CONSUMERS MAINS

Requirement

Consumers mains are existing and shall be retained

E2 3 METERING

Supply Authority metering is existing at the main switchboard and shall be retained

The Contractor shall obtain and fill in 'Application for Service" forms, obtain signatures etc as necessary, and make all other arrangements on behalf of the Proprietor for the connection of power

E2.4 EARTHING

Requirement

Supply and install a complete system of Multiple-Earth-Neutral (MEN) earthing to earth effectively the main switchboard, distribution boards, conduits, cables, ducts, fixed and general purpose outlets, metal flush plates and lighting fittings and otherwise as required by the SAA Wiring Rules and Energy Australia

Earth continuity shall be maintained throughout the installation and test certificates of earth continuity and resistance, measured at each switchboard and at each item of plant and equipment shall be supplied to the Superintendent prior to handing over the works

The size of earth conductors shall not be less than those required by the SAA Wiring Rules and as determined by the full current carrying capacity of the submains cables and the subcircuit concerned Earthwires shall be run within the conduits

E3 SWITCHBOARDS AND EQUIPMENT

E3 1 SWITCHBOARD MANUFACTURE

Requirement

All switchboards provided under this section of the contract shall be manufactured by one (1) of the following companies

K E Brown Pty Ltd, Sydney

SMB Harwal Electric Pty Ltd, Sydney

Relec Pty Ltd, Sydney

Gosford Electrical Manufacturing Pty Ltd, Gosford

The Contractor will be held completely responsible by the Superintendent for all aspects of the supply of the boards including submission of shop drawings, manufacture to specification requirements, co-ordination of Energy Australia and installation requirements and delivery to meet the building programme

Accordingly tenderers are advised to assure themselves of the capacity of their selected manufacturer to meet the contract requirements

E3 2 LABELS AND DESIGNATIONS

Requirement

All cubicles, panels and control equipment shall be labelled in accordance with the requirements of Clause E1 22

E3 3 NEW DISTRIBUTION BOARDS

Construction

New distribution boards shall be of the front-connected totally enclosed metal-clad cabinet type and constructed in Lysaght CRCDQ or zincanneal sheet of not less than 1 6mm thickness All edges shall be returned and all corners welded

Escutcheon type removable covers shall be provided to equipment panels and plain covers to cable trough and link sections Covers shall be dustproof and fixed with chromium-plated captive metal thread screws Dustproofing shall be by means of a neoprene gasket installed in a channel formed on all edges or other equivalent means

The complete switchboard assembly shall be degreased and cleaned free of all rust and blemishes, suitably primed and undercoated Inside surfaces shall be spray painted in two (2) coats of gloss white enamel and outside surfaces in three (3) coats of X-15 orange to AS2700

Equipment

Distribution boards shall accommodate circuit breakers complying with the requirements of Clause E3 5 and E3 6 Circuit breakers shall be so mounted that all incoming and outgoing connections are readily accessible from the front of the cabinet with covers removed and shall be arranged to afford maximum space for wiring around equipment Individual units shall be removable from the fronts of panels without disturbing adjacent breakers

All conductors on the line side of circuit breakers shall be in the form of a busbar Busbars shall be of high conductivity copper throughout and shall comply in all respects with AS 2067

Labelling

A label shall be provided on each distribution board to identify the size and origin of all submains cabling entering and leaving the distribution board

E3.4 MODIFICATIONS TO EXISTING DISTRIBUTION BOARDS

Requirement

Modifications to existing distribution boards shall be carried out with equipment of the same manufacture as the existing equipment on the respective distribution board

E3 5 MINIATURE CIRCUIT BREAKERS

Requirement

Miniature circuit breakers shall be of the DIN rail mounted type equal to Merlin Gerin type C60N Miniature circuit breakers shall be of the same manufacture as the moulded case circuit breakers

The new distribution boards shall be fitted with DIN rail circuit breakers

E3 6 CIRCUIT BREAKERS WITH INTEGRAL EARTH LEAKAGE PROTECTION (RCD'S)

Requirement

Circuit breakers with integral earth leakage protection shall be equal to Merlin Gerin 'Multi-9 RCD Safety Switches' and have rated tripping current of 30mA

E3 7 CONTACTORS

Requirement

Contactors shall be of Sprecher and Schuh or equal approved manufacture and shall comply with AS 1029 All contactors shall be of the block style, electromagnetic, air break type The rated duty of all contactors shall be uninterrupted type for non-ventilated enclosure and the AS utilisation category shall be AC-3 minimum Series or parallel contacts shall not be used to achieve the required rating All contactors shall be quiet in operation

E3 8 CIRCUIT SCHEDULES

Requirement

The Contractor shall supply and install typed circuit schedules adjacent to the modified main switchboard and the new distribution boards

The circuit schedules shall be mounted behind an approved heavy clear acrylic cover sheet

E3 9 EMERGENCY LIGHTING TESTING CIRCUIT

Requirement

Provide a circuit on each distribution board to enable the emergency lighting to be tested without the need to interrupt the general lighting The circuit shall incorporate a key operated 'TEST' switch, time delay relay and contactor to isolate the unswitched active supply to the emergency luminaires as required by AS2293 The circuit shall operate so that operation of the key switch shall initiate the operation of the emergency luminaries for a period of two hours after which time supply shall be automatically restored to the luminaries

E3 10 DESIGNATIONS OF SWITCHBOARDS

Requirement

The designations of switchboards as shown on the drawings are provisional only The actual designations will be confirmed by the Superintendent

E3 11 DISPLAY DRAWINGS

Requirement

Supply and install the following plastic laminate drawings

Distribution Board Cupboards

- Reduced size A3 prints of the lighting and power layouts showing the final subcircuit details "as-installed"

The display drawings shall be laminated and mounted on the door of the distribution board cupboard

E4 RETICULATION AND WIRING

E4 1 SUBMAINS

Requirements

Supply and install new submains cabling of the type and installed in the manner shown on the drawings

Phase out, terminate and connect all submains cables

E4 2 SUBCIRCUIT CABLING

Generally

Except where otherwise specified, subcircuit cabling shall comprise PVC insulated cables enclosed in rigid PVC conduit which shall be concealed wherever possible by enclosure in concrete slabs masonry walls and false ceiling spaces

Surface run conduit shall only be installed where concealment is not practicable and where approved by the Superintendent Such surface run conduit, where exposed, shall be of the square section miniature type similar to 'Aussie Duct' or approved equal

Subcircuit Cabling In False Ceiling and Roof Spaces

Subcircuit cabling installed in false ceiling and roof spaces shall comprise TPS cables which shall be securely fixed to the building structure The main route of cables shall be run via cable tray Separate cable trays shall be run for lighting/power and communication services Where dropping in walls to outlets and switches the cabling shall be enclosed in rigid PVC conduit

Subcircuit Cabling In Plant Areas

Subcircuit cabling in Plant Areas shall be surface run and enclosed in rigid PVC conduit

E4.3 UNDERGROUND CABLING AND CONDUIT

Installation

All trenching included in the works shall be excavated to an even surface, free from sharp projections

Conduits shall be bedded on 50mm minimum of clean sand and covered by a further 50mm of clean sand before backfilling the trench

After laying of the conduits the trench shall be backfilled with spoil removed from the trench, and all excess spoil removed from the site All existing disturbed surfaces, including paving, turfed and landscaped areas shall be reinstated to their original condition

Marker Tape

A 150mm wide yellow or orange marker tape bearing the words 'WARNING - ELECTRIC CABLE BURIED BELOW' or similar shall be laid in each trench 150mm below ground for the entire length

Penetrations in External Walls

Where underground conduits penetrate external walls of a building, the penetration shall be effectively sealed against ingress of moisture by an approved non-setting bitumen compound

E4 4 MARKING PLATES FOR UNDERGROUND CABLING

General

The Contractor shall provide approved engraved brass marker plates to indicate the routes of underground cabling Each plate shall be 75mm x 75mm and of minimum thickness 1mm and shall be screw fixed to a concrete block approximately 150 x 150 x 300 deep located immediately above the cable

The plates shall be installed in the following locations

1) **Where underground cables enter a building**

2) **At each change in direction of underground cabling**

Indication of Cable Entry To A Building

At the point at which an underground cable enters or leaves the building the marker plate shall be engraved with an arrow pointing in the direction in which the cable is laid and the words 'ELECTRIC CABLE'

Indication of Directional Changes
At each change of direction two (2) marker plates shall be installed Each plate shall be engraved with an arrow pointing in the direction in which the cable is laid and the words 'ELECTRIC CABLE'

E4 5 CONDUIT

General
Unless otherwise indicated, conduit shall be of the rigid PVC type

All conduit shall be concealed wherever possible by enclosure in concrete slabs, masonry walls etc and by installation in false ceiling spaces Surface run conduit shall be installed true and straight and aligned to perpendicular and lateral building elements

The entire works shall be carried out on the draw-in principle

Conduits shall be securely fixed to wall boxes by means of conduit clamps Elbows and tees shall only be used where specifically approved by the Superintendent and only where readily accessible at all times

All conduit joints shall be free from burrs and rough edges and adequate precautions shall be taken at all times to prevent entry of moisture or foreign matter into the conduit systems

The use of flexible conduit shall be kept to a practical minimum

All flexible conduit shall be corrosion resistant and fully weatherproof and of Sealflex manufacture Positive type screwed fittings shall be used at all terminations of flexible conduits

All conduits for future use shall be complete with polypropylene draw-cords

PVC Conduit
PVC conduit shall comprise light duty UPVC conduit in compliance with AS 2053 The conduit shall be of minimum size 20mm diameter and shall be complete with moulded PVC conduit fittings fixed with approved adhesive cement All fittings and wall boxes used in conjunction with the conduit shall be of the same manufacture and material as the conduit

Corrugated PVC conduit shall only be installed with the prior approval of the Superintendent

Heavy Duty UPVC Conduit
HD UPVC conduit shall comply with AS 2053 and with 'Category A' enclosures as defined in the SAA Wiring Rules All fittings shall be of the material specified for the piping and all joints shall be made with an approved adhesive cement

E4 6 PVC INSULATED CABLES

Requirement
All PVC insulated and PVC insulated and sheathed cables shall be of approved manufacture with multi-strand copper conductors and of V75, 0 6/1 kV grade All cables shall be delivered to site in their original packages

The minimum sizes of subcircuit cables shall be as follows

General power subcircuits	-	2 5mm²
Lighting subcircuits	-	2 5mm²

The final sizes of subcircuit cables shall be determined to suit the respective voltage drop requirements As a minimum requirement power and lighting circuits with route lengths in excess of 30 metres shall be wired with cables of minimum size 4 0mm²

E4 7 CABLE TRAYS

Requirement

Cable trays shall be of perforated metal in standard Admiralty pattern and of Ductail or approved equal manufacture All trays shall have a cold rolled galvanised finish and shall be machine press formed, with both edges returned a minimum of 50mm for stiffening Tray shall be formed in 2 5 metre lengths and shall be of the following minimum gauges

Width of Tray	Thickness of Material
75, 100, 150 mm	1 0 mm
225 mm	1 2 mm
300 mm	1 6 mm

The tray width selected with each application shall allow 20% spare space for future cables

Tray shall be complete with galvanised perforated fishplates, bends and galvanised fixings, all to manufacturer's recommendations

Installation

Tray shall be secured to the structure to approval and shall be installed with sufficient clearance to permit installation of cable clips and other cable fixings Supports shall be evenly spaced to ensure that tray is true and straight Spacing of supports shall be within the manufacturer's recommendations for the loading concerned and in any case not less than two (2) supports shall be provided per length of tray

Supports shall be of substantial fabricated hot-dip galvanised steel construction

The complete installation shall be free of any distortion or bowing

E4 8 CABLE TROUGHING

General

Cable troughing and fittings shall be of approved manufacture and shall be complete with clip-on type covers, formed true and straight and returned not less than 10mm over the sides of the troughing

Cable troughing shall be fixed to walls or supported in an approved manner at minimum 1200mm centres Each length of troughing shall have at least two (2) fixings or supports

Retaining clips shall be installed to retain the wiring at intervals not exceeding 1000 in all locations except where cable troughing is run horizontal with covers uppermost

Plastic Troughing

Plastic troughing shall be UPVC The troughing and covers shall be robustly constructed from heavy gauge material to avoid sagging between supports and to avoid warping All associated fittings shall be of similar material to the troughing

E4 9 CABLE PITS

Requirement

Cable pits shall be of the concrete type equal to Gatic manufacture and complete with a concrete, galvanised steel or approved equal cover The sizes of all pits shall be selected to suit the respective purpose **Polycrete or plastic pits** and lids will **not** be accepted

Drainage

Pits shall be bedded on a minimum of 100mm of gravel aggregate which shall extend under the entire pit bottom Pits shall be installed with covers flush with the finished ground level For each pit a nibble drain of minimum 300 x 100 deep shall be provided and graded away from the pit a minimum distance of 2 metres Where possible pits must be located below the floor level of surrounding buildings to prevent flooding of buildings via the conduits

Labelling

An engraved brass plate shall be fixed to the top of each pit cover to identify the function of each pit Pits shall not be labelled Telstra' unless specifically used for Telstra

E4 10 CIRCUITING

Requirement

Circuiting of all outlets is shown on the drawings and no variations will be permitting without prior written approval from the Superintendent

Balancing

The completed installation shall be balanced over three (3) phases to the approval of the Energy Australia Any modification necessary to the specified circuiting to achieve this balance shall be to the approval of the Superintendent and any such variations shall be noted on the 'as installed' drawings

E5 LUMINAIRES AND ACCESSORIES

E5 1 LUMINAIRES

Requirement

Supply and install all luminaires as detailed on the drawings The manufacturers' names listed against luminaires on the drawings are to be considered as a guide only and tenderers may, if so desired, tender also for similar type fittings of recognised and approved manufacture, but as an alternative

Before placing any orders for luminaires the successful tenderer will be required to submit for approval illustrations and detailed information, clearly stating manufacturers' names and manufacturers' type number of capacitors and ballasts The successful tenderer will also be required to submit both add and deduct unit rates and total price against each nominated fitting Orders shall not be placed until approval of the proposed fittings has been obtained from the Superintendent

Accessories

The luminaires shall be complete with all metalware, accessories and auxiliary equipment All auxiliary equipment shall be of the quick connect type

Unless otherwise specified, all fluorescent luminaires shall be fitted with approved electronic ballasts

Electronic ballasts shall be equal to Helvar manufacture with approved connection facility

E5 2 LAMPS AND TUBES

Requirement

Supply and install all lamps and fluorescent lamps to suit the number and types of luminaires as shown on the drawings

Fluorescent Tubes

With the exception of the compact type, fluorescent lamps shall be of T5 Philips Master TL5 High Output type or approved equal and maximum 4000°K colour temperature All fluorescent tubes shall have a guaranteed life of not less than 3500 hours and the Contractor shall be responsible for the replacement of tubes having a lesser life

Metal Halide Lamps

Metal halide lamps shall be of the pulse–start type and Venture or approved equal manufacture All metal halide lamps shall have a guaranteed life of not less than 7000 hours and the Contractor shall be responsible for the replacement of lamps having a lesser life

Miniature Fluorescent Lamps

Miniature fluorescent lamps shall be of Phillips or approved equal manufacture The colour of the lamps shall be 4000°K colour temperature

E5 3 INSTALLATION OF LUMINAIRES

General

All screws, battens, noggings, trim, packing etc necessary for the proper fixing of luminaires shall be provided by the Contractor as part of the works whether individually specified or not

Packing pieces of approved materials shall be fitted where required to level the luminaires and to prevent distortion of the luminaires

Where painted surfaces are damaged they shall be made good Such repairs shall be of the same standard as the original paintwork

Luminaires are to be erected subject to the agreement and approval of the Superintendent immediately prior to the application of the finishing coat of paint to the ceiling

Surface Mounted Luminaires

Luminaires shall be securely fixed to structural members of the ceiling or walls, or fixed by hangers, brackets or the like which are themselves securely fixed to building members

Wiring to surface mounted luminaires shall be terminated on terminal blocks installed within the luminaires

E5 4 LIGHTING OUTLETS

Provisional Positions

The position of lighting outlets shown in the drawings are provisional only and outlets shall be installed in accordance with final architectural details

Variations

Any variations necessary to lighting outlet positions shall be carried out by the Contractor at no extra cost to the Proprietor provided that variations are within three (3) metres of indicated locations and are advised prior to installation

E5 5 EMERGENCY LIGHTING SYSTEM

Supply and install a complete emergency lighting system incorporating self contained emergency luminaires and EXIT signs in accordance with the requirements of AS2293-2005

Luminaires

Emergency luminaires and exit signs shall comply with AS 2293 Duration of operation shall not be less than two (2) hours Each emergency lighting unit shall be of the maintained self contained type complete with sealed nickel cadmium batteries, dual rate battery charger, inverter, test switch and light emitting diode to indicate that the charger is operating

Where emergency lighting units are contained within normal luminaires, the batteries and associated control equipment shall be housed on a separate metal enclosure attached to the luminaire and located so that the batteries are not affected by the high temperatures generated within the luminaire during normal operation

Provide an unswitched active to each emergency luminaire

All distribution boards shall be labelled in accordance with AS2293 to indicate circuits which supply emergency luminaires

Supply and complete maintenance log books in accordance with AS2293

E5 6 EMERGENCY LIGHTING MAINTENANCE

Requirement

Provide two (2) visits at six (6) monthly intervals during the defects liability period to test the emergency lighting in accordance with AS 2293

The luminaires shall be paced on full discharge for two (2) hours at each inspection and a visual check shall be made to ensure that the batteries are re-charging when power is re-applied

This testing shall be carried out outside of normal working hours

E5 7 LIGHTING SWITCHES

Requirement

Unless otherwise specified lighting switches shall be Clipsal "Series C2000" type or approved equal incorporating 10 amp rated switch mechanisms specifically designed to reduce the arcing associated with switching fluorescent lamps Switches shall have approved colour dollies and shall be mounted in flush boxes set in walls or surface mounted bases as applicable

Switches mounted on door/window mullions shall be of the approved 'architrave' type

Installation

The mounting height of all switches shall be confirmed on site with the Superintendent, but unless otherwise advised will generally be at a height of 1200mm to the centre of the switchplate

Unless otherwise specified, install all switches on the lock side of the doors irrespective of the position shown on the drawings

The Contractor shall submit samples of all lighting switches to the Superintendent for approval prior to commencing installation

E5 8 FLUSH PLATES FOR LIGHTING SWITCHES

Requirement

Unless otherwise indicated, flush plates for lighting switches not installed on switch panels shall be of the high impact PVC type of colour to be selected by the Superintendent and to approved sample

E5 9 MOTION DETECTORS

General

Motion detectors for the control of lighting in selected areas shall be of the passive infra-red type and shall be enclosed in a high impact PVC enclosure Each motion detector shall be installed in a position designed to ensure that the motion caused by people within the respective area is clearly detected Where more than one detector is installed, the circuit shall be wired so that the lighting will be illuminated if either detector detects movement

Detectors

Detectors in Offices, Reception, Classrooms and General areas shall be equal to Clipsal "753R Series Indoor Infrascans" The detectors in the Store rooms shall be equal to Clipsal "751R Series Indoor Infrascans"

Each detector shall include an adjustable time delay for switching the load off when the movement has stopped Set the time delay period in accordance with directions to be provided by the Superintendent.

E5 10 LIGHTING OUTLETS – PROVISIONAL QUANTITY

Requirement

Supply and install the additional following light outlets in positions to be determined on site by the Architect

Fitting Type A bulkhead 8 off

Refer Tender Form (Page 1 of 4)

The fittings are in addition to those shown in the drawings

All outlets not used shall be deducted from the contract amount

All outlets shall be complete with circuit breakers, cable, conduit etc

E6 POWER OUTLETS AND ACCESSORIES

E6 1 GENERAL PURPOSE POWER OUTLETS

Requirement

General purpose power outlets shall be of matching type and of the same manufacture as lighting switches and to approved sample and colour Outlets shall be of the combination flush type mounted in flush boxes set in walls or on surface mounting bases as applicable Outlets shall not have a removable cover plate

Outlets shall be to approved sample and of colour to be approved by the Superintendent

Mounting Height

The mounting height of all GPOs shall be confirmed on site with the Superintendent

Weatherproof Outlets

Weatherproof outlets shall be equal to Clipsal 56 Series' outlets

Surge Protected Outlets

Surge protected outlets shall be equal to Clipsal or HPM manufacture

Variations

Any variations necessary to positions of general purpose power outlets shall be carried out by the Contractor at no extra cost to the Proprietor, provided that variations are within three (3) metres of indicated locations and are advised prior to installation

E6 2 FIXED POWER OUTLETS

Requirement

Supply and install wiring to fixed power outlets generally as shown on the drawings and complete with isolating switches and a neutral conductor

Fixed power outlet appliances will be supplied and placed in position by the Contractor

Final locations of all fixed power outlets shall be confirmed with the Superintendent prior to installation of any cabling

E6 3 LABELLING OF POWER OUTLETS

Requirement

Each power outlet shall be labelled to indicate the subcircuit to which it is connected

GPO's shall be of the type which incorporates space for an additional switch A blanking insert and clear cap shall be inserted in this space with a typed label

E6.4 DISABLED CALL SYSTEM

Requirement

Supply and install a disabled toilet call system equal to Light Com System by Acetek (Ph 9872 9022) as shown on the drawings

The operation of a call button shall cause the buzzer and indicating light to operate in the respective office The buzzer/call button shall be of the momentary action type

E6 5 CONDUIT PROVISIONS FOR FUTURE AUDIO VISUAL SYSTEMS

Requirement

Supply and install a conduit system to facilitate the future installation of cabling for future Audio Visual systems within the new building

Conduit outlets shall comprise flush wall boxes complete with blank PVC flushplates and each outlet shall be connected with a separate 32mm conduit Each flushplate shall be labelled 'FUTURE AV'

E6 6 HAND DRYERS

Requirement

Supply and install hand dryers equal to JD Macdonald Engineering Co Pty Ltd, Autobeam manufacture Hand dryers shall generally be installed at a height of 1,000mm AFFL and hardwired The power shall be controlled by a suitably labeled isolator mounted at 2100 AFFL directly above the hand dryer

E6 7 POWER OUTLETS – PROVISIONAL QUANTITY

Requirement

Supply and install the following outlets in positions to be determined on site by the Architect

Outlets are in addition to those shown on the drawings

Single General Purpose Outlets	5 off
Double General Purpose Outlets	5 off

Refer Tender Form (Page 1 of 4)

All outlets not used shall be deducted from the contract amount

All outlets shall be complete with circuit breakers with RCD protection, cable, conduit etc

E7 SECURITY AND FIRE ALARM SYSTEM

E7 1 GENERAL

Requirement

This contract includes for the supply and installation of extensions to the existing security alarm system to provide protection to the existing buildings and the new Primary Library

The work shall comprise the following

- Modifications and reprogramming as required to the existing security alarm panel
- Security system data gathering panel
- Passive infra-red detectors
- Magnetic reed door switches
- Smoke and heat detectors
- Cabling and accessories

The system shall be arranged so that when armed, the operation of any smoke or security detector shall automatically transmit an alarm signal to the existing external Security Company

All work shall be carried out as shown on the drawings and to the complete approval of the Superintendent All works relating to the Security System shall be carried out by the existing specialist subcontractor, (To Be Confirmed)

E7 2 EQUIPMENT LAYOUT

Requirement

The layout of equipment and detectors shown on the drawings is to be considered diagrammatic only and does not relieve the Contractor of his responsibility of providing a complete security/monitoring system to protect the building as shown

The Contractor shall, before commissioning the installation, prepare and submit for review detailed shop drawings of equipment layouts co-ordinated with all other services Complete installation details of all equipment together with samples shall also be provided

E7 3 CABLING

Requirement

Security system cabling shall be concealed and installed in separate conduits Cabling for detectors, magnetic reed switches etc shall comprise shielded 3 pair twisted stranded conductors as a minimum

E7.4 SECURITY SYSTEM DATA GATHERING PANEL

The security alarm data gathering panel shall be of the manufacture to match the existing system The panel shall have the capacity to connect a minimum of 100% additional alarm zones to the circuits connected under this contract The spare capacity is to allow the future adjacent buildings to connect to the system when required

E7 5 EXISTING SECURITY ALARM PANEL

Requirement

The existing security alarm panel shall be modified and reprogrammed as required to suit this contract Final zoning shall be arranged on site between the Contractor and the School

E7 6 PIR DETECTORS

Requirement

Passive infra-red motion detectors shall be equal to Detection Systems TF560 manufacture incorporating PIR Microwave detection The exact type of detector shall be selected to suit the area and coverage required by the layout shown on the drawings

E7 7 KEYPAD CONTROL PANELS

Requirement

The keypad control panels shall be of the magnetic/pushbutton type with liquid crystal display and nominal dimensions 100 x 80 x 20 The code pad shall be of approved colour and shall incorporate red and green LED indicators to show whether a PIN has been accepted or not accepted by the system

E7 8 DOOR SECURITY SWITCHES

Requirement

Door security switches shall be of the magnetic reed type Switches installed on hinged doors shall be enclosed in high impact PVC cases and shall be mounted at the head of the door and frame approximately 300mm from the lock side As far as practicable, switches shall be recessed into the door and frame so that they are concealed when the door is closed

E7 9 ANTI-TAMPER DEVICES

General

Provide anti-tamper devices to alarm panels and detectors The devices shall register an instantaneous alarm if covers are removed or vital wiring is disconnected or damaged

E7 10 ALARM STROBES

General

Supply and install an external alarm strobe light and siren mounted in a stainless steel enclosure The alarm strobe light and siren shall comply with AS2201 1 The exact location for the alarm strobe light and siren shall be determined on site

E7 11 INTERNAL SOUND ALERTS

General

Supply and install internal sound alerts as detailed on the drawings

In addition a sound alert complying with AS2201 1 shall be supplied and installed within the false ceiling space in the main entry lobby of the Administration building

E7 12 SMOKE AND HEAT DETECTORS

General

Supply and install smoke and heat detectors as indicated on the drawings The smoke and heat detectors shall be of the self-contained type and compatible with the security system

The detectors shall be separately zoned in the security system to allow 24 hour operation and indication to the Monitoring Company Provide a key isolation switch in the Distribution Board Cupboard of each building to isolate the detectors in the respective building

E7 13 FUNCTION OF SYSTEM

Function

The function of the system shall be such that from the security control panel it shall be possible to determine which of the alarm devices are monitored at any time Any alterations to the programming shall require the use of a security code In the event of an alarm, the system shall automatically raise a local alarm as well as sending an alarm signal to the external security company

Access to the secured buildings shall be by means of a PIN number Use of an authorised PIN shall automatically disarm the alarm devices in the particular zone of the building Re-use of the PIN shall automatically re-arm the system

Time delays shall be incorporated in the control system to enable personnel to exit the building after arming the system and without actuating an alarm

The system shall record all operations including authorised and unauthorised activity The retained data shall include time, data, device activated and card key or security code used, as applicable

E7 14 TESTING AND COMMISSIONING

Requirement

The Contractor shall be responsible for the testing and commissioning of the security system Prior to completion of the work, all circuits, control and indicator equipment shall be tested for satisfactory operation

The installation shall be inspected, tested and passed by the Superintendent

The Contractor shall be responsible for the complete commissioning of the system The commissioning shall be carried out in two stages, an initial programme to allow occupation and operation of the system and a second programme to be carried out during the defects liability period to modify the original arrangement if necessary to suit the requirements of the user

E7 15 REMOTE MONITORING

Requirement

The existing security system is connected to an external security company

The remote monitoring facility shall remain in operation at all times during the construction period

E8 TELEPHONE AND DATA CABLING SYSTEM

E8 1 GENERAL

Scope

The works to be carried out under this section of the contract comprise the supply, installation, testing and commissioning of the complete telephone and data cabling system and include

- New Building Distributor
- Patch panels and patch chords
- Data outlets
- Fibre optic cabling
- Testing and commissioning
- As built drawings and records
- 15 year warranty of the installation

All works shall be carried out by an Australian Communications Authority (ACA) licensed Contractor and to the requirements of the ACA

E8 2 STANDARDS

Requirement

The works shall be in complete accordance with the current editions of the following standards

AS3080 Integrated Communications Cabling Systems for Commercial Premises

Austel cabling and technical manuals 001, 002, 003, 006, 008, 009 & 010

E8 3 BUILDING DISTRIBUTOR

Requirement

The Building distributor shall be a 18RU wall mounted 600mm x 600mm deep cabinet equal to Computer Room Solutions which shall be powder coat paint finished to approval The rack shall incorporate vertical cable management channels and a 240V AC power rail shall be fitted with a 10 Amp circuit breaker accessible to users

The rack shall be designed to accommodate rack mounted equipment and patch panels

All equipment for the data cabling system shall be mounted to the top of the building distributor rack The space at the bottom of the rack shall be left for the future audio visual equipment

Patch Panels

In the patch panel cabinet provide patch panels sufficient to enable the termination of the cabling from the telephone and data outlets as shown on the drawings

The patch panels shall be of Clipsal or approved equal manufacture and shall incorporate RJ45 sockets in arrays of 24 All equipment shall be certified to Category 6 standard

E8.4 DATA OUTLETS

Requirement

Data outlets shall comprise Category 6 RJ45 female sockets mounted on high impact PVC flushplates of a colour to be selected by the Superintendent Outlets shall be equal to Clipsal manufacture and complete with dust shutters

E8 5 CABLING TO DATA OUTLETS

General

Supply and install 4-pair enhanced Category 6 unshielded twisted pair cable from each data outlet to the patch panel cabinet

Terminate and connect the cable at each end

The cabling shall generally be installed as specified for subcircuit cabling in the respective area except that in the ceiling spaces, the main runs of cable shall be supported by plated steel catenary cables or cable trays which shall in turn be securely fixed to the ceiling structure

All cables shall be run in such a manner that they avoid contact with other electrical cables Where necessary, such contact should be at 90 degrees (ie they should cross each other) Under no circumstances are data cables to run side by side with electrical cables

All cables are to be kept well clear of electrical fittings such as lights preferably by either using cable trays or by suspending them below the floor above

Cables are to be laid so they are not stretched around corners or pulled taut in any way

At each data outlet and patch panel, the cable shall be terminated in accordance with protocol T568A as defined in AS3080

Labelling
Each data outlet shall be labelled by means of an engraved label The labelling system shall identify the building number and outlet number and shall be approved by the Superintendent A corresponding engraved laminated plastic label shall be installed above each corresponding socket/terminal on the patch panels

E8 6 FIBRE OPTIC CABLING

Requirement
Supply and install 12 core loose tube OM3 50/125µm multimode fibre optic cable to the building as shown on the drawings

Supply and install a fibre optic cable termination panel on the Existing Campus Distributor in the Library and new Building Distributor to enable the termination of the fibre cable The required position for each frame will be nominated by the Superintendent

E8 7 PATCH CORDS AND FLY LEADS

Requirement
Supply to the School one (1) Category 6 patch cord for each data outlet installed under the contract The patch cords shall each comprise 4 pair unshielded twisted pair cable complete with an RJ45 socket on each end and of a length to be determined by the School

Supply to the School one (1) fly lead for each second data outlet installed under the Contract The fly leads shall match the patch leads 50% of the leads shall be 1 5 metres long and the remainder shall be 2 5 metres long

E8 8 TESTING

Copper Testing
Testing shall be performed with a Level III field test device to AS/NZS 3087

Each tester shall have a valid calibration certificate issued by an accredited NATA agent

The Category 6 cabling shall be tested to ISO 11801 Class D Permanent Link (Latest revision)

No marginal passes shall be accepted

All links shall be 100% tested

Optical Fibre Testing
Testing shall be performed with a power meter – light source to TIA/EIA – 526–14A Method B

All Horizontal and Backbone multi–mode fibres shall be tested at 850nm and 1300nm in both directions

All Horizontal and Backbone single–mode fibres shall be tested at 1310nm and 1550nm in both directions

A link loss budget shall also be prepared to determine the Pass/Fail criteria

All optical fibres shall be tested in both directions with an OTDR unless the power meter – light source can save and print a hard copy of the link

If the power meter – light source do not provide the length of the cable, the meter marks from the cable jacket should then be recorded to calculate the link loss budget

OTDR tests performed shall be both 850nm and 1300nm in both directions for multi–mode fibres and 1310nm and 1550nm in both directions for single–mode fibres

The results of testing shall be typed and issued to the Superintendent All cables and outlets found to be faulty shall be repaired and/or replaced

E8 9 CERTIFICATION

Requirement

On completion of the installation, the Contractor shall provide to the Superintendent certification from the data equipment manufacturer guaranteeing the operation of the data cabling system for a minimum period of fifteen (15) years

E8 10 COMMISSIONING DOCUMENTATION

Requirement

Prior to practical completion, provide the Superintendent with a printed spreadsheet associating room numbers, with outlet numbers The spreadsheet shall be bound into an approved labelled binder

E9 AUDIO VISUAL SYSTEM

E9 1 DESCRIPTION

General

The classrooms will be fitted out as indicated on the drawings The following audio visual systems are required in these rooms

- High quality front projection of data and video images
- Smart Boards
- Amplifiers
- Audio system ceiling mounted speakers

E9 2 WORKS ASSOCIATED WITH AUDIO VISUAL EQUIPMENT

Classrooms

Smartboards and projectors will be installed by the School, however all necessary wiring and conduits to facilitate the future use of the projector are part of this contract

E9 3 AMPLIFIER

Requirement

Supply and install an amplifier within the classroom ceiling space adjacent the projector location or an adjacent storeroom The amplifier will be equal to Altronic Redback Public Address Amplifier model number A4020 30W

The amplifier shall be provided with volume control on the unit as well as volume control located near the door

E9 4 CEILING SPEAKERS

Requirement

Supply and install recessed ceiling speakers in the locations shown on the drawings The speakers are to be equal to Total Audio Group (TAG) model number 8QF/DC

E9 5 AV WALL PLATE

Requirement

Supply and install an AV wall plate within the Classroom located in the position shown on the drawings The AV wall plate will be equal to Questronix Model AWPI Mk II

E9 6 CABLING

Classrooms

Cabling shall be supplied and installed as per the details on the drawing

E10 SOLAR POWER SYSTEM

E10 1 GENERAL

General

Supply, install and commission a grid connect solar power system on the northern side of the New Classroom roof The system shall be sized at 6kW capacity and consist of

- Photovoltaic cells
- Inverters
- Smart meter
- 3 phase connection to building distribution board
- Web Box for data connection to School network to monitor energy
- LCD display in Administration Building

The system shall be equivalent to a BP Solar Australia system and be installed by an approved specialized Subcontractor

E10 2 PHOTO VOLTAIC CELLS

Requirement

Supply and install glass covered aluminum framed photo voltaic cells on the roof as shown on the drawings Each panel shall be mounted on a galvanised steel framing system which shall be fixed to the roof sheeting with an approved clamping system The panels shall be equivalent to BP Solar BP317ON 170 Watt solar modules

E10 3 INVERTER

Requirement

Supply and install a DC to AC inverter(s) in the storeroom where indicated on the drawings The inverter(s) shall then feed power into Distribution Board DB–M via an appropriately rated circuit breaker

The inverter shall be equivalent to a SMC6000 grid connect inverter

E10.4 SMART METER AND DISPLAY

Requirement

Install a smart meter to monitor the following

- Actual kWh being produced
- Total kWh produced for the day
- Total kWh produced for the week
- Total kWh produced for the month
- CO^2 emission reduction

The smart meter shall connect via a web box to allow the above information to be transmitted over the School IT Network and accessed via any computer Provide a 22" LCD monitor to be installed in the Reception of the existing Administration Building The LCD display shall display the information from the smart meter as a minimum that listed above

E10 5 ELECTRICITY METER

Requirement

Replace the existing Supply Authority meter at the existing main switchboard with a meter that can run in reverse if the solar system produces excess power The new meter shall be a type approved by the local Supply Authority

E10 6 COMMISSIONING

Requirement

The Contractor shall be responsible for the testing and commissioning of the Solar Power System The testing shall be carried out in the presence and to the entire satisfaction of the Project Manager

LOQUAT VALLEY ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS

Schedule of Electrical Services Drawings

Drawing	**Title**
5337-ES-1	Legend
5337-ES-2	Site Plan
5337-ES-3	New Classroom Block Power and Lighting Layouts
5337-ES-4	Miscellaneous Power and Lighting Layouts
5337-ES-5	Lift A and Lift B Power and Lighting Layouts
5337-ES-6	Single Line Diagrams
5337-ES-7	Details Sheet

Schedule of Workshop Drawings

Workshop drawings to be submitted by the Builder for approval in accordance with section 1 shall include, but not be limited, to the following

- New Distribution Board
- Submain Routes and Installation Details
- Security System Layouts
- Telephone/Data System Cabling Details
- Audio Visual System Details
- Solar Power System

TENDER FORM (Page 1 of 4)

LOQUAT VALLEY ANGLICAN SCHOOL

ALTERATIONS AND ADDITIONS

ELECTRICAL SERVICES

SCHEDULE OF PRICES

The following schedules are to be completed and returned with the Tender Form and will be used in the assessment of tenderers and administration of the Contract

	ITEMISED LUMP SUM PRICE	**FIXED PRICE**
1	Modifications to existing Main Switchboard	$
2	Supply only of Distribution board	$
3	Modifications to existing distribution boards	$
4	Submain Cabling	$
5	Supply only of luminaires	$
6	Lighting and power subcircuit cabling	$
7	Provisional quantity of power outlets and lighting fittings	$
8	Voice/data cabling system	$
9	Security and Fire Alarm System	$
10	"As-Installed" Drawings	$
11	Solar Power System	$
12	General installation	$
	TOTAL OF ITEMS 1-12 ABOVE	$
	GST	$
	TOTAL (Incl GST)	**$**

Note A GST nett figure is to be shown against each item except for Item 12 which all include all mark up and profit margins

The tenderer, by signing below, acknowledged that they have been to the School and conducted a complete investigation of the proposed works prior to submitting this tender

Company

Signature

Witness Date

TENDER FORM (Page 2 of 4)

ELECTRICAL SERVICES

SCHEDULE OF RATES

LOQUAT VALLEY ANGLICAN SCHOOL

ALTERATIONS AND ADDITIONS

VARIATION	**ADDITION** **$**	**DELETION** **$**
Supply and installation of wiring for one (1) only lighting outlet wired in TPS cabling on an existing circuit within five (5) metres of an existing outlet	$	$
Erection of one (1) only lighting fitting (excluding supply of lighting fitting)	$	$
Supply and installation of one (1) only wall mounted GPO wired in surface run conduit and looped in conduit and looped in from an existing outlet within ten (10) metres run	$	$
Supply and installation of one (1) only wall mounted GPO wired in concealed conduit and looped in from an existing outlet	$	$
Supply and installation of one (1) only PIR detector wired in TPS cabling located within ten (10) metres of an existing detector	$	$
Hourly labour rate	$ /hr	$ /hr
Percentage mark-up on materials costs	%	$
Additional cost per cubic metre for excavation in rock if encountered during trenching for contract works	$ /m^3	$ /m^3
Supply and installation of one (1) only security system smoke fire detector wired in TPS cabling on an existing circuit within five (5) metres of an existing outlet	$	$

TENDER FORM (Page 3 of 4)

ELECTRICAL SERVICES

SCHEDULE OF RATES

LOQUAT VALLEY ANGLICAN SCHOOL

ALTERATIONS AND ADDITIONS

VARIATION	ADDITION $	DELETION $
Supply and installation of one (1) only security system heat detector wired in TPS cabling on an existing circuit within five (5) metres of an existing layout	$	$
Installation of one (1) only circuit breaker within an existing spare space (excluding supply of circuit breaker)	$	$
Supply and installation of one (1) only single data outlet wired within 30 metres of an existing campus or building distributor	$	$
Supply and installation of one (1) only dual data outlet wired within 30 metres of an existing campus or building distributor	$	$
Supply and installation of one (1) only security reed switch detector wired in TPS cabling on an existing alarm circuit	$	$

Company

Signature

Witness Date

TENDER FORM (Page 4 of 4)

ELECTRICAL SERVICES

SCHEDULE OF TECHNICAL DATA

LOQUAT VALLEY ANGLICAN SCHOOL

ALTERATIONS AND ADDITIONS

This Schedule is to be completed and returned with the tenders

1 ELECTRICAL SUBCONTRACTOR

Name
Recent School Experience

2 DISTRIBUTION BOARD

Manufacturer

3 CIRCUIT BREAKERS

Manufacturer, Moulded Case
Manufacturer, Miniature

4 LIGHTING SWITCHES & GENERAL PURPOSE OUTLETS

Manufacturer
Type

5 SPECIALIST SECURITY ALARM SUBCONTRACTOR

Name

6 LUMINAIRES

Fluorescents

Emergency Lights

7 SPECIALIST DATA/TELEPHONE CABLING SUBCONTRACTOR

Name

8 SOLAR POWER SYSTEM

System Manufacture

Specialist Subcontractor

System Capacity

No of Phases

Company

Signature

Witness Date

TECHNICAL SPECIFICATION

FOR THE
INSTALLATION
OF

HYDRAULIC SERVICES

At

LOQUAT VALLEY ANGLICAN SCHOOL
ALTERATIONS & ADDITIONS

Prepared For

Sydney Anglican Schools Corporation

Hydraulic Consultant

David Buckle & Associates

PROJECT NO	**2743**
ISSUE	**CONSTRUCTION**
DATE	**27-11-09**

URBAN CITY CONSULTING PTY LTD

2 JAN 2010

Accredited Certifier
Accreditation No. BPB0084

Construction Issue
20 October 2009

David Buckle & Associates Pty Ltd
Suite 8 38 Rowe St
Eastwood NSW 2122

CONTENTS

SECTION ONE - GENERAL CONDITIONS

1 01 GENERAL REQUIREMENTS

This Hydraulic Services Technical Specification shall be read in conjunction with the Hydraulic Drawings and other such documentation issued by the Superintendent in association with this contract In particular the sub contractor shall read the following sections of the architectural specification sections,

- Preliminaries
- General requirements
- Adhesives Sealants and Fasteners
- Metals and Prefinishes
- Termite Control
- Service trenching

1 02 DEFINITIONS

In constructing this Technical Specification the following words shall have the meaning assigned to them below unless there is something in the subject or context inconsistent with such construction

• Principal	shall mean **Sydney Anglican Schools Corporation**
• Superintendent	shall mean **Midson Group**
• Architect	shall mean **Midson Architecture**
• Hydraulic Consultant	shall mean **David Buckle & Associates**
• Contractor	shall mean the successful building Contractor
• Sub-Contractor	shall mean the successful hydraulic services Sub-Contractor
• Approved	where the term "approved" is used in this Scope Of Works it shall be taken to mean accepted or selected by the Project Manager The Project Manager will be the sole judge and will determine what is, and what is not approved

1 03 DEVELOPMENT DESCRITPION

The development described under this contract refers to construction of alterations and additions at Loquat Valley Anglican School

The general development layout and design intent has been documented by the Architect in the architectural drawings

1 04 HYDRAULIC SERVICES SCOPE OF WORKS

The works to be provided under this sub-contract include for the complete design, engineering, supply, delivery, installation, testing, commissioning, maintenance and warranty of hydraulic services within the new buildings at the school site

Specifically the works are as described in the associated documentation as listed hereunder

- Hydraulic Services Drawings as prepared by David Buckle and Associates

1 05 HYDRAULIC SERVICES TECHNICAL SPECIFICATION

The intent of this Hydraulic Services Technical Specification is to provide detailed description of the technical requirements of workmanship, materials, plant and equipment required to complete the works as set out in the Hydraulic Services Drawings

1 06 HYDRAULIC SERVICES DRAWINGS

Hydraulic Services Drawings show the approximate route of the various services The Sub-Contractor shall make due allowance for all necessary diversions from the straight line, rise and fall and adjustment of positions of equipment as may be required for the proper execution of the works

Obtain from site all necessary dimensions to enable work to proceed Do not scale architectural plans or other project plans for dimensions Verify on site all measurements and dimensions All cores incorrectly placed shall be reinstated at the cost of the Sub-Contractor

The Hydraulic Services Drawings and Hydraulic services Specification document are intended to be mutually explanatory and complete, however all work called for by one even if not by the other shall be fully executed Should there be any discrepancy between the Hydraulic Services Drawings and Hydraulic Services Specification document, the contract shall be deemed to include whichever alternative involves the greater cost

Hydraulic Services Drawings issued with this contract are as follows,

H00	Legend Location Plan & Drawing Schedule
H01	Site Plan & Drawing Key Plan
H02	01 New Classrooms and Access Ramps
H03	02 New Ramps Access WC and Lift
	03 New Lift
	04 & 05 New Stores
H04	Detail Sheet

1 07 CONSTRUCTION HYDRAULIC SERVICES DRAWINGS & MANUALS

Prior to manufacture or installation "Installation" drawings from which the subject works shall be built Drawings are be prepared on AutoCAD R2000 / i2004 drafting system

The drawings shall initially be submitted by the Hydraulics Trade to the other Building Trades for checking, co-ordination and approval "Installation" drawings shall contain reference to all intended installation of Hydraulic services work with sufficient detail to enable accurate co-ordination with other trades concerned & be not limited to

- Area service connection details
- Plumbing and drainage system layouts
- Fire System Services
- Dimensioned core hole penetrations & Cast-ins pipework
- Details of equipment

At completion prepare "As Constructed" Drawings covering all the services installed under the Contract

Manuals (3 off) shall comprise a plastic ring binder(s) with the project title, location, propietor's name contractor's name and Project Manager's name embossed on the cover The manuals are to incorporate an

- Index
- Manufacturer's brochures on all equipment and accessories used in the installation
- Maintenance and testing instructions for all components in the installation, which require regular preventative maintenance and checking
- A list of service companies and agencies for maintenance of components equipment and systems in the installation

SECTION TWO - WORKMANSHIP

2.01 WORKMANSHIP GENERALLY

Workmanship shall be first class throughout the entire development

The installation throughout shall comply in every respect with the various codes and regulations as specified herein

The whole of the work shall be best quality carried out by registered tradesman under the full supervision of a Gold Licensed Plumber, Drainer and Gasfitter in accordance with the Hydraulic Services Drawings and Specification

All work shall be at least equal to or better than requirements of the appropriate Australian British or American standards in that order of preference Where any doubt exists as to the appropriate standard, a decision shall be made prior to commencement of any work

2 02 STANDARDS OF WORKMANSHIP

All material furnished and all work installed shall comply with Codes, rules and regulations of all statutory authorities with the rules and the recommendations of Sydney Water and the Work cover Authority and with all requirements of the Local Council and the following

1) AS 3500 National Plumbing & Drainage Code
2) Building Code of Australia
3) The Local Council
4) AS/NZS 3000 2007 Wiring Rules

2 03 COORDINATION

Coordinate hydraulic services works with other trades and the construction program Follow up other trades as fast as works proceed Allow for all necessary pipework offsets as required to coordinate with building structure, mechanical services ductwork, electrical wiring and various other trades as required

2.04 NUISANCE

Work shall not be carried out or materials handled in such a manner as to cause nuisance on the site or to other contractors, or to the public at large Notify the Superintendent before commencement of any works that may cause inconvenience to other parties

Any works likely to create a safety hazard, shall not be commenced prior to appropriate safety measures and work practices being applied, in accordance with Workcover requirements

2.05 DIMENSIONS

The Sub-Contractor shall be responsible for taking dimensions on site The dimensions must be checked before work is commenced or pre-fabricated All levels and dimensions must be confirmed prior to commencing work The invert levels shown on the Hydraulic Services Drawings are recommended only, and must be checked on site before any excavation or installation of pipework

2 06 SETTING OUT

The Architectural and Hydraulic Services drawings show the approximate position of plant machinery, equipment fixtures, fittings, outlets and accessories and also the general run of the services The exact final location of the services shall be subject to contractor's co-ordination with other trades Where locations are not clearly set out in the documents the contractor shall promptly notify the superintendent to obtain clarification

The Sub-Contractor shall be responsible for taking all dimensions on site checking finished levels for correct cover and position of all lines, checking levels of existing mains before commencing work, fabrication or placing orders

Services run in false ceilings, in roof spaces shall be arranged adjacent to and horizontally parallel with each other and with adequate spacing of at least 50mm between pipes and/or insulation Clearances between pipes and electrical cables shall be not less than that prescribed by the Wiring Rules

All measurements shall be taken from site Only dimension drawings shall be used for set-out

No walls or ducts shall be built before set out has been approved Where pipework extends through walls scheduled to have tile finish, set out in conjunction with the architectural detail showing centre lines of fixtures and outlets

No additional cost variation will be made for reinstallation or alteration of works incorrectly placed due to insufficient supervision or checking

2 07 PUBLIC UTILITIES & EXISTING SERVICES

One of the new classrooms included in this scope is to be constructed over a Sydney Water sewer main which has been concrete encased and a junction has been installed to receive discharge from this development These BOS works have been completed and approved as part of a previous work package

The Hydraulic Services Sub Contractor shall investigate for exact location depth and size of existing services Deviations of services are to be brought to the notice of the superintendent before *commencement of the work*

The Hydraulic Services Sub Contractor shall pay all fees and lodge applications with relevant authorities for positions of and connections to individual services Where the Hydraulic Services Contractor is unsure as to the exact location and/or depth of any existing service, he shall provide all pipe and cable search equipment necessary to locate the service prior to excavation

Where underground public utility lines and surface drainage works and undergrounds pipes conduits or cables exist in the vicinity of the works, the hydraulic services Sub-Contractor must take all measures required to protect such services Any damage to such services must be immediately reported to the relevant Authority and the Superintendent

Existing services shall not be interrupted except with the approval of the Superintendent to ascertain the time and date of least disruption to the site and shall then seek in writing the Superintendents directions

2 08 CORE HOLES AND SLEEVES

Set all core holes and sleeves in floors, walls and columns in conjunction with the fixing of formwork and/or placing of concrete To prevent weakening of the building structure all core holes shall be approved by the structural engineer prior to placing concrete Strip core from formwork and seal and make good all holes and chases through walls and floors after installation of pipework

Sleeves Where stacks or branches pass through walls, slabs or beams, provide pipe over sleeves with adequate clearance all round pipes to enable it to be packed with an approved fire resistance compound

Holes through floor structures shall be made with an impact moulded plastic form complete with integral flexible plastic sealing diaphragm equal to "Slabseal"

For PVC and polyethylene installations, use approved fire stop collars

2 09 LAYING OF PIPES

Pipes shall be laid to an even grade to levels shown on the Hydraulic Services Drawings They shall be laid in such a manner that their barrels bear firmly and evenly on bedding material the sockets being

entirely free from bearing The spigots shall be pushed home in the sockets so that an even line will occur at the invert, any lip due to eccentricity being at the soffit

After testing and approval, the spaces under the sockets shall be filled with sand or mortar respectively to complete the bedding according to which material is used for supporting the barrel of the pipe as specified, care being taken in the process not to disturb the joint

Where pipes leave beams at extremities of buildings allowance for movement of the pipes outside the building shall be made by providing two short lengths of pipe with rubber ringed joints

Any pipework to be installed at a grade of 1 25% or less shall be installed with the aid of an electronic laser level

2 10 FIXING AND SUPPORTING OF PIPES

All services pipes shall be positioned in locations as approved by the Hydraulic Consultant before installation of fabrication commences All pipes shall be adequately supported and secured to adjacent walls or slabs Pipework must not come into contact with any other service pipes or part of the building structure

All pipework shall be free to move without causing stresses in the pipework or in the pipe joints Supports shall be galvanised mild steel "Unistrut" channel complete with purpose made galvanised spring nuts framings fittings and pipe clamps for each pipe

Mild steel brackets must be hot dipped galvanised after fabrication Vertical frames where used to support suspended horizontal runs shall allow for complete adjustment of clamp support to suit pipe grading as required Channels shall be galvanised steel bolt fixed direct, or with purpose made clips to walls or underside slabs into "masonry anchors" and hanger rods fixed direct into channel

All copper pipes shall be separated from supports by 4mm thick PVC strip or similar approved material

In the case of spigot and socketed pipes such as cast iron, there shall be at least one fixing behind each collar or pipe fitting or coupling

2.11 CHASING OF PIPES

Chasing in walls for pipework installation shall be carried out with a mechanical saw Chasing will not be allowed in concrete walls columns or slabs unless approval in writing is given by the Superintendent All chased water supply pipework shall be insulated with Kemlag or equal for copper tubes and conduit sheath for poly tubes

2 12 CAPPING OFF

During the construction leave all unfinished work in safe condition protect the works against damage or loss through any cause whatsoever Seal off open ends of pipe in such a manner as to prevent the entry of foreign matter into the lines until the works have been handed over on completion

2 13 INSPECTION OF SERVICES

All labour and equipment required to enable the Superintendent or their representative to carry out any inspection of services deemed necessary during the construction period will be provided as part of this trade package

2.14 TESTING GENERALLY

Make all tests as required or ordered by the authorities having jurisdiction, using the methods prescribed by them Furnish all necessary materials equipment and skilled labour for testing the work All necessary water for tests will be furnished by the Sub-Contractor

All tests shall be made only after confirming the maximum recommended test pressure for a given pipe material from the manufacture of the material in question The Sub-Contractor shall pay for and make good all damage to work and materials resulting from the tests

All tests shall be witnessed in the presence of the Superintendent or their representatives and authorities Give not less than 24 hours notice in writing to these parties before making tests

2 15 FLUSHING OF PIPEWORK

On completion, and prior to commissioning all pipework services shall be thoroughly flushed to remove any debris which may have accumulated during construction

2 16 RESTORATION OF SERVICES

The Sub-Contractor shall allow to restore all roads, paving, bitumen surfaces and the like that are damaged as a result of the executed work Restore all damage with equal quality materials and standards of construction to that existing prior to commencement of works

2 17 PIPE IDENTIFICATION

Markers shall be of the vinyl, pressure sensitive, self-adhesive type consisting of combined flow direction arrow and name of service Markers shall be provided on all hydraulic lines at not greater than 3-meter centre Additional markers shall be provided for

- Both sides of a wall or partition through which a pipe passes,
- A marker adjacent to tees, valves, outlets, pumps, etc,
- Both legs of a bend,
- Both sides of a pipe which can be approached from two directions

Marker sizes shall be as follows

Pipe Sizes	Marker Size
75 mm and above	460 x 57
40 mm and less than 75 mm	460 x 29
Up to 40 mm	460 x 29 (Cut to Suit)

2.18 VALVE IDENTIFICATION

All isolating valves with the exception of single and group fixture isolating valves within the same area as the fixture, shall be clearly identified with a removable tag The tag shall be durable and marked clearly indicating a brief description of its purpose The valve description should also include an assigned valve number, which shall correspond to the same number on As-Installed Drawings and Valve Schedules

2 19 WATER HAMMER

Before concealing of any water service pipework the Hydraulic Service Sub Contractor shall carry out an operational test for water hammer Should any pipework be concealed prior to testing, and water hammer exist then the Hydraulic Services Sub Contractor will be required to remedy the problems and make good all surfaces, structure fittings and fixtures at his own cost

Any evidence of water hammer within the water services will be required to be rectified at the Hydraulic Service Sub Contractor's own expense

2 20 EXPOSED PIPEWORK

Except where otherwise specified, all exposed pipework in toilet blocks, kitchen areas, including pipe supports, clips, etc , adjacent to fixtures such as wastes, traps branches from hot water and cold water supply, shall be heavily chromium plated This shall include where such pipes pass through walls or partitions they shall be fitted with chromium plated wall plates

2.21 CLEANING OF SERVICES

After installation and prior to testing of services, each service shall be thoroughly cleaned and flushed out All valves seats tap washers and strainers shall be checked for any foreign matter and cleaned Damaged seats and washers shall be replaced

Any pipework buried or permanently enclosed before it has been thoroughly cleaned inspected and tested shall be uncovered at the hydraulic services Sub-Contractors expense

2 22 PROTECTION OF POLISHED SURFACES

All polished and exposed surfaces including such materials as stainless steel chromium plate, vitreous china and enamel shall be protected during all stages of construction

On removal of the protection, the polished surface of the material shall be cleaned Any scratched or damaged finishes will not be accepted

2 23 MAKING GOOD

The Sub-Contractor shall be responsible for making good of any damage caused by the hydraulic services works to building structure, finishes and other trades Reinstatement shall be in accordance with any applicable Australian Standards to the satisfaction of the Superintendent and to a standard of repair at least as good as that before commencement

2 24 ELECTRICAL WORK

All electrical work to be installed under this section of the work shall be carried out by a licensed electrician, and in accordance with the Electrical specification for this project the SAA Wiring Rules ASCGI - Part 1 1986 and all amendments thereto, and the requirements of the local supply authority

All equipment supplied and work carried out under the contract shall comply with the requirements of the latest appropriate SAA Specification or Code or if no SAA publication has been issued then the appropriate BS Specification shall apply

All items of equipment shall be of first grade with regard to design and manufacture and shall be completely satisfactory for operation, control, safety and maintenance under all conditions of service

2.25 HYDRAULIC SERVICES DUCTS

Except where otherwise shown on the Hydraulic Services Drawings or where projecting from the wall, floor or ceiling to connect to a fixture or appliance, piping of all kinds and description shall be concealed Where required hydraulic services pipework shall be concealed in ducts

The size and locations of ducts shall be coordinated with the architect and other trades involved The hydraulic services sub contractor shall confirm to the Contractor the locations and sizes of required access panels (for the Hydraulic Services)

SECTION THREE - EXCAVATION

3 01 EXCAVATION GENERALLY

Excavation work, backfilling and surface reinstatement shall be undertaken by the Sub-Contractor as part of his Scope Of Works for all buried services installed under this contract including excavation of all internal and external pits

The Sub-Contractor shall allow for all excavations within his scope of the work to be carried out as follows,

- Materials as found (excluding rock)
- Allow for concrete saw cutting and making good where required

3 02 TRENCHES TO BE EXCAVATED

The ground shall be excavated in the form of trenches to enable the various pipelines to be constructed in the locations indicated on the Hydraulic Services Drawings Trenches shall be excavated at uniform grades and in straight lines

It shall be noted that in some instances two or more drainage pipes will be housed within the same excavation in the bed of the trench to form a step configuration permitting drains to run parallel but at inverts, which allow clearance for crossing

The Sub-Contractor shall not excavate by machine within one metre of existing underground services nor within 2 5 metres of any existing tree within the protected woodland or structure without prior permission of the Superintendent
Excavation shall not be carried out by blasting

3 03 EXCEEDING EXCAVATION

If the Sub-contractor has exceeded the section area of excavation as shown, in consequence of any judicious working, slips, falls, erosions or for any cause other than by the direction of the Superintendent Then the Sub-Contractor shall at his sole cost remove such extra material and make good and fill in the extra excavation with concrete, sand or approved filling as may be directed

No extra payment shall be made for excavation in excess of that required by the Hydraulic Services Drawings and Specifications unless ordered in writing by the Superintendent

3 04 TIMBERING

During excavation in trench shaft or tunnel and during all other work required to be carried out under the contract, the Sub Contractor shall advance the work in a careful, secure and safe manner

This Sub-Contractor shall take all precautions against accidents Where necessary in sandy or loose soil strong shoring, &/or close timbering and shall be installed Generally the sub contractor shall carry out any other work that may be (in the opinion of the Project Manager) required to prevent earth or other material slipping or falling in, or being shaken from the faces, sides, or roof of the excavation including where necessary straw caulking with battening

Payment for the supply, erecting and withdrawing of timber shall be included in the price of the excavation As the works proceed, all shoring and timbering shall be withdrawn except where the Superintendent has directed in writing that shoring and/or timbering shall be left in position

3 05 PUMPING

The de-watering and disposal of all surface waters entering excavations shall be solely the responsibility of the Sub-Contractor executing the work Any damage incurred by rainwater and rainwater run off to the excavations shall be reinstated by the Sub-Contractor to the satisfaction of the Project Manager as part of the normal contract Scope Of Works and at No extra cost

3 06 BACKFILLING

Subject to any special provisions as required by the engineer or authorities fill and consolidate to the satisfaction of the Project Manager all excavations made in any portions of public streets, roads, lanes and footpaths whether paved or unpaved or otherwise

Backfilling of excavations over pipes will vary according to the location of the service and the type of services

Backfilling over water and gas mains may, subject to the approval of the Superintendent and testing authority be carried out prior to testing of the mains, except at the pipe joints Backfilling will be with sand above the pipes will be minimum 150 mm thick over the top of the pipe at the joints

Backfilling over sewer and stormwater drainage for the initial 150 mm over the pipe socket shall be sand except where the drainage is under a road or paved area The initial 300 mm over the pipe socket shall be filled with the sand

3 07 ROADS - BARRIERS, LIGHTS

Maintain efficient hoardings, barriers night lights and properly constructed temporary roads required by any Municipal or authority having charge or control of streets or roads or which may be required for the convenience or safety of occupiers of adjoining property or of the public He shall also make arrangements by temporary roads or bridges or otherwise which may be required by any local authority to prevent stoppage or delay of public traffic or any avoidable inconvenience to the public

The contractor shall not interfere with any private entrance from a public road without making proper temporary provisions for the convenience of owners or users thereof

During such excavation work all the different types of materials shall be placed aside separately The Sub-Contractor shall backfill and consolidate to the underside of the pavement if any and where paved or otherwise as required The base and surface materials of any disturbed pavement shall be replaced in correct order by the Sub-Contractor and consolidated by him to provide a trafficable surface

3 08 SURPLUS SPOIL

Surplus spoil shall mean such excavated material, which is not required for the purpose of this contract and shall be disposed of from the site by the sub-contractor

3 09 COMPLETION

On completion, leave the works clean neat and tidy Remove all rubbish and materials relating to the works from the site

SECTION FOUR - MATERIALS

4.01 MATERIALS GENERALLY

Unless indicated otherwise, all materials shall be new of the best quality and of approved manufacture and type They shall conform to the requirements of the Standards Association of Australia or if no specifications exist, to the requirements of the relevant British Standard specifications

In the event of the Sub Contractor delivering or installing materials of mixed or inferior description and quality the Superintendent or their representative shall have the authority to order the removal of any inferior material from the site immediately

All material delivered to the site must be protected in a manner suitable for storage on a building site Materials shall be stored away from all damp and the ends of pipes shall be sealed

4.02 AVAILABILITY OF MATERIALS

The Sub-Contractor shall be responsible to ensure that all specified materials and items relevant to the works are available from the manufacturers, and are able to be delivered to site for installation in accordance with the construction program

The Sub-Contractor shall notify the Superintendent immediately of any materials, which are not available in accordance with the construction program The Sub-Contractor shall advise the Superintendent of other alternative materials which are available in accordance with the construction program

4.03 SELECTION OF MATERIALS

The hydraulic services Sub-Contractor shall be responsible to ensure that all materials and items relevant to the works are suitable for their location and environment

All materials, plant and equipment relative to the works shall be suitable to provide a working life in accordance with that specified by the Project Manager but in no case less than a minimum 15 year working life

4.04 REJECTION OF UNSATISFACTORY MATERIALS

All materials deemed by the Superintendent or their representative not in accordance with this Hydraulic Services Technical Specification will be rejected The hydraulic services Sub-Contractor shall replace all rejected materials with new materials that comply with this Hydraulic Services Technical Specification

In the event that materials are of a mixed description and quality the Superintendent shall have power to have those portions of the materials, which in his opinion are suitable for the works picked out, marked and stacked where directed The hydraulic services Sub-Contractor shall remove all defective or unsuitable materials from the site

4.05 UNPLASTICIZED POLYVINYL CHLORIDE (UPVC) PIPES & FITTINGS FOR DRAINAGE

PIPEWORK UPVC pipes shall be Class DWV, conforming with AS 1260 and having Water Mark authorisation

FITTINGS UPVC fittings shall be Class DWV, conforming with AS 1260 and having Water mark authorisation

JOINTS UPVC pipes and fittings shall be installed using solvent welded joints, conforming with the requirements of AS 3879

All UPVC pipework and fittings shall equal in all respects to Vinidex" products, and shall be installed in accordance with the manufacturers recommendations

4.06 FIBRE REINFORCED CONCRETE (FRC) PIPES & FITTINGS FOR DRAINAGE

PIPEWORK FRC pipes shall be minimum Class 2, conforming with AS 4139 and having Water Mark authorisation

FITTINGS FRC fittings shall be minimum Class 2 conforming with AS 4139 and having Water mark authorisation

JOINTS FRC pipes and fittings shall be installed using rubber ring joints

All FRC pipework and fittings shall equal in all respects to "James Hardie" products, and shall be installed in accordance with the manufacturers recommendations The use of Flush Joint" type pipework and fittings will not be permitted for diameters less than 600mm

4.07 REINFORCED CONCRETE (RC) PIPES & FITTINGS FOR DRAINAGE

PIPEWORK RC pipes shall be minimum Class X, conforming with AS 1342 and having Water Mark authorisation

FITTINGS RC fittings shall be minimum Class X, conforming with AS 1342 and having Water Mark authorisation

JOINTS RC pipes and fittings shall be installed using rubber ring joints

All RC pipework and fittings shall equal in all respects to " Icon" products, and shall be installed in accordance with the manufacturers recommendations

4.08 VITRIFIED CLAY (VC) PIPES & FITTINGS FOR DRAINAGE

PIPEWORK VC pipes shall be first quality, conforming with AS 1741 and having Water Mark authorisation

FITTINGS VC fittings shall be first quality, conforming with AS 1741 and having Water Mark authorisation

JOINTS VC pipes and fittings shall be installed using rubber ring joints

All VC pipework and fittings shall be equal in all respects to Hepworth" products and shall be installed in accordance with the manufacturers recommendations

4.09 HIGH DENSITY POLYETHYLENE (HDPE) PIPES & FITTINGS FOR DRAINAGE

PIPEWORK HDPE pipes shall be first quality, conforming with AS 4130 and having Water Mark authorisation

FITTINGS HDPE fittings shall be first quality, conforming with AS 4130 and having Water Mark authorisation

JOINTS HPDE pipes and fittings shall be installed using electro-fusion joints

All HDPE pipework and fittings shall be equal in all respects to "Geberit" products, and shall be installed in accordance with the manufacturers recommendations

4.10 STAINLESS STEEL (SS) PIPES & FITTINGS FOR DRAINAGE

PIPEWORK SS pipes shall be first quality conforming with Australian Standards and having Water Mark authorisation

FITTINGS SS fittings shall be first quality, conforming with Australian Standards and having Water Mark authorisation

JOINTS SS pipes and fittings shall be installed using rubber ring joints

All SS pipework and fittings shall be equal in all respects to "Blucher" products, and shall be installed in accordance with the manufacturers recommendations

4.11 CAST IRON (CI) PIPES & FITTINGS FOR DRAINAGE

PIPEWORK CI pipes shall be first quality, conforming with AS 1631 and having Water Mark authorisation

FIITINGS CI fittings shall be first quality conforming with AS 1631 and having Water Mark authorisation

JOINTS CI pipes and fittings shall be installed using rubber gasket stainless steel clamp couplings

All CI pipework and fittings shall be equal in all respects to "Ensign" products, and shall be installed in accordance with the manufacturers recommendations

4.12 COPPER (CU) PIPES & FITTINGS

PIPEWORK CU pipes shall be solid drawn conforming with AS 1432 and having Water Mark authorisation

FITTINGS CU fittings shall be copper or gunmetal, conforming with AS 1585 and having Water Mark authorisation

JOINTS Joints in copper tubes and brass pipe shall be made with copper phosphorous brazing alloy complying to the requirements of Australian Standards 1167 - 1971 Table 2 Copper Phosphorous brazing alloy Alloy designation B4 having a silver content between not less than 14 5% and 15 5% and the remainder being phosphorous between 4 5% and 5 5% with a melting range of 645°C as a solid and 700°C as a liquid

All CU pipework and fittings shall be equal in all respects to "Kembla" products, and shall be installed in accordance with the manufacturers recommendations

4.13 POLYETHYLENE SLEEVING FOR PROTECTION OF COPPER PIPELINES

All in ground copper pipework and fittings shall be protected with polyethylene sleeving Sleeving to pipes shall comprise polyethylene tube Polyethylene sheet shall only be permitted as sleeving at fittings and valves, or for the repair of damaged tubing

4.14 POLYPROPYLENE (PP) PIPES & FITTINGS

PIPEWORK PP pipes shall be first quality, conforming with AS 1159 and having Water Mark authorisation

FITTINGS PP fittings shall be first quality, conforming with AS 1159 and having Water Mark authorisation

JOINTS PP pipes and fittings shall be installed using electro-fusion joints

All PP pipework and fittings shall be equal in all respects to "Coess" products and shall be installed in accordance with the manufacturers recommendations

Installation As per AS 3500 and/or local authority requirements

Prohibited Areas
PP Grade Polyethylene will not be used in Fire rated areas

4.15 POLYETHYLENE (PE) PIPES & FITTINGS

PIPEWORK PE pipes shall be first quality, conforming with AS 1159 and having Water Mark authorisation

FITTINGS PE fittings shall be first quality, conforming with AS 1159 and having Water Mark authorisation

JOINTS PE pipes and fittings shall be installed using mechanically applied compression joints

All PP pipework and fittings shall be equal in all respects to "Rehau" products and shall be installed in accordance with the manufacturers recommendations

Installation As per AS 3500 and/or local authority requirements

Prohibited Areas
PE Grade Polyethylene will not be used in Fire rated areas

4.16 CROSSED LINKED POLYETHYLENE (XPE) PIPES & FITTINGS

PIPEWORK Crossed Linked Polyethylene pipe and fittings shall be
- In accordance with AS 2492
- Not less than Class 20 – for water pipes
- Wisbo" PEX pipe & fittings for hot & cold Water or other approved equal

FIITINGS Brass Dezincification resistant as to AS 3688 for jointing of PEX pipe

JOINTS PEX system, with the pipes elasticity memory returning it to its original shape to form a sealed joint

Installation As per AS 3500 and/or local authority requirements

Prohibited Areas
Cross Linked Polyethylene will not be used in Fire rated areas

4.17 GALVANISED MILD STEEL (GMS) PIPES & FITTINGS

PIPEWORK GMS pipes shall be medium grade, hot dip galvanised, conforming with AS 1074 and having Water mark authorisation

FITTINGS GMS malleable fittings shall be hot dip galvanised conforming with AS 1074 and having Water Mark authorisation

JOINTS Galvanised mild steel pipework and fittings shall be jointed using roll grooved couplings

All GMS pipework and fittings shall be equal in all respects to "Northguard" products, and shall be installed in accordance with the manufacturers recommendations

4.18 FLANGES

Flanges shall conform with AS B52 or ANSI 150, and be Table E unless specified otherwise Use brass flanges for copper tube, galvanised mild steel flanges for galvanised mild steel pipes, and cast iron flanges for cast iron pipes

4.19 VALVES

Valves shall be placed in easily accessible position for operation and repairs Approved type of valves only shall be used All valves shall have Water Mark authorisation

All valves up to 65 mm shall be all bronze with screwed connections Screwed valves shall be provided with unions to facilitate maintenance removal All valves over 65mm shall be cast iron with bronze trim and flanged connections

The internal seats and washers of valves must be cleaned of all foreign material during installation Any valve faces or seats found damaged on completion of the installation shall be replaced

4.20 GALVANISING

All galvanising of steelwork shall be galvanised to approval using the hot dip process to give a coating minimum thickness of 0 1 mm Galvanising shall be done after all fabrication and drilling of the metalwork has been completed

4.21 CONCRETE

All concrete work shall comply with AS 1480 - 1982 as amended All concrete shall have a minimum strength of 20 MPa at twenty-eight days All concrete is to be placed in such a manner as to allow proper compaction

4.22 FIRE ISOLATION COLLARS

Where PVC pipework penetrates fire rated elements (floors, walls etc) allow to provide a fire seal to the required fire resistant rating for the element Provide a sample fire stop collar to the Principal for approval prior to the installation of the collars

Fire Isolation Collars (Fire Stop collars) shall be provided to maintain the structural integrity of the building as required by the BCA All pipe penetrations which pass through one fire zone to the next shall have fire retardant capability of 2 Hours This generally may be achieved by the use of "Hilti CP680 Cast-in fire stop device" or equal type collars

4.23 INSULATION

All pipework (hot and cold water) chased into walls shall be pre-lagged and shall be equal to "Kemlag" or other approved equal

All pipework except where located in walls shall be insulated with

- The pipe insulation shall comprise Thermotec 4-Zero fire retarded closed cell polyethylene foam having a density of not less than 50 kg/m^3
- All insulation shall be installed around the pipework surface as tightly as possible without gaps, with the edges and ends tightly butted together
- All joints shall be taped using a 48 mm adhesive backed PVC tape or, if faced with aluminium foil joints shall be taped using a 48 mm pressure sensitive aluminium tape
- Where necessary, the pre-formed sections shall be cut (using a sharp knife or scissors) and mitred, to ensure a tight fit around bends and at tees
- At union flanges valves and strainers, or any areas where access is required for maintenance, insulation shall incorporate the press seal fastener system
- Metal sheathing is required for areas external or where the product is subject to physical damage, to meet a four (4) hour fire rating per AS 1530 Part 4
- Where installed underground the lagging shall be fully wrapped in a grease impregnated cloth tape equal to Denso 400

Insulation shall not be applied until the Superintendent or their representative has inspected the service and pressure tests have been approved

Before application, remove any scale, rust, grease, etc Materials and adhesives shall comply to tests set out in methods for Fire Tests on building materials and structures, AS 1530 and shall have zero readings for combustibility flammability, early fire hazard and fire resistance

4 24 FIXINGS

Fixings shall be "Dynabolts", rawlplugs or other approved equal expansion type rawl plug

Power driven fixings are not approved

All fixings shall be installed in accordance with the manufacturer's instructions and to the approval of the Principal

4 25 BRACKETING & SUPPORTS

All service pipes shall be positioned in locations as approved before installation or fabrication commences All pipework shall be free to move without causing stresses in the pipework or in the pipe joints The works shall be entirely free of system noises and water hammer

Generally supports shall be similar and equal in all respects to galvanised mild steel "UNI-STRUT" channel complete with purpose made fittings and pipe clamps & be positioned with a minimum of 40mm clearance, including insulation from adjacent services floors and walls

Special care shall be taken to avoid contact of dissimilar metals likely to cause electrolytic corrosion Separate all pipes from dissimilar metals with 3mm thick rubber strip or similar approved material Adhesive tape will not be accepted

4.26 INSPECTION PITS, GRATES & FRAMES

Inspection pits shall be sized as noted on the drawings and shall be of Icon Industries Manufacture or other approved equal Be complete with gas tight covers and shall have brass edged strips suitable for flooring finishing Pits shall be bolt down type where subject to adverse system pressures

Grates and frames shall be sized as noted on the drawings and shall be as manufactured by Icon or alternate approved equal Minimum grade class of grate loading shall be appropriate to the paved loading in accordance with the Australian Standard AS3996-1992 Minimum Class C in all locations
All grates in paths and paving shall be of a heel proof type (capable of taking high heel shoes and trolley wheels)

4.27 FLEXIBLE CONNECTIONS

Flexible connections for pumps and other anti-vibration applications shall be manufactured from stainless steel braided corrugated hose complete with stainless steel flanged or BSP couplings as manufactured by Radcoflex or other approved equal

4.28 GAUGES

Gauges shall be Dobbie Glycerine filled burden type or other approved equal The face of the gauge shall be a minimum of 100mm diameter and shall be graduated in kilo Pascals and meters head

All gauges shall register one third greater than the maximum system operating pressure

Each gauge shall be complete with pet brass isolation valve and sufficient copper tube for connection to pipework Gauges shall be installed on the inlet and outlet sides of all pumps

SECTION FIVE – DRAINAGE SERVICES

5 01 DRAINAGE SERVICES GENERALLY

The Scope Of Works covered under this section includes for the complete design engineering supply, delivery, installation, testing, commissioning maintenance and warranty of drainage services for this development

Specifically this section of the Hydraulic Services Technical Specification shall cover the following hydraulic drainage services

- Sewer House Drainage
- Sanitary Plumbing
- Stormwater Drainage
- Stormwater Plumbing

5 02 STANDARDS

Works under this section of the Specification shall be installed in accordance with the following standards,

- The Building code of Australia (current amendments)
- New South Wales Code of Practice Plumbing and Drainage (2005)
- AS 3500 2 Sanitary Plumbing And Drainage (2003)
- AS 3500 3 Stormwater Drainage (2003)
- Local Council Stormwater Drainage Guidelines

5 03 BASIS OF DESIGN

The works to be provided under this section of the Hydraulic Services Technical Specification shall be as described by the Hydraulic Services Drawings and Hydraulic Services Specification

5 04 MATERIALS

All drainage service materials shall conform with the specifications detailed under the Materials section of this Hydraulic Services Technical Specification

Drainage services for this development shall be constructed from materials as follows

SERVICE	LOCATION	DIAMETER	MATERIAL
Sewer Drainage	In-Ground	100mm – 150mm	Class DWV U P V C
Gravity Stormwater	In Ground	100mm – 150mm	UPVC

5 05 EXISTING AUTHORITY SERVICES

Identify, locate and protect of all existing Authority services during construction of the works specified under this contract
This contract includes for multiple connections to the existing authority stormwater channel The contractor shall make allowance for making all applications, paying all fees and constructing the works in accordance with all authority requirements

5 06 EXISTING DRAINAGE SERVICES

Any existing drainage services and connections found on the site, which are not for re-use, are to be located and sealed off to the complete satisfaction of the relevant Authority and the Superintendent

5 07 MINIMUM DRAINAGE GRADIENTS

The minimum recommended drainage gradients are

- Sub-Soil Drainage 1 00% grade (1 in 100)
- Stormwater Drainage 1 00% grade (1 in 100)
- Sewer Drainage 100mm diameter 1 67% grade (1 in 60)
- Sewer Drainage 150mm and above 1 00% grade (1 in 100)

Any drainage laid at less than the recommended minimum gradients will require special permission from the Superintendent or their representative and or local authority unless otherwise noted on the Hydraulic Services Drawings

5 08 DRAINAGE BEDDING

Drainage pipes shall be bedded solidly on the barrels with clear chases under collars Fill chases with cement mortar after testing Bed pipes on 1 4 cement/sand mortar 50mm Min thickness below the barrel and sparge at 45 deg to centre line of pipe barrel

5 09 TESTING OF DRAINAGE

The Sub-Contractor shall allow static water tests, to all drainage services in accordance with requirements of the relevant Authorities codes and regulations and this Specification

At least 48 hours notice shall be given for inspection of works under test Underground or enclosed pipework shall not be covered or concealed from view until it has been inspected and approved by the Superintendent or their representative and the relevant Authorities

All lines shall be subject to a hydrostatic test for a minimum period of 24 hours The line must be free of air pockets while under test Supply all plugs and other materials necessary for the tests including string lines where required for inspection of grades and straightness

5 10 SEWER DRAINAGE CONNECTION

This project is partly constructed over a Sydney Water sewer The sewer concerned has been concrete encased and a junction installed to receive the discharge from this contract All these works required to satisfy Sydney Water building over sewer requirements have been completed as a previous contract and do not form part of this package Ascertain the depth, location and suitability of existing sewer mains prior to commencement of any work Advise the Superintendent of any adjustments required to execute the works as indicated on the Hydraulic Services Drawings

5 11 PIPEWORK IN FILLED OR WATER CHARGED GROUND

Support all sewer and trade waste drainage pipework installed within filled or water charged ground on a 150mm thick concrete lintel supported by piers to natural ground or suspended on galvanised mild steel hangers cast into a concrete slab above where available Allow to supply all de-watering equipment as required to facilitate the pipework installation

5 12 SEWER MANHOLES

MANHOLES

Unless noted otherwise sewer manholes shall be pre-cast concrete type manholes, of the size and depth indicated on the Hydraulic Services Drawings Wherever possible sewer manholes shall be supplied as one piece units so as to reduce the number of extension risers required to achieve design levels

Sewer manholes installed externally to buildings shall be circular Sewer manholes installed within building shall be square

All connections into manholes shall be made through the pipework connection recess provided, and have the joint sealed flush to the internal pit wall with 3 1 cement mortar

All manhole bases shall benched with 3 1 cement mortar so as to provide a smooth transition from the invert level of inlet pipework to the invert level of outlet pipework

COVERS

Unless noted otherwise manhole covers shall be pre-cast concrete type covers equal in size to the internal dimensions of the manhole to which they are installed Where indicated on the Hydraulic Services Drawing, covers shall be lockable

Covers shall be installed flush to surface levels in all paved areas and 50mm above surface levels in all landscaped areas

Covers shall be of sufficient strength to suit the installation location in accordance with the Australian Standard AS3996-1992, generally as a minimum Class C shall apply to all locations, which are not subject to excessive heavy loads

Light duty, Medium duty, Heavy-duty applications must be co-ordinated to the application & location Where a class of duty may indicate a lighter than class C, either from the Hydraulic services details or other documentation, which may contradict then class D" shall be provided unless otherwise approved

Covers for all sewer manholes shall be gas tight

5 13 BLUE METAL

Provide clean washed blue metal of average diameter 12mm

5 14 STORMWATER PITS

Unless noted otherwise stormwater pits shall be pre-cast concrete type, of the size and depth indicated on the Hydraulic Services Drawings Wherever possible stormwater pits shall be supplied as one piece units so as to reduce the number of extension risers required to achieve design levels

All connections into pits shall be made through the pipework connection recess provided, and have the joint sealed flush to the internal pit wall with 3 1 cement mortar

All manhole bases shall benched with 3 1 cement mortar so as to provide a smooth transition from the invert level of inlet pipework to the invert level of outlet pipework

COVERS

Unless noted otherwise pit covers or grates shall be pre-cast concrete type covers equal in size to the internal dimensions of the pit to which they are installed Where indicated on the Hydraulic Services Drawing, covers shall be lockable

Covers shall be installed flush to surface levels in all paved areas
Covers shall be of sufficient strength to suit the installation location in accordance with the Australian Standard AS3996-1992, generally as a minimum Class C shall apply to all locations, which are not subject to excessive heavy loads

Light duty, Medium duty, Heavy-duty applications must be co-ordinated to the application & location Where a class of duty may indicate a lighter than class C either from the Hydraulic services details or other documentation which may contradict then class "D" shall be provided unless otherwise approved

SECTION SIX – PLUMBING SERVICES

6 01 PLUMBING GENERALLY

The Scope Of Works covered under this section includes for the complete design, engineering supply, delivery, installation, testing, commissioning, maintenance and warranty of plumbing services for this development

Specifically this section of the Hydraulic Services Technical Specification shall cover the following hydraulic plumbing services

- Rainwater Plumbing
- Sanitary Plumbing

6 02 STANDARDS

Works under this section of the Specification shall be installed in accordance with the following standards,

- The Building code of Australia (current amendments)
- NSW Code of Practice Plumbing and Drainage (2005)
- AS 3500 2 Sanitary Plumbing And Drainage (2003)
- AS 3500 3 Stormwater Drainage (2003)

6 03 BASIS OF DESIGN

The works to be provided under this section of the Hydraulic Services Technical Specification shall be as described by the Hydraulic Services Drawings

6 04 MATERIALS

All plumbing service materials shall conform with the specifications detailed under the Materials section of this Hydraulic Services Technical Specification

Plumbing services for this development shall be constructed from materials as follows

SERVICE	LOCATION	DIAMETER	MATERIAL
Rainwater Plumbing	In ground	100mm – 300mm	Class DWV U P V C
Sanitary Plumbing	All	50mm – 100mm	Class DWV U P V C

6 05 MINIMUM PLUMBING GRADIENTS

The minimum recommended plumbing gradients shall be

- Rainwater Plumbing 1 00% grade (1 in 100)
- Sanitary Plumbing to AS3500
-

6 06 INSPECTION OPENINGS AND GATES

Inspection openings in pipes shall be located so that each horizontal section of plumbing pipework is accessible in at least one direction, maximum distance between inspection openings shall be 20 metres Inspection openings shall be placed in accessible position and to the approval of Sydney Water and the Superintendent

Install screwed testing gates 1500 mm above the foot of each sanitary plumbing riser of each alternate floor level for testing purposes and to facilitate reduced duct opening heights

Install inspection openings and testing gates for pipes, bends and junctions as required by A S 3500

6 07 TESTING OF PLUMBING

The complete plumbing installation shall be tested to the approval of Sydney Water Each floor shall be given a head test to the maximum choke level in the presence of the Superintendent whether or not such a test is required by the local authority

Where an intermediate floor is not provided with a testing gate the outlet points to that floor shall be plugged off and the plumbing filled to the highest choke condition of the floor above

6 08 DOWNPIPES

Downpipes shall be by the roofer Provide collars with grates for all downpipes Refer to the Architectural details

SECTION SEVEN - WATER SERVICES

7 01 WATER SERVICES GENERALLY

The Scope Of Works covered under this section includes for the complete design, engineering, supply, delivery, installation, testing, commissioning, maintenance and warranty of water services for this development

Specifically this section of the Hydraulic Services Technical Specification shall cover the following water services

- Cold Water Service
- Rainwater Service

All pipework shall be installed in a neat workmanlike manner and the contractor shall be responsible for including all bends sets and installing sufficient unions, flanges and isolating valves for satisfactory removal of piping and fittings for maintenance or repairs to produce an installation to the approval of the Principal whether such items are shown on drawings or specified

7 02 STANDARDS

Works under this section of the Specification shall be installed in accordance with the following standards,

- The Building code of Australia (current amendments)
- NSW Code of Practice Plumbing and Drainage (2005)
- AS 3500 1 Water Supply (2003)

7 03 BASIS OF DESIGN

The works to be provided under this section of the Hydraulic Services Technical Specification shall be as described by the Hydraulic Services Drawings and Hydraulic Services Scope Of Works document

7 04 MATERIALS

All water service materials shall conform with the specifications detailed under the Materials section of this Hydraulic Services Technical Specification

Water services for this development shall be constructed from materials as follows

SERVICE	LOCATION	DIAMETER	MATERIAL
Cold Water	In-Ground	< 100	Type B Copper
	< 100	Type B Copper	
Cold Water Service	Above Ground	All	Type B Copper
Cold Water Service	Internal	All	Type B Copper
Cold Water Service	All	< 25mm	Type B Copper
Rainwater Service	All	All	Type B copper

7 05 EXISTING WATER SERVICES

Ascertain the depth location and suitability of existing water mains prior to commencement of any work Advise the Superintendent of any adjustments required, to execute the works as indicated on the Hydraulic Services Drawings immediately

Any existing water services and connections found on the site, which are not for re-use, are to be located and sealed off to the complete satisfaction of the relevant Authority and the Superintendent

7 06 TESTING OF WATER SERVICES

All water services shall be tested hydraulically after completion to the AS3500 1 Standard of 1 5 times the maximum working pressure This test pressure shall be checked against the manufacturers maximum allowable pressure, not exceeding 1500 kPa and the lesser applied for a period not less than 30 minutes This shall be witnessed by the Superintendent and or their representative or the Contractor and entered into Quality Assurance documentation

7 07 COLD WATER SERVICE CONNECTION

Connect to existing services on site where shown

It shall be the contractors responsibility to verify & confirm location and size of existing connection points prior to installation

No Control valve shall exist down stream of the water meter on the Hose reel system

7 08 CONTAINMENT BACKFLOW PREVENTION DEVICE

The Sub-Contractor shall confirm the operation of the existing backflow preventer located at the water meter

The Sub-Contractor shall certify installation and operation of the backflow prevention device installation and at completion of the Performance Guarantee period

7 09 CONTROL VALVES

Provide control valves for each group of fixtures as necessary or as indicated on the Hydraulic Services Drawings Plastic pipe from main to control valves is not acceptable

7 10 EXTERNAL HOSE TAPS

Provide hose taps & isolation valves to all plant areas and to ensure adequate coverage of landscaped and car park areas All hose taps are to be complete with vacuum break valves in accordance with AS 3500

All external Hose Taps shall have removable handle and stop valve on standpipe

7 11 VACUUM BREAKER VALVES

Provide vacuum breaker valves as required prevent cross-connection of the cold water service Vacuum breaker valves shall be equal to equal to Reliance Valves manufacture "AquaGaurd" (BHCV)

7 12 DOUBLE CHECK VALVES (TESTABLE TYPE)

Provide double check valves as required prevent cross-connection of the cold water service Double check valves shall be equal to equal to Reliance Valves manufacture models 007/709 (TDCV)

7 13 REDUCED PRESSURE ZONE DEVICE

Provide reduced pressure zone device valves as required prevent cross-connection of the cold water service Reduced pressure zone device valves shall be equal to WILKINS Valve Manufacture

7 14 RAINWATER TANK AND PRESSURE SET

The rainwater tank and pressure set shall be as shown on the details sheet dwg H04
Rainwater shall be piped to a local hose cock and to provide make up to toilet cisterns as shown on the drawings

SECTION EIGHT - SANITARY FIXTURES & TAPWARE

8 01 SANITARY FIXTURES & TAPWARE GENERALLY

All sanitary fixtures & taps are to be supplied and installed by the Hydraulic Services Contractor

Specifically this section of the Specification shall cover the following sanitary fixtures & tapware

- Sanitary Fixtures
- Tapware

The Hydraulic services contractor shall obtain a written guarantee of vitreous china and tapware items stating that any fixture which crazes or develops a defect within (12) months of Date of Practical Completion shall be replaced free of charge, each such guarantee shall be handed to the Principal before Date of Practical Completion

On completion of the installation allow to test the fixtures for normal operation and adjust as necessary

8 02 STANDARDS

Works under this section of the Specification shall be installed in accordance with the following standards,

- The Building Code of Australia (current amendments)
- NSW Code of Practice Plumbing and Drainage (2005)
- AS 3500 1 Water Supply (2003)
- AS 3500 2 Sanitary Plumbing And Drainage (2003)

8 03 BASIS OF DESIGN

The works to be provided under this section of the Hydraulic Services Technical Specification shall be as described by the Hydraulic Services Drawings

8 04 SANITARY & TAP FIXTURE SCHEDULE

Allow for the following and provide brochures for each fixture for the approval of Loquat Valley Anglican School and Sydney Anglican Schools Corporation

Sink

Make	Clark Benchmark 1 5 bowl
Model	2009 1 (1TH)
Colour	Stainless Steel
Tapware	Enware Single Lever Swivel Spout model SLM307 connect to hot and cold provide blue And red indicators

Disabled Water Closet Suite

Make	Caroma
Model	Concorde Care Pan with concealed trap
Cistern	Vandal Resistant Viceroy dual flush
Seat	Colani Disabled single flap closed front

Disabled Persons Wall Basin

Make	Caroma
Model	Caroma Care Integra 500 with one tap hole
Tapware	Enware SLM306D fitted with Blue Or Blue and yellow indicators as required

Pupil Toilet Suites

Make	Caroma
Model	Junior Pan
Cistern	Sovereign 2000
Seat	Caroma Junior single flap closed front

Hand Wash Trough (male & female)
Make Stainless Metal Craft PWD Wallsend Pattern 2 4 m long with 4 off taps at 600mm complete with support assembly and s/s splashback as per PWD standard drawing WTT-ANG-L/R
Tapware Enware Timed flow Tempostop basin tap with 3 second flow
Model TFC745P

Practical Activity Trough
Make Stainless Steel Metalcraft (SMC) 316L Stainless Steel bright polished, 1200 long practical activities trough with two tapholes and overflow
Code PAT-1-ANG Provide stainless steel plug and waste to trough and overflow Connect overflow to junction in trap riser Connect trough to waste

Tapware Two (2) Mattson 4L 10 Gooseneck sink mixers per trough Connect to Cold water only Provide blue indicator

Hot Water Unit
Rheem Heat Pump Model 551310 As shown on drawings

External Hose Cocks
External hose cocks shall be 20mm dia and be provided with stop valves on the riser Hose cocks shall be key operated for security

Architectural Specification

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

Loquat Valley Anglican School Alterations and Additions

midson architecture

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Document QA

Issue	Issued To	Qty	Date	Reviewed	Approved
A	Premier Building Group	1	13 January 2010	PC	GG

Issue	A
Issued	January 2009
File Name	\\Mg Server2\Midsongroup\MM0804 Loquat Valley ELC\4 00 Consultants\4 03 Architect\Specifications\Construction\LVAS_Specification_Constructionissuea Doc
Client	Sydney Anglican Schools Corporation
Project Name	Loquat Valley Anglican School – Alterations & Additions

1 0 PRELIMINARIES

1 1 GENERALLY

1 1 1 GENERAL

General conditions

AS 4000–1997 General conditions of contract, published by SAI Global

Interpretation

General The word "contract administrator" has the same meaning as "superintendent"

Cross reference The clause **Interpretation**, in the General requirements worksection, also applies

1 1 2 LEGISLATIVE REQUIREMENTS

Compliance

The principal, before entering into the contract, has given the notices, paid the fees and obtained the permits approvals and other authorisations stated in the **Prior applications and approvals schedule**

Prior applications and approvals schedule

Prior notices given and applications made	Fees paid	Permits, approvals and authorisations received
Development Application	Yes	Yes
Complying Development Certificate	Yes	Yes
Construction Certificate	Yes	Pending
Construction Industry Long Service Leave Levy	Yes	N/A

Authority conditions schedule

The Principal is responsible for obtaining a Development Application for a portion of the works from Pittwater Council Any conditions required under that approval will be advised at the time of approval and any costs incurred by the Contractor in complying with those conditions will be treated as a variation under the contract The remainder of the works are subject to a Complying Development Certificate obtained from the Private Certifier

1 1 3 PROTECTION OF PEOPLE AND PROPERTY

Occupied premises

For those parts of the College designated as occupied premises in the **Occupied premises schedule**

- Permit occupants to continue in secure possession and occupancy of the premises for the required period
- Make available safe access for occupants
- Arrange work to minimise nuisance to occupants and ensure their safety
- Protect occupants against weather, dust, dirt water or other nuisance by such means as temporary screens

Occupied premises schedule

Occupants	Occupied premises	Period of occupancy
School students & Staff	Existing school buildings & pathways between buildings	Duration of contract except school holiday periods and other times agreed through negotiation with the school

Safety

Accidents Promptly notify the Superintendent of the occurrence of the following

- Accidents involving death or personal injury
- Accidents involving loss of time
- Incidents with accident potential such as equipment failure, slides and cave-ins

Accident reports Submit reports of accidents

Purpose of submission Information only

Protective clothing
Safety helmets Make available safety helmets for the use of visitors
Standard To AS/NZS 1801 Type 1
Standards Mark Required
Number of helmets 4

Adjoining property
Revealed encroachments If the works reveal unknown encroachments of adjoining property on to the site or of existing site structures on to adjoining property, immediately seek instructions

Access roads
Temporary roads refer to drawings for temporary access for heavy vehicles
Principal's existing roads Use only designated roads
Location refer to drawings

Services
General Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site Determine the location of such services

1 1 4 CARE OF THE WORK AND REINSTATEMENT OF DAMAGE

Existing services
Attendance Attend to existing services as follows
- If the service is to be continued, repair, divert or relocate as required If such a service crosses the line of a required trench, or will lose support when the trench is excavated, provide permanent support for the existing service
- If the service is to be abandoned, cut and seal or disconnect, and make safe

Proposals Submit proposals for action to be taken with respect to existing services before starting this work Minimise the number and duration of interruptions

1 1 5 DAMAGE TO PERSONS AND PROPERTY OTHER THAN WORK UNDER CONTRACT

Property on the site
Repair of services Rectify immediately any obstruction or damage to roadways and footpaths, drains and watercourses and other existing services in use on the site Provide temporary services whilst repairs are carried out
Repair of property Rectify immediately any interference or damage to property which is to remain on the site, including trees

Reinstatement
General Clean and repair damage caused by installation or use of temporary work and restore existing facilities used during construction to original condition

Adjoining property
Repair of services Rectify immediately any obstruction or damage to roadways and footpaths drains and watercourses and other existing services adjacent to the site Provide temporary services whilst repairs are carried out
Repair of property Rectify immediately any interference or damage to property which is adjacent to the site, including adjoining property encroaching onto the site, and trees

1 1 6 SUPERINTENDENT'S REPRESENTATIVE

Superintendent's representatives
Name Midson Group Pty Ltd
Address 3/51 Rawson Street Epping,2121
Ph 9868 6923
Fax 9868 6924

1 1 7 SITE

Access for others

The following persons are engaged by the principal to carry out work on the site other than WUC

- School maintenance and property staff

Site restrictions

Site limitations Comply with the following restrictions on the use of the site Access to the construction area is to be by the temporary road connected to the existing Feeder Road on the north side of the College site

Restrictions Access on to and around the site, and use of the site for temporary works and constructional plant including working and storage areas, location of offices, workshops, sheds, roads and parking is restricted to the following areas Construction area as shown on the drawings and as agreed by the principal

1 1 8 SETTING OUT THE WORKS

Setting out

Setting out set out the building and road works using a registered surveyor

Final Survey

Final survey provide a final survey showing the location of the building, new walkways, any new and altered road works and levels altered by the building project

Format

- Hardcopy at 1 200 scale on A1 sheets
- Electronic in Autocad "DWG" format

1 1 9 CLEANING UP

Final cleaning

General Before practical completion, clean throughout including interior and exterior surfaces exposed to view Vacuum carpeted and soft surfaces Clean debris from site, roofs, gutters, downpipes and drainage systems Remove waste, surplus materials and rubbish

Samples Remove non-incorporated samples, prototypes and sample panels

Pest eradication

Employ suitably qualified pest exterminators Submit certificate to the superintendent stating that completed works are free of pest types identified in the Pest eradication treatments schedule

Pest eradication treatments schedule

Pest type to be treated	Eradication method
Vermin (rats, mice & cockroaches)	Contractor's recommendation

1 1 10 MATERIALS, LABOUR AND CONSTRUCTION PLANT

Use of existing services

Existing services may be used as temporary services for the performance of the contract subject to conditions stated in the **Existing services schedule**

Existing services schedule

Service	Conditions of use
Existing water service	No charge but maintain continuous service to Proprietor and minimise usage on site
Existing electrical service	No charge but maintain continuous service to Proprietor and minimise usage on site

Parking

Principal s existing parking areas Do not use

Removal of materials and constructional plant

General Within 10 working days after practical completion, remove temporary works and construction plant no longer required Remove the balance before the end of the defects liability period

Temporary services
Provide the following services on site to enable communications between the Superintendents project team and the Contractor
- Telephone
- Facsimile

Temporary fence
Secure the construction site to WorkCover requirements

Project signboards
General A project-specific signboard is not required however the Federal Government requires a sign acknowledging funding through the BER programme to be displayed in a prominent position The sign will be supplied by the Principal and shall be erected by the Contractor

Other signboards Obtain approval before display of advertisements or provision of other signboards

Changes to existing
General At least 5 working days before changing the following existing items, give notice
- Existing electrical supply
- Existing communications network
- Existing water service
- Existing sewerage service

1 1 11 WORKING HOURS
General
Working hours refer to Conditions of the Complying Development Certificate
(these are not contract definitions of working days or working hours but permissible times)

1 1 12 PROGRAMMING

Program of work
Construction program Within 14 days after the date for possession of the site, submit a construction program showing the following
- Sequence of work
- Critical paths of activities related to the work
- Allowance for holidays
- Activity inter-relationships
- External dependencies including provision of access document approvals and work by others
- Periods within which various stages or parts of the work are to be executed

Revisions Revise the construction program as required by the progress of the work Submit revisions with each progress claim Identify changes since the previous version and show the estimated percentage of completion for each item of work
Program chart Display in the contractor's site office an up-to-date bar chart and network diagram based on construction program

Site meetings
General Attend site meetings on a fortnightly frequency throughout the contract and ensure attendance of appropriate subcontractors

Contacts At the first site meeting, submit names and telephone numbers of responsible persons who may be contacted after hours during the course of the contract

Project Report
Project Report At each site meeting submit a report with the following information
- Brief description of work completed since the last Project Report
- Brief description of work projected prior to the next site meeting
- Photographs showing the extent of the work Images to identify the project, date, time, location and orientation
- Schedule of Requests for Information noting dated submitted to whom and whether a response has been received
- Schedule of Variations noting cost, status and approval
- Schedule of delays/ extensions of time noting type of delay and reasons for delay
- Updated construction programme

Purpose of submission Information only
Minimum frequency submit for every site meeting
Format A4

2 0 GENERAL REQUIREMENTS

2 1 GENERALLY

2 1 1 PRECEDENCE

Precedence

General Requirements of subsequent worksections of the specification override conflicting requirements in this worksection

2 1 2 CROSS REFERENCES

Associated worksections Conform to the following

- Adhesives sealants and fasteners
- Metals and prefinishes
- Termite management
- Timber finishes and treatment

2 1 3 REFERENCED DOCUMENTS

Contractual relationships

General Responsibilities and duties of the principal contractor and contract administrator are not altered by requirements in the documents referenced in this specification

Current editions

General Use referenced documents which are the editions, with amendments, current 3 months before the closing date for tenders except where other editions or amendments are required by statutory authorities

2 1 4 INTERPRETATION

Abbreviations

General For the purposes of this worksection the abbreviations given below apply

APAS Australian Paint Approval Scheme
AS Australian Standard
BCA Building Code of Australia
CFC Compressed fibre cement
DPC Damp proof course
MS Mild steel
NATA National Association of Testing Authorities
NZS New Zealand Standard
PCA Plumbing Code of Australia
SS Stainless steel
SSL Scientific Services Laboratory – ActivFire register or fire protection equipment

Definitions

General For the purposes of this worksection the definitions given below apply

- Attendance "Attendance", "provide attendance" and similar expressions mean "give assistance for examination and testing"
- Contract administrator "Contract administrator" has the same meaning as "superintendent" and is the person appointed by the "owner" or "principal"
- Geotechnical site investigation The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction
- Give notice "Give notice", "submit", "advise", "inform" and similar expressions mean "give notice (submit, advise, inform) in writing to the contract administrator"
- Hold point The activity cannot proceed without the approval of the contract administrator
- IP "IP", "IP code", "IP rating" and similar expression have the same meaning as "IP Code" in AS 60529
- Maintenance period Synonymous with Defects liability period"
- Obtain "Obtain", "seek" and similar expressions mean "obtain (seek) in writing from the contract administrator"
- Professional engineer A person who is listed on the National Professional Engineers Register (NPER) in the relevant discipline at the relevant time
- Metallic-coated steel Includes zinc-coated steel, zinc/iron alloy-coated steel and aluminium/zinc-coated steel
- Pipe Includes pipe and tube
- Principal "Principal" has the same meaning as "owner", "client and "proprietor" and is the party to whom the Contractor is legally bound to construct the works

- Proprietary "Proprietary" mean identifiable by naming manufacturer, supplier, installer trade name, brand name, catalogue or reference number
- Provide "Provide" and similar expressions mean "supply and install" Installation shall include development of the design beyond that documented
- Tests
  - Pre-completion tests Tests carried out before completion tests
  - Type tests Tests carried out on an item identical with a production item, before delivery to the site
  - Production tests Tests carried out on a purchased item, before delivery to the site
  - Site tests Tests carried out on site
  - Completion tests Tests carried out on completed installations or systems before the date for practical completion, to demonstrate that the installation or system, including components controls and equipment, operates correctly safely and efficiently, and meets performance and other requirements The superintendent may direct that completion tests be carried out after the date for practical completion
- Registered testing authority
  - The CSIRO Division of Manufacturing and Infrastructure Technology (CSIRO-MIT)
  - An authority registered by the National Association of Testing Authorities (NATA) to test in the relevant field
  - An organisation outside Australia recognised by NATA through a mutual recognition agreement
- Required Means required by the documents, the local council or statutory authorities
- If required A conditional specification term for work which may be shown in the documents or be a legislative requirement
- Samples Includes samples prototypes and sample panels
- Supply "Supply", "furnish" and similar expressions mean "supply only"
- Verification Provision of evidence or proof that a performance requirement has been met or a default exists
- Witness points Provides an opportunity to attend an activity but does not involve an obligation The activity can proceed without approval from the contract administrator

2 1 5 CONTRACT DOCUMENTS

Services diagrammatic layouts

General Layouts of service lines plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable

Before commencing work

- Obtain measurements and other necessary information
- Coordinate the design and installation in conjunction with all trades

Levels

General Spot levels take precedence over contour lines and ground profile lines

2 1 6 PERFORMANCE

General

General If required, provide structures, installations and components as follows

- Fixed access ways To AS 1657
- Structural design actions To AS/NZS 1170 0 and the **Structural design actions schedule**

2 1 7 INSPECTION

Notice

General Minimum notice for inspections to be made 2 working days

Inspection If notice of inspection is required in respect of parts of the works that are to be concealed advise when the inspection can be made before concealment

Attendance

General Provide attendance

2 1 8 SUBMISSIONS

Authorities

Authorities' approvals Submit documents showing approval by the authorities whose requirements apply to the work

Correspondence Submit copies of correspondence and notes of meetings with authorities whose requirements apply to the work

Electronic submissions
File format Adobe Acrobat PDF' format Transmission medium Email or compact disc

Hard copy submissions
- Bound documents 2 copies
- Loose documents up to and including A1 2 copies

Errors
General If a submission contains errors, make a new or amended submission as appropriate indicating changes made since the previous submission

Identification
General Identify the project contractor subcontractor or supplier, manufacturer applicable product, model number and options as appropriate and include pertinent contract document references Include service connection requirements and product certification Identify proposals for non-compliance with project requirements and characteristics which may be detrimental to successful performance of the completed work

Notice
Minimum notice 5 working days

Materials and components
Product certification If products must conform to product certification schemes submit evidence of conformance
Product data For proprietary equipment, submit the manufacturer's product data as follows
- Technical specifications and drawings
- Type-test reports
- Performance and rating tables
- Recommendations for installation and maintenance
- Additional product data for services equipment
  - Model name, designation and number
  - Country of origin and manufacture
  - Capacity of all system elements
  - Size, including required clearances for installation
  - Materials used in the construction

Proposed products schedules If major products are not specified as proprietary items, submit a schedule of those proposed for use within 3 weeks of site possession

Samples
Submission Submit nominated samples
Incorporation of samples If it is intended to incorporate samples into the works submit proposals Incorporate samples in the works which have been endorsed for incorporation Do not incorporate other samples
Retention of samples Keep endorsed samples in good condition on site, until practical completion

Shop drawings
General Where required, submit dimensioned drawings showing details of the fabrication and installation of services and equipment, including relationship to building structure and other services, cable type and size, and marking details

Diagrammatic layouts Coordinate work shown diagrammatically in the contract documents, and submit dimensioned set-out drawings

Submission medium
- Electronic PDF file format
- Transmission medium compact disc and/ or email

Builder's check Before passing shop drawings to the Superintendent the builder shall check all shop drawings for compliance with contract requirements and for co-ordination with the building fabric and other services

Annotate the drawings so as to
- Identify mistakes, omissions and discrepancies
- Identify the date of the check and the name of the person carrying out the check

Timing Submit shop drawings to the project manager for examination prior to ordering or production including prototypes Do not order, manufacture, assemble or supply any item or component which is the subject of shop drawings until the project manager returns the applicable stamped drawings

Rejection If a document is rejected submit a new or amended document as directed

Shop drawing schedule Before starting shop drawings, submit to the project manager a detailed schedule and program for submission of all shop drawings required to be provided during the course of the works The schedule shall be co-ordinated with the general construction program and shall be amend as necessary to accommodate any changes to the general program and resubmitted Allow sufficient time for any or all re-examinations and resubmissions in the event of incorrect or inadequate drawings

Information Provide at least the following

- (Initially) proposed submission dates of each shop drawing
- (During the course of the works) the actual submission dates and include
  - Dates of submission of drawings for examination
  - Examined drawings
  - Drawings to be amended
  - Dates of resubmission of amended drawings
  - Dates of submission of balance of drawings

Updates Update and resubmit the schedule with every submission and re-submission of shop drawings, using the amendment number A, B C, etc to identify revisions

Timing and delays Ensure that all shop drawings are submitted at such times as to permit examination (or amendment, resubmission and re-examination) and the subsequent ordering, fabrication or manufacture to commence in accordance with the construction program Delays caused by late submission of shop drawings or submission of inadequate or incomplete shop drawings will not be accepted as justification for variations to the contract or extensions of time

Submission dates To give effect to the preceding requirement prepare and submit within 5 days after date of acceptance of tender a schedule of submission dates for all shop drawings required or specified under the subcontract The submission program shall be arranged to submit shop drawings in a regulated manner so that large numbers of drawings are not presented at the one time and to facilitate the examination process

Dimensioning All elements shall be drawn dimensionally related to all structural elements which they abut or to which they are connected and showing dimensional relationships to the column grids Verify all relevant dimensions and dimension drawings so that the items or components fit accurately into the required positions

Related work Shop drawings shall be prepared in co-operation with and fully co-ordinated between related subcontractors prior to submission All adjoining building sequences and work by subcontractors either existing or following on shall be indicated clearly on shop drawings, including dimensional relationships

Services Indicate in all shop drawings where services occur, i e in or on walls, partitions, joinery, furniture and workstations, or where above-ceiling acoustic baffling or walls are penetrated by services, showing methods of reticulating services and positions of services entries and outlets, access panels and all other like situations It is critical to co-ordinate and accurately locate services entry and outlet points in conjunction with the services subcontractors, before finalising shop drawings

Formatting All shop drawings shall have a title block, title, sequential drawing number, amendment column, date of amendments and issue, scale and north point All details shall be fully dimensioned, annotated including manufacturer's names and catalogue numbers where appropriate, cross referenced and titled and their locations shown on the general arrangement plans Drawings shall be on the same size drawing sheets, preferably A 1 size and be of similar format to the subcontract drawings

Examination by consultants Within 10 days after receipt of a document, the project manager will advise whether the document is suitable or unsuitable and will return the document provided that any comments of any nature made by consultants will be made in good faith as an assistance to the subcontractor the consultants shall not be responsible for dimensions, quantities calculations or methods of manufacture, nor will the consultants warrant that all information is shown The marking-up, permission to use or endorsement of a shop drawing does not in any way constitute an instruction nor does it relieve the subcontractor of responsibility for the errors, omissions or compliance with the requirements of the subcontract

Permission to use of shop drawings Shall imply only that the subcontractor's interpretations of the relevant requirements of the subcontract are generally acceptable but shall in no way relieve the

subcontractor of its obligations to construct and complete the works correctly and accurately and in accordance with the subcontract documents

Completion After all amendments have been carried out to the satisfaction of the project manager provide four sets of prints and CAD discs in addition to the reproducible set, for the use of the principal and consultants Drawing techniques shall be suitable for microfilming archiving

Drawing size To match project drawings

Availability Keep copies of all current and superseded shop drawings on site for the use of the project manager Keep current shop drawings up to date and together in sets Store superseded drawings systematically and separately from current drawings to facilitate convenient reference and to ensure that superseded drawings are not referenced in error

2 2 PRODUCTS

2 2 1 TESTS

Notice

Notice Give notice of time and place of nominated tests
Minimum notice for inspections to be made 5 working days

Attendance

General Provide attendance on tests

Testing authorities

General Except for site tests, have tests carried out by a Registered testing authority

Reports Submit copies of test reports, including certificates for type tests, showing the observations and results of tests and conformance or non-conformance with requirements

Site tests Use instruments calibrated by authorities accredited by a Registered testing authority

2 2 2 MATERIALS AND COMPONENTS

Consistency

General For the whole quantity of each material or product use the same manufacturer or source and provide consistent type, size quality and appearance

Corrosion resistance

General Conform to the following corrosivity category with regard to worksection corrosion resistance tables
Corrosivity category Medium

Manufacturers' or suppliers' recommendations

Proprietary items Select, if no selection is given, and transport, deliver store, handle, protect, finish, adjust, prepare for use and provide manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

Proprietary systems/assemblies Assemble install or fix to substrate in accordance with the current written recommendations and instructions of the manufacturer or supplier

Project modifications Advise of activities that supplement or are contrary to manufacturer's or suppliers' written recommendations and instructions

Product certification If products must comply with product certification schemes provide them in accordance with the certification requirements

Proprietary items

Implication Identification of a proprietary item does not necessarily imply exclusive preference for the item so identified, but indicates the necessary properties of the item

Alternatives If alternatives are proposed, submit proposed alternatives and include samples available technical information, reasons for proposed substitutions and cost If necessary, provide an English translation State if provision of proposed alternatives will necessitate alteration to other parts of the works and advise consequent costs

Sealed containers

General If materials or products are supplied by the manufacturer in closed or sealed containers or packages, bring the materials or products to point of use in the original containers or packages

2 2 3 EARLY FIRE HAZARD PROPERTIES

General

Comply with BCA Specification C1 10a which sets out requirements in relation to the fire hazard properties of -

- floor materials and floor coverings and
- wall and ceiling linings

Floor materials and floor coverings

A floor material or floor covering must have

- A critical radiant flux not less than that listed the **Critical Radiant Flux Of Floor Materials And Floor Coverings table**, and
- In a building not protected by a sprinkler system complying with BCA Specification E1 5, a maximum smoke development rate of 750 percent-minutes

Critical Radiant Flux (Crf in Kw/M2) Of Floor Materials And Floor Coverings table

Class of building	General		Fire-Isolated Exits
	Building not fitted with a sprinkler system complying with Specification E1 5	Building fitted with a sprinkler system complying with Specification E1 5	
Class 9b	2 2	1 2	2 2

Walls and ceilings

A material used as a finish, surface lining or attachment to a wall or ceiling must be a Group 1 Group 2 or Group 3 material used in accordance with **Wall And Ceiling Lining Materials (Material Groups Permitted) table** and for buildings not fitted with a sprinkler system complying with BCA Specification E1 5, have -

- a smoke growth rate index not more than 100 or
- an average specific extinction area less than 250m2/kg

Wall And Ceiling Lining Materials (Material Groups Permitted) table

Class of building	Fire-isolated exits	Public corridors		Specific areas		Other areas
Class 5 6, 7 8 or 9b schools	Wall/Ceiling	Wall	Ceiling	Wall	Ceiling	Wall/Ceiling
Unsprinklered	1	1 2	1 2	1 2 3	1 2	1 2 3

2 3 EXECUTION

2 3 1 COMPLETION

Samples

General Remove unincorporated samples on completion

Warranties

General Name the Principal as warrantee in conformance with the **Warranty schedule** Register with manufacturers as necessary Retain copies delivered with components and equipment

Commencement Commence warranty periods at practical completion or at acceptance of installation, if acceptance is not concurrent with practical completion

Approval of installer If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm

2 3 2 RECORD DRAWINGS

General

General Submit record drawings Show the "as installed" locations of building elements, plant and equipment Include "as installed" amendments to shop drawings Show off-the-grid dimensions where applicable

Date for submission As for Operation and Maintenance Manuals

Accuracy

Documents Incorporate all modifications made during the progress of the work and testing period Show any provisions for the future

Endorsement Sign and date all record drawings Keep one set of shop drawings on site at all times expressly for the purpose of marking changes made during the progress of the works

Drawing layout
General Use the same borders and title block as the contract drawings

Quantity and format
General Refer to **Submissions**

2 3.3 OPERATION AND MAINTENANCE MANUALS

General
General Submit operation and maintenance manuals for installations

Authors and compilers Personnel experienced in the maintenance and operation of equipment and systems installed and with editorial ability

Referenced documents If referenced documents or technical worksections require that manuals be submitted, include corresponding material in the operation and maintenance manuals

Subdivision By installation or system, depending on project size

Date for submission Refer to the Conditions of Contract for Capital Works dated June 2008

Contents
General Include the following

- Certificates
  - Certificates from authorities
  - Copies of manufacturers' warranties
  - Product certification
- Directory Names addresses, and telephone and facsimile numbers of principal consultant, subconsultants contractor subcontractors and names of responsible parties
- Drawings
  - Record drawings full size
- Drawings and technical data As necessary for the efficient operation and maintenance of the installation
- Equipment descriptions
  - Name, address and telephone and facsimile numbers of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers
  - Schedules (system by system) of equipment stating locations, duties, performance figures and dates of manufacture Provide a unique code number cross-referenced to the record and diagrammatic drawings and schedules, including spare parts schedule, for each item of equipment installed
- Maintenance procedures
  - Detailed recommendations for preventative maintenance frequency and procedures
  - Manufacturer's technical literature as appropriate Register with manufacturer as necessary Retain copies delivered with equipment
  - Safe trouble-shooting, disassembly, repair and reassembly, cleaning alignment and adjustment, balancing and checking procedures Provide logical step-by-step sequence of instructions for each procedure
  - Schedule of spares recommended to be held on site, being those items subject to wear or deterioration and which may involve the principal in extended deliveries when replacements are required Include complete nomenclature and model numbers, and local sources of supply
- Operation procedures
  - Manufacturers technical literature as appropriate
- Table of contents For each volume Title to match cover

Format – electronic copies
Printing Provide material that can be legibly printed on A4 size paper
Scope Provide the same material as specified for hardcopy in electronic format
Quantity and format Refer to **Electronic submissions**

Format – hard copy
General A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled Include the following features

- Cover Identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL", to spine Identify title of project, volume number, volume subject matter and date of issue
- Dividers Durable divider for each separate element, with typed description of system and major equipment components Clearly print short titles under laminated plastic tabs

- Drawings Fold drawings to A4 size and accommodate them in the binders so that they may be unfolded without being detached from the rings Provide with reinforced punched binder tabs
- Pagination Number pages
- Ring size 50 mm maximum, with compressor bars
- Text Manufacturers' printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English

Number of copies 3

2 3 4 CLEANING

Final cleaning

General Before practical completion clean throughout, including all exterior and interior surfaces except those totally and permanently concealed from view

Labels Remove all labels not required for maintenance

2.4 SELECTIONS

2 4 1 SCHEDULES

Structural design actions schedule

Refer to STRUCTURAL NOTES on Structural drawings

Warranty schedule

Warranty Period	Warranty Period
Termite Barriers	10 years
Metal Roofing and Walling – materials and installation	10 years
Windows – materials and installation	10 years
Mechanical services	Refer to Mechanical Services Specification
Hydraulic services	Refer to Hydraulic Services Specification
Electrical services	Refer to Electrical Services Specification

3 0 ADHESIVES, SEALANTS AND FASTENERS

3 1 GENERAL

3 1 1 CROSS REFERENCES

General

General Conform to the General requirements worksection

3 2 EXECUTION

3 2 1 ADHESIVES AND SEALANTS

Standards

Mastic adhesive To AS 2329

Non-structural adhesive for timber To AS 2754 3

Polymer emulsion adhesive for timber To AS 2754 2, not inferior to Type 3 if required to be water resistant

Sealing compound (polyurethane, polysulphide acrylic)

- Single component To ASTM C920

Sealing compound (silicone)

- Single component To TT-S-1543B

Performance

General Provide adhesives and sealants capable of transmitting imposed loads, sufficient to ensure the rigidity of the assembly or integrity of the joint and which will not cause discolouration of finished surfaces

3 2 2 FASTENERS

General

Masonry anchors To be proprietary expansion or chemical types

Plain washers To AS 1237 1

- Provide washers to the heads and nuts of bolts, and the nuts of coach bolts

Plugs To be proprietary purpose-made plastic

Powder-actuated fasteners To AS/NZS 1873 4

Steel nails To AS 2334

- Length At least 2 5 x the thickness of the member being secured and at least 4 x the thickness if the member is plywood or building board < 10 mm thick

Unified hexagon bolts screws and nuts To AS/NZS 2465

Bolts

Coach bolts To AS/NZS 1390

Hexagon bolts Grades A and B To AS 1110 1

Hexagon bolts Grade C To AS 1111 1

Corrosion resistance

Steel products Conform to the **Corrosion resistance table** or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance

Corrosion resistance table – medium corrosivity category

Situation[1]	Self drilling screws to AS 3566 Class	Threaded fasteners and anchors Material or minimum local metallic coating thickness (µm)	Powder actuated fasteners Material or minimum local metallic coating thickness (µm)
Internal	2	Electroplated zinc 12	Electroplated zinc 12
External	4	Hot-dip galvanize 50	Stainless 316

[1]Situation
- Internal Includes building fabric protected from salt and moisture by vapour barriers, sarking sheathing and building wraps
-External Includes external leaf and air spaces behind single skin brickwork or blockwork walls

Finishes

Electroplating

- Metric thread To AS 1897
- Imperial thread To AS 4397

Galvanizing

- Threaded fasteners To AS 1214
- Other fasteners To AS/NZS 4680

Mild steel fasteners Galvanize if

- Exposed to weather
- Embedded in masonry
- In external timbers such as weatherboards or decking
- In contact with chemically treated timber

Nuts

Hexagon chamfered thin nuts Grades A and B To AS 1112 4

Hexagon nuts Grade C To AS 1112 3

Hexagon nuts Style 1 Grades A and B To AS 1112 1

Hexagon nuts Style 2 Grades A and B To AS 1112 2

Performance

Provide fasteners capable of transmitting the loads imposed, and sufficient to ensure the rigidity of the assembly

4 0 METALS AND PREFINISHES

4 1 GENERAL

4 1 1 CROSS REFERENCES

General

General Conform to the General requirements worksection

4 2 PRODUCTS

4.2 1 METALS

Coated steel

Electrogalvanizing ferrous hollow and open sections To AS 4750

Hot-dip galvanizing (zinc)

- Ferrous open sections by an in-line process To AS/NZS 4791
- Ferrous hollow sections by a continuous or specialised process To AS/NZS 4792

Metallic-coated sheet To AS 1397

- Thickness Metal thicknesses specified are base metal thicknesses

Steel wire To AS/NZS 4534

Stainless steel

Bars To ASTM A276

Plate sheet and strip To ASTM A240/A240M

Welded pipe (round) To AS 1769

Welded pipe (square) To ASTM A554

4 3 EXECUTION

4 3 1 GENERAL

Brazing

General Ensure brazed joints have sufficient lap to provide a mechanically sound joint

Butt joints Do not use butt jointing for joints subject to loads If butt joints are used do not rely on the filler metal fillet only

Filler metal To AS 1167 1

Damage

General If prefinishes are damaged, including damage caused by unauthorised site cutting or drilling, remove and replace the damaged item

Finishing

Visible joints Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting galvanizing or electroplating Ensure self-finished metals are without surface colour variations after jointing

Preparation

General Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method

Standard To AS 1627

Priming steel surfaces If site painting is specified to otherwise uncoated mild steel or similar surfaces

- Prime after fabrication and before delivery to the works
- After installation, repair damaged priming and complete the coverage to unprimed surfaces

Repair

General If a repair is required to metallic coated sheet or electrogalvanized on inline galvanized steel products clean the affected area and apply a two-pack organic primer to AS/NZS 3750 9 or APAS-2916

Welding

Aluminium To AS 1665

Stainless steel To AS/NZS 1554 6

Steel To AS/NZS 1554 1

4 3 2 ELECTROPLATING

Electroplated coatings

Chromium on metals To AS 1192

Nickel on metals To AS 1192

Service condition number At least 2

Zinc on iron or steel To AS 1789

4 3 3 ANODISING

Anodising

Standard To AS 1231

Thickness grade

- Indoor applications At least AA10
- Outdoor applications At least AA25

4 3 4 POWDER COATING

Preparation

General Use chemical pretreatments If recommended, provide conversion coatings

Aluminium Pretreat to AS 3715 Appendix G

Galvanized steel Clean by immersing in a suitable alkaline or acidic solution apply a zinc phosphate chemical conversion coating, rinse and degas

Unprotected steel Remove rust to the recommendations of AS 1627 4 to grade Sa 2½ of AS 1627 9 Clean by immersing in trichloroethylene or an alkaline solution, and apply a coat of iron phosphate

Thermoset powder coating

Standards To AS 3715 or AS/NZS 4506 as appropriate

External use APAS-0155/2

Finish Full gloss

Internal use APAS-0155/1

4 3 5 PREPAINTING

Air-drying enamel

Application Spray or brush

Finish Full gloss

General use

- Primer Two-pack epoxy primer to APAS-2971
- Top coats 2 coats to APAS-0015/1

Oil resistant use

- Primer Two-pack epoxy primer to APAS-2971
- Top coats 2 coats to APAS-0024/1

Equipment paint system

Description Brush or spray application using paint as follows

- Full gloss enamel finish coats, oil and petrol resistant APAS-0024/1 two coats
- Prime coat to metal surfaces generally APAS-0032 or APAS-0162/1
- Prime coat to zinc-coated steel APAS-0134
- Undercoat APAS-0029

High performance organic coatings

Description Factory applied spray coatings on aluminium products, including polyvinylidene fluoride (PVF_2) coatings

Standards To AAMA 2604 and AS/NZS 2728

Pre-painted metal products

Standard To AS/NZS 2728

Product type Not lower than the type appropriate to the field of application

Stoving enamel

Application Spray or dip

Internal use

- Primer To APAS-0065

- Topcoat To APAS-0066/3

Two-pack liquid coating

Application Spray

Finish Full gloss

Primer Two pack epoxy primer to APAS-2971

Topcoat

- Internal use Proprietary polyurethane or epoxy acrylic system
- External use Proprietary polyurethane system

5 0 TERMITE MANAGEMENT

5 1 GENERAL

5 1 1 AIMS

Responsibilities
Provide termite management materials and systems
Conform to the **Schedule**

5 1 2 CROSS REFERENCES

General
General Conform to the General requirements worksection

5 1 3 STANDARD

General
Termite barriers To AS 3660 1

5 1 4 INSPECTION

Notice
Inspection Give sufficient notice so that inspection may be made of the completed termite barriers

5 1 5 TESTS

Chemical soil barriers – reticulation systems
DO NOT USE

5 1 6 SUBMISSIONS

Tests
Submit a Registered testing authority laboratory analysis certificate of chemical soil barrier type testing to Appendix E

5 2 PRODUCTS

5 2 1 NON-CHEMICAL BARRIERS

Concrete slab barrier (Tb1)
Standard To AS 3660 1 Section 4
Services penetration barrier type
- Proprietary UPVC pipe shields
- Proprietary stainless steel pipe shields
- Stainless steel mesh

Woven stainless steel mesh barriers (Tb2)
Standard To AS 3660 1 Section 6
Proprietary item Termi-Mesh

Graded stone particles barriers (Tb3)
Standard To AS 3660 1 Section 7
Proprietary item Granitgard

5 2 2 CHEMICAL SOIL BARRIERS

DO NOT USE

5 2 3 NON-SOIL MATRIX BARRIERS (Tb4)

Concrete slab barrier
Description Composite membrane incorporating a termiticide

Brickwork
Description Bedding mortar incorporating a termiticide
Application Brick bed and perpends as follows
Cavity walls built off a concrete slab on ground
Buildings with typical raft infill (footing) or formed void slab construction
Permanent barrier in sub-floor brickwork and brick piers

Assessment criteria
Standard To AS 3660 3

5 3 EXECUTION

5 3 1 NON-CHEMICAL BARRIERS

Concrete slab barrier
Standard To AS 3660 1 Section 4

Termite cap and strip shields
Standard To AS 3660 1 Section 5

Woven stainless steel mesh barriers
Standard To AS 3660 1 Section 6

Graded stone particles barriers
Standard To AS 3660 1 Section 7

5 3 2 COMPLETION

Termite barrier notice
Provide a durable notice permanently fixed in a prominent location to BCA Volume 1 Part B1 4 (i) (ii) and AS 3660 1 Appendix A

Waste materials
Progressively cleaning Ensure that no waste materials which could attract termites remain on the site

Warranty
Terms Materials and installation 10 years

Completion inspection
At the end of the defects liability period, inspect the termite control systems and submit a report on their efficacy and status

5.4 SELECTIONS

5 4 1 SCHEDULE

Termite barriers schedule

Location	Barrier types
Concrete slab on ground	
Slab penetrations	Use Tb1
Slab control joints and footing/slab joints	Use Tb1, Tb2 or Tb3
Building perimeters	Use Tb1, Tb2 or Tb3
Under concrete slab on ground	Use Tb1 Tb3 or Tb4

6 0 TIMBER FINISHES AND TREATMENT

6 1 GENERAL

6 1 1 AIMS

Responsibilities

General Provide finished and treated timbers

6 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

6 1 3 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply

- Plywood To AS/NZS 4491
- "Standard trade common names" To AS/NZS 1148
- Groups of timbers Terms employed for that purpose in relevant Australian standards

6 1 4 SUBMISSIONS

Materials

Pressure preservative treatment For timber required to be pressure treated, submit a certificate or other satisfactory evidence showing that the timber has been treated

6 2 PRODUCTS

6 2 1 TIMBER

Durability

General **Only termite resistant timbers are to be used** Provide timbers having natural durability appropriate to the conditions of use, or preservative-treated timber of equivalent durability

Natural durability class of heartwood To AS 5604

Minimum requirements

- Class 1 Timbers in contact with ground
- Class 2 Timbers above ground, not in continuous contact with moisture, well ventilated, protected from moisture but exposed to the weather
- Class 3 Timbers above ground, not in continuous contact with moisture well ventilated, protected with a finish and well maintained
- Class 4 Timbers fully protected from moisture indoors above ground and well ventilated

Lyctus susceptible timbers

General Do not provide timbers containing Lyctus susceptible sapwood

Preservative treatment

Glued laminated timber products To AS/NZS 1604 5

- Hazard classification To Table A1

Laminated veneer lumber (LVL) To AS/NZS 1604 4

- Hazard classification To Table A1

Plywood To AS/NZS 1604 3

- Hazard classification To Table A1

Reconstituted wood-based products To AS/NZS 1604 2

- Hazard classification To Table A1

Sawn and round timber To AS 1604 1

- Hazard classification To Table D1

Preservative treatment schedule

Type of timber	Preservative treatment	Comment
All internal timber incorporated into building structure	H2	required if not naturally termite resistant
Above ground – External timber exposed to the weather	H3	e g Fascias - required if not naturally termite resistant
Timber in contact with ground	H4	

Water-repellent treatment
Repellent To APAS-0096

Moisture content
Tolerance Make milled and dressed products from timbers seasoned as follows
- To within 3% of the equilibrium moisture content appropriate to the timber and its intended conditions of use
- To 10 – 15% moisture content
- With no more than 3% difference between any 2 pieces in any one group

Test To AS/NZS 1080 1

Protection Protect timber and timber products stored on site from moisture and weather For milled, pre-finished, prefabricated and similar elements which are protected in the final structure, provide temporary weather protection until the permanent covering is in place

Finished sizes
General Provide milled timbers with actual dimensions which are at least the stated dimensions except for dimensions qualified by a term such as "nominal" or out of" to which industry standards for finished sizes apply

Unseasoned timber
General If unseasoned timber is used, or if variations in moisture are likely, allow for shrinkage, swelling and differential movement

Surface finish
Hardwood To AS 2796 1 Table B1

Softwood To AS 4785 1 Table B1

6 2 2 VENEERS

Timber veneer
Veneer quality To AS/NZS 2270

Grades (minimum requirement)
- Select grade, veneer quality A for visible surfaces to have clear finish or to have no coated finish
- General purpose grade, veneer quality B, for other visible surfaces

6.3 EXECUTION

6 3 1 WORKMANSHIP

Ploughing
General Back plough boards liable to warp (e g if exposed externally on one face) Make the width depth and distribution of ploughs appropriate to the dimensions of the board and degree of exposure

Painting
Edges Chamfer edges of work to receive paint or similar coatings

Priming For woodwork to be painted, prime hidden surfaces before assembly

7 0 SITE PREPARATION

7 1 GENERAL

7 1 1 AIMS

Responsibilities

General The aim of this worksection is to clear the site and put in place adequate environmental controls to allow the commencement of earthworks and/or building works

7 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Notes on structural engineering drawings

Should there be a discrepancy between the following specifications and the structural engineering drawings the structural engineering drawings shall take precedence

7 2 EXECUTION

7 2 1 EXISTING SERVICES

Marking

General Before commencing earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing excavating and trenching

Excavation

General Do not excavate by machine within 1 m of existing underground services

7 2 2 ENVIRONMENTAL PROTECTION

Erosion control

General Plan and carry out the work so as to avoid erosion, contamination, and sedimentation of the site, surrounding areas, and drainage systems

Temporary erosion control measures

Staging Stage operations (e g clearing, stripping)

Restoration Progressively restore disturbed areas

Drains Provide temporary drains and catch drains

Dispersal Divert and disperse concentrated flows to points where the water can pass through the site without damage

Spreader banks or other structures Disperse concentrated run-off

Silt traps Construct and maintain silt traps to prevent discharge of scoured material to downstream areas

Contour ploughing provide to uphill sides of building platform and grade to north side of platform at nominal 1 50 grade

Contour interval 1metre height

Temporary fencing Required

Maintenance After each rain inspect clean, and repair if required, temporary erosion and sediment control works

Removal Remove temporary erosion control measures when they are no longer required

Dewatering

General Keep groundworks free of water Provide and maintain slopes, crowns and drains on excavations and embankments to ensure free drainage Place construction, including fill, masonry, concrete and services, on ground from which free water has been removed Prevent water flow over freshly laid work

7 2 3 SITE CLEARING

Extent

General Clear only the following site areas

- Areas to be occupied by works such as buildings, paving, excavation, regrading and landscaping
- Other areas designated to be cleared

Contractor's site areas If not included within the areas specified above, clear generally only to the extent necessary for the performance of the works

Clearing and grubbing

Clearing Remove everything on or above the site surface, including rubbish, scrap, grass vegetable matter and organic debris, scrub, trees, timber, stumps boulders and rubble

Grubbing Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, or 300 mm below finished surface in unpaved areas Holes remaining after grubbing shall be backfilled with sand material to prevent ponding of water The material shall be compacted to the relative density of the existing adjacent ground material

Old works Remove old works, including slabs, foundations, pavings drains and manholes found on the surface

7 2 4 DISPOSAL OF MATERIALS

Disposal

General Remove cleared and grubbed material from the site and dispose of legally

Surplus material stockpile where directed on site

8 0 EARTHWORK

8 1 GENERAL

8 1 1 AIMS

Responsibilities

General Provide earthwork surfaces for building, pavement and landscaping works that are as follows

- In conformance with the level tolerances specified
- Have been tested by a NATA registered geotechnical testing authority
- In conformance with the compaction requirements specified

8 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Notes on civil and structural engineering drawings

Notes on Structural and Civil Drawings Should there be a discrepancy between the following specifications and the structural engineering drawings, the structural engineering drawings shall take precedence

8 1 3 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply

- Standard To AS 1348
- Description and classification of soils To AS 1726
- Bad ground Ground unsuitable for the purposes of the works, including fill liable to subsidence, ground containing cavities faults or fissures, ground contaminated by harmful substances and ground which is or becomes soft, wet or unstable
- Base One or more layers of material usually constituting the uppermost structural element of a pavement and on which the surfacing may be placed, which may be composed of fine crushed rock, natural gravel, broken stone stabilised material asphalt or Portland cement concrete
- Discrepancy A difference between contract information about the site and conditions encountered on the site including but not limited to discrepancies concerning the following
  - The nature or quantity of the material to be excavated or placed
  - Existing site levels
  - Services or other obstructions beneath the site surface
- Line of influence A line extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings slab or pavement
- Rock Monolithic material with volume greater than 0 5 m3 which cannot be removed until broken up either by explosives or by rippers or percussion tools
- Subbase The material laid on the subgrade below the base either for the purpose of making up additional pavement thickness required to prevent intrusion of the subgrade into the base, or to provide a working platform
- Subgrade The trimmed or prepared portion of the formation on which the pavement or slab is constructed Generally taken to relate to the upper line of the formation

8 1 4 GEOTECHNICAL AND ENVIRONMENTAL SITE INVESTIGATION

Report

General The geotechnical and environmental site investigation report provided is for information only The geotechnical information and information on contaminants given is information on the nature of the ground at each tested part It is not a complete description of conditions existing at or below ground level The contractor is to make a full allowance for earthworks including excavation in rock as can reasonably be inferred from a site inspection and interpretation of the below surface conditions as indicated in the geotechnical report

8 1 5 NOTICE

As found site conditions

General If the following are encountered give notice immediately and obtain instructions before carrying out any further work in the affected area

- Bad ground
- Discrepancies
- Rock not to depths indicated in Geotechnical report
- Springs seepages
- Topsoil > 150 mm deep

8 1 6 RECORDS OF MEASUREMENT

Excavation and backfilling

Agreed quantities If a schedule of rates applies, provisional quantities are specified, or there are variations to the contract levels or dimensions of excavations, do not commence backfilling or place permanent works in the excavation until the following have been agreed and recorded

- Depths of excavations related to the datum
- Final plan dimensions of excavations
- Quantities of excavations in rock

Method of measurement. To be by registered surveyor unless otherwise agreed

Rock

Level and class If rock is to be measured for payment purposes whether as extra over excavation of material other than rock or for adjustment of provisional measurements, do not remove the rock until the commencing levels and the classes of rock have been determined

8 1 7 EXPLOSIVES

General

General Do not use explosives

8 1 8 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- *Items to be measured as listed in Records of measurement*
- Excavation completed to contract levels or founding material
- Proof roll subgrade prior to placing fill
- Filling completed to contract levels
- Stockpiled topsoil before spreading

8 1 9 TESTS

Test locations

Test the areas of fill which are to support non-spanning concrete ground slabs as specified by the Structural engineers

Geotechnical testing authority

General Use a NATA registered geotechnical testing authority
Level of responsibility to AS 3798 Appendix B Level 2

Testing

Compaction (density) Test for compliance
Retesting Rework and retest areas which do not achieve the required density until that density is achieved

Test methods

Field dry density To AS 1289 5 3 1, AS 1289 5 3 5 or AS 1289 5 8 1 If using AS 1289 5 8 1 calibrate the surface moisture-density gauge in accordance with AS 1289 5 8 4 before use

Density index To AS 1289 5 6 1

Standard maximum dry density To AS 1289 5 1 1

Modified maximum dry density To AS 1289 5 2 1

Fill Test to AS 1141 or AS 1289 as appropriate

Reference density

Standard maximum dry density To AS 1289 5 1 1

Modified maximum dry density To AS 1289 5 2 1

Minimum and maximum dry density cohesionless soil To AS 1289 5 5 1

Hilf density ratio and moisture variation To AS 1289 5 7 1

Varying Do not vary the test procedure for a given soil type

Sampling Follow the recommendations in AS 3798 clause 7 4

Moisture curing of samples Allow adequate curing times, or make appropriate allowances for poorly-conditioned compaction curves

California bearing ratio Sample and test to AS 1289 6 1 1, AS 1289 6 1 2 or AS 1289 6 1 3, as appropriate

Test schedule

Type of test	Test method	Frequency/number of tests
CBR	**AS 1289 F1 1**	1 Per 500m2
Compaction/ Moisture content	AS 1289 5 1 1 AS 1289 4 1 1 AS 1289 5 7 1	1 Per 250m2

Compaction control test frequency

Standard To AS 3798 Table 8 1

Site area 500 – 1500 m2 At least (whichever requires the most tests)

- 1 test per layer or 200 mm thickness per 1000 m2
- 1 test per 200 m3 distributed evenly throughout full depth and area
- 1 test per allotment per layer

Confined operations 1 test per 2 layers per 50 m2

8 1 10 SUBMISSIONS

Tests

Imported fill Submit certification or test results which establish the compliance of imported fill with the contract

Compaction Submit certification and/or test results in accordance with the specified level of responsibility to AS 3798

Materials

General Submit details of materials proposed including the following

- Sources of imported fill

8 1 11 TOLERANCES

Tolerances

Finish Finish the surface to the required level, grade and shape within the following tolerances

- Under building slabs and loadbearing elements + 0, -25 mm
- Pavement subgrades, + 0, - 40 mm
- Batters No steeper than the slope shown on the drawings Flatter slopes shall not impact on boundaries or required clearances to buildings, pavements or landscaping
- Other ground surfaces ± 50 mm, provided the area remains free draining and matches adjacent construction where required Provide smoothness as normally produced by a scraper blade

8 2 PRODUCTS

8 2 1 FILL MATERIALS

Fill material generally

General Inorganic, non-perishable material

Sulphur content Do not provide filling with sulphur content exceeding 0 5% within 500 mm of cement bound elements (for example concrete structures or masonry) unless such elements are protected by impermeable membranes or equivalent means

Excluded materials
- Organic soils
- Materials contaminated through past site usage
- Materials which contain substances which can be dissolved or leached out or which undergo volume change or loss of strength when disturbed and exposed to moisture
- Silts or silt-like materials
- Fill containing wood, metal plastic boulders or other deleterious material

Sources
Provide fill imported on to the site from suitable sources unless the fill type can be provided from
- spoil recovered from the excavations, or
- borrow material from designated borrow pits

Fill types
General fill Imported fill should be clean sandy material with characteristics which match the physical properties existing ground conditions and apparent from the geotechnical report

Select fill As specified by civil / structural / geotechnical engineer

Fill materials schedule

Location	Fill type	Depth (mm)	Maximum layer thickness (loose) (mm)
Under concrete slabs on ground	As noted on Structural drawings	As noted on Structural drawings	As noted on Structural drawings
Backfill to excavation generally	General	As required	300

8 3 EXECUTION

8 3 1 REMOVAL OF TOPSOIL

General
Extent Areas to be cut and areas to be filled and areas to be occupied by structures, pavements, embankments and the like

Maximum depth 100 mm

Re-use of removed topsoil
General Removed topsoil is to be reused in areas requiring turfing mixed with additives as necessary to meet the required standards as specified under LANDSCAPING

Topsoil stockpiles

General Stockpile site topsoil intended for re-use and imported topsoil where necessary Establish stockpiles to heights not exceeding 1 5 m Provide adequate drainage and erosion protection Do not burn off or remove plant growth which may occur during storage Do not allow traffic on stockpiles If a stockpile is to remain for more than four weeks, sow with temporary grass Protect the topsoil stockpiles from contamination by other excavated material, weeds and building debris

Disposal of excess topsoil
General Excess topsoil to be distributed on site as directed by the Superintendent

8 3 2 EXCAVATION

Extent
Site surface Excavate over the site to give correct levels and profiles as the basis for construction, pavements, filling and landscaping Make allowance for compaction or settlement

Footings Excavate for footings, pits, wells and shafts, to the required sizes and depths Confirm that bearing capacity is adequate

Proof rolling
Extent Proof roll excavations for pavements filling and non-spanning slabs on ground to determine the extent of any bad ground

Proof rolling method refer to structural drawings

Rock excavation
General Excavate the ground as found No additional payment will be made for rock excavation

Distribution of excess excavated material
General Excess excavated material shall be located on site as directed by the Superintendent

8 3 3 SUBGRADES AFFECTED BY MOISTURE

General

General Where the subgrade is unable to support construction equipment, or it is not possible to compact the overlying pavement only because of a high moisture content perform one or more of the following

- Allow the subgrade to dry until it will support equipment and allow compaction
- Scarify the subgrade to a depth of 150 mm, work as necessary to accelerate drying, and recompact when the moisture content is satisfactory
- Excavate the wet material and remove to spoil and backfill excavated areas

8 3 4 BEARING SURFACES

General

General Provide even plane bearing surfaces for loadbearing elements including footings Step to accommodate level changes Make the steps to the appropriate courses if supporting masonry

Deterioration

General If the bearing surface deteriorates because of water or other cause excavate further to a sound surface before placing the loadbearing element

8 3 5 REINSTATEMENT OF EXCAVATION

General

General Where excavation exceeds the required depth or deteriorates, reinstate to the correct depth, level and bearing value

Particular

General Below or within the "line of influence" of footings beams or other structural elements Concrete of strength equal to the structural element, minimum 15 MPa

Below slabs or pavements Provide selected filling compacted to the specified density In cut subgrades if the over excavation is less than 100 mm, do not backfill but make good by increasing the thickness of the layer above Backfill rock depressions and over excavation of subsoil drains using coarse subsoil filter

8 3 6 PREPARATION FOR FILLING

General

General Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements Shape to assist drainage Remove materials which will inhibit or prevent satisfactory placement of fill layers, loose material debris and organic matter Compact the ground exposed after stripping or excavation in conformance with the **Compaction schedule**

Benching

General If fill is to be placed on a surface which slopes more than 1 4, bench the surface to form a key for the fill As each layer of fill is placed, cut the existing ground surface progressively to form a series of horizontal steps > 1 m in width and > 100 mm deep Recompact the excavated material as part of the filling Shape to provide free drainage

Under earth mounds

General Cultivate the ground to a depth of 200 mm before mound formation

Under slabs, paving and embankments

General Compact the ground to achieve the densities specified in the **Compaction schedule** If necessary loosen the ground to a depth of > 200 mm and adjust the moisture content before compaction to a density consistent with subsequent filling

Rock ledges

General Remove overhanging rock ledges

8 3 7 PLACING FILL

General

Layers Place fill in near-horizontal layers of uniform thickness, deposited systematically across the fill area

Extent Place and compact fill to the designated dimensions levels grades and cross sections so that the surface is always self draining

Edges At junctions of fill and existing surfaces, do not feather the edges

Mix Place fill in a uniform mixture

Previous fill Before placing subsequent fill layers, ensure that previously accepted layers still conform to requirements, including moisture content

Protection Protect the works from damage due to compaction operations Where necessary, limit the size of compaction equipment or compact by hand Commence compacting each layer at the structure and proceed away from it

Protective covering Do not disturb or damage the protective covering of membranes during backfilling

Placing at structures

General Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading Carefully place first layers of fill over the top of structures

Concrete Do not place fill against concrete until the concrete has been in place for 21 days unless the structure is supported by struts or 85% of the design concrete strength is achieved

8 3 8 COMPACTION REQUIREMENTS FOR FILL AND SUBGRADE

Density

General Compact the subgrade and each layer of fill to the required depth and density, as a systematic construction operation and to conform to the **Compaction table** Shape surfaces to provide drainage and prevent ponding

Compaction table

Location	Cohesive soils Minimum dry density ratio (standard compaction) to AS 1289 5 1 1	Cohesionless soils Minimum density index to AS 1289 5 6 1
Commercial -Fills to support minor loadings incl floor loadings < 20 kPa and isolated pad or strip footings < 100 kPa	98 std	70
Pavements		
-Fill to support pavements	95 std	65
-Subgrade to 300 mm deep	98 std	80

Excavated and stripped ground surface After excavation and/or stripping, these surfaces should also be compacted in conformance with the **Compaction table** to a minium depth of 150 mm

Maximum rock and lump size in layer after compaction 2/3 compacted layer thickness

Fill batter faces Either compact separately, or overfill and cut back Form roughened surfaces to the faces

Moisture content

General Adjust the moisture content of fill during compaction within the range of 85 – 115% of the optimum moisture content determined by AS 1289 5 1 1 or AS 1289 5 2 1 as appropriate in order to achieve the required density

8 3 9 GRADING

External areas

General Grade to give falls away from buildings, minimum 1 100

8 3 10 COMPLETION

Records

Certified records of measurement Submit a certified copy of the agreed records of measurement

Construction records

General Submit the following

- Geotechnical site visit record, and
- Earthworks summary report or daily geotechnical reports

Content At least the following

- The areas in which fill is placed
- Levels after stripping
- Materials exposed after stripping and the criteria upon which the decision to cease stripping was made
- Levels after completion of the filling

- Types of fill materials in various zones
- Location and level of each compliance test together with test results State if a test is a retest of an area which was previously rejected
- Action taken where testing indicated that the specified criteria had not been met
- Any areas where fill material or compaction was to be of a greater or lesser standard than
- elsewhere on site

Format To AS 3798 Appendix C

8 3 11 SITE RESTORATION

Requirement

General Where existing ground surfaces are not required to be varied as part of the works, restore them to the condition existing at the commencement of the contract

9 0 SERVICE TRENCHING

9 1 GENERAL

9 1 1 AIMS

Responsibilities

General Provide trenching safe for workers and adjacent structures, and suitable for receiving services and to be backfilled so as to have no adverse impact on following work or the completed project

9 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Hydraulic Services specification
- Electrical Services specification

9 1 3 DESIGN

Shoring and lining systems

Steel shoring and trench lining systems To AS 4744 1

9 1 4 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made at the following stages

- Service trenches excavated before laying the service
- Services laid in trenches and ready for backfilling

9 1 5 TESTS

Density tests

Testing authority Have density tests of pipe bedding and backfilling carried out by a Registered testing authority

Test methods

- Field dry density AS 1289 5 3 2 or AS 1289 5 3 5
- Standard maximum dry density AS 1289 5 1 1
- Dry density ratio AS 1289 5 4 1
- Density index AS 1289 5 6 1

9 2 EXECUTION

9 2 1 EXCAVATING

Existing surfaces

General Before excavating trenches saw-cut existing concrete and bituminous surfaces on each side of the trench to provide a straight even joint

Excavation

General Excavate for underground services

- To required lines and levels
- Straight between personnel access ways, inspection points and junctions
- With vertical sides and uniform grades

Trench widths

General Keep trench widths to the minimum consistent with the laying and bedding of the relevant service and construction of personnel access ways and pits

Trench depths

General As required by the relevant service and its bedding method

Notice If excavation is necessary below the zone of influence of the underside of adjacent footings, give notice, and provide support for the footings as instructed

Obstructions

General Clear trenches of sharp projections Cut back roots encountered in trenches to at least 600 mm clear of services Remove other obstructions including stumps and boulders which may interfere with services or bedding

Dewatering
General Keep trenches free of water Place bedding material services and backfilling on firm ground free of surface water

Excess excavation
General If trench excavation exceeds the correct depth reinstate to the correct depth and bearing value using compacted bedding material or sand stabilised with 1 part of cement to 20 parts of sand by weight

9 2 2 BACKFILLING

General
General Backfill service trenches as soon as possible after the service has been laid and bedded if possible on the same working day Place the backfill in layers ≤ 150 mm thick and compact

Marking services
Underground marking tape To AS/NZS 2648 1

Backfill material
General General fill with no stones greater than 25 mm occurring within 150 mm of the service, or other materials as required for particular services or locations Well graded, inorganic, non-perishable material maximum size 75 mm, plasticity index ≤ 55%
Under roads and paved areas and within 4 m of building Coarse sand controlled low strength material or fine crushed rock

In topsoil areas Complete the backfilling with topsoil for at least the top 100 mm

In reactive clay In sites classified M M-D H H-D or E to AS 2870, reuse excavated site material at a moisture content within ± 1% of that of the adjoining in situ clay

9 2 3 REINSTATEMENT OF SURFACES

General
General Reinstate existing surfaces removed or disturbed by trench excavations to match existing and adjacent work

Lawn areas
General Provide 150 mm of loam and re-sow the lawn over the trench and other disturbed areas

Paving and roads
General Reinstate to match adjacent work, paved surfaces and assets disturbed or removed during excavation of trenching

Concrete surfaces
General Reinstate concrete surfaces to the original level If required provide steel reinforcement with dowels into the adjacent concrete

10 0 CONCRETE FORMWORK

10 1 GENERAL

10 1 1 AIMS

Responsibilities

General Provide finishes to formed concrete surfaces which are as follows

- Appropriate to the importance (visual or physical) of the concrete elements
- Compatible with following trades and finishes

Allowances Allow for dimensional changes, deflections and cambers resulting from the following

- Applied loads
- Concrete shrinkage and creep
- Temperature changes
- The application of prestressing forces (if any)

Design

General The design of the formwork is the contractor's responsibility

10 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Concrete reinforcement
- Concrete cast in situ
- Concrete finishes
- Notes on Structural Drawings Should there be a discrepancy between the following specifications and the structural engineering drawings, the structural engineering drawings shall take precedence

10 1 3 STANDARDS

General

Formwork design and construction To AS 3610

Reinforced concrete design and construction To AS 3600

10 1 4 TOLERANCES

General

Plumb of elements ≥ 8 m high 1 in 1000

Position Construct formwork so that finished concrete is in conformance with the **Position tolerances table**

Position tolerances table

Surface finish class to AS 3610	1	2	3	4	5
Permissible deviation from designed position (mm)	10	15	20	25	40

10 1 5 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Completed formwork before concrete placing
- Evaluation of the finish

10 2 PRODUCTS

10 2 1 MATERIALS

Form linings and facings

Compatibility To be compatible with finishes to be applied to concrete

Lost formwork

General Not to contain timber or chlorides and not to impair the structural performance of the concrete members

Release agents

Compatibility To be compatible with finishes to be applied to the concrete

Void formers
Material To be cardboard or fibreboard, collapsible on absorption of moisture

10 3 EXECUTION

10 3 1 PREPARATION

Cleaning
General Before placing concrete, remove free water, dust debris and stains from the forms and the formed space

10 3 2 CONSTRUCTION

General
General Conform to the **Formed surfaces schedule**

Removable bolts Remove the bolts without causing damage to the concrete

Bolt hole filling
Cover Position formwork tie bolts left in the concrete so that the tie does not project to within 50 mm of finished surface

Durability Provide material with durability and colour matching the concrete

Recessed filling Fill or plug the hole to 6 mm below the surface

Corners
Work above ground Chamfer at re-entrant angles, and fillet at corners
- Face of bevel 25 mm

Embedment
General Fix embedment through formwork to prevent movement, or loss of slurry or concrete, during concrete placement

Release agents
Application Before placing reinforcement, apply a release agent to form linings and facings

Steel linings
Rust Clean off any rust and apply rust inhibiting agent prior to reuse

Visually important surfaces
General For concrete of surface finish classes 1 2 or 3, set out the formwork to give a regular arrangement of panels, joints, bolt holes and similar visible elements in the formed surface

10 3 3 COMPLETION

Formwork removal
Extent Remove formwork, other than steel reinforcement decking, including formwork in concealed locations, but excepting lost formwork

Timing Do not disturb forms until concrete is hardened enough to withstand formwork movements and removal without damage

Stripping
- General To AS 3600 where it is more stringent than AS 3610

Loading before stripping
General Do not erect masonry walls or other brittle elements on beams and slabs while they are still supported by formwork

10.4 SELECTIONS

10.4.1 SCHEDULES

Formed surfaces schedule

Concrete element or surface	Surface finish class to AS 3610	Form lining type	Bolt hole filling
Visible concrete surfaces	Class 2	Plastic coated form ply	Patch holes flush, grind joints and sand smooth
Concrete surfaces to be rendered or hidden	Class 3	Contractor's selection	Patch
Concrete surfaces to be permanently concealed	Class 4	-	-

11 0 CONCRETE REINFORCEMENT

11 1 GENERAL

11 1 1 AIMS

Responsibilities

General Design and provide reinforcement which is as follows

- Enhances the concrete works
- Performs appropriately for strength, serviceability and durability

11 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Concrete formwork
- Concrete cast in situ
- Concrete finishes
- Notes on Structural Drawings Should there be a discrepancy between the following specifications and the structural engineering drawings, the structural engineering drawings shall take precedence

11 1 3 STANDARDS

General

Standard To AS 3600

Tolerances

Fabrication and fixing To AS 3600

11 1.4 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Cores and embedments fixed in place
- Reinforcement fixed in place with formwork completed

11 1 5 SUBMISSIONS

Execution – proposals

Changes If changes are proposed to reinforcement show on the drawings, submit detail

Damaged galvanizing If repair is required, submit proposals to AS/NZS 4680 Appendix E

Mechanical splices If mechanical bar splices are proposed or required, submit details and test certificates for each size and type of bar to be spliced

Provision for concrete placement If spacing or cover of reinforcement does not comply give notice

Splicing If splicing not documented is proposed, submit details

Welding Give notice before welding reinforcement

11 2 PRODUCTS

11 2 1 MATERIALS

Steel reinforcement

Standard To AS/NZS 4671

- Ductility grade Class N

Surface condition Free of loose mill scale rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete

Tie wire

General To be annealed steel 1 25 mm diameter (minimum)

External and corrosive applications Galvanized

11 3 EXECUTION

11 3 1 CONSTRUCTION

Dowels

Fixing If a dowel has an unpainted half embed this in the concrete placed first

Tolerances

- Alignment 2 mm in 300 mm
- Location ± half the diameter of the dowel

Grade 250 N

Supports

General Provide proprietary concrete, metal or plastic supports to reinforcement in the form of chairs spacers stools hangers and ties as follows

- To be adequate to withstand construction and traffic loads
- With a protective coating if they are ferrous metal extending to the surface of the concrete or are used with galvanized or zinc-coated reinforcement

Minimum spacing

- Bars ≤ 60 diameters
- Fabric ≤ 750 mm

Supports over membranes Prevent damage to waterproofing membranes or vapour barriers Place a metal or plastic plate under each support

Projecting reinforcement

General If starter' or other bars project beyond reinforcement mats or cages, through formwork or from cast concrete provide a plastic protective caps to each bar until it is incorporated into subsequent work

Tying

General Secure the reinforcement against displacement by tying at intersections with either wire ties, or clips Bend the ends of wire ties away from nearby faces of forms so that the ties do not project into the concrete cover

Beams Tie stirrups to bars in each corner of each stirrup Fix other longitudinal bars to stirrups at 1m maximum intervals

Bundled bars Tie bundled bars together so that the bars are in closest possible contact Provide tie wire at least 2 5 mm diameter at centres ≤ 24 times the diameter of the smallest bar in the bundle

Columns Secure longitudinal column reinforcement to all ties at every intersection

Mats For bar reinforcement in the form of a mat secure each bar at alternate intersections

Tolerances To AS 3600

Welding

General If welding of reinforcement is proposed, provide details

11 3 2 COMPLETION

Unencased reinforcement

General If 'starter bars' and other items project from cast concrete for future additions and are exposed to the weather, provide details of protection

12 0 IN-SITU CONCRETE

12 1 GENERAL

12 1 1 AIMS

Responsibilities

General Provide cast in situ concrete that

- Can be readily placed into corners and angles of forms, and around reinforcement without segregation
- Is not porous, cracked or honeycombed
- Has acceptable plastic settlement cracking
- Has acceptable levels of bleed water

12 1 2 CROSS REFERENCES

General requirements

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Concrete formwork
- Concrete reinforcing
- Concrete finishes
- Notes on Structural Drawings Should there be a discrepancy between the following specifications and the structural engineering drawings the structural engineering drawings shall take precedence

12 1 3 STANDARDS

General

Materials and construction To AS 3600

12 1 4 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Base or subgrade before covering
- Membrane or film underlay installed on the base
- Completed formwork, and reinforcement, cores fixings and embedded items fixed in place
- Surfaces or elements to be concealed in the final work before covering
- Commencement of concrete placing

12 1 5 SAMPLES AND SUBMISSIONS

Pre-mixed supply

Delivery docket For each batch, submit a docket listing the information required by AS 1379, and the following information

- For special class performance concrete, specified performance and type of cement binder
- For special class prescription concrete, details of mix, additives, and type of cement binder
- Method of placement and climate conditions during pour
- The amount of water if any added at the site

12 2 EXECUTION

12 2 1 POLYMERIC FILM UNDERLAY

Standard

Vapour barriers and damp-proofing membranes To AS 2870

Location

General Under slabs on ground including integral ground beams and footings, provide a vapour barrier or, in areas prone to rising damp or salt attack, a damp-proofing membrane

Installation

General Lay over the base, lap joints at least 200 mm and seal the laps and penetrations with waterproof adhesive tape Face the laps away from the direction of concrete pour Take the underlay up vertical faces past the damp proof course where applicable and tape fix at the top Patch or seal punctures or tears before pouring concrete Cut back as required after concrete has gained strength and forms have been removed

Base preparation
General According to base type, as follows
- Concrete working base Remove projections above the plane surface and loose material
- Graded prepared subgrade Blind with sufficient sand to create a smooth surface free from hard projections Wet the sand just before laying the underlay

12 2 2 CONCRETE MATERIALS

Bagged cement
Standard To AS 3972
- Age Less than 6 months old
- Type GP

Chemical admixtures
Contents Free of chlorides, fluorides and nitrates

12 2 3 CONCRETE

General
General Provide concrete in conformance with the following
- STRUCTURAL NOTES -CONCRETE on Structural drawings

Elapsed delivery time
General Ensure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the **Elapsed delivery time table** Do not discharge below 10°C or above 32°C

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (hours)
10 – 24	2 00
24 – 27	1 50
27 – 30	1 00
30 – 32	0 75

Pre- mixed supply
Addition of water If water is to be added, comply with AS 1379 Section 4 2 3

Transport Mode must prevent segregation, loss of material and contamination of the environment, and must not adversely affect placing or compaction

Site mixed supply
Emergencies If mixing by hand is carried out, provide details

Plant Mix concrete in a plant located on the construction site

12 2 4 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements
General For adjoining elements to be fixed to or supported on the concrete provide for the required fixings If required, provide for temporary support of adjoining elements during construction of the concrete

Protection
General Grease threads Protect embedded items against damage

Compatibility Ensure inserts, fixings and embedded items are compatible with each other, with the reinforcement and with the concrete mix to be used

Corrosion If in external or exposed locations galvanize anchor bolts and embedded fixings

Structural integrity
General Fix cores and embedded items to prevent movement during concrete placing In locating cores, fixings and embedded items, reposition but do not cut reinforcement and maintain cover to reinforcement

Tolerances
General Maximum deviation from correct positions
- Anchor bolt groups for structural steel To AS 4100
- Cores and embedded items generally 10 mm
- Other fixing bolts 3 mm

12 2 5 PLACING AND COMPACTION

Compaction

Methods Use immersion and screed vibrators accompanied by hand methods as appropriate to remove air bubbles and to fully compact the mix

Vibrators Do not allow vibrators to come into contact with partially hardened concrete, reinforcement or items including pipes and conduits embedded in concrete Do not use vibrators to move concrete along the forms Avoid over-vibration that may cause segregation

Horizontal transport

General Use suitable conveyors, clean chutes, troughs or pipes

Placing

General Use placing methods which avoid segregation and loss of concrete, and which minimise plastic settlement Maintain a generally vertical and plastic concrete edge at faces of a pour

Layers Place concrete in layers ≤ 300 mm thick such that each succeeding layer is compacted before previous layer has taken initial set

Placing records

General Keep on site and make available for inspection a log book recording each placement of concrete, including the following

- Date
- Specified grade and source of concrete
- Slump measurements
- The portion of work
- Volume placed

Rain

General Do not expose concrete to rain before it has been placed and set

Vertical elements

General In vertical elements, limit the free fall of concrete to 1500 mm per 100 mm element thickness, up to a maximum free fall of 3000 mm, using enclosed vertical chutes or access hatches in forms

12.2 6 PLACING IN HOT WEATHER

Handling

General Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses Mix transport place and compact the concrete in conformance with the **Elapsed delivery time schedule**

Placing

Concrete Maintain the temperature of the freshly mixed concrete in conformance with the **Hot weather placing table**

Formwork and reinforcement Before and during placing maintain temperature at ≤ 35°C

Severe weather

General If surrounding outdoor shade temperature > 38°C do not mix concrete

Temperature control

General Select one or more of the following methods of maintaining the specified temperature of the placed concrete

- Cool the concrete using liquid nitrogen injection before placing
- Cover the container in which the concrete is transported to the forms
- Spray the coarse aggregate using cold water prior to mixing
- Use chilled mixing water

Hot weather placing table

Concrete element	Temperature limit
Normal concrete in footings beams columns walls and slabs	32°C
Concrete in sections ≥ 1 m in all dimensions except for concrete of strength 40 MPa or greater in sections exceeding 600 mm in thickness	27°C

12 2 7 CURING

General

Concrete strength If the strength of concrete required by AS 3600 clauses 4 4 or 4 5 has not been achieved, extend the curing period until strength is achieved

Curing Cure continuously from initial set until the total cumulative number of days or fractions of days during which the air temperature in contact with the concrete is above 10°C, is at least the following unless accelerated curing is adopted

- Fully enclosed internal surfaces/Early age concrete 3 days
- Other surfaces concrete 7 days

End of curing period Prevent rapid drying out at the end of the curing period

Protection Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period

Cold weather curing

General Maintain concrete temperature between 10 – 20°C for curing period

Curing compounds

Standard To AS 3799

Application Provide a uniform continuous flexible coating without visible breaks or pinholes which remains unbroken at least for the required curing period after application

Substrates Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to applied finishes, concrete toppings and cement-based render

Visually important surfaces Apply curing compounds to produce uniform colour on adjacent surfaces

Hot weather curing

Curing compounds Do not use curing compounds

Protection Select a protection method as applicable

- If the concrete temperature exceeds 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant
- If temperature of surrounding air is > 35°C, protect from wind and sun until the concrete can be covered
- Immediately the concrete has set, cover exposed surfaces using an impervious membrane, or hessian kept wet, until curing begins

Water curing

General If water is used, pond or continuously sprinkle for the required curing period

12 2 8 CONSTRUCTION JOINTS

Location

General Do not relocate or eliminate construction joints, or make construction joints not shown on the drawings If emergency construction joints are made necessary by unforeseen interruptions to the concrete pour, submit a report on the action taken

Finish at construction joints

General Butt join the surfaces of adjoining pours In visually important surfaces make the joint straight and true, and free from blemishes impermissible for its surface finish class

Joint preparation

General Roughen and clean the hardened concrete joint surface Remove loose or soft material, free water, foreign matter and laitance Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry

12 2 9 EXPANSION JOINTS

Joint filling

Joint filling Fill with jointing materials Finish visible jointing material neatly flush with adjoining surfaces

Preparation Before filling, dry and clean the joint surfaces, and prime

Watertightness Apply the jointing material so that joints subject to ingress of water are made watertight

Jointing materials

Type Provide jointing materials compatible when used together, and non-staining to concrete in visible locations

Bond breaking Provide back-up materials for sealants, including backing rods, which do not adhere to the sealant They may be faced with a non-adhering material

Foamed materials (in compressible fillers) Closed-cell or impregnated types which do not absorb water

13 0 CONCRETE FINISHES

13 1 GENERAL

13 1 1 AIMS

Responsibilities

General Provide finishes to formed and unformed concrete surfaces which are as follows

- Appropriate to the importance (visual or physical) of the concrete elements
- Compatible with following trades and finishes

13 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Concrete formwork
- Concrete cast in situ

13 1 3 STANDARDS

General

Formed surfaces To AS 3610

Unformed surfaces To AS 3600

13 1 4 TOLERANCES

General

Formed surfaces Confirm conformance with the surface finish requirements of AS 3610 for the surface class nominated in the **Formed surface finishes schedule**

Unformed surfaces Confirm conformance with the **Tolerance classes table** for the class of finish nominated using a straight edge placed anywhere on the surface in any direction

Tolerances class table

Class	Measurement	Maximum deviation (mm)
A	3 m straight edge	3
B	3 m straight edge	6
C	600 mm straight edge	6

13 2 PRODUCTS

13 2 1 MATERIALS

Surface hardeners, sealers and protectors

Supply If required by the project documentation, provide proprietary products in accordance with the manufacturer's written requirements

13 3 EXECUTION

13 3 1 SURFACE MODIFIERS

General

Application Apply to clean surfaces in accordance with the manufacturer's requirements

13.3 2 UNFORMED SURFACES

General

General Strike off, screed and level slab surfaces to finished levels, to tolerance class C

Finishing methods

Broom finish After floating draw a broom or hessian belt across the surface to produce a coarse even-textured slip-resistant transverse-scored surface

Machine floated finish After screeding and when the concrete has stiffened sufficiently, work the slab surface using a machine float Hand float in locations inaccessible to the machine float Cut and fill to tolerance class B and refloat immediately to a uniform, smooth texture

Pattern paving After machine floating, apply a proprietary treatment producing integral coloured and patterned surface

Scored or scratch finish After screeding give the surface a coarse scored texture using a stiff brush or rake drawn across the surface before final set

Sponge finish After machine floating obtain an even textured sand finish by wiping the surface using a damp sponge

Steel trowelled finish After machine floating, use power trowels to produce a smooth surface relatively free from defects Then when the surface has hardened sufficiently use steel hand trowels to produce the final finish free of trowel marks and defects, and uniform in texture and appearance to tolerance class A

Wood float finish After screeding, machine produce the final finish using a wood float, to tolerance class B

Surface finishes

General Provide surface finishes in conformance with the **Integral finish schedule**

13 3 3 FORMED SURFACES

General

General Provide formed concrete finishes in conformance with the **Formed surface finishes schedule**

Damage Do not damage concrete works through premature removal of formwork

Curing

General If forms are stripped when concrete is at an age less than the minimum curing period, commence curing exposed faces as soon as the stripping is completed

Evaluation of formed surfaces

General If evaluation of formed surface tolerance or colour is required, complete the evaluation before surface treatment

Surface repairs

General Surface repair method Before commencing repairs, submit proposals

13.4 SELECTIONS

13 4 1 SCHEDULES

Integral finishes schedule

Location	Finish	Surface tolerance class
Internal floor slabs with no applied finish	Mechanical float steel trowel finish	B
External concrete paving generally	Cove finish	B
External stairs and landings	Cove finish + slip resistant treatment	B
Vertical faces of ramps, suspended slabs etc	Off form	B

14.0 BRICK AND BLOCK CONSTRUCTION

14 1 GENERAL

14 1 1 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Plastering

14 1 2 STANDARD

General

Materials and construction To AS 3700

14 1 3 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Bottoms of cavities, after cleaning out
- Bottoms of core holes, before grouting
- Control joints, ready for insertion of joint filler
- Damp-proof courses, in position
- Flashings, in position
- Lintels, in position
- Structural steelwork, including bolts and shelf angles, in position

14 2 PRODUCTS

14 2 1 MATERIALS

Bricks and blocks

Standard To AS/NZS 4455

Minimum age of clay bricks 7 days

Mortar materials

Admixtures

- Admixtures To AS 3700 clause 10 4 2 4

Lime To AS 1672 1

Masonry cement To AS 1316

Portland cement To AS 3972

- Type GP

Proportions Conform to the **Mortar mix table**

Sand To be fine aggregate with a low clay content and free from efflorescing salts, selected for colour and grading

Water To be clean and free from any deleterious matter

White cement To have iron salts content ≤ 1%

Mortar mix table

Mortar class to AS 3700	Cement, lime, sand ratios			Water thickener
	Clay	Concrete	Calcium silicate	
Masonry cement				
M3	1 0 4	1 0 4	n/a	No
M4	1 0 3	n/a	n/a	No
Portland cement				
M2	1 2 9	n/a	n/a	No
M3	1 1 6	1 1 6	n/a	Optional
	1 0 5	1 0 5	1 0 5	Yes
M4	1 0 5 4 5	1 0 5 4 5	n/a	Optional
	1 0 4	1 0 4	1 0 4	Yes

14 2 2 COMPONENTS

Steel lintels

Angles and flats To AS/NZS 3679 1

Cold formed proprietary lintels To be designed to AS/NZS 4600

Corrosion protection To AS/NZS 2699 3

Galvanizing Do not cut after galvanizing

Wall ties

Standard To AS/NZS 2699 1

- Type A

Strength classification

- Cavities > 60 and < 200 mm wide Heavy duty
- Masonry veneer Light duty
- Normal cavity construction and at abutments Medium duty

Corrosion resistance and durability

Compliance To be as follows and to the **Corrosion resistance and durability table**, or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance

- Built-in products Below damp proof course to be stainless steel 316 or engineered polymer
- Bricks and blocks Below damp-proof course, and in external leaves in the High corrosivity
- category, use 'Exposure category to AS/NZS 4456 10 1997 Appendix A (Salt attack resistance categories)
- Mortar Below damp-proof course use mortar grade M4 to the **Mortar mixes table**

Corrosion resistance and durability table – Medium corrosivity category

Situation[1]	Steel lintels	Wall ties, connectors and other structural steel accessories above damp proof course	Minimum cement content (mortar grade) above damp proof course
Internal	Galvanize after fabrication 300 g/m^2	Galvanize after fabrication 300 g/m^2 Galvanized wire 300 g/m^2 Metallic-coated sheet Z275/AZ150	M2
External	Galvanize after fabrication 600 g/m^2	Galvanize after fabrication 600 g/m^2 Galvanized wire 470 g/m^2	M3

Situation[1]
- Internal Includes building fabric protected from salt and moisture by vapour barriers sarking, sheathing and building wraps
-External Includes external leaf and air spaces behind single skin brickwork or blockwork walls

Connectors and accessories

Standard To AS/NZS 2699 2

Flashings and damp-proof courses

Standard To AS/NZS 2904

14.3 EXECUTION

14 3 1 GENERAL

Mortar mixing

General Measure volumes accurately to achieve the specified proportions Machine mix for at least six minutes

Protection from contamination

General Protect masonry materials and components from ground moisture and contamination

Building in

Embedded items Build in wall ties and accessories as the construction proceeds If it is not practicable to obtain the required embedment wholly in the mortar joint in hollow unit brickwork or blockwork, fill appropriate cores with grout or mortar

Steel door frames Fill the backs of jambs and heads solid with mortar as the work proceeds

Clearance for timber frame shrinkage
General In timber frame brick veneer construction, leave clearances between window frames and brick sill and between roof frames and the brick veneer as follows
- Additional clearance Accommodate additional shrinkage of unseasoned floor timbers
- Single storey frames and ground floor windows (not for slab on ground) 10 mm

Construction at different rates or times
Monolithic structural action If two or more adjoining sections of masonry, including intersecting walls, are constructed at different rates or times, rake back or tie the intersections between those sections so that monolithic structural action is obtained in the completed work

Holes and chases
General If holes and chases are required in masonry walls provide proposals

Chasing
Requirements Unless otherwise permitted, chasing of blockwork shall be to the **Concrete blockwork chasing table** and subject to the following limitations
- Chasing may only be carried out in core-filled hollow blocks or solid blocks which are not
- designated as structural
- Parallel chases on opposite faces of a wall shall not be closer than 600 mm to each other

Concrete blockwork chasing table

Block thickness (mm)	Depth of chase (maximum mm)
190	35
140	25
90	20

Joints
General Lay solid and cored units on a full bed of mortar Face-shell bed hollow units Fill perpends solid Cut mortar flush

Finish
- Externally Tool to give a dense water-shedding finish
- Internally If wall is to be plastered rake not more than 10 mm to give a key
- Thickness 10 mm

Cutting Set out bricks or blocks with joints of uniform width and minimise cutting of masonry units

Monolithic structural action
General Provide brick or block header units, except in stretcher bond facework, to AS 3700 clause 4 11 2

Spacing 600 mm maximum

Location
- At engagement of engaged piers
- At engagement of diaphragms with the leaves in diaphragm walls
- At intersections of flanges with shear walls
- At intersections with supporting walls and buttresses
- Between leaves in solid masonry construction

Rate of construction
Regulate the rate of construction to eliminate joint deformation, slumping or instability

Rods
Set out Construct masonry to the following rods
- 75 mm high units 7 courses to 600 mm
- 90 mm high units 6 courses to 600 mm
- 190 mm high units 3 courses to 600 mm

Weather protection
General Keep the top surface of brickwork and blockwork covered to prevent the entry of rainwater

Temporary support
General If the final stability of the brickwork or blockwork is dependent on (structural) elements to be constructed after the brickwork or blockwork provide proposals for temporary support or bracing

14.3 2 FACEWORK

Cleaning
General Clean progressively as the work proceeds to remove mortar smears, stains and discolouration Do not use acid Do not erode brickwork or blockwork

Colour mixing
Distribution If the colour of the face units is visible, evenly distribute the colour range of units and prevent colour concentrations and "banding"

Commencement
General Commence at least 1 full course for blockwork or 2 full courses for brickwork, below adjacent finished level

Double face walls
Selection Select face units for uniform width and double-face qualities in single-leaf masonry with facework both sides

Preferred face Before starting obtain a ruling as to which is the preferred wall face, and favour that face should a compromise be unavoidable

Perpends
General If it is proposed to use other than vertically aligned perpends in alternate courses, provide details

Sills and thresholds
General Solidly bed sills and thresholds and lay them so that the top surfaces drain away from the building

Set out Set out so that no unit is cut smaller than ¾ full width

14.3 3 SUBFLOOR WORK

Air vent locations
General Provide air vents to give adequate cross ventilation to the space under ground floors
Cavity walls Provide matching vents in the internal leaves located as near as practicable to the vents in the external leaves
Location Below damp-proof course to internal and external walls

Air vent types
Blockwork
Vent blocks Purpose-made vent blocks

14 3 4 CAVITY WORK

Cavity clearance
General Keep cavities clear at all times

Cavity fill
General Fill the cavity to 1 course above adjacent finished (ground) level with mortar Face the top surface towards the outer leaf

Cavity width
General Provide minimum cavity widths in conformance with the following
- Brick or block walls 50 mm
- Block veneer walls 50 mm between the masonry leaf and the loadbearing frame

Openings
Care Do not close the cavity at the jambs of external openings

Wall ties connectors and accessories
Protection Install to prevent water passing across the cavity

14.3 5 DAMP-PROOF COURSES

Location
General Provide damp-proof courses as follows
- Masonry veneer construction In the bottom course of the outer leaf, continuous horizontally across the cavity Fasten to the inner frame 75 mm above floor level
- Walls adjoining infill floor slabs on membranes In the course above the underside of the slab in internal walls and inner leaves of cavity walls Project 40 mm and dress down over the membrane turned up against the wall

Height Not less than

- 150 mm above the adjacent finished ground level
- 75 mm above the finished paved or concrete area
- 50 mm above the finished paved or concreted area and protected from the direct effect of the weather

Installation

General Lay in long lengths Lap full width at angles and intersections and at least 150 mm at joints Step as necessary, but not exceeding 2 courses per step Sandwich damp-proof courses between mortar

Junctions Preserve continuity of damp-proofing at junctions of damp-proof courses and waterproof membranes

14 3 6 FLASHINGS

Location

General Unless shown otherwise on the drawings, provide flashings and weatherings as follows

- Floors Full width of outer leaf immediately above slab or shelf angle continuous across cavity and up the inner face bedded in mortar, turned 30 mm into the inner leaf 2 courses above Where the slab supports the outer skin and is not rebated bed the flashing in a suitable sealant
- Under sills 25 mm into the outer leaf bed joint 1 course below the sill, extending up across the cavity and under the sill
- Over lintels to openings in cavity walls Full width of outer leaf immediately above the lintel continuous across cavity, turned 25 mm into the inner leaf 2 courses above Extend at least 50 mm beyond the lintels
- Over lintels to openings in masonry veneer construction Full width of outer leaf immediately above the lintel, continuous across cavity Turn up against the inner frame and fasten to it Extend at least 50 mm beyond the lintels
- At abutments with structural frames or supports Vertical flashing in the cavity using 150 mm wide material wedged and grouted into a groove in the frame opposite the cavity
- At jambs where cavities are closed Full height flashing extending 75 mm beyond the closure into the cavity, interleaved with the sill and head flashing at each end Fix to jambs

Installation

General

- Any significant interruption of the cavity, including at conduits, should be flashed Head and sill flashings should not be taut across the cavity and threshold flashings should be bedded in mortar to run vertically and horizontally, not diagonally
- Sandwich flashings between mortar except on lintels or shelf angles Bed flashings, sills and copings in one operation to maximise adhesion

Pointing Point up joints around flashings, filling voids

Weepholes

Location Provide weepholes to external leaves of cavity walls in the course immediately above flashings, and cavity fill and at the bottoms of unfilled cavities

Form Open perpends

Maximum spacing 720 mm

14.3 7 WALL TIES

Classification

Durability Classification to AS/NZS 2699 1

Conformance, Provide ties in conformance with the **Wall ties category table**

Wall ties category table

Classification to AS/NZS 2699 1	Service conditions
Medium duty	Normal cavity construction
Medium duty	Tie bonding at abutments
Heavy duty	Cavities > 60 mm wide

Corrosion protection To BCA Table 3 3 3 1

Location
Provide wall ties spacing in conformance with AS 3700 clause 4 10 *Wall ties* or BCA Figure 3 3 3 1 as follows
Not more than 600 mm in each direction

Adjacent to vertical lateral supports

Adjacent to Control joints

Around openings

Installation
Embedment At least 50 mm into mortar ensuring that mortar cover is 15 mm minimum to the outside face of the mortar

14 3 8 CONTROL OF MOVEMENT

Joints
General Unless shown otherwise on the drawings, provide joints as follows
- Expansion joints for concrete masonry
  - Maximum length of continuous wall 8 m
  - Maximum vertical spacing 8 m
  - Width of control joint ≥ 10 mm ≤ 20 mm
  - Width of horizontal joint ≥15 mm ≤ 20 mm

Filler material Provide compatible sealant and bond breaking backing materials which are non-staining to masonry Do not use bituminous materials with absorbent masonry units
- Bond breaking materials To be non-adhesive to sealant, or faced with a non-adhering material
- Foamed materials To be closed-cell or impregnated, not water-absorbing

Joint filling
- Installation Clean the joints thoroughly and insert an easily compressible backing material before sealing
- Sealant depth Fill the joints with a gun-applied flexible sealant for a depth of at least two-thirds the joint width

14.3 9 REINFORCED AND GROUTED BLOCKWORK

Cleaning core holes
General Provide purpose-made cleanout blocks or machine cut a cleaning hole at the base of each grouted core
Location Locate on the side of the wall which is to be rendered or otherwise concealed
Cleaning Rod cores to dislodge mortar fins protruding from the blocks and mortar droppings from reinforcement Remove through the clean-out blocks

Grouting
Commencement Do not commence until grout spaces have been cleaned out and the mortar joints have attained sufficient strength to resist blow-outs
Height of lift Limit the height of individual lifts in any pour to ensure that the grout can be thoroughly compacted to fill all voids and ensure bond between grout and masonry
Compaction Compact by vibration or by rodding
Topping up On the completion of the last lift, top up the grout after 10 min to 30 min, and vibrate or rod to mix with the previous pour

14 3 10LINTELS

Location
General Provide 1 lintel to each wall leaf in conformance with the **Lintel schedule**

Installation
General Do not cut on site Keep lintels 10 mm clear of heads of frames

Steel lintels Pack mortar between the vertical component and supported masonry units For angles install the long leg vertical

Minimum bearing each end
- Span ≤ 1000 mm 100 mm
- Span > 1000 mm 150 mm
- Span > 3000 mm 200 mm

Propping To prevent deflection or excessive rotation, temporarily prop lintels until the masonry reaches its required strength

- Minimum propping period 7 days

Maximum span (mm)	Lintel dimensions (mm)
950	50 x 10
1050	75 x 10
1500	90 x 90 x 8
1800	100 x 100 x 8
2400	150 x 90 x 10
3000	150 x 90 x 12

Protection

Steel lintels Steel lintels shall be hot dip galvanized (after fabrication)

14.4 SELECTIONS

14 4.1 BRICK AND BLOCK CONSTRUCTION SCHEDULE

Face Brickwork Type 1 (WBF)	
Type	Smooth faced extruded
Colour	To match existing
Location	External walls as shown on the drawings
Manufacturing dimensions (mm)	230 x 110 x 76
Category	General Purpose
Coefficient of expansion (mm/m)	< 1 0
Joints	Nom 10mm
Joints	Nom 10mm high with raked profile
Mortar Colour	To match existing
Face Blockwork Type 1 (WBW)	
Proprietary item	Boral Masonry 'Designer Block
Type	Shot-blast Face Series 100 200 and cappings
Colour	Almond
Location	External walls as shown on the drawings
Manufacturing dimensions (mm)	390 x 190 x 190/90
Category	General Purpose
Coefficient of expansion (mm/m)	< 1 0
Joints	Nom 10mm high with raked profile
Mortar Colour	White
Face Blockwork Type 1 (WBF1)	
Proprietary item	Boral Masonry One 'Grey Block
Type	Smooth faced Series 200
Colour	Natural Grey
Location	Retaining walls where not visible and rendered walls as shown on the drawings
Manufacturing dimensions (mm)	390 x 190 x 190
Category	General Purpose
Coefficient of expansion (mm/m)	< 1 0
Joints	Nom 10mm high with raked profile
Mortar Colour	Grey

15 0 STRUCTURAL STEEL

15 1 GENERAL

15 1 1 AIMS

Responsibilities

General Provide structural steelwork that is integrated into the building construction

15 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Notes on Structural Drawings Should there be a discrepancy between the following specifications and the structural engineering drawings, the structural engineering drawings shall take precedence

15 1 3 STANDARDS

General

Materials, construction, fabrication and erection To AS 4100

Cold-formed steel AS/NZS 4600

15 1 4 ADJOINING ELEMENTS

General

Fixing Provide for the fixing of adjoining building elements that are to be connected to or supported on the structural steel The fixing requirements for adjoining elements may not necessarily be shown on the structural drawings This clause makes it the contractor's responsibility to coordinate the requirements

15 1.5 INSPECTION

Notice – off site

Inspection Give sufficient notice so that inspection may be made of the following

- *Surface preparation before shop painting*
- Completion of protective coating before delivery to site

Notice – on site

Inspection Give sufficient notice so that inspection may be made of the following

- Steelwork on site before erection
- Anchor bolts in position before casting in
- Steelwork and column bases erected on site before grouting, encasing, site painting or cladding
- Tensioning of bolts in categories 8 8/TB and 8 8/TF
- Reinforcement and formwork in place prior to any encasement
- After any grouting, encasement fire protection or site painting is completed
- Surfaces after preparation prior to application of first coating
- Coating stages
- After application of primer or seal coats
- After application of each subsequent coat

15 1 6 TESTS

Non destructive weld examination

Standard To AS/NZS 1554 1

Methods Inspect welds in conformance with the **Non-destructive weld examination (NDE) table**

Radiographic and ultrasonic inspection Have the examination performed by an independent testing authority

Repairs Repair welds revealed as faulty by non-destructive examination and repeat the examination

Non-destructive weld examination (NDE) table

Type of weld and category	Examination method	Extent (% of total length of weld type)
Fillet welds	Visual means	100
Butt welds GP	Visual means	100
Butt welds SP	Visual means	100
Fillet and butt welds, SP	Radiographic or ultrasonic inspection	10

15 1 7 SUBMISSIONS

Subcontractors

Submit names and contact details of proposed fabricator and installer

Shop drawings

General Submit 3 hard copies 1 transparency or 1 email set of shop drawings showing the following information

- Relevant details of each assembly, component and connection
- Information relative to fabrication, surface treatment, transport and erection

Particular Include the following information

- Identification
- Steel type and grade
- Dimensions of items
- Required camber, where applicable
- Fabrication methods including where applicable, hot or cold forming and post weld heat treatment
- Location, type and size of welds and/or bolts and bolt holes
- Weld categories and bolting categories
- Orientation of members
- Surface preparation methods and coating system if shop applied
- Best practice details in relation to application of protective coatings
- Breather holes for hollow sections (with seal plates) being hot-dip galvanized
- Procedures necessary for shop and site assembly, and erection
- Location of and preparation for site welds
- Temporary works such as lifting lugs, support points, temporary cleats and bracing which are required for transport and erection of the structural steelwork
- Required fixings for adjoining building elements

Requirements Do not commence fabrication until final approved shop drawings are received Allow 7 working days for review of shop drawings after submission

Materials and components

Concrete or masonry anchors If masonry anchors other than as shown on the drawings are required or proposed for the support or fixing of structural steel, submit evidence of the anchor capacity to carry the load

Execution

Anchor bolts If anchor bolts do not meet specified tolerances in relation to their location submit proposals that will allow steel erection to proceed

Splicing If splicing of structural members is intended, submit proposals

Welding procedures Submit details of proposed welding procedures, using the WPS form in Appendix C of AS/NZS 1554 1

Identification marks If members and/or connections are to be exposed to view submit details of proposed marking

Distortions If a member is distorted during the galvanizing process, submit proposals for straightening

15 2 PRODUCTS

15.2 1 STEEL TYPE AND GRADE

Material

Conformance Steel members and sections shall conform to the **Steel grade table** and or the **Steel grade schedule**

Steel grade (minimum) table

Type of steel	Grade
Universal beams and columns parallel flange channels large angles to AS/NZS 3679 1	300
Flat small angles taper flange beams and columns to AS/NZS 3679 1	250
Welded sections to AS/NZS 3679 2	300
Hot rolled plates floor plates and slabs to AS/NZS 3678	250
Hollow sections to AS 1163	
-Circular sections less than 165 mm nominal outside diameter	C250/C350
-Sections other than the above	C350/C450
Cold formed purlins and girts to AS 1397	G450 Z350

15 2 2 BOLTS

Bolts, nuts and washers

General Hot-dipped galvanized, corrosion-free coated in oil and in serviceable condition

15 3 EXECUTION

15 3 1 FABRICATION

General

Care Shop detail and fabricate members so that they can be properly erected

Substitution If substitution of members is proposed, provide details

Minimum requirements For connection bolts not shown on the drawings or specified, provide 10 mm plates and 2 M20 bolts in 8 8/S category

Beam camber

General If beam members have a natural camber within the straightness tolerance, fabricate and erect them with the camber up

Straightening

Care If straightening or flattening members do not damage

Work exposed to view

Welds Grind smooth but do not reduce the weld below its nominal size

Shearing, flame cutting and chipping Perform carefully and accurately

Corners and edges Grind fair those corners and edges which are sharp, marred, or roughened

Site work

General Other than work shown on the shop drawings as site work do not fabricate, modify or weld structural steel on site

Identification marks

General Provide marks or other means of identifying each member compatible with the finish, for the setting out, location, erection and connection of the steelwork

High strength bolting If the work includes more than one bolting category, mark high-strength structural bolted connections with a 75 mm wide flash of colour clear of holes

Cold formed members Clearly mark material thickness

Tolerances

Measurement Tolerances are to be checked by measurement after fabrication when corrosion protection has been applied

Conformance To AS 4100 clause 14 4

15 3 2 BOLTING

Connections
General Bolting is to be in conformance with the **Bolting category schedule**

Contact surfaces Clean, as-rolled and free from applied finishes

Bolting category schedule
Refer to STRUCTURAL NOTES – STRUCTURAL STEEL on structural drawings

Foundation bolts
General Provide each foundation bolt with 2 nuts and 2 oversize washers and provide sufficient thread to permit the levelling nut and washer to be set below the base plate

Hexagonal bolts To AS/NZS 1111 1

Hexagonal nuts Class 5

Plain washers To AS 1237 1

Lock nuts
General Provide lock nuts for bolts in moving parts or parts subject to vibration and for vertical bolts in tension

Tensioning of bolting categories 8 8/TB and 8 8/TF
Method Use part-turn-of-nut or load indicating washers

Permanent bolting
Completion Bolt only when correct alignment and preset or camber have been achieved

15 3 3 WELDING

General
Standard To AS/NZS 1554 1

Weld category
Weld categories not shown on the drawings Category GP

Weld type
Weld type not shown on the drawings 6 mm continuous fillet weld made using E48XX electrodes or equivalent

Site welds
Completion Weld only when correct alignment and preset or camber have been achieved

Overhead welding If overhead welding is required, submit proposals

15 3.4 ERECTION

General
Execution Ensure that every part of the structure has sufficient design capacity and is stable under construction loads produced by the construction procedure or as a result of construction loads which are applied

Calculations If required to justify the adequacy of the structure to sustain any loads and/or procedures which may be imposed, provide calculations

Temporary work
General Supply all necessary temporary bracing or propping

Temporary connections If cleats not shown on shop drawings are required submit details

Temporary members If temporary members are required, fix so as not to weaken or deface permanent steelwork

Hand flame cutting
General If hand flame cutting of bolt holes appears to be necessary, submit a report and proposed alternative options

Movements
General Allow for thermal movements during erection

Foundation bolts
General For each group of foundation bolts provide a template with setting out lines clearly marked for positioning the bolts when casting in

Grouting at supports

Preparation Before grouting steelwork to be supported by concrete, masonry and the like, set steelwork on packing or wedges

- Permanent packing or wedges Form with solid steel or grout of similar strength to the permanent grout
- Temporary packing or wedges Remove before completion of grouting

Timing Grout at supports before the construction of any supported floors, walls, roofing, wall cladding or precast

Temperature Do not grout if the temperature of the base plate or the footing surface exceeds 35°C

Type Non shrink proprietary grout

Minimum compressive strength (MPa) 30Mpa

Minimum thickness (mm) 20

Maximum thickness (mm) 30

Handling

Care Handle members or components without overstressing or deforming them

Drifting

Limitation Use drifting only to bring members into position, without enlarging holes or distorting components

15 3 5 PROTECTION OF STEELWORK

General Protection

General Structural steelwork not indicated to have a hot dipped galvanised finish shall be given a protective coating

Standards To AS 1627 and AS/NZS 2312 Section 1

Steel surfaces Remove loose millscale loose rust, oil grease, dirt globules of weld metal, weld slag and other foreign matter Ensure surfaces are dry

Coating Coat prepared steelwork as follows

- Primer Zinc silicate primer
- Thickness 80 ∝m
- Requirement Verify and record thickness
- Time delay Prime the steel surface as soon as possible after surface preparation and before the surface deteriorates If the surface is contaminated or rust bloomed, repeat surface preparation before priming
- Conditions Do not prime in adverse conditions
- Concrete encasing Where members are part concrete encased extend the priming 25 mm into the surface to be encased
- Clearances Keep priming clear of members and components to be site welded and surfaces against which concrete is to be poured (including concrete encasing except as noted above)
- On completion of site welding, of concrete pouring and of 8 8/TF bolting, prime to give complete coverage of exposed surfaces
- Inaccessible surfaces Where surfaces will be in contact or near contact after fabrication or erection apply the finish and allow it to dry before assembly

Marking On the contact surfaces of friction type joints, confine the use of marking ink to the minimum necessary for marking hole positions

Shop work Apply the primer coat or protective system to the structural steel before delivery to the site

Transport and handling Do not damage the paintwork

Site work After erection, repair damage to the shop coating and apply coating omitted at site connections

15 4 HOT DIP GALVANIZED COATINGS

15 4 1 GENERAL

Standards

Coating Comply with the requirements of AS/NZS 4680

Metal finishing

Methods To AS 1627

Coating mass/thickness minima To AS/NZS 4680

Problematic features

General If design and fabrication features of the articles to be galvanized may lead to difficulties during galvanizing, identify these and submit details for improvement

Care

Dimensional change If design and fabrication features of articles to be galvanized are likely to lead to dimensional change, identify these and submit proposals for its minimisation

Embrittlement If steel is susceptible to embrittlement, take due care in processing in order to avoid this

Mechanical properties Avoid mechanical damage Ensure that mechanical properties of the base metal do not change

Surface preparation

Surface contaminants and coatings generally Chemical clean, then acid pickle

Chemical cleaning To AS 1627 1

Acid pickling To AS 1627 5

- Acid Hydrochloric
- Inhibitor Required

Abrasive blast cleaning To AS 1627 4

- Grade Sa 2 to AS 1627 9

Components in contact with concrete

General Chromate passivate

Chromate passivation process Dip in 0 15 – 0 2% sodium dichromate solution

Drilling

Repair Prime drill hole surfaces to APAS-0014/1 or APAS-2916 before the surface begins to corrode

Coating

Threaded fasteners To AS 1214

Structural sections

Cold worked items Except for hollow sections, anneal to 650°C before galvanizing

Hollow sections Provide seal plates with breather holes

Surface finish

Coating quality Coatings shall be continuous, adherent smooth or evenly textured and uniform, free from defects detrimental to the end use of the finished article such as lumps, blisters, gritty areas uncoated spots acids and black spots, dross and flux

Friction-type bolted connections Treat contact surfaces to achieve the required slip factor

Lip factor test To AS 4100 Appendix J

Surplus zinc on fastener threads Remove

Coating reinstatement

Extent Repair areas of uncoated surface, and areas damaged by handling at the galvanizing plant so that total uncoated or damaged areas do not exceed 0 5% of total surface area or 25,000 mm2whichever is the lesser

- Size of area to be repaired Any > 4000 mm2

Method Wire brush or mechanically buff the surface and apply organic zinc-rich primer in two coats each of 75 □m dry film thickness in accordance with the manufacturers' requirements Stipple edges of the primed area

- Primer To APAS-0014/1 or APAS-2916
- Surface preparation To AS 1627 2 and Grade St 3 to AS 1627 9

Preparation for architectural finishes
Coarse preparation Remove spikes, and ensure edges are free from lumps and runs

Light sweep blasting prior to painting
- Maximum zinc removal 0 01 mm
- Abrasive grade (range) 0 15 – 0 18 mm clean ilmenite or garnet
- Angle of blasting to surface 45°
- Blast pressure (maximum) 280 kPa
- Distance of nozzle from surface (range) 300 – 400 mm
- Nozzle type Venturi, diameter 10 – 13 mm

Storage of galvanized articles
General Store in dry, well ventilated conditions

15.4.2 DELIVERY

General
Transport Transport in dry, well ventilated conditions

Site welding
Grinding of edges Permitted
Weld areas Reinstate coating

15 4 3 SITE WORK

Site coating reinstatement
Extent Areas damaged by transport, site welding, site flame cutting site handling or erection
- Size of areas to be repaired Repair all affected areas greater than 4000 mm2, and other affected areas so that the total uncoated or damaged areas do not exceed 0 5% of the total surface area or 250,000 mm2, whichever is the lesser

Method Wire brush or mechanically buff the surface and apply organic zinc-rich primer in two coats each of 75 ∝m dry film thickness Stipple edges of the primed area
- Paint standard To APAS-0014/1 or APAS-2916
- Surface preparation To AS 1627 2 and Grade St 3 to AS 1627 9

15 5 COMPLETION

15 5 1 REPAIRS

General
Repair finishes to ensure the full integrity of each phase and each coating

15 5 2 COMPLETION

Tolerances
Compliance After erection is complete confirm compliance with AS 4100 clause 15 3

Temporary connections
Remove temporary cleats on completion and restore the surface

16 0 LIGHT TIMBER FRAMING

16 1 GENERAL

16 1 1 AIMS

Responsibilities

General Provide light wall and ceiling framing as follows

- In conformance with the performance criteria nominated
- Integrated into the building
- Suitable for the fixing to it of linings and cladding
- Independently designed and documented
- Independently certified by a professional engineer for the design and the erected framing

16 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Timber finishes and treatment

16 1 3 STANDARDS

General

Framing To AS 1684 Parts 2, 3 or 4, as appropriate

Design To AS 1720 1

16 1 4 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Timber work after erection but before it is covered

16 1 5 SUBMISSIONS

Design

General Where the structural drawings define performance criteria, submit independent design documentation and certification from a professional engineer including for the erected work

Floor and wall frame member sizes Submit a schedule of proposed member sizes, certified as meeting stated project and AS 1720 1 requirements for span, spacings and loadings

Shop drawings

Wall frames If wall framing is to be pre-fabricated, prepare drawings to show

- On plan, the wall layout
- On elevations the arrangement of members and the size and section type of each member
- The method of assembly connection, lifting, holding down and bracing

Materials

Identification

- Certification Submit a supplier's certificate (which may be included on an invoice or delivery docket) verifying that the timber complies with the specification

16 1 6 TOLERANCES

General

Walls Conform to the **Walls tolerances table**

Walls tolerances table

Property	Tolerance criteria Permitted deviation (mm)
Generally Verticality in 2000 mm	4
Generally Flatness[1] in 2000 mm	3
Features[2] Verticality in 2000 mm	2
Features Horizontality in 2000 mm	2

1 Flatness Measured under a straightedge laid in any direction on a plane surface

2 Features Conspicuous horizontal or vertical lines including external corners parapets reveals heads sills

16 2 PRODUCTS

16 2 1 TIMBER

Structural timber
Natural durability ratings to AS 5604 Table A1 (minimum) Durability class 2, or preservative treated timber of equivalent durability

Timber grades
Structural timbers
- Appearance grade if exposed to view in the finished work
- Stud grade or lintel grade, as appropriate

Structural timber grading standards
Hardwood To AS 2082

Softwood To AS 2858

Mechanical stress grading To AS/NZS 1748

Machine proof-grading To AS 3519

Identification
Method Identify timber using branding certification or both

Branding Brand structural timber under the authority of a recognised product certification program applicable to the product Locate the brand mark on faces or edges which will be concealed in the works Include the following data for timbers, not covered by branding provisions of Australian standards or regulations for which branding is required
- Stress grade
- Method of grading
- "Seasoned" or "s"
- The certification mark of the product certification program
- The applicable standard

Recognised product certification programs
- Pine framing Plantation Timber Certification
- Finger jointed structural timber Plantation Timber Certification

Certification
- Timber to be certified all timber incorporated into structure

Inspection If neither branding nor certification is adopted, have an independent inspecting authority inspect the timber

16 2 2 SHEET PRODUCTS

Structural plywood
Standard To AS/NZS 2269

Bond Type A

Flooring Tongued and grooved

Veneer quality to visible surfaces C (minimum)
Identification
- Method Identify plywood using branding certification or both
- Branding Brand structural plywood, under the authority of a recognised product certification program applicable to the product Locate the brand mark on faces or edges which will be concealed in the works Include the following data
  - Stress grade
  - Method of grading
  - The certification mark of the product certification program
  - The applicable standard
- Recognised product certification programs
  - Plywood Plywood Association of Australia (PAA) Quality Control and Product Certification Scheme
  - Blockboard Plywood Association of Australia (PAA) Quality Control and Product Certification Scheme
- Certification
  - Plywood to be certified all plywood incorporated into structure

- Inspection If neither branding nor certification is adopted have an independent inspecting authority inspect the plywood

Wet-processed fibreboard (including hardboard)
Standard To AS/NZS 1859 4

Hardboard bracing
Classification Tempered hardboard

16 2 3 COMPONENTS

Fasteners
Material galvanized steel

Installation Do not split or otherwise damage the timber

Coating Before placing bolts in contact with CCA treated timber, coat the shank of the bolt in a grease or bituminous coating

Damp-proof course
Material To AS/NZS 2904
- Type 0 55mm thick bitumen coated aluminium

Flashings
Material To AS/NZS 2904
- Type 06mm thick soft aluminium

16 2 4 FINGER JOINTED STRUCTURAL TIMBER

General
Standard To AS/NZS 1491

Location as an alternative to solid timber lintels (subject to specific approval)

Finish quality fine sawn

16 3 EXECUTION

16 3 1 GENERAL

Protection from weather
General Provide temporary protection for members until permanent covering is in place

16 3 2 FLOOR FRAMING

Bearers and joists
Levelling Level bearers and joists by checking or by packing for the full width of the member with dense corrosion resistant material which is secured in place
Maximum thickness of packing 3 mm

Spring Lay bearers and joists to allow for straightening under loading
Joints Locate joints only over supports
Minimum bearing of bearers 50 mm

Minimum bearing of joists 30 mm

Fixing Secure bearers and joists to supports to provide restraint against lateral movement
Joist restraint
Unseasoned timber If joist timber is unseasoned, the span ≥ 3000 mm, and there is no ceiling lining, provide solid blocking between each joist in rows at 1800 mm centres

Deep joists If the joist depth width ratio is ≥ 4, restrain joists at the ends of the joists over supports and at ≤ 1800 mm centres using either of following as appropriate

Continuous trimming joists

Solid blocking or herringbone strutting

Trimmers or blocking dimensions

Depth Joist depth less 25 mm

Width ≥ 25 mm

Herringbone strutting dimensions ≥ 38 x 38 mm

Tolerance
Floors Construct floors to a tolerance of 5 mm maximum deviation in 3 mm measured under a straight edge placed anywhere on the surface in any direction

16 3 3 WALL FRAMING

Wall framing

External Walls Nom 90 x 45 F7 studs at maximum 600mm centres,

Internal walls Nom 90 x 45 F5, studs at maximum 600 mm centres

Bracing material Galvanised strap or angle as required

Additional support

General Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding hardware, accessories, fixtures and fittings as required

Maximum spacing of noggings 1350 mm centres

Vermin barriers

General Provide vermin barriers as follows

Brick veneer barrier Close nail 10 mm steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork

Damp-proof course

General Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as follows

- External walls (not brick veneer) Turn up at least 75 mm on the inside and tack Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°
- Walls of bathrooms shower rooms and laundries Turn up at least 150 mm on the "wet" side and tack to studs

Installation Lay in long lengths Lap full width at angles and intersections and at least 150 mm at joints

Junctions Preserve continuity of damp-proofing at junctions of damp-proof courses, sarkings and waterproof membranes

Flashings

Location Provide flashings to external openings sufficient to prevent the entry of moisture Form trays at the ends of sill flashings

Brick veneer construction Extend across cavities and build into brickwork

16 3.4 ROOF AND CEILING FRAMING

Wall plates

Fixing Fix timber wall plates to masonry, with either straps or bolts

Nailing plates

General Where timber joists rafters or purlins bear on or into steel members provide 50 mm thick nailing plates bolted to the steel member at 500 mm maximum centres

Additional support

General Provide a frame member behind every joint in fibre cement sheeting or lining

16 3 5 COMPLETION

Tightening

Tighten bolts, screws and other fixings so that joints and anchorages are secure at practical completion

17 0 ROOFING

17 1 GENERAL

17 1 1 AIMS

Responsibilities

Provide a roofing system and associated work which

- Remains intact and waterproof under the local or regional ambient climatic conditions
- Protects people, property and the environment from the adverse effects of stormwater
- Provides adequate means of dealing with vapour pressure, condensation corrosion and thermal movement
- Supports the specified imposed loads and types of roof access without impairment of performance
- Prevents birds and vermin from entering roof spaces and ceiling voids

Satisfies other specified performance requirements

17 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Light timber framing
- Insulation & Barriers
- Hydraulics drawings & Specification for further details on roof drainage

17 1 3 PERFORMANCE CRITERIA

Ambient climatic conditions

Wind loading to AS 1170 2

- Derive wind pressures from the following information from AS 1170 2-1989
- Region A2
- Terrain Category 2 0
- Wind speeds
  - * Design wind speed (Vs) 37 m/s
  - * Design wind speed (Vu) 46 m/s

Design rainfall intensity

Design to AS/NZS 3500 3 2

Intensity 227mm/hr

ARI 20 years

Duration 5 minutes

Roof access

Type Normal roof maintenance

17 1 4 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of

- Those parts of the roofing, sarking, vapour barrier, insulation and roof plumbing installation which will be covered up or concealed

17 2 PRODUCTS

17 2 1 COMPONENTS

Fasteners

Self-drilling screws Corrosion resistance Class 3

Finish Pre-finish exposed fasteners with an oven baked polymer coating to match the roofing material, or provide matching purpose-made plastic caps

Fastenings to timber battens Provide fastenings just long enough to penetrate the thickness of the batten without piercing the underside

Profiled fillers
Purpose-made closed cell polyethylene foam profiled to match the roofing profile

Locate profiled fillers under flashings to
- Ridges
- Eaves
- Lapped joints in roof sheeting

Safety mesh
Standard To AS/NZS 4389

17 2 2 SHEET METAL ROOFING

General
Type Provide a proprietary system of preformed sheet and purpose-made accessories installed all in accordance with the manufacturer's published technical instructions

Standards
Design and installation To AS 1562 1
Pre-painted and organic film/metal laminate products To AS/NZS 2728

Materials compatibility

Do not use incompatible materials Lead, copper, galvanised and bare steel are not compatible with factory pre-painted aluminium/zinc coated roofing material Ensure the incompatible materials do not contact the roofing material and that there is no discharge of rainwater from the incompatible material onto the roofing material Comply with the manufacturer's recommendations

Metal Roofing (RMS)

Proprietary Item	Equal to Stramit Building Products Corrugated
Profile	Sinusoidal corrugations 16mm high
Thickness	0 48mm BMT (base metal thickness)
Grade	Colorbond XRW coated steel
Colour	To match existing
Fixing	Patented full length fixing clips screw fixed to purlins all in accordance with the manufacturers recommendations

17 2 3 ROOF ACCESS SAFETY SYSTEM

Generally
Provide an integral system of safe access by ladder and safe movement on roofs for future roof maintenance to all new roofs Provide anchorage points for roof access ladders and anchorage points on roof for attaching safety line system All work in accordance with
- Code of Practice - Safe Work on Roofs - Part 1 Commercial and Industrial Buildings
- Code of Practice - Safety Line Systems

Anchorage points The anchorage points must be sufficient distance from the end to prevent a "pendulum effect" (Re Code of Practice - Safe Work on Roofs - Part 1 Commercial and Industrial Buildings)

Ladder fixing points Provide a minimum of 1 ladder fixing point for each roof at a location that is safely accessible by ladder Install additional fixing points as required by WorkCover

Shop drawings
Submit shop drawings noting the following
- Evidence of compliance with the relevant WorkCover authority
- Roof plan and layout of all elements of the system

Components
Anchorage points Attach non-corrosive steel eye bolts securely to roof or upper wall structure

Requirements
- The eye bolt attachment must have locking nuts system to prevent loosening
- The eye bolts must not be in direct contact with the roof sheeting
- Fixing to be capable of supporting an imposed load of 22KN

Standards Eye bolts to AS 2317

Flashing Where the anchorage points penetrate the roof, provide a proprietary flexible roof flashing especially designed to fit narrow diameter penetrations

Compatibility All metal fittings must be non-corrosive and compatible

Certification
The complete system including the anchoring and/ or static line to be designed and certified by a structural engineer

Hand one copy of the certification to the Superintendent
- Provide a professional drawn plan 1 100 plan layout of the ladder fixing points and anchorage points

17 3 EXECUTION

17 3 1 INSTALLATION

Protection
General Keep the roofing and rainwater system free of debris and loose material during construction, and leave them clean and unobstructed on completion Repair damage to the roofing and rainwater system

Touch up If it is necessary to touch up minor damage to pre-painted metal roofing, do not overspray onto undamaged surfaces

Thermal movement
Provide for thermal movement in the roof installation and the structure, including movement in joints and fastenings

Tolerances
Conform to the **Tolerances table**

Tolerances table

Property	Tolerance criteria Permitted deviation (mm)
Spacing of supporting members	± 5 mm on the nominated support member spacing
Vertical or horizontal misalignment at the abutting ends of sheets	≤ 2 mm
Tops of supporting members in a plane parallel to the nominated roof slope	≤ 7 mm smooth deviation per metre length of supporting member

17 3 2 SAFETY MESH

Standard
General To AS/NZS 4389

Application
It is the Contractor's responsibility to determine the necessity for the use of safety mesh or appropriate fall arrest systems during installation in accordance with relevant WorkCover Occupational Health and Safety Requirements

Exclusions
Safety mesh shall not be visible in the following areas - Verandah, and eaves overhangs

17 3 3 SHEET METAL ROOFING

Roof sheet installation
Fixings as recommended by the manufacturer to fix to the roofing support structure and meet the Performance Criteria
Accessories Provide material with the same finish as roofing sheets

Ridges and eaves
Treat ends of sheets as follows
- Project sheets 50 mm into gutters
- Close off ribs at bottom of sheets with purpose-made fillers or end caps
- Close off ribs at top of sheets with purpose-made fillers or end caps

Ridge and barge capping
Finish off along ridge and verge lines with purpose-made cappings to the profiles shown on the drawings

Metal separation
Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either
- Applying an anti-corrosion low moisture transmission coating to contact surfaces
- Inserting a separation layer

17 3 4 ROOF PLUMBING

General

Standard To AS/NZS 3500 3

General Provide the flashings, cappings gutters, outlets and downpipes necessary to complete the roof system

Materials

Metal rainwater goods To AS/NZS 2179 1

PVC rainwater goods and accessories To AS/NZS 2179 2 (Int)

Jointing sheet metal rainwater goods

Butt joints Make joints over a backing strip of the same material

Soldered joints Do not solder aluminium or aluminium/zinc-coated steel

Sealing Seal fasteners and mechanically fastened joints Fill the holes of blind rivets with silicone sealant

Jointing system To manufacturer's instructions generally using aluminium blind rivets sealed with neutral silicon

Flashings and cappings

Flashing material To AS/NZS 2904

Installation Flash roof junctions, upstands, abutments and projections through the roof Preform to required shapes where possible Notch scribe flute or dress down as necessary to follow the profile of adjacent surfaces Mitre angles and lap joints 150 mm in running lengths Provide matching expansion joints at 6 m maximum intervals

Upstands Flash projections above or through the roof with two part flashings, consisting of a base flashing and a cover flashing, with at least 100 mm vertical overlap Provide for independent movement between the roof and the projection

Wall abutments Provide overflashings where roofs abut walls and adjacent structures, stepped to the roof slope in masonry and planked cladding otherwise raking

Fixing to pipes Solder or seal with neutral cured silicone rubber and either of the following

- Secure with a clamping ring
- Provide a proprietary flexible clamping shoe with attached metal surround flashing

Flashings and cappings schedule

Component	Material and finish	Thickness and grade	Profile	Jointing method
Flashings & Cappings generally	Pre-finished zinc / aluminium coated steel	0 6mm AS 1387-G300-AZ150	Barge roll and/or as indicated on the drawings profiled to match roofing	Seal & fasten
Pipework penetrations	Proprietary system equal to Dektite			

Gutters

General Prefabricate gutters to the required shape Form stop ends downpipe nozzles, bends and returns Dress downpipe nozzles into outlets Provide overflows to prevent back-flooding

Gratings and guards Provide removable gratings over rainwater heads and sumps and leaf guards to gutters and gutter units

Type heavy galvanised steel hemispherical wire mesh dome

Expansion joints Provide expansion joints in guttering longer than 30 m

Downpipes

General Prefabricate downpipes to the required section and shape where possible Connect heads to gutter outlets and if applicable connect feet to rainwater drains

Gutter schedule

Type	**Eaves Gutter Type 1**
Material	Pre-coated zinc / aluminium coated steel
Location	New Classroom building
Shape	Half-round
Size	200mm diameter
Grade	0 6mm thick
Jointing method	Mechanical fasteners with silicone sealant
Finish	Pre-finished as selected from Colorbond range to match the roof
Fixings	External half round gutter support brackets finished to match gutters

Type	**Eaves Gutter Type 2**
Material	Pre coated zinc / aluminium coated steel
Location	Awnings to Lifts
Shape	Half-round
Size	150mm diameter to match existing buildings
Grade	0 6mm thick
Jointing method	Mechanical fasteners with silicone sealant
Finish	Pre finished as selected from Colorbond range to match the roof
Fixings	External half round gutter support brackets finished to match gutters

Downpipe schedule

Type	**Downpipe Type 1**	**Downpipe Type 2**
Location	Downpipes to Gutter Type 1	Downpipes to Gutter Type 2
Material	Zinc/aluminium coated steel	Zinc/aluminium coated steel
Size	150mm nominal OD x 0 6mm	100mm nominal OD x 0 6mm
Grade	G550	G550
Jointing method	Mechanical fasteners with silicone sealant	Mechanical fasteners with silicone sealant
Finish	Colorbond to match gutter	Colorbond to match gutter
Fixings	Provide matching brackets as shown on drawings	Provide matching brackets as shown on drawings

17 4 COMPLETION

17 4 1 COMPLETION

Warranties

Submit the roofing materials manufacturer's published product warranties

Maintenance manual

On completion submit a manual of recommendations from the roof manufacturer or supplier for the maintenance of the roofing system including, frequency of inspection and recommended methods of access inspection cleaning, repair and replacement

18 0 CLADDING

18 1 GENERAL

18 1 1 AIMS

Responsibilities

Responsibilities

Provide a cladding system and associated work which

- Remains intact and waterproof under the local or regional ambient climatic conditions
- Provides adequate means of dealing with vapour pressure, condensation, corrosion and thermal movement
- Prevents birds and vermin from entering roof spaces, wall cavities and ceiling voids
- Satisfies other specified performance requirements

18 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Structural steel
- Light timber framing
- Insulation and vapour barriers

18 1 3 PERFORMANCE CRITERIA

Location exposure severity

Exposure severity category Benign

Ambient climatic conditions

Wind loading to AS 1170 2

- Derive wind pressures from the following information from AS 1170 2-1989
- Region A2
- Terrain Category 2 0
- Wind speeds
  - * Design wind speed (Vs) 37 m/s
  - * Design wind speed (Vu) 46 m/s

18 1 4 INSPECTION

Notice

Inspection Give sufficient notice so that the framing sarking vapour barrier and insulation may be inspected before they are covered up or concealed

18 2 PRODUCTS

18 2 1 TIMBER WEATHERBOARDS

Timber

Hardwood To AS 2796 1

- Grade to AS 2796 2 MF

Seasoned cypress pine To AS 1810

- Grade 1

Boards

Timber species Cyprus Pine

Profile Rusticated to match existing buildings

Thickness (mm) Nom 19mm

Width (mm) To match existing buildings

Finish Specification reference – Painting section

18 2 2 FIBRE CEMENT CLADDING

Fibre cement

Standard To AS/NZS 2908 2

Cladding eaves and soffit linings Type A Category 3 (modulus of rupture ≥ 7 MPa)

Compressed cladding Type A Category 5 (modulus of rupture ≤ 18 MPa)

Fibre Cement Cladding (WFC)

Type	Fibrous cement sheet cladding fixed to timber wall framing
Proprietary Item	Equal to CSR Cemintel Cladding Sheet
Panel Type	6mm fibrous cement sheets factory sealed on faces and edges
Fixing	Countersunk screws to AS 3566 Class 3
Joint Treatment	Expressed face fixed nom 70 x 19 timber battens Pre-prime before fixing
Finish	Site applied paint finish in accordance with the paint system specified under Painting

18 2 3 COMPONENTS

Flashings
Standard To AS/NZS 2904

18 3 EXECUTION

18 3 1 TOLERANCES

Tolerances
Conform to the following to the **Tolerances table**

Tolerances table

Property	Tolerance criteria Permitted deviation (mm)
Spacing of supporting members	± 5 mm on the nominated support member spacing
Vertical or horizontal misalignment at the abutting ends of cladding	≤ 2 mm

18 3 2 CONSTRUCTION GENERALLY

Substrates or framing
Before fixing cladding check and if necessary, adjust the alignment of substrates or framing

Fixing
Nail to timber framing screw to steel framing

Accessories and trim
Provide accessories and trim necessary to complete the installation

Fixing eaves and soffit lining
Nailing 150 mm centres to bearers at maximum 450 mm centres

18 3 3 TIMBER WEATHERBOARD CLADDING

Preparation
Cut surfaces Treat freshly cut surfaces with water repellent before fixing

Installation
Single lengths Whenever possible provide single lengths of boards when installed horizontally
Fixing at crossings
- Seasoned milled weatherboards 2 fixings

Nails
- Hot dip galvanized to non-corrosive timbers

Nailheads Treat visible nailheads as follows
- In opaque finishes Punch below the surface and fill flush with putty after the surface has been primed

Joints
End grain joints Install boards so that butt joints are in compression
Internal, external corners, around window and door openings Butt against a nom 70 x 19mm timber batten of same species

18 3 4 FIBRE CEMENT CLADDING

Installation
Fixings As recommended by the manufacturer to fix to the cladding support structure and meet the Performance Criteria

19 0 WINDOWS

19 1 GENERAL

19 1 1 PERFORMANCE CRITERIA

Requirement

Design, supply, and install a window system as shown on the Drawings and complying with the following specified performance requirements

- remains intact and waterproof under the local or regional ambient climatic conditions,
- provides adequate means of dealing with vapour pressure condensation, corrosion and thermal movement,

Ambient climatic conditions

Wind loading to AS 1170 2

- Derive wind pressures from the following information from AS 1170 2-1989
- Region A2
- Terrain Category 2 0
- Wind speeds
  - * Design wind speed (Vs) 37 m/s
  - * Design wind speed (Vu) 46 m/s

Design rainfall intensity

Design to AS/NZS 3500 3 2

Intensity 227 mm/hr

ARI 20 years

Duration 5 minutes

Maintenance

Product design Provide windows with sashes capable of being opened to satisfy the documented maintenance requirements

19 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Window hardware
- Glazing

19 1 3 STANDARDS

General

Selection and installation To AS 2047

- Building classification Commercial BCA class 9a

19 1 4 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply

- Louvres
  - Horizontal Louvres span between frame stiles or mullions
  - Continuous horizontal Louvres run continuously past, and are supported by concealed mullions
  - Vertical Louvres span between frame heads and sills
- Window The term "window" used in this worksection also means "louvre grille" and "sliding glass door", where applicable
- U-value Total U-Value as defined by BCA and determined in accordance with NFRC 100
- SHGC Solar heat gain coefficient as defined by BCA and determined in accordance with NFRC 200

19 1 5 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Openings prepared to receive windows (where windows are to be installed in prepared openings)
- Fabricated window assemblies delivered to the site, before installation

19 1 6 SUBMISSIONS

Samples

Submit samples of window framing as follows

- Accessory and hardware items documented descriptively or by performance (i e not documented as proprietary items) including locks, latches, handles, catches sash operators, anchor brackets and attachments masonry anchors and weather seals (pile or extruded)
- Colour samples of prefinished production material (e g anodised or organic coated extrusions and sheet) showing the limits of the range of variation in the selected colour
- Joints made by proposed techniques
- Sections proposed to be used for frames, sashes louvres and slats
- Label each sample, giving the Series code reference and date of manufacture

Submit samples of glazing materials, each at least 200 x 200 mm showing documented visual properties and the range of variation if any for each of the following types of glass or glazing plastics

- Tinted or coloured glass or glazing plastics
- Surface modified or surface coated glass
- Patterned or obscured glass or glazing plastics
- Ceramic coated glass
- Wired glass
- Mirror glass

Sealant compatibility

Compatibility statements Submit statements from all parties to the installation that certify the compatibility of sealants and glazing systems to all substrates

Prototypes

Sample installations Install the designated typical window assemblies in their final position incorporating at least one example of each component in the system, including attachments to the structure, flashing, caulking, sealing glazing, operating hardware, locks and keys

Samples in prototypes Required samples may form part of prototypes

Shop drawings

Submit shop drawings showing the following information

- Full size sections of members
- Hardware, fittings and accessories including fixing details
- Junctions and trim to adjoining surfaces
- Layout (sectional plan and elevation) of the window assembly
- Lubrication requirements
- Methods of assembly
- Methods of installation, including fixing, caulking and flashing
- Provision for vertical and horizontal expansion
- Method of glazing, including the following
  - Rebate depth
  - Edge restraint
  - Clearances and tolerances
  - Glazing gaskets and sealant beads

Subcontractors

General Submit names and contact details of proposed manufacturers and installers Have windows installed by their manufacturer or by a subcontractor recommended by the manufacturer

19 2 PRODUCTS

19 2 1 GENERAL

Standards

Flashings To AS/NZS 2904

Glass To AS 1288

Aluminium extrusions To AS/NZS 1866

19 2 2 LOUVRE ASSEMBLIES

General

Description Provide louvre blades mounted in a metal surround frame or subframe and able to withstand the permissible-stress-design wind pressure for that location without failure or permanent distortion of members and without blade flutter

Adjustable louvres

Description Provide louvre blades clipped into blade holders pivoted to stiles or coupling mullions, linked together in banks, each bank operated by an operating handle incorporating a latching device, or by a locking bar

19 2 3 INSECT SCREENS GENERALLY

Aluminium framed screens

Provide aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners Provide an extended frame section where necessary to adapt to window opening gear

Mesh Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and without distortion

Fixed screens

Provide fixed screens to the window frames with a clipping device which permits removal for cleaning

Hinged screens

Hinge at the top to give access to opening sash

19 3 EXECUTION

19 3 1 INSTALLATION

General

General Install windows so that the frames

- Are plumb, level, straight and true within acceptable building tolerances
- Are fixed or anchored to the building structure in conformance with the wind loading requirements
- Will not carry any building loads, including loads caused by structural deflection or shortening
- Allow for thermal movement

Flashing and weatherings

General Install flashings weather bars, drips storm moulds caulking and pointing so that water is prevented from penetrating the building between the window frame and the building structure under the prevailing service conditions, including normal structural movement of the building

Fixing

Fastener spacing (nominal) 600 mm

Fasteners Conceal fasteners

Packing Pack behind fixing points with durable full width packing

Prepared masonry openings If fixing of timber windows to prepared anchorages needs fastening from the frame face, sink the fastener heads below the surface and fill the sinking flush with a material compatible with the surface finish

Joints
General Make accurately fitted tight joints so that neither fasteners nor fixing devices such as pins, screws, adhesives and pressure indentations are visible on exposed surfaces

Sealants If priming is recommended, prime surfaces in contact with jointing materials

Installers
General Have windows installed by their manufacturer or by a subcontractor recommended by the manufacturer

Operation
General Ensure moving parts operate freely and smoothly, without binding or sticking at correct tensions or operating forces and are lubricated

Protection
Removal Remove temporary protection measures from the following
- Contact mating surfaces before joining up
- Exposed surfaces

Trim
General Provide mouldings, architraves, reveal linings and other internal trim using materials and finishes matching the window frames Install to make neat and clean junctions between frames and the adjoining building surfaces

Machining
Cut edges drilled holes, riveted joints and flat sheets be clean, neat free from burrs, and indentations Remove sharp edges without excessive radiusing fit mitred joints accurately to a fine hairline

Hardware
Where door closers, panic exit devices and all outer surface mounted door hardware are screw fixed into aluminium sections, fix with rivnuts Self tapping screws or pop rivets are not acceptable

Building Loads
Install the windows by methods that ensure that neither the window frame nor the fixings will carry building loads, including loads from resulting from short terms or long term deflection of slabs or beams

Glazing
Carry out glazing in factory or on site Secure glass by EDPM gaskets, snap-in beads complete with neoprene packers Glazing shall comply with the GLAZING section

Replacement Glazing
Carry out replacement glazing on site or in factory to AS 1288
Safety Glass Where laminated safety glass is used to replace ordinary annealed glass, upgrade the sash/window assembly as required to enable the sash to operate properly (Eg Increased sash counter balances/weights for double hung or vertical sliding windows to compensate for heavier safety glass)

19 3 2 COMPLETION

Maintenance manual
General Submit the window manufacturer's published instructions for operation, care and maintenance

19 4 SELECTIONS

19 4 1 WINDOW CONSTRUCTION SCHEDULE

WINDOW TYPE1 (W07, W09 and fixed windows each side of Lift to Library)
Location Combination sliding sash and fixed glass type windows

Proprietary item Equal to LIDCO Commercial 100mm Centre Glazed 710 System / 100mm Narrow sash sliding 740 System components (alternatives only to prior approval)
- Provide sub sill assemblies to all external windows
- Provide sub head assemblies to all external windows
- Provide fixed aluminium screens to all external openings

Glass type refer to glazing

Glazing Method Preformed roll in glazing wedges made from matt black flexible U V stabilised P V C

Trim
- 25 x 25 x 1 6 mm thick aluminium angle to vertical sides of external faces generally prior to installation of trim to weatherboard cladding
- Timber architraves internal

Finish Dulux 'Duralloy' Thermoset Powder Coating Colour To be selected

Window hardware Provide key operated sash locks Key all locks alike

WINDOW TYPE 2 (W02, W03, W05, W10, W12, W13, W14)
Location Sliding sash windows

Proprietary item Equal to LIDCO 100mm Narrow sash sliding 740 System components (alternatives only to prior approval)
- Provide sub sill assemblies to all external windows
- Provide sub head assemblies to all external windows
- Provide fixed aluminium screens to all external openings

Glass type refer to glazing

Glazing Method Preformed roll in glazing wedges made from matt black flexible U V stabilised P V C

Trim
- 25 x 25 x 1 6 mm thick aluminium angle to vertical sides of external faces generally prior to installation of trim to weatherboard cladding
- Timber architraves internal

Finish Dulux 'Duralloy' Thermoset Powder Coating Colour To be selected

Window hardware Provide key operated sash locks Key all locks alike

WINDOW TYPE 3 (W06)
Location Double hung windows

Proprietary item Equal to LIDCO 100mm double hung 748 System components (alternatives only to prior approval)
- Note Sill member of perimeter frame to be omitted
- Provide sub head assembly
- Provide retractable aluminium screen to all external opening

Glass type refer to glazing

Glazing Method Preformed roll in glazing wedges made from matt black, flexible U V stabilised P V C

Trim
- 25 x 25 x 1 6 mm thick aluminium angle to vertical sides of external faces generally prior to installation of trim to weatherboard cladding
- Timber architraves internal

Finish Dulux 'Duralloy Thermoset Powder Coating Colour To be selected

Window hardware Provide key operated sash locks Key all locks alike

WINDOW TYPE 4 (W04, W11, W15, W16)
Location Sliding doors

Proprietary item Equal to LIDCO 100mm Premium Sliding 735 System components (alternatives only to prior approval)
- Provide sub head assemblies
- Provide sliding aluminium screens to all external openings

Glass type refer to glazing

Glazing Method Preformed roll in glazing wedges made from matt black flexible U V stabilised P V C

Trim
- 25 x 25 x 1 6 mm thick aluminium angle to vertical sides of external faces generally prior to installation of trim to weatherboard cladding
- Timber architraves internal

Finish Dulux 'Duralloy' Thermoset Powder Coating Colour To be selected

Window hardware Provide key operated sash locks Key all locks alike

WINDOW TYPE 5 (L01, L02, L03, L04, L05, L06)
Location Adjustable glass louvres

Proprietary item Equal to LIDCO 100mm Adjustable louvre 610 System components (alternatives only to prior approval)
- Provide sub sill assemblies
- Provide sub head assemblies
- Provide fixed aluminium screens to all external openings

Glass type refer to glazing

Glazing Method Preformed roll in glazing wedges made from matt black flexible U V stabilised P V C

Trim
- 25 x 25 x 1 6 mm thick aluminium angle to vertical sides of external faces generally prior to installation of trim to fibrous cement cladding
- Aluminium cover plates between jambs against trusses
- 25 x 25 x 1 6 mm thick aluminium angle to vertical edges against walls

Finish Dulux 'Duralloy' Thermoset Powder Coating Colour To be selected

Window hardware Provide key operated sash locks Key all locks alike

WINDOW TYPE 6 (W01, W08)
Location Bi-folding door system

Proprietary item Equal to LIDCO 100mm 615 'Lifestyle' System components (alternatives only to prior approval)
- Provide recessed guide channel at floor level Note No subsill required

Glass type refer to glazing

Glazing Method Preformed roll in glazing wedges made from matt black, flexible U V stabilised P V C

Trim
- 25 x 25 x 1 6 mm thick aluminium angle to vertical jambs generally prior to installation of trim to weatherboard cladding
- Rondo setting bead to vertical jambs internal

Finish Dulux 'Duralloy Thermoset Powder Coating

Colour To be selected

Door hardware Provide proprietary hinges, flush bolts, rollers and guides equally to Centor Locks and furniture as scheduled in Appendix B Door Schedule

20 0 WINDOW HARDWARE

20 1 GENERAL

20 1 1 AIMS

Responsibilities
Provide window hardware in conformance with the **Selections**

20 1 2 CROSS REFERENCES

General
General Conform to the General requirements worksection

Associated worksections
Associated worksections Conform to the following
- Windows
- Door hardware

20 1 3 INTERPRETATIONS

Abbreviations and definitions

Abbreviation	Term	Definition
KD	Keyed to differ	Each lock has a unique key which will operate that lock only
KA	Keyed alike	All locks in the group will pass the same key but that key will not operate any lock outside the group

20 2 PRODUCTS

20 2 1 HARDWARE

Hardware specified generically
Provide hardware of sufficient strength and quality to perform its function appropriate to the intended conditions of use, suitable for use with associated hardware, and fabricated with fixed parts firmly joined

Locks and latches
Standard To AS 4145 3

Window catches Provide 2 catches per sash to manually latched awning casement or hopper sashes over 1000 mm wide

20 3 EXECUTION

20.3 1 INSTALLATION

Fasteners
Materials Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function

Concealed fixings Provide a corrosion resistant finish

Exposed fixings Match exposed fixings to the material being fixed

Support Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings

Hollow metal sections Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws Do not use self tapping screws or pop rivets

Window hardware
Proprietary window systems Provide the standard hardware and internal fixing points for personnel safety harness attachment where required by and complying with the governing regulations

Operation
Ensure working parts are accurately fitted to smooth close bearings without binding or sticking, free from rattle or excessive play, lubricated where appropriate

Supply
Delivery Deliver window hardware items, ready for installation, in individual complete sets for each window set
- Clearly labelled to show its intended location
- In a separate dust and moisture proof package
- Including the necessary templates fixings and fixing instructions

20 3 2 COMPLETION

Adjustment

Leave the hardware properly adjusted with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate

Keys

Contractor's keys Immediately before practical completion, replace cylinders to which the contractor has had key access during construction with new cylinders which exclude the contractor's keys

Keys For locks keyed to differ and locks keyed alike, verify quantities against key records and deliver to the contract administrator at practical completion

Key codes Submit the lock manufacturer's record of the key coding system showing each lock type number and type of key supplied key number for re-ordering and name of supplier

20 4 SELECTIONS

20 4.1 LOCKS AND CATCHES

Locks, catches and bolts

Hardware item	**Window types**
Location	**Sliding windows**
Hardware	Key operated push button sliding window lock Pull handle and catch
Keying	Key all windows in building alike

21 0 DOORS AND HATCHES

21 1 GENERAL

21 1 1 AIMS

Responsibilities

General Provide doors, frames, doorsets security screen doors and fire doorsets as scheduled in

Selections

21 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Windows for door frames which form part of a window/door assembly

21 1 3 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply

- Balanced construction A construction of flush doors in which the facings on one side of the core are essentially equal in thickness grain direction, properties and arrangement to those on the other side of the core It is such that uniformly distributed changes in moisture content will not cause warpage
- Door frame Includes jamb linings
- Doorset An assembly comprising a door or doors and supporting frame, guides and tracks including the hardware and accessories necessary for operation
- Fire-doorset A doorset which retains its integrity, provides insulation and limits, if required, the transmittance of radiation in a fire
- Smoke-doorset A doorset which restricts the passage of smoke
- Flush door A door leaf having two plane faces which entirely cover and conceal its structure It includes doors with intermediate rail, cellular, blockboard and particleboard cores
- Solid core door A flush door with a solid core continuous between stiles and rails or edge strips and fully bonded to the faces
- Joinery door A door leaf having either stiles and rails, or stiles, rails and mullions, framed together A joinery door may also incorporate glazing bars
- Louvred door A joinery door in which the panel spaces are filled in with louvre blades
- Panelled door A joinery door with spaces filled in with panels including glass

21 2 PRODUCTS

21 2 1 FRAMES

Aluminium frames

General To be assembled from aluminium sections including necessary accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashing, with suitable provision for fixing specified hardware

Steel frames

General To be continuously welded from metallic-coated steel sheet sections, including necessary accessories such as buffers, strike plates, spreaders, mortar guards switch boxes, fixing ties or brackets, and cavity flashing with suitable provision for fixing hardware and electronic security assemblies, and pre-finished with a protective coating

Finish Grind the welds smooth cold galvanize the welded joints and shop prime

Hardware and accessories Provide for fixing hardware including hinges and closers, using 4 mm backplates and lugs Screw fix the hinges into tapped holes in the back plates

Base metal thickness

- General _ 1 2 mm
- Fire rated doorsets _ 1 4 mm

Metallic-coated steel sheet To AS 1397

- Metallic-coating Zinc-iron

21 2 2 DOORS

Standards

General To AS 2688 and as follows

- Decorative laminated sheets To AS/NZS 2924 1
- Hardboard and medium density fibreboard To AS/NZS 1859 4 (Int)
- Medium density fibreboard (MDF) To AS/NZS 1859 2 (Int)
- Particleboard To AS/NZS 1859 1 (Int)
- Plywood and blockboard for interior use To AS/NZS 2270
- Plywood and blockboard for exterior use To AS/NZS 2271
- Seasoned cypress pine To AS 1810
- Timber – hardwood To AS 2796 1
- Timber – softwood To AS 4785 1

General

Doors To be proprietary products manufactured for the exposure to the weather and for the finish required

Flush doors

General To be of balanced construction

Cellular core and intermediate rail core flush doors DO NOT USE

Solid core Solid flush doors as follows

- Flush door with blockboard Core plate of timber strips laid edge to edge, fully bonded to each other and to facings each side of no less than two sheets of timber veneer
- Single thickness of moisture resistant general purpose medium density fibreboard

Smoke doors To be solid core _ 35 mm thick

Construction

Cut outs If openings are required in flush doors (e g for louvres or glazing) make the cut outs not closer than 120 mm to the edges of the doors

Adhesives

- Internal To AS/NZS 2270
- External To AS/NZS 2271

Door thickness

- General 35 mm
- External doors and doors over 900 mm wide 40 mm

Edge strips Fix to stiles Minimum thickness 10 mm Increase overall thickness to > 15 mm to accommodate the full depth of the rebate in rebated doors Form rebates to suit standard rebated hardware

Louvre grilles Construct by inserting the louvre blades into a louvre frame and fix the frame into the door

Double doors

Rebated meeting stiles Provide rebated meeting stiles or fix equivalent metal "T" stop to one leaf unless the doors are double acting Chamfer square edged doors as necessary to prevent binding between the leaves

21 2 3 DOORSETS

Fire-resistant doorsets

Standard To AS/NZS 1905 1 and BCA Spec C3 4

Cavity Sliding Doorsets

Proprietary Item Equal to Altro Building Systems Euro Cav cavity sliding system

21 2.4 ANCILLARY MATERIALS

Trims

Timber Solid timber at least 18 mm thick mitred at corners

Extruded gaskets and seals

General To be non cellular (solid) elastopressive seals as follows

- Flexible polyvinyl chloride (PVC) To BS 2571 100% solids with high consistency, ultra-violet stabilised
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber) To BS 4255 1

Jointing materials
General To be compatible with each other and with the contact surfaces and non staining to finished surfaces Do not provide bituminous materials on absorbent surfaces

Nylon brush seals
General To be dense nylon bristles locked into galvanized steel strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door with double sided PVC foam tape

Pile weather strips
General To be polypropylene or equivalent pile and backing low friction silicone treated, ultraviolet stabilised

Standard To AAMA 701/702

Weather bars
General Provide a weather bar under hinged external doors, locate under the centres of closed doors

Type 3mm thick aluminium angle or bar finishing flush with the internal finished floor surface

Threshold plates
General Provide an extruded aluminium threshold plate under hinged external doors, locate under the centres of closed doors

21 3 EXECUTION

21 3 1 FRAMES

General
Frames Install so that the frames are as follows
- Plumb level, straight and true
- Adequately fixed or anchored to the building structure
- Will not carry any building loads including loads caused by structural deflection or shortening

Aluminium frames
Building in to masonry Screw galvanized steel brackets twice to jambs and build in

Fixing to masonry openings Build-in seasoned timbers plugs to masonry joints or use proprietary expansion anchors and screw twice through jambs at each fixing

Fixing to stud frame openings Screw once to studs at each fixing

Frame fixing
Brackets Metallic-coated steel
- Width ≥ 25 mm
- Thickness ≥ 1 5 mm

Depth of fixing or building into masonry
- Brackets _ 200 mm
- Expansion anchors _ 50 mm
- Plugs _ 50 mm
- Rods _ 60 mm

Heads of fasteners Conceal where possible otherwise sink the head below the surface and fill the sinking flush with a material compatible with the surface finish

Jamb fixing centres ≤ 600 mm

Joints
General Make accurately fitted tight joints so that neither fasteners nor fixing devices such as pins screws adhesives and pressure indentations are visible on exposed surfaces

Steel frames
Building in to masonry Attach galvanized steel rods to jambs, build in and grout up

Fixing to masonry openings Build in hairpin anchors and install locking bars, or use proprietary expansion anchors and screw twice through jambs at each fixing

Fixing to stud frame openings Attach galvanized steel brackets to jambs and screw twice to studs at each fixing

Weatherproofing
Flashings and weatherings Install flashings weather bars, drips, storm moulds, caulking and pointing to prevent water from penetrating the building between the door frame and the building structure under the prevailing service conditions including normal structural movement of the building

Finishing
Trim Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames Install to make neat and clean junctions between the frame and the adjoining building surfaces

21 3 2 DOORS

Priming
General Prime timber door leaves on top and bottom edges before installation

21 3 3 COMPLETION

Operation
General Ensure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and that they are lubricated where appropriate

Protection
Temporary coating On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection

21 4 SELECTIONS

21 4 1 STEEL DOOR FRAME SCHEDULE

Schedule

Frame code	SF1	SF2
Material	Zinc coated steel to AS 1397 with Z200 coating	Zinc coated steel to AS 1397 with Z200 coating
Thickness	1 2mm	1 2mm
Overall size	140mm	120mm
Profile type	Double rebate	Double rebate
Width between back flanges	115mm	95mm
Width of architrave faces	38mm	38mm
Depth of door seat rebate	41 x 15mm	41 x 15mm
Comment	Generally door frame for brick walls and to prepared openings to cavity brick walls or brick veneer	Generally internal door frame for building in to 90mm blockwork walls

21 4 2 ALUMINIUM DOOR FRAMES

ALUMINIUM DOOR FRAME (ALF)

Location Refer to DOOR & HARDWARE SCHEDULE

Type equal to LIDCO 710 System 100mm Glazed Shopfront Framing

- Requirement framing to be engineered, manufactured and installed in accordance with AS 2047-2048 (Windows in Buildings), AS 1170 (Loading Code) and AS 1664 (Aluminium Structures Code)

Installation Fix to prepared openings

Requirement Trim door stops adjacent to locksets to avoid knuckles grazing on the door stops

Trim 25 x 25 x 1 6 mm thick aluminium angle to sides of internal faces

Trim 25 x 25 x 1 6 mm thick aluminium angle to sides of external faces prior to installation of timber trim to weatherboard cladding

Finish Dulux Duralloy Thermoset Powder Coating Colour To be selected

21 4 3 FLUSH DOORS CONSTRUCTION SCHEDULE

Flush doors schedule

Door code	FD1	FD2
Door type	Solid core	Solid core
Door thickness	41mm	41mm
Core material	35mm thick blockboard	35mm thick blockboard
Facing	3mm thick timber veneer to both faces	3mm thick external grade ply to both faces
Edge strips	Stiles only	Stiles only

Door code	FD3
Door type	Solid MDF
Door thickness	35mm
Core material	35mm thick MR MDF

22 0 ROOM DIVIDERS

22 1 GENERAL

22 1 1 AIMS

Responsibilities
General Provide room dividers to the **Selections**

22 1 2 CROSS REFERENCES

General
General Conform to the *General requirements* worksection

22 1 3 INSPECTION

Notice
Inspection Give sufficient notice so that inspection may be made of the following
- Overhead tracks installed before dividers/door panels are hung and ceiling installed
- Completion of assembly

22 1 4 SUBMISSIONS

Samples
General Submit 2 samples of each of the following where applicable
- Sections proposed to be used for frames, louvres and slats
- Joints made by proposed techniques
- Finishes to prepared surfaces with associated selected edgestrips and trims
- Colour range samples of facings and prefinished production material
- Manufacturer's standard door furniture items

Subcontractors
General Submit names and contact details of proposed installers

22 1 5 TOLERANCES

General
Deviation (from true grid lines and planes) 1 1000 up to 3 mm maximum
Misalignment (of adjoining surfaces at grid junctions) ± 1 mm maximum
Panel thickness ± 0 5 mm
Length and width ± 1/1000th of the dimension or 0 5 mm, whichever is the greater
Flatness twist, winding and bow ± 1 mm maximum deviation from a 2 4 mm straightedge placed in any position
Maximum deviation of edges from the intended true line ± 1 mm

22 2 EXECUTION

22 2 1 COMPLETION

Maintenance manual
General Submit manufacturer's published recommendations for service use

Cleaning
Temporary coating On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection

22 3 SELECTIONS

22 3 1 OPERABLE WALLS

Operable walls schedule

Proprietary Item	Lotus Folding Walls and Doors Pty Ltd
Product	100S/41/CD2
Door arrangement	6 equal hinged panels and full height door panel
Stacking arrangement	Centre stacking
Panel suspension	Overhead timber framing
Opening Size (mm)	5600w x 2700h
Sheeting	MDF
Facing	Full height pinboard material in select colour
Finish	Panel frames, jambs and head track in natural anodised aluminium
Weighted sound reduction index (R_w) to AS/NZS 1276 1 or ISO 717-1	R_w 41

23 0 OVERHEAD DOORS

23 1 GENERAL

23 1 1 AIMS

Responsibilities
General Provide overhead doorsets as scheduled in **Selections**

23 1 2 CROSS REFERENCES

General
General Conform to the *General requirements* worksection

Associated worksections
Associated worksections Conform to the following

- Door hardware

23 1 3 STANDARDS

General
Garage doors To AS/NZS 4505

23 1.4 INTERPRETATIONS

Definitions
For the purposes of this worksection the definitions given below apply

- Cycle One complete operation from the closed position to fully open and back to closed
- Roller shutters The general term referring to Roller doors, Fire resistant roller shutters (or Fire shutters) and Roller grilles which operate by means of rolling the curtain material over an overhead drum
- Roller doors Roller shutters with a continuous curtain material
- Roller grilles Roller shutters with a curtain material of articulated links
- Fire shutters Roller doors which have a fire-resistance rating

23 1 5 INSPECTION

Notice
Inspection Give sufficient notice so that inspection may be made of the following

- Tracks and guides installed before doors or shutters are hung

23 1 6 SUBMISSIONS

Subcontractors
General Submit names and contact details for proposed suppliers and installers

Shop drawings
General Submit shop drawings showing details of each assembly component and connection and information relevant to fabrication, surface treatment and installation for the following

- Fire shutters
- Roller doors and grilles

Type test certification
Fire resistant doorsets Submit certification from an independent testing authority showing compliance with the required fire rating

23 2 PRODUCTS

23 2 1 ROLLER SHUTTERS

Types
Roller door Proprietary system comprising a flexible continuous curtain sliding between vertical guides, raised or lowered by rolling or unrolling around a horizontal drum (barrel) mounted above the opening inclusive of the manufacturer's standard operating gear, hardware, and accessories necessary for satisfactory performance
Fire shutters

- Standard To AS 1905 2

Wind actions
General Install so that the shutter, in its closed position, withstands pressure on the surface without impairment of its ability to function

Curtain
Continuous curtain A single metal sheet pressed to a horizontal ribbed profile
Slatted curtain A curtain of horizontal interlocking slats, incorporating interlocking hinges extending the full width of the curtain
Bottom curtain rail A stiffening member interlocking with the bottom edge or lowest slat of the curtain, extending between the inner faces of the vertical guides, formed or adapted where necessary to follow the contour of a sloping floor or threshold The rail may also be adapted to house the locking device

Wind locks
General Wind lock end clips and guides to retain the curtain in wide openings or under extreme wind conditions

Drum
Drum deflection 1/360th of the span (maximum)
Springs Helical torsion springs housed in the drum and arranged to counterbalance the curtain weight without exceeding the safe working stress of the spring material

Operation
Method of raising and lowering the curtain
- Direct manual By handles attached to the bottom curtain rail

Manual operation
General Install so that the force required to operate the door manually does not exceed 220 N

23 3 EXECUTION

23 3 1 FRAMES

General
Frames Install so that the frames are as follows
- Plumb, level, straight and true
- Fixed or anchored to the building structure
- Will not carry any building loads, including loads caused by structural deflection or shortening

23 3 2 COMPLETION

Operation
General Ensure moving parts operate freely and smoothly, without binding or sticking at correct tensions or operating forces and that they are lubricated where appropriate

Protection
Temporary coating On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection

Maintenance manual
General Submit the overhead door manufacturer's published instructions for operation, care and maintenance

Warranties
Roller shutters Submit the manufacturer's published product warranties

23 4 SELECTIONS

23 4.1 SCHEDULES

Location Store 3 (D09)

Roller Shutter Type 1
Proprietary item Equal to Airport Doors Series B Steel Roller Shutter
Opening size 2400 high x 2400 wide
Operation Manual

Curtain The curtain of the door is formed by a continuous, roll-formed, deep profile steel sheet, lock seamed together The 0 425mm thick steel sheet is fitted with a nylon felt strip which runs down either side of the curtain for smooth operation

Finish Galvanised steel

Bottom Rail The bottom rail is manufactured from a heavy, extruded aluminium section with a minimum depth of 40mm and fitted with a PVC weather seal

Door Guides Guides shall be roll formed, galvanised steel channel section with a thickness of 1 8mm and a width of 50mm

Locking A centre lift-lock keyed on the external face and latched on the internal face shall be fitted to the door at waist height

Location Hall Extension Store (D12)

Roller Shutter Type 1
Proprietary item Equal to Airport Doors Series B Steel Roller Shutter
Opening size 2100 high x 1400 wide
Operation Manual

Curtain The curtain of the door is formed by a continuous roll-formed, deep profile steel sheet, lock seamed together The 0 425mm thick steel sheet is fitted with a nylon felt strip which runs down either side of the curtain for smooth operation

Finish Galvanised steel

Bottom Rail The bottom rail is manufactured from a heavy, extruded aluminium section with a minimum depth of 40mm and fitted with a PVC weather seal

Door Guides Guides shall be roll formed, galvanised steel channel section with a thickness of 1 8mm and a width of 50mm

Locking A centre lift-lock keyed on the external face and latched on the internal face shall be fitted to the door at waist height

Location Undercroft Store (D13)

Roller Shutter Type 2 -/120/30 FRL
Proprietary item Equal to Airport Doors 2hr Fire Shutter
Opening size 2000 high x 1810 wide
Operation Manual

Bottom Rail The bottom rail shall be manufactured using mild steel angles of not less than 40mm by 40mm and 2 5mm thick bolted to back with the last slat sandwiched between the angles The bolts shall not be less than 8mm diameter and fixed at not less than 300mm centres Two lifting handles shall be fitted to the bottom rail on either side of the shutter centre

Curtain The curtain shall be manufactured using 75mm by 0 8mm thick roll-formed galvanised interlocking steel slats Each alternative slat shall be fitted with steel end clips to form a 2 hour rating curtain

Finish The curtain and guide channels shall be fabricated from galvanised material All remaining components shall be given a coat of zinc rich Grey primer

Automatic Closing In the event of a fire the door shall automatically close in order to prevent flame spread The fusible link (rated at 80°C) fitted below the roller drum at one end is connected to a spring loaded automatic release arm The release arm shall activate the automatic release/push down spring allowing the door to automatically close The roller drum automatic release shall be fitted with an automatic controlled descent governor to match the door size and weight The governor shall be designed to provide an average speed of between 250mm-300mm per second

24 0 DOOR HARDWARE

24 1 GENERAL

24 1 1 AIMS

Responsibilities

General Provide door hardware in conformance with **Selections**

Handing Before supply, verify on site, the correct handing of hardware items

Keying Grand master key and master key to the existing school Confirm keying with College prior to ordering of lock cylinders

Hardware specified generically Provide hardware of sufficient strength and quality to perform its function appropriate to the intended conditions of use, suitable for use with associated hardware and fabricated with fixed parts firmly joined

Operation Ensure working parts are accurately fitted to smooth close bearings, without binding or sticking free from rattle or excessive play, lubricated where appropriate

Supply

Delivery Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows

- Clearly labelled to show its intended location
- In a separate dust and moisture proof package
- Including the necessary templates fixings and fixing instructions

24 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Window hardware
- Doors and hatches

24 1 3 SUBMISSIONS

Samples

Generic items Submit samples of hardware items offered as meeting the description of items not specified as proprietary items

Materials and components

Key control system Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster, etc)

Maintenance

Manual Submit the manufacturer's published recommendations for use, care and maintenance of the hardware provided

Product warranties

Hardware Submit the warranties offered by the manufacturer for the hardware items provided in the works

Keys

Key codes Submit the lock manufacturer's record of the key coding system showing each lock type number and type of key supplied, key number for re-ordering, and name of supplier

Keys For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion

24 2 PRODUCTS

24 2 1 HINGES

Butt hinge sizes

General Conform to **Hinge table A** and **Hinge table B** (not applicable to cupboard doors), in which length (l) is the dimension along the knuckles, not including hinge tips, if any, and width (w) is the dimension across both hinge leaves when opened flat

- Steel, stainless steel, brass, bronze butt hinges for timber doors in timber or steel frames
  To **Hinge table A**
- Aluminium hinges for aluminium doors or for doors of other materials in aluminium frames
  To **Hinge table B**

Hinge materials

Aluminium hinges High tensile aluminium with fixed stainless steel pins in nylon bushes and with nylon washers to each knuckle joint

Doors fitted with closers Provide low friction bearing hinges

Brass hinges For brass hinges used for door leaves exceeding 30 kg or door leaves controlled by door closers provide bronze or stainless steel washers to each knuckle joint

Hinge pins

Exterior or security doors opening out Provide fixed pin hinges or security hinges

Hinge table A

Nominal hinge size l x w x t (mm)	Door leaves not exceeding any of the following		
	Mass (kg)	Width (mm)	Thickness (mm)
70 x 50 x 1 6	16	620	30
85 x 60 x 1 6	20	820	35
100 x 75 x 1 6	30	920	40
100 x 75 x 2 5	50	920	50
100 x 75 x 3 2	70	1020	50
125 x 100 x 3 2*	80	1220	50

* Non standard to special order only

Hinge table B

Nominal hinge size l x w x t (mm)	Door leaf not exceeding mass (kg)	Minimum construction	
		Knuckles	Screws/hinge leaf
100 x 70 x 3	25	3	3
100 x 80 x 3 5	40	5	4
130 x 50* x 3 4	75	Interfold	3

* Interfold (Fast fix) surface mounted

Number of hinges

Fire doors To AS/NZS 1905 1

Other door leaves Provide 3 hinges for leaves between 2040 mm and 2340 mm high, and 4 for door leaves between 2340 mm and 3050 mm high Provide at least 3 low friction bearing hinges for door leaves controlled by door closers

Small door leaves Door leaves not exceeding any of the following may have 2 hinges each

- 2040 mm high
- 820 mm wide
- 30 kg mass

Wide throw

General If necessary provide wide throw hinges to achieve the required door swings in the presence of obstacles such as nibs deep reveals and architraves

24.2 2 LOCKS AND LATCHES

Mechanical locksets
Standard To AS 4145 2

Mortar guards
General For steel door frame installations, provide mortar guards designed to enable the full extension of the lock tongue or similar devices and the correct operation of the locking mechanism

Padlocks
Standard To AS 4145 4

Strike plates
General Use strike plates provided with the locks or latches Do not provide universal' strike plates

24 2 3 DOOR CONTROLLERS

Fire rated door closers
General Provide closers tested and certified for use as components of fire door assemblies

Standard To AS/NZS 1905 1

Performance
Door controllers specified generically Provide door controllers, including door closers, floor or head spring pivots and automatic door operators, which are suitable for the door type, size, weight and swings required and the operating conditions including wind pressure

24 3 EXECUTION

24 3 1 INSTALLATION

Door hardware
Mounting heights Mount locks and latches so that the centreline of the door knob or lever spindle is 1000 mm above finished floor

Door stops

Fixing Fix on the floor, skirting or wall as appropriate, to prevent the door or door furniture striking the wall or other surface

Fasteners
Materials Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function

Concealed fixings Provide a corrosion resistant finish to concealed fixings

Exposed fixings Match exposed fixings to the material being fixed

Security Locate exposed fixings to lock furniture on the inside faces of external doors and on the inside faces of internal doors to lockable rooms

Support Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fixings

Hollow metal sections Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws Do not use self tapping screws or pop rivets

Hinges
Metal frames Fix hinges using metal thread screws

Timber doorsets Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing) and fix with countersunk screws

24 3 2 COMPLETION

Adjustment
General Leave the hardware properly adjusted with working parts in working order, and clean undamaged, properly adjusted, and lubricated where appropriate

Automatic door operators Maintain and adjust the system throughout the defects liability period

Keys
Contractor's keys Immediately before practical completion replace cylinders to which the contractor has had key access during construction with new cylinders which exclude the contractor's keys

24 4 SELECTIONS

24 4 1 HINGE SCHEDULE

Steel butt hinges
Location internal flush doors generally

Type Broad butt fixed pin

Stainless steel butt hinges
Location External doors and doors to wet areas (toilets)

Type Broad butt, fixed pin

Aluminium butt hinges
Location timber or aluminium doors in aluminium door frames

Type Aluminium heavy duty interfold hinges

Proprietary item McCallum Australia Code No A104

24 4 2 DOOR CONTROLLERS SCHEDULE
Refer Appendix A - DOOR AND HARDWARE SCHEDULE

24 4 3 LOCK & LATCH SCHEDULE

Definition
In this schedule the term 'lock' shall include 'latch' unless the context otherwise requires

Lock cylinders
All lock cylinders to be AP 3000 SERIES Restricted GMK compatible with the existing School master key system Confirm key system before ordering hardware

Lock and Latchsets
Refer Appendix A - DOOR AND HARDWARE SCHEDULE

24 4.4 BOLTS & CATCHES SCHEDULE
Refer Appendix A - DOOR AND HARDWARE SCHEDULE

24.4 5 MISCELLANEOUS DOOR FURNITURE SCHEDULE
Refer Appendix A - DOOR AND HARDWARE SCHEDULE

24 4 6 KEYING SCHEDULE

Key codes schedule
Refer Appendix A - DOOR AND HARDWARE SCHEDULE

25 0 GLAZING

25 1 GENERAL

25 1 1 AIMS

Responsibilities
Selections Conform to the **Schedules**

25 1 2 CROSS REFERENCES

General
General Conform to the General requirements worksection

Associated worksections
Associated worksections Conform to the following
- Windows
- Doors

25 1 3 STANDARDS

Glass type and thickness To AS 1288 where no glass type or thickness is given For values to be used for permissible stress design, multiply the ultimate limit state design wind pressure derived from AS/NZS 1170 2 by 0 67

Materials and installation To AS 1288

Quality requirements for cut-to-size and processed glass To AS/NZS 4667

Terminology for work on glass To AS/NZS 4668

25 2 PRODUCTS

25 2 1 GLASS

Glass types
Classification and description To BS 952-1

Glass and glazing materials
Glass and glazing materials generally Free from defects which detract from appearance or interfere with performance under normal conditions of use

Glazing plastics Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance and general deterioration

Glass tolerances
Size squareness and flatness To AS/NZS 2208

Plate and sheet (i e not patterned)
- Roller wave Maximum 0 15 mm

Float glass quality
Glazing Select Quality to ASTM C1036

Safety glasses
Standard To AS/NZS 2208

Standards Mark Required

25 2 2 GLAZING MATERIALS

General
Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges) Appropriate for the conditions of application and the required performance

Jointing materials
Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non staining to finished surfaces Do not provide bituminous materials on absorbent surfaces

Glazing tapes
Standards To AAMA 800 Products coded 804 3 806 3, 807 3 as applicable

Elastomeric sealants
Sealing compound (polyurethane, polysulphide acrylic)
- Single component Type II, Class A
- Multi component To ASTM C920

Sealing compound (silicone)
- Single component Class A
- Multi component To ASTM C920

Sealing compound (butyl) To ASTM C1311

Glazing compounds To AAMA 802 3 (Types I or II), or 805 2, as applicable

Narrow joint seam sealer To AAMA 800, Products coded 803 3

Exterior perimeter sealing compound To AAMA 800

Non drying sealant To AAMA 800

Expanded cellular glazing tape To AAMA 800

Very high bond pressure sensitive tapes To ASTM D897, ASTM D1002, ASTM D3330M, ASTM D3652M, ASTM D3654M, and ASTM D3715M

Extruded gaskets and seals
Type Non cellular (solid) elastopressive seals

Material
- Rubber products (neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber) To BS 4255-1
- Flexible polyvinyl chloride (PVC) To BS 2571, E type compounds, colour fastness grade B

Priming
Apply the recommended primer to the surfaces in contact with sealant materials

Movement joints
Depth of elastomeric sealant One half the joint width, or 6 mm whichever is the greater

Foamed materials (in compressible fillers and backing rods) Closed-cell or impregnated types which do not absorb water

Bond breaking Provide backing rods, and other back-up materials for sealants which do not adhere to the sealant

25 2 3 MIRRORS

Reflective surface
Type Silver layer deposited on the glass or glazing plastic

Protective coatings Electrolytic copper coating at least 5 ∝m thick, and 2 coats of mirror backing and edge sealing paint having a total dry film thickness of at least 50 ∝m

25 2.4 PRODUCT IDENTIFICATION

Safety glazing materials
Identify each piece or panel to AS 1288

25 3 EXECUTION

25 3 1 GLASS PROCESSING

General
Processing Perform required processes on glass, including cutting, obscuring silvering and bending Form necessary holes, including for fixings equipment, access holes and speaking holes Process exposed glass edges to a finish not inferior to ground arrised

25 3 2 INSTALLATION

General

General Install the glass so that

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials
- Building movements are not transferred to the glass
- External glazing is watertight and airtight

Temporary marking Use a method which does not harm the glass Remove marking on completion

Toughened glass Do not cut, work, or permanently mark after toughening Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials

Heat absorbing glass In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes with minimum feather

- Edge grinding or arrising Wet process using grit no coarser than 120 – 180 Do not work across the edge from surface to surface
- Temporary marking Remove before installation

Frameless installations Join the vertical edges of adjacent glass panels with silicone jointing compound

Pre-glazing

Window assemblies and glazed doors Supply inclusive of glazing, shop pre-glazed unless pre-glazing is impracticable

25 3 3 FIXING MIRRORS

Screw fixing

Direct to wall plugs with dome-headed chromium-plated screws in each corner and at 900 mm maximum centres around perimeter Provide polyethylene sleeves and washers to prevent contact between screw and glass Do not over-tension the screws

Frame fixing

General Propnetary aluminium frames to mirror perimeter, corners mitred Bed glass edges in a continuous resilient gasket Attach the frame to the substrate with concealed screw fixings Seal the frame to the substrate with paintable sealant which will not react with the mirror coating Do not allow the sealant to contact the mirror back

Finish clear anodised

25 3 4 COMPLETION

Cleaning

Replace damaged glass and leave the work clean, polished, free from defects and in good condition

25 4 SELECTIONS

25 4 1 GLAZING SCHEDULES

Glass types schedule

Generic term	Integral properties	Location(s)
Clear float general quality		DO NOT USE
Mirrors	Clear float silvering quality	Refer to *MIRROR SCHEDULE*
Laminated safety glass	Viridian IntruderGuard Clear - 6 52mm thick incorporating Clear PVB interlayer	Glazing to windows and doors generally except where noted otherwise
Performance Glazing	Viridian Enviroshield Performance ITO SuperBlue 40 - 6 76mm thick with a high performance interlayer	Glazing to windows W02 W03 W04 W05 AND W14

Mirrors schedule

Designation	MIR1
Location	Accessible WCs
Size (mm)	1000 (H) x 500 (W)
Mounting height	900 mm above floor
Mirror type	Clear float silvering quality
Thickness	6mm
Fixing	Frame fixing
Frame material & colour	Clear anodised aluminium

26 0 INSULATION AND VAPOUR BARRIERS

26 1 GENERAL

26 1 1 AIMS

Responsibilities

General Provide insulation and vapour barrier systems

- Complete for their function
- Conforming to the detail and location drawings
- Firmly fixed in position
- Maintain their performance for the life of the building

26 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Roofing
- Cladding
- Linings

26 1 3 STANDARDS

Installation of mineral wool insulation

Installation Comply with the AMWU/CFMEU/CEPU/ICANZ Industry Code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation

Marking Deliver mineral wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION

26 1 4 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply

- Terminology To AS/NZS 4859 1
- Fire hazard properties Means the average specific extinction area, critical radiant flux, Flammability index, Smoke-Developed Index, smoke growth rate index, smoke development rate of Spread-of-Flame Index of a material or assembly that indicate how they behave under specific fire test conditions
- Sarking-type material Flexible membrane material normally used for waterproofing, vapour proofing or thermal reflectance
- Mineral wool (including glasswool and rockwool) Entangled mat of fibrous non-crystalline materia derived from inorganic oxides or minerals, rock, slag or glass, processed at high temperatures fro molten state
- Vapour barrier A material or system that adequately impedes the transmission of water vapour under specified conditions

26 1 5 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the sarking, vapour barrier and insulation before they are covered up or concealed

26 2 PRODUCTS

26 2 1 MATERIALS AND COMPONENTS

Fire hazard properties

General To AS/NZS 1530 3

- Spread of flame index ≤ 0
- Smoke developed index ≤ 3
- Flammability index to AS 1530 2 ≤ 5

Bulk Insulation
Mineral wool blankets and cut pieces To AS/NZS 4859 1 Section 8

Polyester To AS/NZS 4859 1 Section 7

Reflective insulation To AS/NZS 4859 1 Section 9

Wool To AS/NZS 4859 1 Section 6

Standards Mark Required

Sarking-type material
Standard To AS/NZS 4200 1

Duty Minimum requirement - Medium

Vapour proofing Permeance to AS 3999

Wall sarking Vapour-permeable

Fasteners and supports
General Metallic-coated steel

Mesh support to roof insulation
Metallic-coated wire netting To AS 2423 Section 4

Size *45 mm mesh x 1 mm diameter*

Welded safety mesh To AS/NZS 4389

Note Where a proprietary product does not require mesh support it is the Contractor's responsibility to determine the necessity for the use of safety mesh or appropriate fall arrest systems during installation in accordance with relevant Occupational Health and Safety Requirements

26 3 EXECUTION

26 3 1 GENERAL

Bulk insulation
Standard To AS 3999 or AS 4075

Batts and rigid sheets Fit tightly between framing members If support is not otherwise provided, staple nylon twine to the framing and stretch tight

Sarking-type material
Standard To AS/NZS 4200 2

Wall sarking
Location Provide sarking under cladding which provides a permanent weatherproof seal

Installation Fix to the frame members with metallic-coated broad-head clouts, staples, screws or pop rivets spaced at 300 mm maximum centres Apply to the outer face of external stud walls from the bottom plate up, over the flashing At the top, seal across the wall cavity

26 4 SELECTIONS

26 4 1 INSULATION TYPE 1 [INS1]

General
Foil backed sarking

Location External walls to timber framing behind weatherboard, fibrous cement and metal claddings

Type Sheet material consisting of kraft paper bonded in between two layers of aluminium foil with fire retardant adhesives

Materials
Proprietary Item Bradford Insulation 'Thermofoil Medium Duty Sarking Foil (733)

Installation
The insulation material shall be installed as recommended by Bradford Insulation and as detailed in its Technical & Specification Guide Provide a minimum 20mm airspace between the cladding and the foil face of the sarking

26 4 2 INSULATION TYPE 2 [INS2]

General

Foil backed sarking

Location The roof area with exception of the roof to the Breezeway

Type Sheet material consisting of a glasswool blanket adhered to an impermeable reinforced reflective foil facing

Materials

Proprietary Item Bradford Insulation Anticon 95 Roofing Blanket

R-value 2 3

Thickness (mm) 100 nominal

Installation

The insulation material shall be installed as recommended by Bradford Insulation Where the contractor chooses to install safety mesh for OH&S reasons the mesh shall be laid with sufficient slack to enable the material to recover its nominal thickness

26.4 3 INSULATION TYPE 3 [INS3]

General

Thermal insulation

Location To all timber framed external and internal walls

Materials

Proprietary Item Bradford Insulation Gold Wall Batts'

R-value 2 0

Thickness (mm) 90 nominal

Installation

Friction fit between framing members If support is not otherwise provided, staple nylon twine to the framing and stretch tight

26 4.4 INSULATION TYPE 4 [INS4]

General

Thermal insulation

Location To roof space above all internal ceilings

Materials

Proprietary Item Bradford Insulation 'Gold Ceiling Batts'

R-value 2 5

Thickness (mm) 140 nominal

Installation

Install above ceiling linings and below or between roof framing Lay over any supporting ceiling lining framing (eg furring channels) Turn down to wall insulation at eaves Do not extend across lighting strips or ceiling grilles

27 0 LININGS

27 1 GENERAL

27 1 1 AIMS

Responsibilities
General Provide internal lining systems to the **Selections**

27 1 2 CROSS REFERENCES

General
General Conform to the General requirements worksection

Associated worksections
Associated worksections Conform to the following
- Cladding

27 1 3 TOLERANCES

Surface
Flatness, twist winding and bow 1 5 mm deviation from a 1 5 m straightedge placed in any position

27 2 PRODUCTS

27 2 1 MATERIALS AND COMPONENTS

Plasterboard
Standard To AS/NZS 2588

Fibre cement
Standard To AS/NZS 2908 2

Wall and ceiling linings Type B category 2

Plywood and blockboard
Interior use To AS/NZS 2270
Exterior use To AS/NZS 2271
Visible surfaces with a clear finish Veneer quality A
Other visible surfaces Veneer quality B
Back/face veneer Veneer quality C or D
Bond Type A

Dry-processed fibreboard (including medium density fibreboard)
Standard To AS/NZS 1859 2
Melamine overlaid medium density fibreboard Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine

High pressure decorative laminate sheet
Standard To AS/NZS 2924 1

Coated steel
Standard To AS 1397

Fasteners
Steel nails Hot dip galvanized

Adhesives
Contact adhesives To AS 2131

For plasterboard To AS 2753

For wallboards Mastic adhesive

Sealants
Fire rated sealant Non-hardening sealant compatible with the materials to be sealed and having a fire rating equal to that of the partition it seals

Acoustic sealant Non-hardening sealant compatible with the materials to be sealed and having a specific gravity of not less than 1 5 gm/cubic centimetre and of 100% polyurethane mastic

27 3 EXECUTION

27 3 1 CONSTRUCTION GENERALLY

Conditions
Do not commence lining work until such time as the building or zone in question is enclosed and weathertight and all wet trades have been completed

Substrates or framing
General Before fixing linings check and if necessary adjust the alignment of substrates or framing

Battens
General Fix at each crossing with structural framing members, or direct to solid walls or ceilings Provide wall plugs in solid backgrounds

Ceiling linings
General Do not install until at least 14 days after the roof structure is fully loaded

Accessories and trim
General Provide accessories and trim necessary to complete the installation

Adhesives
General Provide adhesives of types appropriate to their purpose, and apply them so that they transmit the loads imposed without causing discolouration of finished surfaces

27 3 2 PLASTERBOARD LINING

Supports
General Install timber battens or proprietary cold-formed galvanized steel furring channels as follows

- Where framing member spacing exceeds the recommended spacing
- Where direct fixing of the plasterboard is not possible due to the arrangement or alignment of the framing or substrate
- Where the lining is the substrate for tiled finishes

Transverse walls Locate noggings as follows

- At least 150 mm from the horizontal joint
- Ensure that noggings do not protrude beyond the face of studs

Installation
Gypsum plasterboard To AS/NZS 2589 1

Fibre reinforced gypsum plaster To AS/NZS 2589 2

Framed construction Screw or nail or combine with adhesive

Metal stud frames Screw using galvanized self tapping screws, or retain using proprietary clamping straps and cover trims

Masonry construction Fix using adhesive direct to masonry

Suspended ceilings Fix using screw or screw and adhesive to ceiling members

To furring channels Fix using screw or screw and adhesive

Multiple sheet layers
Application Fire rated and acoustic rated walls

Joints Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers Stagger all sheet joints by minimum 200 mm

Joints
Flush joints Provide recessed edge sheets and finish flush using perforated paper reinforcing tape

Butt joints Make joints over framing members or otherwise provide back blocking

External corner joints Make joints over metallic-coated steel corner beads

Dry joints Provide square edged sheet and finish with a UPVC joining section

Control joints Install purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural movement joints

Wet areas Install additional supports flashings, trim and sealants as required

Joints in tiled areas Do not apply a topping coat after bedding perforated paper tape in bedding compound

27 3 3 FIBRE CEMENT LINING

Supports

General Install timber battens or proprietary cold-formed galvanized steel furring channels as follows

- Where framing member spacing exceeds the recommended spacing
- Where direct fixing of the fibre cement is not possible due to the arrangement or alignment of the framing or substrate
- Where the lining is the substrate for tiled finishes

Installation

General Run sheets across the framing members In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings Provide supports at edges and joints

Timber framed construction Nail only or combined with adhesive

Steel framed construction Screw only or combined with adhesive

Wall framing

- Do not fix to top and bottom plates or noggings
- In tiled areas Provide an extra row of noggings immediately above wall-to-floor flashings Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet

Masonry wall construction

- Fix using adhesive direct to masonry, but do not fix direct to masonry as a substrate for tiled finish
- Fix to furring channels using screw or screw and adhesive

Ceilings Fix using screw or screw and adhesive to ceiling furring members Do not fix sheets to the bottom chords of trusses

Wet areas Do not use adhesive fixing alone

Multiple sheet layers

Application Fire rated and acoustic rated walls

Joints Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before commencing succeeding layers Stagger all sheet joints by minimum 200 mm

Joints

Flush joints Provide recessed edge sheets and finish flush using perforated paper reinforcing tape

- Movement joints in walls Position a stud parallel to the joint on each side
- Movement joints in ceilings and soffits Provide movement joints to divide ceilings into bays not larger than 10 8 x 7 2 m and soffit linings into bays not larger than 4 2 x 4 2 m or 5 4 x 3 6 m Provide framing parallel to the joint on each side Do not fix the lining to abutting building surfaces

External corner joints Make joints over metallic-coated steel corner beads

Dry joints Provide square edged sheet and finish with a UPVC joining section

Control joints Provide purpose-made metallic-coated control joint beads at ≤ 7 2 m centres in walls and ceilings and to coincide with structural movement joints

Wet areas Provide additional supports, flashings trim and sealants as required

Joints in tiled areas Bed perforated paper tape in bedding compound Do not apply a topping coat

- Movement joints Space to suit joints required in tiling
- Internal corners Reinforce with metallic-coated steel angles In corners subject to continuous moisture, flash over the angle and under the sheeting with continuous bitumen coated aluminium flashing

27.3 4 CEILING ACCESS

General

Location Provide personnel access ways to ceiling spaces above STORE 1 and STORE 2

Type

Flush personnel access ways lockable panel flush fitted set with the surrounding ceiling

Size (mm) AP1 600 X 600

Panel Trafalgar Building Products APT/WW (Product Code FB40040) Zincanneal access panel

Lock budget steel cam 6mm square lock

Finish Paint finish to match ceiling

27 3 5 TRIM

General

General Provide trim such as beads, mouldings and stops to make neat junctions between lining components, finishes and adjacent surfaces

Timber trim

Hardwood AS 2796 1

Cypress pine AS 1810

Softwood To AS 4785 1

- Grade To AS 4785 2

Window reveals

- Timber species or group MDF or pine
- Size Nom 20mm thick as required or as detailed on drawings

Window architraves

- Timber species or group MDF or pine
- Size (h x t) (mm) nom 100 x 20 splayed profile

Timber skirtings

Generally except where noted otherwise

Size (h x t) (mm) nom 100 x 20 splayed profile

- Timber species or group MDF or pine
- Fixing
  Masonry Fix to wall plugs
  Stud walls Fix to bottom plates
  Built up Sills Fix to timber packing

Plasterboard ceiling / wall junction

- RONDO P50 10mm shadowline stopping angle

Plasterboard ceiling and wall / window junction

- RONDO P13 stopping bead leaving 3-5mm open joint

27.4 SELECTIONS

27 4 1 PLASTERBOARD LININGS

PLASTERBOARD TYPE 1 (PBD1)
Standard to AS/NZS 2588

Location Where PB1 noted in INTERNAL FINISHES SCHEDULE or shown on drawings

Thickness 13mm

Mass 8 5kg/m2

Edge type Recessed

Joint type Flush

Level of finish 4 and smooth plumb surface free of texture irregularities and capable of sustaining a semi-gloss or low gloss paint finish

Trim Shadowline stopping bead at junctions

PLASTERBOARD TYPE 2 (PBD2) - Moisture Resistant
Standard to AS/NZS 2588

Location Where PB3 noted in INTERNAL FINISHES SCHEDULE or shown on drawings

Type Gypsum plasterboard with core, face and back liner treated to make it resistant to moisture and humidity Manufactured to meet the requirements of ASTM C630

Proprietary item CSR 'Aquachek'

Thickness 10mm

Mass 8 0kg/m2

Edge type Recessed

Joint type Flush

Level of finish 2 (where concealed) 4 (where visible) and smooth, plumb surface free of texture irregularities and capable of sustaining a semi-gloss or low gloss paint finish

FIBROUS CEMENT TYPE 1 (FC1)
Standard to AS/NZS 2588

Location Where FC1 noted in INTERNAL FINISHES SCHEDULE or shown on drawings

Proprietary item Equal to CSR Cemintel wallboard sheet

Thickness 6mm

Mass 13 5kg/m2

Edge type Recessed

Joint type Flush

Level of finish 2 (where concealed) 4 (where visible) and smooth, plumb surface free of texture irregularities and capable of sustaining a semi-gloss or low gloss paint finish

28 0 TIMBER FIXTURES

28 1 GENERAL

28 1 1 AIMS

Responsibilities

General Fabricate and install joinery items to backgrounds undamaged, plumb, level, straight and free of distortion and to the **Tolerances table**

Tolerances table

Property	Tolerance criteria
Plumb and level	1 mm in 800 mm
Offsets in flush adjoining surfaces	< 0 5 mm
Offsets in revealed adjoining surfaces	< 2 mm
Alignment of adjoining doors	< 0 5 mm
Difference in scribe thickness for joinery items centred between walls	< 2 mm
Doors centred in openings	zero

28 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Metal fixtures
- Miscellaneous Furniture

28 1 3 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Site erected assemblies on completion of erection, before covering up by cladding and encasing
- Surfaces prepared for, and immediately before, site applied finishes

28 1 4 SUBMISSIONS

Shop drawings

General Submit shop drawings to a scale not smaller than 1 50, showing

- Overall dimensions
- Materials, thicknesses and finishes of elements including doors, divisions, shelves and benches
- Type of construction including mitre joints and junctions of members
- Hardware type and location
- Temporary bracing, if required
- Procedures for shop and site assembly and fixing
- Locations of benchtop joints
- Locations of sanitary fixtures, stoves, ovens, sinks, and other items to be installed in the units
- Relationship of fixture to adjacent building elements
- Proposals for the break-up of large items as required for delivery to the site
- Proposed method of joining the modules of large items

28 2 PRODUCTS

28 2 1 JOINERY MATERIALS AND COMPONENTS

Joinery timber

Hardwood To AS 2796 3

Seasoned cypress pine To AS 1810

Softwood To AS 4785 3

Plywood
Interior use generally To AS/NZS 2270

Interior use, exposed to moisture To AS/NZS 2271

Grade general purpose

Wet processed fibreboard
Hardboard To AS/NZS 1859 4
- Classification Tempered (MR)

Particleboard
Standard To AS/NZS 1859 1
- Classification Moisture resistant (MR)

Melamine overlaid particleboard Particleboard overlaid on both sides with low pressure melamine

Dry-processed fibreboard (MDF)
Standard moisture resistant medium density fibreboard (MR MDF) To AS/NZS 1859 2

Melamine overlaid medium density fibreboard Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine

Decorative overlays
Standard To AS/NZS 1859 3

High-pressure decorative laminate sheets
Standard To AS/NZS 2924 1

Class	Definition	Typical applications
CG (S or F)	Compact general purpose	High performance self supporting vertical or horizontal surfaces
HD (S or F)	Horizontal heavy duty	High performance horizontal surfaces
HG (S For P)	Horizontal general purpose	General horizontal surfaces and high performance vertical surfaces
VG (S For P)	Vertical general purpose	General vertical surfaces and light duty horizontal surfaces
VL (S)	Vertical light duty	Light duty vertical surfaces

Thickness (minimum)
- For horizontal surfaces fixed to a continuous background 1 2 mm
- For vertical surfaces fixed to a continuous background 0 8 mm
- For post formed laminate fixed to a continuous background 0 8 mm
- For vertical surfaces fixed intermittently (e g to studs) 3 0 mm
- For edge strips 0 4 mm

28 2 2 JOINERY ITEMS

General
Provide materials noted on drawings as follows
- Joinery components and their location indicative construction details, scribes and trims, materials, dimensions and thicknesses, and finishes shall be as detailed
- All dimensions noted on drawings shall be confirmed on site after the completion of partitions and walls
- Hardware and equipment Major items shall be noted on drawings where they occur and all hardware and equipment items are noted in the Fixtures schedule

28 2 3 FURNITURE ASSEMBLIES GENERALLY

Standard
General To AS/NZS 4386 1

Plinths
Material Select from the following
- Exterior general purpose plywood
- High moisture resistant particleboard
- High moisture resistant medium density fibreboard

Thickness 16 mm

Fabrication Form up with front and back members and full height cross members at not more than 900 mm centres

Finish High-pressure decorative laminated sheet
- Class VG-S
- Type LAMINEX 'Premium grade'
- Pattern texture & colour as selected from full nationally stocked LAMINEX range for type
- Fasteners Conceal with finish

Installation Scribe to floor and secure to wall to provide level platform for carcasses

Carcasses

Material Select from the following
- Melamine overlaid high moisture resistant particleboard
- Melamine overlaid high moisture resistant medium density fibreboard

Thickness 16 mm

Joints Select from the following
- Proprietary mechanical connections
- Dowels and glue
- Screws and glue
- Proprietary joining plates and glue

Adjustable shelves Support on proprietary pins in holes bored at equal centres vertically
- Spacing 32 mm

Finish - Invisible surfaces shelving & internal division faces coloured melamine to match high pressure decorative laminated sheet

Finish - Visible surfaces Outside ends of fixtures High-pressure decorative laminated sheet
- Class VG-S
- Type LAMINEX Premium grade'
- Pattern, texture & colour as selected from full nationally stocked LAMINEX range for type
  Fasteners Conceal with finish

Installation Secure to walls at not more than 600 mm centres

Drawer fronts and doors

Material Select from the following
- Melamine overlaid high moisture resistant medium density fibreboard

Thickness 16 mm

Maximum door size 2400 mm high, 900 mm wide 1 5 m2 on face

Drawer fronts Route for drawer bottoms
- Type LAMINEX 'Premium grade'
- Pattern texture & colour as selected from full nationally stocked LAMINEX range for type

Drawer backs and sides

Material PVC film wrapped particleboard

Thickness 12 mm

Colour white

Installation Mitre corners leaving outer skin of foil intact, finish with butt joints, glue to form carcass and screw to drawer front Route for drawer bottoms

Drawer bottoms

Material PVC film laminated hardboard

PVC film faces 2

Thickness 3 mm

Colour white

Laminated benchtops

Material High moisture resistant particleboard

Benchtop thickness 33 mm

Finish High-pressure decorative laminated sheet
- Class HG-F
- Type LAMINEX Redback' Grade for post forming

- Pattern texture & colour as selected from full nationally stocked LAMINEX range for type Exposed edges Extend laminate over bullnosed edge, finishing > 50 mm back on underside Splay outside corners at 45°

Balance underside Laminate undersides of benchtops

Installation Scribe to walls Fix to carcass at least twice per 600 mm length of benchtop

Joint sealing Fill joint with chemical resistant sealant matching finish and clamp with proprietary mechanical connectors

28 2.4 HARDWARE

Hinges

Hinge types Concealed metal hinges with the following features
- Adjustable for height, side and depth location of door
- Self-closing action
- Hold open function - Angle of opening 90 deg
- Nickel-plated

Piano hinges Chrome plates steel, extending full height of doors

Drawer Slides

Slides Metal runners and plastic rollers with the following features
- 30 kg loading capacity
- Closure retention
- White thermoset powder coating

Location all cupboard drawers

Cupboard door handles

Type 76 x 8 mm dia steel 'D' handle with concealed screw fixings

Finish SCP

Location cupboard & drawer doors generally except where noted otherwise

Cupboard door lock

Latch Type LOCKWOOD 690 pin tumbler lock

Finish SCP

Location Install to
- cupboard doors as shown on drawings (Key alike)

28 3 EXECUTION

28 3 1 JOINERY

General

Joints Provide materials in single lengths whenever possible If joints are necessary make them over supports

Framing Frame and trim where necessary for openings, including those required by other trades

Accessories and trim

General Provide accessories and trim necessary to complete the installation

Fasteners

Visibility Do not provide visible fixings except in the following locations
- Inside cupboards and drawer units
- Inside open units in which case provide proprietary caps to conceal fixings

Visible fixings Where fastenings are unavoidable on visible joinery faces, sink the heads below the surface and fill the sinking flush with a material compatible with the surface finish In surfaces which are to have clear or tinted finish provide matching wood plugs showing face (not end) grain In surfaces which are to have melamine finish provide proprietary screws and caps finished to match

Fix joinery units to backgrounds as follows
- Floor mounted units 600 mm centres max
- Wall mounted units To each nogging and/or stud stiffener

Fixings Screws with washers into timber or steel framing, or masonry anchors

Adhesives
General Provide adhesives to transmit the loads imposed and to ensure the rigidity of the assembly, without causing discolouration of finished surfaces

Decorative laminated sheets Contact adhesive to AS 2131

Finishing
Junctions with structure Scribe benchtops, splashbacks ends of cupboards, kickboards and returns to follow the line of structure

Joints Scribe internal and mitre external joints

Edge strips Finish exposed edges of sheets with edge strips which match sheet faces

Sealing Seal all carcass junctions with walls and floors, and to cable entries with silicone beads for vermin proofing Apply chemical and water resistant sealants around all plumbing fixtures and ensure the sealants are fit for purpose Seal benchtops to backing walls with chemical and water resistant sealants

Labelling
General Permanently mark each unit of furniture with the manufacturer's name, on an interior surface

28 3 2 DELIVERY AND STORAGE

General
General Deliver joinery units to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected Do not store in areas of wet plaster Keep storage to a minimum by delivering items only when required for installation
Back prime surfaces concealed by backgrounds
Examine joinery units for completeness and remedy deficiencies

Acclimatisation
General Acclimatise the joinery items by stacking it in the in-service conditions with air circulation to all surfaces after the following construction operations are complete
- Airconditioning operational
- Lighting operational
- Site drainage and stormwater works are complete
- Space fully enclosed and secure
- Wet work complete and dry

Background
General Damp clean and vacuum background surfaces that will be permanently concealed

28 3 3 COMPLETION

Maintenance manual
General Submit manufacturer's published recommendations for service use

Cleaning
Temporary coatings On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection

General Remove all dust, marks and rubbish from all surfaces and internal spaces Clean and polish all self finished surfaces such as anodised and powdercoated metals, sanitaryware, glass, tiles and laminates

28 4 FIXTURES

28 4 1 PRACTICAL ACTIVITIES UNIT AND UNDER BENCH CUPBOARDS

Location & Size
CLASSROOM B – East wall [Nom 6200mm long x 600mm deep x 600mm high]

Assembly
To consist of bench unit doors intermediate divisions and adjustable shelf as shown on drawings
Allow for installation of sink as applicable

Fabrication with cupboard
Plinth Solid 100mm high concrete plinth

Carcase & shelving refer to FURNITURE ASSEMBLIES GENERALLY

Doors refer to FURNITURE ASSEMBLIES GENERALLY

Drawers refer to FURNITURE ASSEMBLIES GENERALLY

Benchtop refer to FURNITURE ASSEMBLIES GENERALLY

Requirements
- Provide cut out for sink

28 4 2 OVERHEAD CUPBOARD UNIT

Location
CLASSROOM B – East wall [Nom 3600mm long x 350mm deep x 600mm high]

Assembly
To consist of cupboard unit with cupboard doors, intermediate divisions and single adjustable shelf as shown on drawings

Fabrication

Carcase & shelving refer to FURNITURE ASSEMBLIES GENERALLY

Doors refer to FURNITURE ASSEMBLIES GENERALLY

28 4.3 OPEN SHELVING

Location
STORE 1 and 2

Size
Nom 2400mm high x 300/450/600mm deep shelves)

Layout

Shelving units on 100mm high plinth with equal vertical divisions at maximum 1100mm centres
Each division to have fixed top bottom and mid shelf and 4 off adjustable shelves

Plinths refer to FURNITURE ASSEMBLIES GENERALLY

Carcasses refer to FURNITURE ASSEMBLIES GENERALLY

Installation Secure to walls at not more than 600 mm centres

28.4 4 KITCHEN BENCH UNIT

Location
KITCHEN

Assembly
To consist of bench unit doors, intermediate divisions and adjustable shelf as shown on drawings
Allow for installation of sink as applicable

Fabrication with cupboard

Plinths As per FURNITURE ASSEMBLIES GENERALLY

Carcase & shelving refer to FURNITURE ASSEMBLIES GENERALLY

Doors refer to FURNITURE ASSEMBLIES GENERALLY

Drawers refer to FURNITURE ASSEMBLIES GENERALLY

Benchtop refer to FURNITURE ASSEMBLIES GENERALLY

Requirements
- Provide cut out for sink

28 4 5 OVERHEAD CUPBOARD UNIT

Location
KITCHEN – East wall [Nom 2400mm long x 350mm deep x 600mm high]

Assembly
To consist of cupboard unit with cupboard doors, intermediate divisions and single adjustable shelf as shown on drawings

Fabrication

Carcase & shelving refer to FURNITURE ASSEMBLIES GENERALLY

Doors refer to FURNITURE ASSEMBLIES GENERALLY

28 4.6 OPEN SHELVING

Location
KITCHEN – South wall [Nom 2800mm long x 600mm deep x 900mm high]

Assembly

Shelving units on 100mm high plinth with equal vertical divisions at maximum 1100mm centres Each division to have fixed top, bottom and mid shelf

Plinths refer to FURNITURE ASSEMBLIES GENERALLY

Carcasses refer to FURNITURE ASSEMBLIES GENERALLY

Benchtop refer to FURNITURE ASSEMBLIES GENERALLY

Installation Secure to walls at not more than 600 mm centres

28 4 7 CUPBOARD UNIT

Location
CLASSROOM C – West wall alcove [Nom 1400mm long x 600mm deep x 2100mm high]

Assembly
To consist of cupboard unit with cupboard doors, intermediate panel, kickplate and base single fixed shelf and 4 adjustable shelves

Fabrication

Plinths refer to FURNITURE ASSEMBLIES GENERALLY

Carcase & shelving refer to FURNITURE ASSEMBLIES GENERALLY

Doors refer to FURNITURE ASSEMBLIES GENERALLY

29 0 METALWORK

29 1 GENERAL

29 1 1 AIMS

Responsibilities

General Provide metal fixtures that are

- Undamaged, plumb, level and straight
- Free of surface defects or distortions

29 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Conform to the following

- Metals and prefinishes
- Timber fixtures
- Miscellaneous Furniture

29 1 3 SUBMISSIONS

Tests

Stainless steel Before fabrication commences, submit satisfactory evidence that relevant procedure test plates have passed the tests specified in AS/NZS 1554 6

Materials

Manufacturer's data Submit manufacturer's published product data including standard drawings and details

Stainless steel For each batch of stainless steel supplied to the works submit the certificate of compliance or test certificate specified in the applicable standard

29 2 PRODUCTS

29 2 1 MATERIALS AND COMPONENTS

Metals

Performance Provide metals suited to their required function, finish and method of fabrication, in sections of strength and stiffness adequate for their purpose

Copper alloys (brass, bronze, etc)

Composition and designations To AS 2738

Rivets

General Blind rivets where available in the required metal

Masonry anchors

General Proprietary types comprising screws or bolts in self-expanding sockets

Masonry plugs

General Screws in purpose-made resilient plastic sockets

29 3 EXECUTION

29 3 1 CONSTRUCTION GENERALLY

Aluminium structures

Standard To AS/NZS 1664 1 or AS/NZS 1664 2

Metals

Performance Provide metals so that they transmit the loads imposed and ensure the rigidity of the assembly without causing deflection or distortion of finished surfaces

Incompatible metals Separate using concealed layers of suitable materials in appropriate thicknesses

Fasteners

Performance Provide fasteners so that they do not cause galvanic corrosion

Materials Provide fasteners in materials of mechanical strength and corrosion resistance at least equal to that of the lowest resistant metal joined

To copper and copper alloys Provide copper or copper-alloy fixing devices only

To aluminium and aluminium alloys Provide aluminium alloy or non-magnetic stainless steel fixing devices only

To stainless steel Provide appropriate stainless steel materials only

Fabrication

Workshop Fabricate and pre-assemble items in the workshop wherever practicable

Edges and surfaces Keep clean, neat and free from burrs and indentations Remove sharp edges without excessive radiusing

Tube bends Form bends in tube without visibly deforming the cross section

Colour finished work Match colours of sheets, extrusions and heads of fasteners

Thermal movement Accommodate thermal movement in joints and fastenings

Fabrication tolerances

Structural work generally ± 2 mm from design dimensions

Joints

General Fit joints to an accuracy appropriate to the class of work Finish visible joints made by welding, brazing or soldering using grinding, buffing or other methods appropriate to the class of work, before further treatment

Self-finished metals Free of surface colour variations, after jointing

Joints Fit accurately to a fine hairline

Marking

General Provide suitable and sufficient marks or other means for identifying each member of site erected assemblies, and for their correct setting out, location, erection and connection Mark bolted connections to show the bolting category Do not mark stainless steel by notching

Splicing

General Provide structural members in single lengths

29 3 2 WELDING AND BRAZING

General

Quality Provide finished welds which are free of surface and internal cracks slag inclusion and porosity

Site welds Avoid site welding wherever possible If required locate site welds in positions for down hand welding

Butt weld quality level Not inferior to the appropriate level recommended in AS 1665 Appendix A

Brazing

General Ensure brazed joints have sufficient lap to provide a mechanically sound joint Do not used butt joints relying on the filler metal fillet only

29 3 3 STAINLESS STEEL FABRICATION

Welding stainless steel

Certification of welders To AS 1796

Riveting

General Riveting may be used only to join stainless steel sheet or strip less than 1 mm thick Drill (not punch) the rivet hole and drive the rivet cold On completion clean and passivate the riveted assembly

Soldering

General Do not solder stainless steel

29 3.4 METAL FIXTURES

General

General Provide metal fixtures noted on drawings as follows

- Components and their location, indicative construction details, scribes and trims, materials, dimensions and thicknesses and finishes shall be as detailed
- All dimensions noted on drawings shall be confirmed on site
- Finishes selections are noted in the Finishes schedule
- Hardware and equipment Major items shall be noted on drawings where they occur and all hardware and equipment items are noted in the FF&E schedule

29 4 FIXTURES & FITTINGS

29 4 1 STAIR AND RAMP HANDRAILS [HR1]

Location
External stairs and ramps Refer to the drawings

Fabrication
Form from a pair of nom 42 OD x 3 2 galvanised mild steel CHS curved and joined together at ends Weld 15mm dia support rods at spacings to match supports and galvanise after fabrication Support brackets welded to galvanised steel posts where provided Provide 8mm thick GMS circular plates for bolt fixing to masonry or timber

Provide chrome buttons to top and bottom of handrails in conformance with AS 1428 1

29 4 2 STAIR AND RAMP BALUSTRADES [BAL2, BAL3, BAL4]

Location
External stairs and ramps Refer to the drawings

Fabrication
Form from 50 x 50 mild steel RHS posts with 75 x 50 x 8 unequal angle top rail and 100 high x 10mm thick plate bottom kerb rail welded to posts BAL2 and BAL3 to be provided with 38 x 10 plate vertical rails at maximum 150mm centres welded to top and bottom rails Hot dip galvanise balustrades after fabrication in maximum lengths

Post Spacing at maximum 1500mm centres

Fixing Core drill concrete and epoxy grout finish

29 4 3 GRAB RAIL

Location
ACCESSIBLE WC – 1 off

Type
Fourty five degree skew angled tubular metal rail, bent twice with one welded intermediate wall bracket and pre drilled welded end flange plates
All fittings and installation must be in compliance with AS1428 1 -2001

Rail
- Nominal Size 38 mm OD Satin finish stainless steel AS 1449 - Type 304
- Height From Floor 810mm (top of rail)
- Horizontal Length 850 mm (nominal) x Skew Length 700 mm

Fabrication
Fully welded joins, grind and polish smooth

Fixing
Securely fix to wall through pre-drilled holes in flange plates Fixing screws/bolts are to be stainless steel and are to be supplied by the manufacturer including all accessories all fixed in accordance with the manufacturers recommendations

29 5 ACCESSIBLE LIFTS

Location	Where shown on the drawings
Description	Fully automatic, self operating mechanical screw drive lift Compliant with BCA 3 6 and AS 1735 16 Emergency battery [UPS] backup
Proprietary Item	Masterlifts Pty Ltd 'Contessa 2000 BCA'
Finishes & Fittings	Standard floor and ceiling finishes, Linished stainless steel wall cladding on MDF panels, Aluminium framed, laminated glass landing doors, Concealed hydraulic door closers

29 6 FENCES AND GATES

29 6 1 PALISADE FENCING

Location	Where shown on the drawings
Description	Nom 1800mm high powdercoated steel fencing
Proprietary Item	Equal to Colemans Fencing (Australia) Pty Ltd
Type	To match existing
Finish	To match existing
Gates	Pair 1200w x 1800h swing gates with barrel bolts to both leaves Provide welded eyelets at 1100mm above ground level for padlock by others

29 6 2 CHILDPROOF FENCING

Location	Where shown on the drawings
Description	Nom 1200mm high powdercoated steel fencing
Proprietary Item	Equal to Colemans Fencing (Australia) Pty Ltd
Type	To match palisade fencing
Finish	To match palisade fencing
Gates	Pair 1200w x 1200h swing gate with childproof magnetic latch mechanism

29 7 COMPLETION

Maintenance manual

General Submit manufacturer's published recommendations for service use

Cleaning

Temporary coatings On or before completion of the works, or before joining up to other surfaces remove all traces of temporary coatings used as a means of protection

30 0 MISCELLANEOUS FURNITURE

30 1 GENERAL

30 1 1 CROSS REFERENCES

General
General Conform to the General requirements worksection

Associated worksections
Conform to the following
- Timber fixtures
- Miscellaneous Furniture

30 2 PRODUCTS

30 2 1 HAZARDOUS MATERIALS

Fire hazard
General Do not provide materials which, when subject to fire conditions, will emit excessive smoke or dangerous fumes

30 2 2 MATERIALS

Steel tube
Surface
- For painted work Semi-bright
- For electroplated work Bright

Steel sheet
Surface finish
- For electroplating P (plating quality)
- For painting B (bright) or M (matt)

Stainless steel
Grade 316

Finish Surface finish 4 (general purpose polished)

Textile upholstery fabrics
Standard To AS 2687

Performance classification (minimum) 3

Wool and wool blend fabrics
- Woolmark/Woolblendmark Required

Flexible cellular polyurethane
Standard To AS 2281

Applications Generally as recommended in AS 2281 Appendix A

Decorative overlays
Standard To AS/NZS 1859 3

High-pressure decorative laminate sheets
Standard To AS/NZS 2924 1

Thickness (minimum)
- For horizontal surfaces fixed to a continuous background 1 2 mm
- For vertical surfaces fixed to a continuous background 0 8 mm
- For post formed laminate fixed to a continuous background 0 8 mm
- For vertical surfaces fixed intermittently (e g to studs) 3 0 mm
- For edge strips 0 4 mm

30 3 EXECUTION

30 3 1 WORKMANSHIP GENERALLY

Fabrics
Fabric surfacing Prepare and apply so that the finished surface is smooth and without irregularities

Fabric upholstery Make the front of the upholstered component in one piece between pipings, if any, with side joins at the rear or underside Fix with upholsterer's staples

Piping 3 mm diameter beads with core

30 4 BLINDS AND COVERINGS

30.4 1 WINDOW (HOLLAND) BLINDS

Location
Windows W02, W03, W04, W06, W07 Including door, W11, W12, W13, W14

Type
Opaque plasticised chain drive holland blind

Requirement
Blind fabric fire resistant to AS1530, Parts 2 and 3
Ball chain to finish 1200mm mm above floor level Where blinds are located over gas room heaters then both chain and blind to be sized to finish above the heater in accordance with the supply authority requirements
Blinds to be complete with brackets, fixing screws lath or aluminium rail chain drive units and ball chain Install drive units either on the left or right hand side in accordance with the superintendents instruction Allow two turns around top of roller on each blind over the size of the required drop
Provide each blind with a pocket along the bottom edge if using lath or sew spline to bottom edge if using aluminium rail Sew spline to top edge of fabric and fit spline into keyway in the roller tube
Wind fabric around the roller tube and fix with tape or adhesive at each end

- Extend rollers including pin 19 mm each side of blind fabric
- Width (preferred maximum) 1800 mm
- Drop (maximum in single drop) 2400 mm

Fabric
Proprietary item Luxaflex Twilight 100% Polyester

Colour as selected from standard range

Roller
Size 38 mm diameter tin plated or colour-bonded non-rusting steel with spline keyway

Brackets
Size Zinc plated or powdered coated white formed steel with a minimum thickness of 1 6 mm

Fixing 16g x 18 mm screws for fixing to timber or self-tapping metal screws for fixing to metal

Installation Accurately measure width of blinds **to ensure even overlap** of window frame as agreed on site with the Architect

Chain Operated Roller
Manufactured from fibre glass filled industrial grade nylon Idler end to have pin protruding from the end and to rotate on itself

Ball Chain Nylon cord with industrial grade nylon beads spaced at regular intervals to drive mechanism The chain is to incorporate a steel ball chain joiner to allow easy replacement and to act as a pre-set stop device to prevent blinds from being overwound

30 5 DISPLAY SURFACES

30 5 1 PINBOARDS [PIN]

Location
CLASSROOM A, B C & D where nominated PIN in Appendix A Internal Finishes Schedule

Height from floor to bottom edge Generally 300 mm

Height from floor to top edge Generally 2400mm above floor

Note

- Allow for all cut-outs in pinboards where electrical plates and electrical fixture controllers are located
- Generally keep pinboards 300mm clear of the lock stile of doors

Description
Commercial wall fabric facing bonded to a laminated polyethylene foam backing and adhered to a wallboard lining substrate (organic fibre board must not be used)

Proprietary item MELCOR "Noticeboard" on backing substrate

Thickness 8 5 to 10 mm

Colour as selected from standard range

Substrate
Description MR Medium density fibreboard

Thickness 5 0 mm

Early Fire Hazard Indices
Each layer of the pinboard wall lining material (e g facing fabric, foam and plywood substrate board) must comply with the indices shown below
Tested in accordance with AS 1530 3 by a NATA or a NATA accredited testing laboratory

Spread of flame Smoke developed
Not more than "9"
If more than "5 then not more than "8"

Manufacture
Requirement The bonding of the fabric faced foam backed product to the wallboard lining substrates must be undertaken by the manufacturer prior to delivery, bonding of the materials must not be done on site

Colouring Full thickness of the board

Installation
Fix the pinboard wall lining (includes fabric, foam & lining substrate) to the wall frame/masonry wall in accordance with the manufacturer's recommendations Where required fix through backing layer of plasterboard to wall frame

Joints Butt

Exposed edges Proprietary anodised aluminium angle or channel

30 5 2 RETRACTABLE PROJECTION SCREENS (PS)

Locations
CLASSROOM A – 1 off

Type
Proprietary extendible screen system for front projection, mounted on a spring-loaded roller so as to be fully retractable when not in use

Screens Flexible synthetic fabric, flame retardant and mildew resistant, presenting a flat plane surface when extended

Screen surfaces Textured to control the distribution of projected light evenly over a wide viewing angle

Finishes Metal components factory pre-finished by plating anodising, or a thermo set powder coating

Size (mm) 2100 mm wide x 1800 mm high (nominal)

Hanging types
A screen system extendable from a top roller suspended from proprietary hanging brackets fixed to the building structure, with provision for mechanical locking in the fully or partially extended pulldown positions Hanging brackets must enable projection screen to clear whiteboards

30 6 APPLIANCES TO BE SUPPLIED AND INSTALLED BY CONTRACTOR

30 6 1 INSTALLATION

General
Supply, install in accordance with manufacturers instructions and carry out operational testing of the items as specified in this subsection

30 6 2 HAND DRYER

Locations
ACCESS WC – 1 off

Type
Electric 240 volt 50Hz 10A hand dryer

Element 2400 watts, protected by thermal overload switch

Motor 2 pole, with permanently lubricated ball bearings

Timer 45 second cycle

Operation Push button

Housing Cast Aluminium or Zinc Die Cast, with heavy duty powdercoat white Finish

Mounting Height To Underside 900 mm

Proprietary Item equal to JD Macdonald Touchdry-SC

30 7 FIXTURES

30 7 1 DISPENSERS FOR TOILET PAPER

Location

ACCESSIBLE WC – 1 off
PUPIL TOILETS – 4 off

Single roll capacity SCP or SSS finish screw fixed to walls/doors using approved plugs

Standards All fittings and installation for Disabled units must be in compliance with AS1428 1

Proprietary item Efco 844

30 7 2 CLOTHES HOOK

Location
To back of doors in
ACCESSIBLE WC - 1 off

Standards
When clothes hook/s are to be installed in Accessible WC installation must be in compliance with AS1428 1 - 2001

Description
SSS or CP cast brass hat and coat hook screw fixed to wall in position to be nominated

30 7 3 DISPENSERS FOR PAPER TOWELS

Location
PUPIL TOILETS – 1 off
CLASSROOM B – 1 off located near Practical Activities trough
Proprietary item KIMBERLY-CLARK* Optimum Hand Towel Dispenser
Order code 4959
Colour White
Other features ABS plastic snaplock

30 8 COMPLETION

30 8 1 COMPLETION

Warranties
Submit the installer's warranty against defective workmanship or wrong installation

Maintenance manual
Submit the manufacturers'

- recommendations for service use, care and maintenance, and
- list of manufacturers and suppliers of replacement parts

31 0 EXTINGUISHERS AND BLANKETS

31 1 GENERAL

31 1 1 CROSS REFERENCES

General

General Conform to the General requirements worksection

31 1 2 AUTHORISED PRODUCTS

General

General Provide equipment listed in the SSL Register of Accredited Products – ActivFire register or fire protection equipment

31 2 PRODUCTS

31 2 1 EXTINGUISHERS

Standards

General Provide portable fire extinguishers and location signs as follows

- General requirements AS/NZS 1841 1
- Water AS/NZS 1841 2
- Wet chemical AS/NZS 1841 3
- Foam AS/NZS 1841 4
- Powder AS/NZS 1841 5
- Carbon dioxide AS/NZS 1841 6
- Non-rechargeable To AS/NZS 1841 8

Selection and location To AS 2444

StandardsMark Required

Fire extinguishers schedule

Location	Rating	Class of fire	Type of ext.	No Off
STORE 3	3A40B(E)	AB(E)	Dry Chem Powder	1
CLASSROOMS	10B(E)	B(E)	Carbon dioxide	4

31 3 EXECUTION

31 3 1 COMPLETION

Maintenance

Fire extinguishers To AS 1851 1

Fire blankets To AS 1851 1

32 0 SIGNS AND DISPLAY

32 1 GENERAL

32 1 1 AIMS

Responsibilities

General Provide signage systems to the **Selections**

32 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

32 1 3 STANDARDS

Signs

General Public information signs as applicable

- AS 2899 1 General information signs
- AS 2899 2 Water safety signs

Safety signs - design and use To AS 1319

Signs and graphics for disabled access AS 1428 Parts 1 and 2

32 1 4 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply

- Changeable plate systems Sign systems consisting of fixed plate holders to which may be attached or inserted removable interchangeable sign plates
- Variable room identification system Changeable plate systems incorporating fixed room numbers and removable name strips
- Changeable letter systems Sign systems consisting of display boards or holders into which can be inserted removable individual letters numbers, etc
- Illuminated signs Signs consisting of cabinets enclosing an illuminated source, lighting translucent face panels bearing the specified signage
- House signage Internal and external project specific signs
- Statutory signage Signs prescribed by the BCA and statutory authorities

32 1 5 SAMPLES

General

Materials Submit samples showing each colour and finish of exposed graphics materials and accessories If there is a range of colours and/or textures for a particular item submit samples showing the extremes and mean of the range

32 2 PRODUCTS

32 2 1 MATERIALS

Materials standards

Aluminium

- Plate for engraving Alloy and temper designation 6063-0
- For casting To AS 1874

Stainless steel Surface finish designation 4 (general purpose polished)

Plastics

- UPVC sheet Semi-rigid sheet
- Rigid cellular polystyrene To AS 1366 3, class VH for cut-out shapes

32 3 EXECUTION

32 3 1 WORKMANSHIP

Production

General Form graphics items accurately with clean, well defined edges or arises, free from blemishes

Engraving to two layer plastic laminate Lettering excavated to expose the lower laminate

Engraved and filled Lettering precision excavated and filled colouring material Clean faces of all filling material

Casting Produce shapes free of pits, scale blow holes or other defects, hand or machine finished if necessary

Laser cut Individual vinyl letters with self adhesive backing

Printed lettering Lettering and graphic images screen / digitally printed on
- Film with self adhesive backing
- Acrylic sheet
- Aluminium plate
- Stainless steel plate

Large format digital printing Lettering and graphic images screen printed film with self adhesive backing

Signwriting Lettering and graphic images hand painted direct to the background by a tradesman with recognised qualifications and demonstrated experience

Fabricated Three dimensional, formed as follows
- Laser cutting from solid material and hand finished as necessary
- Moulding Individual plastic hollow three dimensional characters and shapes formed by
  Injection moulding
  Vacuum forming
- Built-up individual shapes by fabricating the faces and edges from separate pieces neatly and securely joined

Installation

General Install signage level and plumb, securely mounted, with concealed theft-resistant fixings Fix self adhesive signs free of bubbles and creases

32 4 SELECTIONS

32 4.1 VARIABLE ROOM IDENTIFICATION SYSTEM

Location

Refer to DOOR AND HARDWARE SCHEDULE for text and location

Type

Changeable Plate System

Holder

Material Extruded aluminium
Finish Natural satin anodised to 10 microns (minimum)

Size Width of door x 32 mm

Fixing method Drill flat section in 3 places Glue and screw fix with 3 mm diameter countersunk screws

Sign plates

Type Engraved plates

Engraved Plates

Material Laminated plastic with contrasting coloured layers

Colour matte FORMICA aluminium with black text

Size (l x h x t) Door leaf width (less 30mm) x 30 mm high

Finish Depth of engraving sufficient to cut through top layer to reveal lower laminate

Characters
- Letter Height 12 mm
- Typeface Gill Sans Bold – (Case as indicated in DOORSET SCHEDULE)

Fixing Method Slide-in fit to holder To secure plate crimp one end of holder and apply "spot" of suitable waterproof adhesive, capable of being removed if required by breaking adhesive seal

32 4.2 SYMBOL SIGNS

General

Type A pictogram in reverse cut computer vinyl with raised tactile surface Colour to be in accordance with international standards

Fixing Self adhesive fixed to surface after application of final coat of paint

External Signs Silkscreened onto 1 mm thick marine aluminium and screw fixed to backing

Signage
- "Male" symbol
- "Female" symbol
- "Disabled Access symbol"

Locations Refer to DOOR AND HARDWARE SCHEDULE

Requirement provide tactile surface to face of sign in accordance with BCA D3 6 & AS 1428 1

32 4.3 OTHER SIGNS

Termite protection

Position Electrical Cupboard

Message to Indicate
- The method of protection
- The date of installation
- The life expectancy of a chemical barrier as listed on the National Registration Authority label
- The installer's recommendation for inspections

Letter size 12 point font

Sign type Laminated page(s)

Compliance BCA B1 3 (i)(ii), AS 3660 1 Appendix C or D as appropriate

33 0 PLASTERING

33 1 GENERAL

33 1 1 AIMS

Responsibilities

General Provide plaster finishes as follows

- Resistant to impacts expected in use
- Free of irregularities
- Consistent in texture and finish
- Firmly bonded to substrates for the expected life of the application
- As a suitable substrate for the nominated final finish

Selections Conform to the **Selections**

33 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Brick and block construction
- Ceramic tiling

33 1 3 INTERPRETATION

Abbreviations

General For the purpose to this worksection the abbreviations given below apply

- CRF Cement render – finish
- CRM Cement render – medium
- CRS Cement render – stronger
- CRW Cement render – weaker
- GPF Gypsum plaster – finish

Definitions

General For the purposes of this worksection the definitions given below apply

- Plastering The process of coating the framing or solid surfaces of a building with a plastic material which hardens and then may be decorated or remain self-finished
- Substrate The surface to which a material or product is applied
- Base coat A plaster coat applied prior to the application of the finish coat
- Bonding treatment A treatment of a substrate which improves adhesion of a plaster system
- Finish coat The final coat of a multi-coat plaster system which may receive decoration or receive finishing treatment, including terms as follows

  Bedding coat

  Hardwall plaster

  Setting coat

  Skim coat

  Whiteset plaster

- Finishing treatment The treatment applied to a finish coat which may include processes and results as follows

  Wood float The plaster is laid on with a trowel and finished with a dry wood float as soon as the wet sheen has disappeared from the surface

  Sponge The plaster is laid on thinly with a trowel, floated up with a wood float and lightly finished with a sponge

  Smooth (dado) finish Cement based plaster is laid on with a trowel skimmed with a float and trowelled down The surface is trowelled to a smooth, dense finish as the plaster stiffens No water is applied during trowelling

Ornamental Patterned surfaces achieved by working the hardening plaster with a trowel or other tool

Sprayed Textured surfaces achieved by projecting plaster onto a substrate using a purpose-designed machine also known as 'tyrolean'

Stippled Textured surfaces achieved by working the hardening plaster with a stiff brush

Thrown Rough surfaces achieved by throwing plaster onto a substrate or pebbles onto a plastic plaster base

- Control joints Includes isolation joints construction joints and crack control joints
- Plaster A mixture of binders, aggregate and water which are applied to substrates in a plastic state and dry and cure to a hard surface which may subsequently be decorated

  Cement Plaster containing Portland cement as the principal binder

  Gypsum Plaster containing hydrated or anhydrous calcium sulphate as the principal binder
- Plastering system One or more coats of plaster and associated treatments comprising some or all of the following in sequence

  Base coat 1 or 2

  Bonding treatment

  Finish coat

  Finishing treatment
- Render rendering Plaster plastering, usually single coat and usually cement lime sand

33 1 4 INSPECTION

Notice

Inspection Give notice so inspection may be made of the following

- Prototypes ready for inspection
- Substrates immediately before applying base coats
- Finish treatments before decoration

33 2 PRODUCTS

33 2 1 MATERIALS AND COMPONENTS

Accessories

Beads To be metal proprietary sections manufactured to be fixed to substrates and/or embedded in the plaster to form and protect plaster edges and junctions

Lath To be a proprietary product manufactured from raised expanded metal for use with plaster

- Mass/unit area ≥ 1 84 kg/m^2
- Material thickness ≥ 0 70 mm
- Mesh size 9 5 x 28 6 mm

Metallic-coatings For beads or lath in cement plaster To the **Corrosion resistance and durability table**

Admixtures

Plasticizers or workability agents Do not use in cement plasters

Aggregates

Sand To be fine, sharp, well-graded sand with a clay content between 1% and 5%, and free from efflorescing salts

Bush sand is not acceptable and must not be used

Sand grading for base coat plaster To the **Sand gradation table**

Sand gradation table

Sieve size	Percent passing	
	Minimum	Maximum
4 75 mm	100	100
2 36 mm	90	100
1 18 mm	60	90
600 µm	35	70
300 µm	10	30

Sieve size	Percent passing	
	Minimum	Maximum
150 µm	0	5
75 µm	0	3

Plaster for autoclaved aerated concrete
General To be a proprietary product manufactured for use with the wall system

Bonding products
General To be proprietary products manufactured for bonding cement-based plaster to solid substrates

Cement
Standard To AS 3972
- Type GP

Colouring products
General To be proprietary products manufactured for colouring cement plaster
Integral pigment proportion ≤ 5% by mass of cement

Cornice cement
General To be a proprietary product manufactured for use with the cornice

Cornices
Cast plaster Proprietary item

Corrosion resistance and durability
General Conform to the **Corrosion resistance and durability table** or proprietary products with metallic and/or organic coatings of equivalent corrosion resistance

Corrosion resistance and durability table– Medium corrosivity category

Situation	Metal lath, beads and embedded items	Minimum cement content (mix type) above damp-proof course
Internal	Galvanize after fabrication 300 g/m^2 Metallic-coated sheet Z275/AZ150	CRW
External	Stainless 316 Powder-coated aluminium	CRM

Curing products
General To be proprietary products manufactured for use with the plaster system

Gypsum plaster
General To be a proprietary product containing calcium sulphate hemihydrate with additives to modify setting

Lime
Limes for building To AS 1672 1

Lime putty
General Prepare lime putty as follows
- Stand dry hydrate of lime to AS/NZS 1672 1 and water for 24 hours or more without drying out
- Stand quicklime and water for 14 days or more without drying out

Metal lath Expanded metal to AS 1397

Mixes
General Select a mix ratio to suit the conditions of application in conformity to the **Mixes table**
Measurement Measure binders and sand by volume using buckets or boxes Do not allow sand to bulk by absorption of water
Plaster mixing Machine mix ≥ 3 < 6 minutes
Strength of successive coats Ensure successive coats are no richer in binder than the coat to which they are applied

Mixes table – Cement render

Mix type		Substrate	Upper and lower limits of proportions by volume		
			Cement	Lime	Sand
Single or multi-coat systems with integral finishing treatments Base coats in multi-coat systems with cement or gypsum finishes	CRS	Dense and smooth concrete and masonry	1 1	0 0 5	3 4 5
	CRM	Regular clay or concrete masonry	1 1	0 5 1	4 5 6
	CRW	Lightweight concrete masonry and other weak substrates	1 1	1 2	6 9
Second coat - Internal	CRF	Cement render base coats	1 1	1 2	6 9
Second coat - External	CRF	Cement render base coats	1 1	1 2	5 6

Mix table – Gypsum finish coat, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume			
			Gypsum	Cement	Lime putty	Sand
Gypsum finish coats	GPF	Cement render base coats	1 1	- -	1 5 2	- -

Mix table – Gypsum finish coat, by weight

Gypsum plaster (kg)	Lime putty (kg)
17	25
34	50
51	75

Control joint products

General To be proprietary products manufactured for use with the plastering system and to accommodate the anticipated movement of the substrates and/or the plaster

Water

General To be clean and free from any deleterious matter

33 3 EXECUTION

33 3 1 PREPARATION

Substrates

General Ensure substrates have

- Any deposit or finish which may impair adhesion of plaster cleaned off
- If framed or discontinuous, support members in full lengths without splicing
- If solid or continuous, excessive projections hacked off and voids and hollows filled with plaster stronger than the first coat and not weaker than the substrate

Absorbent substrates If suction is excessive control it by dampening but avoid over-wetting and do not plaster substrates showing surface moisture

Dense concrete If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 2 mm of the laitance and expose the aggregate then apply a bonding treatment

Painted surfaces Remove paint and hack the surface at close intervals

Untrue substrates If the substrate is not sufficiently true to ensure conformity with the thickness limits for the plaster system or has excessively uneven suction resulting from variations in the composition of the substrate apply additional coats without exceeding the thickness limits for the substrate or system

Beads
Location Fix beads as follows
- Angle beads At all external corners
- Drip beads At all lower terminations of external plaster
- Movement control beads At all movement control joints
- Stop beads At all terminations of plaster and junctions with other materials or plaster systems

Joints in beads Use dowels to maintain alignment
Mechanical fixing to substrate ≤ 300 mm centres

Bonding treatment
General If bonding treatment is required, throw a wet mix onto the substrate as follows
- Cement plaster 1 part cement to 2 parts sand
- Gypsum plaster 1 part gypsum to 2 parts sand

Curing Keep continuously moist for ≥ 5 days and allow to dry before applying plaster coats
Thickness From ≥ 3 < 6 mm

Embedded items
General If there are water pipes and other embedded items sheath them to permit thermal movement Ensure embedded items conform to the **Corrosion resistance and durability table**

Lath
Location
- Chases If chases or recesses are 50 mm wide or greater, fix metal lath extending ≥ 75 mm beyond each side of the chase or recess
- Metal and other non-porous substrates Fix metal lath to provide a key

Installation
- General Run the long way of the mesh across supports with strands sloping downwards and inwards from the intended face of the plaster
- Fixing Mechanically fix at centres of 150 mm or less
- Laps Tie with 1 25 mm galvanized wire ≤ 150 mm Do not stop edges of sheets at corners but bend around
- On solid substrates Space the lath 5 mm or more clear of the substrate
- Support spacing ≤ 400 mm

33 3 2 APPLICATION

Plastering
Base coats Scratch-comb each base coat in two directions when it has stiffened
Metal lath Press the plaster through the apertures of expanded metal lath and wings of beads

Finishing treatments
Plain
- Bag To be a finish mainly free from sand by rubbing the finish coat with a Hessian pad when it has set firm
- Carborundum stone To be a smooth finish free from sand by, rubbing the finish coat with a fine carborundum stone when it has set hard
- Foam float To be an even surface by a wood or plastic floating the finish coat on application and finishing with a foam float to a fine sand textured finish
- Steel trowel To be a smooth dense surface by steel trowelling which is not glass-like and is free from shrinkage cracks and crazing
- Wood or plastic float To be an even surface by wood or plastic floating the finish coat on application

Incidental work
General Return plaster into reveals, beads sills recesses and niches Plaster faces, ends, and soffits of projections in the substrate, such as string courses, sills, pilasters and corbels Run throating on soffits of external projections neatly finished Trim around openings Plaster exposed inside of built-in cupboards

Joining up
General If joining up is required, ensure joints will be imperceptible in the finished work after decoration

Control joints
General Provide joints in the finish to coincide with control joints in the substrate Ensure that the joint in the substrate is not bridged during plastering
- Depth Extend the joint right through the plaster and reinforcement to the substrate
- Width 3 mm, or the same width as the substrate joint, whichever is greater

Damp-proof courses Do not continue plaster across damp-proof courses
Plastering on metal lath Provide movement joints to divide the plastering area into rectangular panels ≤ 10 m^2
V-joints Provide V-joints, cut right through the plaster to the substrate at the following locations
- Abutments with metal door frames
- Abutments with other finishes
- Junctions between different substrates

Plaster thickness
General Conform to the **Plaster thickness table**

Plaster thickness table

Substrate	Cement render, total thickness of single or multi-coat work (mm)	Gypsum/lime plaster (mm)
Dense concrete walls	15 max	3 max
Dense concrete ceilings	9 max	3 max
Brickwork and blockwork	12 min	3 max
Lightweight concrete and blocks	12 min	3 max
Metal lath measured from the face of the lath	18 min	3 max

Temperature
General If the ambient temperature is ≤ 10°C or ≥ 30°C ensure that the temperature of mixes, substrates and reinforcement are at the time of application, ≥ 5°C or ≤ 35°C

33 3 3 TOLERANCES

General
Tolerances Conform to the **Tolerances table**

Tolerances table

Description	Alignment	Tolerance
Walls and other vertical structures	Vertical	6 mm in 2400 mm
Reveals sides	Vertical	3 mm in 1800 mm
Reveals head up to 1800 mm	Horizontal	3 mm in 1800 mm
Reveals head over 1800 mm	Horizontal	5 mm max
Reveals piers, beams, wall stop ends and the like up to 300 mm	Square	3 mm max
Reveals, piers beams, wall stop ends and the like over 300 mm	Square	5 mm max
Radius of corners	Round	Should not vary by more than ± 10% over the length of the arris

33 4 COMPLETION

Cornices

General Accurately cut and mitre corners Match and align ornament Unless required or full lengths are not available, do not make butt joints in the length of a cornice

Installation Butter edges, mitres and joins for the full length of the cornice with adhesive

Mechanical fixing If projection across ceiling ≥ 400 mm, provide additional mechanical fixing

- Fixing centres ≤ 600 mm

Curing

General Prevent premature or uneven drying out and protect from the sun and wind

Keeping moist If a proprietary curing agent is not used, keep the plaster moist as follows

- Base coats and single coat systems Keep continuously moist for 2 days and allow to dry for 5 days before applying further plaster coats

Finish coats Keep continuously moist for 2 days

34 0 WATERPROOFING – WET AREAS

34 1 GENERAL

34 1 1 AIMS

Responsibilities

General Provide wet area waterproofing systems which

- Are graded to floor wastes to dispose of water without ponding
- Prevent moisture entering the substrate or adjacent areas

Selections Conform to the **Selections**

34 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Ceramic Tiling

34 1 3 STANDARDS

Wet areas

Standard To AS 3740

34 1 4 INTERPRETATIONS

Definitions

General For the purposes of this worksection the definitions given below apply

- Bond breaker A system preventing the membrane bonding to the substrate, bedding or lining
- Membranes Impervious barriers to liquid water which may be
  - Installed below floor finishes
  - Installed behind the wall sheeting or render and termed External
  - Installed to the face of the wall sheeting or render and termed Internal
  - Liquid applied in liquid or gel form and air cured to form a seamless film
  - Sheet in sheet form with joints lapped and sealed
- Waterproof The property of a material that does not allow moisture to penetrate through it
- Waterproofing systems Combinations of membranes, flashings, drainage and accessories which form waterproof barriers and which may be
  - Loose-laid
  - Bonded to backgrounds
- Water resistant The property of a material that restricts moisture movement and will not degrade under conditions of moisture
- Wet area An area within a building supplied with a floor waste and/ or drained to a urinal

34 1 5 INSPECTION

Notice

Inspection Give sufficient notice so inspection may be made of the following

- Substrate preparation completed
- Secondary layers preparation completed
- Before membranes are covered up or concealed

34 2 PRODUCTS

34 2 1 PRODUCTS

Membranes

Standard To AS/NZS 4858

Membrane systems

General To be a proprietary membrane systems having one of the following stating that the system is suitable for the intended external waterproofing, as follows

- A current Australian Building Product and Systems Certification Scheme certificate issued by ABCB (Australian Building Codes Board)
- A current appraisal report issued by either CSIRO Building Products and Systems Appraisals
- A current BRANZ report

34 3 EXECUTION

34 3 1 PREPARATION

General

Prepare backgrounds as follows

- Fill all cracks in backgrounds wider than 1 5 mm with a filler compatible with the membrane system
- Fill voids and hollows in concrete backgrounds with a concrete mix not stronger than the background
- Remove excessive projections
- Remove deleterious and loose material
- Leave the surface clean and dust free

Moisture content

Concrete backgrounds Cure for > 21 days

Moisture content Verify that the moisture content of the background is compatible with the water vapour transmission rate of the membrane system by testing to AS/NZS 2455 Appendix B

- Hygrometer test Seal a hygrometer to the background for > 16 hours and measure the relative humidity of the air between the instrument and the slab
- Electrical resistance test Connect a resistance meter to the slab and read the moisture content

Falls

General Verify that falls in backgrounds are < 1 5°

Joints and fillets

Internal corners Provide 45° fillets

External corners Round or arris edges

Movement control joints Prepare all background joints to suit the membrane system

Priming

General If required, prime the backgrounds with compatible primers to ensure adhesion of membrane systems

34.3 2 APPLICATION

Protection

General Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage

Drains

Floor wastes Turn membrane down onto the floor waste puddle flanges and adhere

Hobs

General Extend membrane over the hob and into the room at least 50 mm For hobless showers extend 1800 mm into the room

Sheet joints

Bituminous sheet membranes

- Side laps > 50 mm
- End laps > 100 mm

Synthetic rubber membranes

- Factory–vulcanized laps > 40 mm
- Field side laps > 50 mm for side laps
- Field end-laps > 100 mm for end laps

PVC membranes

- Factory welded laps > 30 mm
- Field–welded laps
- If used over insulation boards > 100 mm
- Other instances > 75 mm overlaps in other instances

Curing of liquid applied systems

General To the manufacturers instructions

Curing Allow membrane to fully cure before tiling

Movement control joints
General Locate over movement control joints in the substructure

Fillets and bond breakers If movement between substrates is expected provide of sufficient dimension to allow the membrane to accommodate the movement

Bonded membranes Carry movement joints in the substrate through to and into the surface finish

Membrane terminations
Edge protection Provide > 100 mm upturns

Anchoring Secure sheet membranes along the top edge

Edge protection Protect edges of the membrane

Waterproofing above terminations Waterproof the structure above the termination to prevent moisture entry behind the membrane using tiler's angle and finish overlaps

Membrane vertical penetrations
Pipes, ducts, and vents Provide separate sleeves for all pipes, ducts, and vents and have fixed to the substrate

Membrane horizontal penetrations
Sleeves Provide a flexible flange for all penetrations, bonded to the penetration and to the membrane

Membrane about doors and windows
General Install membrane prior to the fixing of door or window frames

Overlaying finishes on membranes
Compatibility If a membrane is to be overlayed with another system such as tiles, pavers, provide an overlaying system that is compatible with and not cause damage to the membrane

Bonded or partially bonded systems If the topping or bedding mortar requires to be bonded to the membrane provide sufficient movement joints in the topping or bedding mortar to reduce the movement over the membrane

Flood test
Application Perform a flood test prior to the installation of surface finishes

Set-up
- Measure for dryness the wall/floor junction of adjacent spaces the slab soffit below using the hygrometer test method
- Record the result for each area
- Dam the doorway(s) and seal floor wastes and drainage outlets to allow 50 mm water level
- Fill space with clean water and leave overnight

Evaluation
- Make a visual inspection of the wall/floor junction of adjacent spaces and of the slab soffit below for obvious water or moisture
- Test the same areas for dryness using the hygrometer test method, and compare the results to the measurements taken prior to flooding

Compliance
- Evidence of water from the visual test Failure
- No visual evidence of water Proceed with the hygrometer test
- Increase in test results before and after flooding Failure

34.4 SELECTIONS

34 4 1 LIQUID MEMBRANE SYSTEMS

Location

- Under ceramic floor tiles and behind ceramic wall tiles in Wet Areas (refer to definitions)
- ACCESSIBLE WCs and PUPIL TOILETS

Description

Type proprietary liquid applied water proofing system

Material Acrylic polymer with microfibre reinforcement

Thickness Three coats for a minimum dry film thickness of 1 5mm

Proprietary Item ARDEX Australia Pty Ltd 'Superflex' Two Part Bathroom and Balcony

- First coat Ardex WPM 265 (Sheltercoat water based primer) - 6 0m^2/litre
- Second coat Ardex WPM 002 Superflex Two Part Bathroom & Balcony - 1 0m^2/litre
- Third coat Ardex WPM 002 Superflex Two Part Bathroom & Balcony - 1 0m^2/litre

Installation

Install to manufacturer's recommendations for the substrate, surface, finish and application

Applicators Use only suitable qualified applicators

Walls Minimum 100mm upturn at walls behind tiled skirtings

Floor Wastes Turn Membrane down onto the floor waste puddle flanges and adhere

35 0 CERAMIC TILING

35 1 GENERAL

35 1 1 AIMS

Responsibilities

General Provide tiling systems to walls floors and other substrates as follows and/or to the

Selections

- Consistent in colour and finish
- Firmly bonded to substrates for the expected life of the installation
- Resistant to expected impacts in use
- Set out with joints accurately aligned in both directions and wall tiling joints level and plum
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas

35 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

Associated worksections

Associated worksections Conform to the following

- Waterproofing – wet areas for wet area membranes
- Plastering – for substrate application
- Lining – for substrate installation

35 1 3 INSPECTION

Notice

Inspection Give sufficient notice so that inspection may be made of the following

- Substrate immediately before tiling
- Control joints before sealing and grouting

35 1 4 TOLERANCES

Completed tiling

Conform to the **Tolerances table**

Tolerances table

Property	Tolerance criteria
Alignment Deviation of the finished tiles from a 3 m straight edge laid against any joints	< 3 mm
Flatness Deviation of any plane surface under a 3 m straight edge laid in any direction on an area of uniform grade	< 3 mm

35 2 PRODUCTS

35 2 1 TILES AND ACCESSORIES

Tiles

Standard To AS 4662

Tactile ground surface indicators To AS/NZS 1428 4

Coves, nosings and skirtings To be matching stop-end and internal and external angle tiles moulded for that purpose

Exposed edges To be purpose-made border tiles with the exposed edge (whether round, square or cushion) glazed to match the tile face If such tiles are not available mitre tiles on external corners

Coves, nosings and skirtings

General Provide matching stop ends and internal and external angle tiles moulded for that purpose

35 2 2 ADHESIVES

General

Standard To AS 2358 or AS 4992 1(Int)

Type

General Provide adhesives to the **Wall tiling schedule** and to the **Floor tiling schedule** and compatible with the materials and surfaces to be adhered

Prohibited uses Do not provide the following combinations

- Cement-based adhesives on wood, metal, painted or glazed surfaces, gypsum-based plaster
- Organic solvent-based adhesives on painted surfaces
- Organic PVC-based adhesives and organic natural rubber latex adhesives in damp or wet conditions
- PVA (polyvinyl acetate) based adhesives in wet areas or externally

35 2 3 MORTAR

Materials

Cement type to AS 3972 GP

- White cement Iron salts content ≤ 1%
- Off-white cement Iron salts content ≤ 2 5%

Lime To AS 1672 1

Sand Fine aggregate with a low clay content selected for grading, sharp and free from efflorescing salts

Water To AS 3958 1

Measurement of volume Measure binders and sand by volume using buckets or boxes Do not allow sand to bulk by absorption of water

Bedding mortar

Proportioning Select proportions from the range 1 3 – 1 4 cement sand to obtain satisfactory adhesion Provide minimum water

Terra cotta tiles Use proprietary polymer modified mortar

Mixing To AS 3958 1

Water

General To be clean and free from any deleterious matter

35 2 4 GROUT

Type

Cement based proprietary grout Mix with water Fine sand may be added as a filler in wider joints

Terra cotta tiles Use proprietary polymer modified grout

Portland cement based grout Mix with fine sand Provide minimum water consistent with workability

- For joints < 3 mm 1 cement 2 sand
- For joints ≥ 3 mm 1 cement 3 sand

Pigments

Pigments for coloured grout Provide colourfast fillers compatible with the grout material For cement-based grouts provide lime-proof natural or synthetic metallic oxides compatible with cement

35 3 EXECUTION

35 3 1 SUBSTRATES

Drying and shrinkage

General Before tiling allow at least the following times to elapse (for initial drying out and shrinkage) for these substrates

- Concrete slabs 42 days
- Concrete blockwork 28 days
- Toppings on slabs and rendering on blockwork A further 21 days

35 3 2 PREPARATION

Ambient temperature

General If the ambient temperature is < 5 or > 35°C do not lay tiles

Substrates

General Ensure substrates are as follows

- Clean and free of any deposit or finish which may impair adhesion or location of tiles
- If framed or discontinuous support members are in full lengths without splicing
- If solid or continuous, excessive projections are hacked off and voids and hollows are filled with a cement sand mix not stronger than the substrate nor weaker than the bedding

Absorbent substrates If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture

Dense concrete If not sufficiently rough to provide a mechanical key, roughen by scabbling or the like to remove 3 mm of the surface and expose the aggregate, then apply a bonding treatment

35 3 3 TILING GENERALLY

Sequence

General Fix wall tiles before floor tiles

Cutting and laying

Cutting Cut tiles neatly to fit around fixtures and fittings and at margins where necessary Drill holes without damaging tile faces Cut recesses for fittings such as soapholders Rub edges smooth without chipping

Laying Return tiles into sills, reveals and openings Butt up to returns, frames, fittings, and other finishes Strike and point up beds where exposed Remove tile spacers before grouting

Variations

General Distribute variations in hue colour, or pattern uniformly by mixing tiles or tile batches before laying

Protection

Floor tiles Keep traffic off floor tiles until the bedding has set and attained its working strength

Cleaning Keep the work clean as it proceeds and protect finished work from damage

35.3.4 SETTING OUT

Tile joints

Joint widths Set out tiles to give uniform joint widths within the following limits

- Floors
  - Dry pressed tiles 3 mm
  - Extruded tiles 6 mm
  - Vitrified 3 to 5 mm
  - Quarry tiles 6 to 12 mm
  - Chemical resistant epoxy jointed tiling 5 to 6 mm
- Large and/or irregular floor tiles 6 to 12 mm
- Mounted mosaics To match mounting pattern
- Walls
  - Dry pressed tile 1 5 mm
  - Extruded tile 6 mm

Margins

General Provide whole or purpose-made tiles at margins where practicable, otherwise set out to give equal margins of cut tiles If margins less than half tile width are unavoidable, locate the cut tiles where they are least conspicuous

Fixtures

General If possible position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or on the centre lines of tiles Continue tiling fully behind fixtures which are not built in to the tiling surface Before tiling ensure that fixtures interrupting the tile surfaces are accurately positioned in their designed or optimum locations relative to the tile layout

35 3 5 FALLS AND LEVELS

Grading

General Grade floor tiling to even and correct falls to floor wastes and elsewhere as required

Make level junctions with walls Where falls are not required lay level

Fall, general 1 100 minimum

Fall in shower areas 1 60 minimum

35 3 6 BEDDING

Preparation of tiles

Adhesive bedding Fix tiles dry do not soak

Mortar bedding Soak porous tiles in water for half an hour and then drain until the surface water has disappeared

Terra cotta tiles Use pre sealed tiles or apply a breathable sealer and lay dry If a final sealed finish is selected, use a compatible laying sealer

Bedding

General Use bedding methods and materials which are appropriate to the tile, the substrate, the conditions of service and which leave the tile firmly and solidly bedded in the bedding material and adhered to the substrate Form falls integral with the substrate

Thin adhesive beds

General Provide only if the substrate deviation is less than 3 mm when tested with a 3 m straight edge Cover the entire tile back with adhesive when the tile is bedded

Thickness 1 5 – 3 mm

Thick adhesive beds

General Provide on substrates with deviations up to 6 mm when tested with a 3 m straight edge, and with tiles having deep keys or frogs

Nominal thickness 6 mm

Adhesive bedding application

General Apply adhesive by notched trowel to walls and floors and direct to tiles if required, to provide evenly distributed coverage after laying as follows

- Domestic internal walls > 70%
- Domestic internal floors > 80%
- Other wall and floors > 90%
- Wet areas and bench tops 100%

Pattern of distribution of adhesive As illustrated in AS 3958 1 Verify by examining one tile in ten as work proceeds

Wall tile spacers Do not use spacer types that inhibit the distribution of adhesive

Curing Allow the adhesive to cure for the period nominated by the manufacturer prior to grouting or allowing foot traffic

Mortar beds

For floor tiles Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, or cement-based thin bed adhesive, on to the tile back Do not provide mortar after initial set has occurred

- Nominal thickness 20 to 40 mm

Thick reinforced beds Place mortar bed in two layers, and incorporate the mesh reinforcement in the first layer

35 3 7 MOVEMENT JOINTS

General

General Provide movement joints to as follows

Location

- Over structural (isolation contraction, expansion) joints
- At internal corners
- Close to external corners in large tiled areas
- Around the perimeter of the floor
- At junctions between different substrates
- To divide large tiled areas into bays maximum 5 m wide, maximum 16 m_2

- At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated
- At changes in substrate

Depth of joint Right through to the substrate

Sealant width 6 – 25 mm

Depth of elastomeric sealant One half the joint width, or 6 mm, whichever is the greater

Movement joint materials

Divider strip A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying Set flush with the finished surface

Proprietary slide plate divider strip An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges

Sealant Two-pack self-levelling non-hardening mould resistant, one-part silicone or polyurethane sealant applied over a backing rod Finish flush with the tile surface

- Floors Trafficable, shore hardness > 35

Backing rod Compressible closed cell polyethylene foam with a bond-breaking surface

35 3 8 GROUTED AND CAULKED JOINTS

Grouted joints

General Commence grouting as soon as practicable after bedding has set Clean out joints as necessary before grouting

Face grouting Fill the joints solid and tool flush Clean off surplus grout Wash down when the grout has set When grout is dry, polish the surface with a clean cloth

Edges of tiles Grout exposed edge joints

Epoxy grouted joints Ensure that tile edge surfaces are free of extraneous matter such as cement films or wax, before grouting

Caulked joints

General Provide caulked joints filled with sealant and finished flush with the tile surface as follows

- Where tiling is cut around sanitary fixtures
- Around fixtures interrupting the tile surface, for example pipes, brackets, bolts and nibs
- At junctions with elements such as window and door frames and built-in cupboards

Width 5 mm

Depth Equal to the tile thickness

35 3 9 JOINT ACCESSORIES

Floor finish dividers

General Finish tiled floors at junctions with differing floor finishes with a corrosion resistant metal dividing strip suitably fixed to the substrate with top edge flush with the finished floor Where changes of floor finish occur at doorways make the junction directly below the closed door

Type 3mm thick aluminium bar or angle

Weather bars

General Provide a corrosion resistant metal weather bar under hinged external doors Locate under the centres of closed doors

Type 3mm thick aluminium bar or angle

35 3 10 COMPLETION

Spare tiles

General Supply spare matching tiles and accessories of each type for future replacement purposes Store the spare materials on site

Quantity At least 1% of the quantity installed

Storage location Hand to school maintenance staff

Cleaning

General Clean tiled surfaces using an appropriate tile cleaning agent and polish

Operation and maintenance manuals

General Submit a manual describing care and maintenance of the tiling, including procedures for maintaining the slip-resistance grading stating the expected life of the slip-resistance grade

35.4 SELECTIONS

35 4 1 SCHEDULES

Wall tiling schedule

Designation	WCT
Location	Where shown on drawings and/or scheduled in INTERNAL FINISHES SCHEDULE
Tile type	Ceramic wall tile
Proprietary item	JOHNSON Waringa'
Size (mm)	100 x 100
Colour	Allow for two colours as selected from full range
Surface	Gloss
Bedding	Thin bed adhesive(Suitable for the background and as recommended by the tile manufacturer)
Tile or bond pattern	Stack
Grout	White cement based proprietary

Floor tiling schedule

Designation	FCT
Location	Where shown on drawings and/or scheduled in INTERNAL FINISHES SCHEDULE
Tile type	Vitrified floor tile
Proprietary item	FS GLENNON & CO Bauhaus Modular Tiles
Size (mm)	100 x 100 x 7 5
Non slip rating	R11
Skirting	100mm high colour matching proprietary coved tile
Colour	As selected from full range
Bedding	Thick bed bedding mortar
Reinforcement	Required
Tile or bond pattern	Stack
Grout	Cement based proprietary

36 0 RESILIENT FINISHES

36 1 GENERAL

36 1 1 AIMS

Responsibilities
Install resilient floor coverings to backgrounds as follows and/or to **Selections**
- To remain secured for the warranty life of the covering
- To remain consistently smooth for the warranty life of the covering

36 1 2 CROSS REFERENCES

General
General Conform to the General requirements worksection

Associated worksections
Associated worksections Conform to the following
- Concrete finishes for substrates

36 1 3 INSPECTION

Notice
Inspection Give sufficient notice so that inspection may be made of the following
- Completed installation

36 2 PRODUCTS

36 2 1 UNDERLAYS

Cementitious
General Polymer modified cementitious self smoothing and levelling compound
- Surface tolerance To AS/NZS 2455 1 clause 1 4
- Thickness 3 mm minimum

36 2 2 SHEETS AND TILES

Edges of sheets and tiles
General Ensure edges are firm, unchipped, machine-cut accurately to size and square to the face and that tile edges are square to each other

Cork tiles
Standard To BS EN 12104

Linoleum
Standard To BS EN 548

Cork linoleum
Standard To BS EN 688

Rubber
Standard To BS 1711

Polyvinyl chloride (PVC)
Resilient floor covering jute or polyester felt backing To BS EN 650
Resilient floor covering, with foam layer To BS EN 651

Adhesives
Standard To AS 3553

36 3 EXECUTION

36 3 1 SUBCONTRACTORS

General
General Use specialist installers recommended by the materials manufacturers

36 3 2 PREPARATION

Substrates
General Ensure substrates conform to the **Substrate tolerance table** and are as follows
- To AS/NZS 2455 1 or AS/NZS 2455 2, as appropriate
- Clean and free of any deposit or finish which may impair adhesion or location and functioning of movement joints

Substrate tolerance table

Property	Length of straight edge laid in any direction	Max. deviation under the straight edge
Flatness	3 m	3 mm
Smoothness	150 mm	1 mm
Projections	50 mm	0 5 mm

Cleaning concrete surfaces Mechanically remove the following surface treatments
- Sealers and hardeners
- Curing compounds

Cleaning timber surfaces Remove oil, grease and traces of applied finishes

Concrete substrate correction Remove projections and fill voids and hollows with a levelling compound compatible with the adhesive

Timber substrate correction Remove projections If conformance to the **Substrate tolerance table** can not be achieved fix an underlay in brick pattern with joints avoiding substrate joints

Moisture content Do not commence installation unless
- Concrete The moisture content of the concrete has been tested to AS/NZS 2455 1 Appendix B and the values in clause 2 4 2 (c) have been obtained
- Plywood and timber the moisture content of battens/joists or plywood background has been tested to AS 1080 1 and values obtained as follows
  - Airconditioned buildings 8 to 10%
  - Intermittently heated buildings 10 to 12 5%
  - Unheated buildings 12 to 15%

Working environment
General Do not start work before the building is enclosed, wet work is complete and dry, and good lighting is available Protect adjoining surfaces

36 3 3 SHEET AND TILE INSTALLATION

Sheet set out
General Set out sheets to give the minimum number of joints Run sheet joints parallel with the long sides of floor areas vertically on walls

Joints
Non-welded Butt edges together to form tight neat joints showing no visible open seam

Junctions
General Scribe neatly up to returns, edges, fixtures and fittings Finish flush with adjoining surfaces

Rolling
General Where rolling is required, roll the finish in 2 directions before the adhesive sets, using a 70 kg multi-wheeled roller

Cleaning
General Keep the surface clean as the work proceeds

36 3.4 VINYL SHEETING

Welded joints
Heat welding After fixing, groove the seams using a grooving tool and weld the joints with matching filler rod and using a hot air welding gun When the weld rod has cooled, trim off flush

Cold welding Apply seaming compound 100 mm wide to the substrate centrally under the seam Roll the seam until the compound is forced up into the joint Clean off flush using a damp cloth

Epoxy jointing Join seams with epoxy adhesive

36 3 5 JOINTS AND ACCESSORIES

Junctions
General Finish junctions flush with adjoining surfaces Where changes of floor finish occur at doorways locate the joint on the centreline of the closed door leaf

Accessories
General Provide purpose-made matching moulded accessories for nosings, coves, skirtings, edge cover strips and finishes at junctions, margins and angles, if available Otherwise form accessories from the sheet material Provide solid backing for radiused coves and nosings

Cover strips
General Provide edge cover strips at junctions with different floor finishes and to exposed edges

Metal cover strip Extruded tapered strip 25 mm wide, of the same thickness as the sheet or tile Fix with matching screws to timber bases or to masonry anchors in concrete bases, at 200 mm maximum centres
- Material aluminium

Movement joints
Location Provide movement joints as follows
- Over structural (isolation, contraction, expansion) joints
- At junctions between different substrates

Depth of joint Right through to the substrate

Sealant width 6 ~ 25 mm

Depth of elastomeric sealant One half the joint width or 6 mm, whichever is the greater

36 3 6 COMPLETION

Protection
General Keep traffic off floors until bonding has set or for 24 hours after laying, whichever period is the longer Do not allow water in contact with the finish for 7 days

Reinstatement Repair or replace faulty or damaged work If the work cannot be repaired satisfactorily, replace the whole area affected

Warranties
General For each type of resilient finish specified, submit the installer's warranty of the workmanship and application

Maintenance manual
General Submit manufacturer's published use, care and maintenance requirements for each type of finish

Spare materials
General Supply spare matching covering materials and accessories of each type for future replacement purposes Store the spare materials on site where directed

Quantity At least 1% of the quantity installed

Cleaning
General Clean the finished surface Buff and polish Before handover, mop and leave the finished surface clean and undamaged on completion

36 4 SELECTIONS

36 4.1 SCHEDULES

Sheet Vinyl (FVS)

Location	Where vinyl (FVS) shown on drawings and/ or noted in FINISHES SCHEDULE
Proprietary item	Armstrong Commercial Flooring Accolade Plus
Type	Homogenous flexible sheet vinyl
Form	Sheet
Joints	Heat welded with colour coordinated rods
Colour	Allow for the supply and installation of 4 separate colours in approximately equal quantities Flooring to CLASSROOM B to be in three colours to future pattern
Thickness	2 0mm

37 0 CARPET

37 1 GENERAL

37 1 1 AIMS

Responsibilities
Lay carpet to backgrounds as follows and/or to the **Selections**
- To remain secured for the warranty life of the carpet
- To remain consistently smooth for the warranty life of the carpet
- To form the pattern required

37 1 2 CROSS REFERENCES

General
General Conform to the General requirements worksection

Associated worksections
Associated worksections Conform to the following
- Concrete finishes – for substrates
- Flooring and decking for substrates

37 1 3 INSPECTION

Notice
Inspection Give sufficient notice so that inspection may be made of the following
- Completed carpet after cleaning and before covering for protection

37 2 PRODUCTS

37 2 1 CARPET

Tolerances
Standard To AS 1385

Batching
General Carpet laid in a single area and of a single specified type, quality colour and design, must come from one manufacturing batch and dye lot

Insect resistance
Insecticide Provide carpets and underlays composed entirely of materials either inherently resistant to insect attack, or treated against insect attack including by moth and carpet beetle by application of insecticide to the yarn during the dyeing or scouring process

37 2 2 UNDERLAYS

Standard
General To AS/NZS 2455 1

Fibre cement underlay
Thickness 5 mm minimum

Hardboard underlay
Standard To AS/NZS 1859 4

Classification General purpose medium board manufactured specifically as flooring underlay

Thickness 5 5 mm

Soft underlay
Standard To AS 4288

37 2 3 ADHESIVES AND TAPES

Standard
General To AS/NZS 2455 1

Adhesives
General Compatible with the floor covering material, and suitable for bonding it to the subfloor

Type permanent stick

Friction compound Suitable for holding tiles in position without permanent sticking

Hot-melt adhesive tapes
General Commercial grade glass fibre and cotton thermoplastic adhesive coated tape 60 mm wide on a 90 mm wide metal foil base and backed with silicon-coated release paper

37 2 4 STRIPS

Preformed gripper strips

General Commercial grade plywood carpet gripper strip with 3 rows of rust-resistant angled pins of length appropriate to the carpet type

Size (minimum) 33 mm wide x 7 mm thick

Location At edges, except where edge strips are used Provide double gripper strips to edges where recommended

Edge strips

Type Heavy duty edge strip appropriate to the floor covering type (tackless or adhesive fixed) capable where necessary of accommodating different levels of adjacent floor finishes

Form aluminium extrusion, with vinyl inserts

Colour clear anodised

Location At exposed edges of the carpet, and at junctions with differing floor finishes or finishes of a different thickness Where edge strips occur at doorways, locate the junctions directly below the closed door

37 3 EXECUTION

37 3 1 SUBSTRATE

Substrates

General Ensure substrates conform to the **Substrate tolerance table** and are as follows

- To AS/NZS 2455 1 or AS/NZS 2455 2 as appropriate
- Clean and free of any deposit or finish which may impair adhesion or location and functioning of movement joints

Substrate tolerance table

Property	Length of straight edge laid in any direction	Max. deviation under the straight edge
Flatness	3 m	6 mm
Smoothness	150 mm	1 mm

Concrete substrate correction Remove projections and fill voids and hollows with a levelling compound compatible with the adhesive

Timber substrate correction Remove projections If conformance to the **Substrate tolerance table** can not be achieved fix an underlay in brick pattern with joints avoiding substrate joints

Moisture content Do not commence installation unless

- Concrete The moisture content of the concrete has been tested to AS/NZS 2455 1 Appendix B and values obtained as follows
  - 5 5% when tested by the electrical resistance method
  - 70% when tested by the surface hygrometer test
- Plywood The moisture content of battens/joists or plywood background has been tested to AS 1080 1 and values obtained as follows
  - Airconditioned buildings 8 to 10%
  - Intermittently heated buildings 10 to 12 5%
  - Unheated buildings 12 to 15%

Fixtures Remove door stops and other fixtures, and refix in position undamaged on completion of the installation

37 3 2 LAYING CARPET

Standard

General To AS/NZS 2455 1

Setting out

General Lay the carpet in continuous lengths without cross joins in the body of the area Where unavoidable cross joins occur at doorways, locate the joins directly below the closed doors

Joints in underlay Ensure joints in underlay do not coincide with carpet joints Do not carry underlay over carpet grippers or edge strips

Partition layout Confirm that permanent partitions have been installed before starting carpet laying

Fixing underfelt

To concrete floors Glue continuously at edges and joints with a 100 mm wide strip to each piece, and at 600 mm centres both ways with 150 mm diameter patches

Seaming methods

Woven carpet Machine or hand sew Do not provide glued taped seams

Tufted carpet Seam with hot-melt adhesive tape

Fixing

Permanent stick method Immediately after laying, and again one hour later, roll the carpet from the centre diagonally towards each edge using a 65 kg multi-wheeled roller Do not roll foam-backed carpet

Dual bonded underlay Fix with adhesive between carpet and underlay, and between underlay and subfloor

Gripping system Preformed gripper strip and tackless edge strip Space fixings at 150 mm maximum centres

Cutting laid carpet

Method Where penetrations through laid carpet are necessary for electrical, telephone or other outlets, cut the carpet either by cross cutting or by cutting rectangular or circular openings

37 3 3 COMPLETION

Cleaning

Progressively clean the work Remove waste, excess materials and adhesive

Final cleaning When the installation is complete, clean the carpet as necessary to remove extraneous matter, marks and soiling and to lift the pile where appropriate

Protection provide fabric drop sheets Do not use plastic sheeting If wheeled traffic is to follow carpet installation protect with hardboard sheets butted and fixed with adhesive tape

37 4 SELECTIONS

37.4 1 CARPET SCHEDULES

Carpet Type 1
Carpet and laying schedule

CARPET CODE	FCP
Proprietary item	TUFTMASTER Flashpoint
Description	Fine gauge low profile patterned loop pile
Location	Areas as scheduled in INTERIOR FINISHES SCHEDULE and/or shown on drawings
Soft underlay	BRIDGESTONE Air-Step Slab Underlay
Fixing method	Dual Bond or Direct stick
Colour	To be selected
Pile fibre composition	100% selected wools
Total pile mass (g/m2)	1356 gm/sqm

38 0 DECKING AND FLOORING UNDERLAY

38 1 GENERAL

38 1 1 CROSS REFERENCES

General

General Conform to the following
- *General requirements*

38 1 2 STANDARD

General

Flooring and decking To AS 1684 Parts 2 3 or 4, as appropriate

38 1 3 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply
- Decking Intermittently-supported external flooring with drainage gaps between boards
- Flooring

  Intermittently-supported Flooring which is supported by, and spans across, beams, joists or battens

  Continuously-supported Flooring which is supported by and directly fixed to, a continuous supporting surface

  Platform Flooring laid over the whole of the joisted floor structure prior to the erection of external and internal wall frames
- Joints

  Butt Floor boards cross cut square with plain ends for joining over supports

  End-jointed Floor boards tongue and grooved at the ends to allow joining between supports
- Moisture content The percentage by mass of water present in the timber
- Substrate The structure that supports the flooring (e g concrete slabs timber bearers and joists, or structural steel floor framing)
- Underlay Sheet material fixed to supporting structure and forming part of the substrate on which flooring may be continuously supported

38 1 4 INSPECTION

Notice

Inspection Give notice so that inspection may be made of the following
- Substrate before laying flooring decking or underlay

38 1 5 TESTS

Product moisture content

General Confirm that the moisture content of the timber decking as delivered matches the ambient moisture content of the site If there is a mismatch allow for acclimatisation

38 1 6 SUBMISSIONS

Product samples

General Submit samples of each timber or synthetic decking type illustrating the range of variation in colour and figure in conformance with the **Samples table**

Samples table

Item	Sample size	Number
Decking	300mm long	4

Verification

Inspection If neither branding nor certification is adopted, submit a report by an independent inspecting authority verifying conformance

38 1 7 TOLERANCES

Tolerances
General Maximum deviation of the finished decking/underlay surface under a 3 m straight edge laid in any direction 3 mm

38 2 PRODUCTS

38 2 1 GENERAL

General
Conformance Conform to the **Selections**

Storage
General Deliver timber decking to site and store so that its moisture content is not adversely affected Do not store on the sub-floor until the moisture content of the sub-floor is suitable for the installation of the floor

38 2 2 DECKING

New timber decking
Standard
- Treated softwood to AS 4785 1 Section 4

  Grade to AS 4785 2 Select
- Hardwood to AS 2796 1 Section 4

  Grade to AS 2796 2 Select

Underlay Plywood
Standard To AS/NZS 2269
Plywood certified formaldehyde emission level to AS/NZS 2098 11 Class E1
Grading
- Standard AS/NZS 2269 2
- Grade Bond Type A

Particleboard
Particleboard To AS 1860 2, Class 1
Particleboard certified formaldehyde emission level to AS/NZS 2098 11 Class E1

Compressed fibre cement
Internal
- Product Equal to James Hardie HardiPanel'
- Thickness 15mm

38 3 EXECUTION

38 3 1 PREPARATION

Substrates
General Ensure support members are in full lengths without splicing
Flatness < 3 mm deviation of the substrate under a 3 m straight edge laid in any direction with no abrupt variations greater than 1 mm over 250 mm

Moisture content
General Do not commence installation of decking unless
- Concrete substrate The moisture content of the concrete has been tested to AS/NZS 2455 1 Appendix C and values obtained as follows

  ≤ 5 5% when tested by the electrical resistance test

  ≤ 70% when tested by the hygrometer test

38 3 2 FIXING TIMBER DECKING

General
Installation Lay in long lengths (minimum 3 spans) double nailed at each bearing with fixings finished flush Stagger joints and make them over joists Leave 4 mm between edges of boards
Fixings galvanised twist nails

Arrises Chamfered or rounded
Finishing Apply the first 2 coats all round before fixing

Adhesive
General Use a urethane elastomer adhesive in addition to nails as follows
- Continuously supported flooring 4 mm beads at 300 mm spacing at right angles to run of flooring
- Intermittently supported flooring 6 mm bead along each joist or batten

Nailing
General Ensure the boards are in contact with the joists at the time of nailing particularly where boards are machine nailed Skew nail in a uniform pattern If nails are to be less than 10 mm from ends of sheets or boards pre-drill nail holes 0 – 1 mm undersize
Wide boards For boards more than 65 mm cover width, use two nails skewed 10° in opposite directions

38 3 3 FIXING UNDERLAY

Underlay fixed on joists
Installation Lay the length of the sheets at right angles to the supports Stagger the end joints and locate them centrally over joists If sheets are not tongue and grooved provide noggings or trimmer joists to support the edges
Fixing centres Maximum 300 mm on each support
- Fibre-cement flooring Fix sheeting to the supports with adhesive and non-corrosive countersunk screws Fill the screw holes with sealant before fixing After fixing, stop the screw heads with the same sealant, finished slightly below the sheet surface
- Particleboard and plywood flooring Fix sheeting to the supports with adhesive and nail

Membranes If sheet flooring is the substrate for a wet area membrane or an external roofing membrane, fix with stainless steel countersunk head screws

38 4 SELECTIONS

38 4 1 SCHEDULES

Decking schedule

Proprietary Item	Equal to Boral Timber
Profile	Pencil round
Size (width x thickness, mm)	Nom 86 x 19 finished size
Species or group	Ironbark (Eucalyptus paniculata)
Grade	Standard
Ends	Butt
Spacing (mm)	Nominal 2mm joint between boards
Surface finish	Dressed
Coating system	Water based decking oil with slip resistant additive Refer Specification Section - Painting

39 0 FLOOR SANDING AND FINISHING

39 1 GENERAL

39 1 1 AIMS

Responsibilities

Basic sanded surface Provide as follows

- To an even plane
- Free of irregularities
- Suitable for finish sanding
- As a suitable substrate for a carpet finish
- As a suitable key for an adhesive fixed resilient finish

Finish sanded surface Provide as follows

- As a suitable key for an applied coating system
- That will result in a clear finished surface free of scratch marks when observed standing

Coating system Provide as follows and/or to the **Selections**

- Of a consistent film thickness throughout the surface
- Of a consistent level of gloss
- Without edge bonding

39 1 2 CROSS REFERENCES

General

General Conform to the *General requirements* worksection

Associated worksections

Associated worksections Conform to the following

Timber flooring

39 1 3 INTERPRETATION

Definitions

General For the purposes of this worksection the definitions given below apply

- Basic sanding Sanding procedures resulting in an even plane surface free of irregularities
- Finish sanding Sanding procedures resulting in a surface suitable for the application of the coating system
- Coating system Applied materials to enhance wear and protect the flooring material
- Flooring
  - Hard flooring Timber with a wearing surface not easily cut with an abrasive
  - Mild flooring Timber with a wearing surface easily cut with an abrasive
- Filling Treatment to enhance the surface appearance by
  - Flood filling To fill the pores of open-grained timber or minor cracks in parquetry
  - Stopping To fill punched nail head cavities
- Staining Treatment to alter the colour of the timber surface
- Sealing Treatment to
  - Prevent excessive penetration of coating system
  - Prevent edge bonding by the coating system
- Edge bonding The tendency of some coating systems to glue the edges of strip flooring and parquetry panels which prevents an even distribution of movement gaps

39 1 4 STANDARD

Floor sanding and finishing

General To AS 4786 2

39 1 5 INSPECTION

Notice

Inspection Give notice so that inspection may be made of the following

- Before surface preparation of timber
- Completion of finish sanding
- After staining
- After application of each clear finishing coat

39 1 6 SUBMISSIONS

Samples

General Submit samples of the coating system illustrating the finished effect on the selected floor surface

Product conformity

General Submit current assessments of conformity as follows

- Declaration of conformity by an AS ISO 9001 quality management system certified supplier to the requirements of Appendix I Uniform Paint Standard' to the Standard for the Uniform Scheduling of Drugs and Poisons ( )

Application of coating systems

General Submit proposals

39 2 PRODUCTS

39 2 1 ABRASIVES

Grades

General Select abrasives in accordance with the **Abrasives table**

Abrasives table

Floor hardness	Basic sanding	Finish sanding		Sanding between finish coats of coating system
		Initial cuts	Final sand	
Hard	F24 to F30	F40 to F60	F80 to F120	F150 or finer
Mild	F36 to F40	F60 to F80	F100 to F120	F150 or finer
Soft	F60 to F80	F80 to F100 if necessary	F120	F150 or finer

Scratching If scratching persists during the final sanding re-sand with a finer grade of abrasive

39 2 2 FINISH

Filler

General Non-oil based and compatible with the coating system

Coating system

Type Provide the coating system nominated in **Selections**

Quality Provide premium quality lines

Combinations

- Do not combine clear finishes from different manufacturers in a coating system
- Provide only the combinations of filler stain and sealer recommended by the manufacturer of the top coats

Delivery Deliver all products to the site in the manufacturer's labelled and unopened containers

39 3 EXECUTION

39 3 1 PREPARATION

Sanding procedure

General Provide sanding procedure as follows

Floor type	Proposed use of floor surface	
	As flooring substrate	As a finished surface
Decking	Basic sanding	Basic sanding

Lighting
General Provide supplementary lighting to allow close examination of the entire process
Substrate
General Do not commence sanding until
- Adhesives have cured
- Floor heating has been switched off for 48 hours
- Filler has dried as indicated by the colour fading

Ensure substrates are clean and free of any deposit which may impair the following
- Application of the coating system
- Adhesion of resilient finishes

Preparation
General Punch nails 3 mm below the surface Remove tacks Fill open grained timber with materials compatible with those used in subsequent finishing operations

39 3 2 SANDING
Basic sanding – general
General Remove irregularities caused by cupping or mismatching of the flooring materials, with a drum type sanding machine and coarse abrasives

Basic sanding – strip flooring
General First cut at 45° to the length of the boards second cut at 90° to the first cut, and third cut parallel to the length of the boards
Boundary areas Bring to the same surface condition as the main sanded area using disc sanding
Inaccessible areas Hand scrape to produce an even, plane surface

Stopping and filling
General Select a colour to produce an average match with the final coated timber in tone, colour and texture
Fill minor cracks and stop punched nails with a putty knife
Fill deeper holes in layers > 6 mm allowing each fill to dry Ensure cavities are filled slightly above the surface without air pockets
Flood fill porous timber with the cloth application of water based filler diluted to a creamy consistency

Finish sanding – strip flooring
General After basic sanding, cut twice parallel to the length of the boards using increasingly fine abrasives If hard surfaces show excessive scratching apply an initial cut at 90° to the grain direction
Boundary areas Bring to the same surface condition as the main sanded area, using disc sanding
Inaccessible areas Hand scrape to produce the same surface condition as the main sanded area
Water based coating system For a water based coating system use a final grade of paper of minimum F220 screen back

Cleaning
General After each sanding operation remove all dust by all of the following
- Removal from cracks by hand
- Vacuum cleaning
- Tack rag cleaning

39 3 3 COATING SYSTEM
'Wet paint' warning
General Place notices conspicuously and do not remove them until the coating system has cured and hardened

Application
General Apply the coating system in accordance with the manufacturer's printed instructions
Maintain a wet edge throughout the whole area

Sanding
General Fine sand between coats only within the depth of the finish and remove dust

39 3 4 COMPLETION
Cleaning
General Vacuum clean the area and protect with fabric drop sheets Do not use plastic sheeting

40 0 PAINTING

40 1 GENERAL

40 1 1 AIMS

Responsibilities

General Provide coating systems to substrates as follows and as scheduled

- Consistent in colour gloss level, texture and dry film thickness
- Free of runs, sags, blisters, or other discontinuities
- Paint systems fully opaque
- Clear finishes at the level of transparency consistent with the product
- Fully adhered
- Resistant to expected impacts in use
- Resistant to environmental degradation within the manufacturer's stated life span

40 1 2 CROSS REFERENCES

General

General Conform to the General requirements worksection

40 1 3 STANDARDS

Painting

General Comply with the recommendations of those parts of AS/NZS 2311 and AS/NZS 2312 which are referenced in this worksection

40 1.4 SUBMISSIONS

Clear finish coated samples

General Submit pieces of timber or timber veneer matching the timber to be used in the works, prepared puttied stained sealed and coated in accordance with the specified system, of sufficient size so that each piece can be cut into 4 segments, marked for identification, and distributed as directed

Opaque coated samples

General Submit, on representative substrates, samples of each coating system showing surface preparation, colour, gloss level, texture, and physical properties, to the **Coated samples schedule**

Certification

On completion submit certification

- that the paint systems used is as specified
- that the surface preparation is as recommended by the paint manufacturer
- that the undercoat is as recommended by the paint manufacturer

40 1 5 INSPECTION

Witness points

Give sufficient notice so that inspection of work may be made at the following stages

Painting stages

- Completion of surface preparation
- After application of prime or seal coats
- After application of undercoat
- After application of each subsequent coat

Clear finishing stages

- Before surface preparation of timber
- Completion of surface preparation
- After staining
- After sanding of sealer
- After application of each clear finishing coat

40 2 PRODUCTS

40 2 1 PAINTS

APAS specifications

General Provide paints and other materials which are scheduled in the Australian Paint Approvals Scheme "List of Approved Products" as complying with cited APAS specifications

Quality If the product is offered in a number of levels of quality, provide premium quality lines

Combinations
General Do not combine paints from different manufacturers in a paint system

Delivery
General Deliver paints to the site in the manufacturer's labelled and unopened containers Ensure containers of materials specified by a APAS specification code are labelled accordingly

Tinting
General Provide only products which are colour tinted by the manufacturer or supplier

Toxic ingredients
General Comply with the requirements of Appendix P Uniform Paint Standard to the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP)

Putty
Non-timber substrates Oil-based or polymeric based

Timber finishes Lacquer or water based only

40 3 EXECUTION

40 3 1 PREPARATION

Standards
General To AS/NZS 2311 Sections 3

Protection of steelwork To AS/NZS 2312 Sections 4

Order of work
Other trades Before painting, complete the work of other trades as far as practicable within the area to be painted, except for installation of fittings, floor sanding and laying flooring materials

Clear finishes Complete clear timber finishes before commencing opaque paint finishes in the same area

Protection
Fixtures Remove door furniture, switch plates, light fittings and other fixtures before starting to paint, and refix in position undamaged on completion of the installation

Adjacent surfaces Protect adjacent finished surfaces liable to damage from painting operations

"Wet paint" warning
General Place notices conspicuously and do not remove them until paint is dry

Restoration
General Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition Touch up damaged decorative paintwork or misses only with the paint batch used in the original application

Substrate preparation
General Prepare substrates to receive the painting systems

Cleaning Clean down the substrate surface Do not cause undue damage to the substrate or damage to, or contamination of, the surroundings

Filling Fill cracks and holes with fillers sealants, putties or grouting cements as appropriate for the finishing system and substrate and sand smooth

Clear finish Provide filler tinted to match the substrate

Clear timber finish systems Prepare the surface so that its attributes will show through the clear finish without blemishes, by methods which may involve the following

- Removal of bruises
- Removal of discolourations including staining by oil, grease and nailheads
- Bleaching where necessary to match the timber colour sample
- Puttying
- Fine sanding (last abrasive no coarser than 220 grit) to show no scratches across the grain

40 3 2 PAINTING

Standards
General To AS/NZS 2311 Section 6

Protection of steelwork To AS/NZS 2312 Section 8

Light levels
General During preparation of surfaces, painting and inspection, maintain light levels such that the luminance (photometric brightness) of the surface is equal to the specified permanent artificial illumination conditions or 400 lux, whichever is the greater

Drying
General Use a moisture meter to demonstrate that the moisture content of the substrate is at or below the recommended maximum level for the type of paint and the substrate material

Paint application
General Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur Apply subsequent coats after the manufacturer's recommended drying period has elapsed

Priming before fixing
General Apply one coat of wood primer (2 coats to end grain) to the back of the following before fixing in position
- External fascia boards
- Timber door and window frames
- Bottoms of external doors
- Associated trims and glazing beads
- Timber board cladding

Spraying
General If the paint application is by spraying, use conventional or airless equipment which does the following
- Satisfactorily atomises the paint being applied
- Does not require the paint to be thinned beyond the maximum amount recommended by the manufacturer
- Does not introduce oil, water or other contaminants into the applied paint
- Paint with known health hazards Provide masking ventilating and screening facilities generally to the standards set out for spray painting booths AS/NZS 4114 1 and AS/NZS 4114 2

Sanding
Clear finishes Sand the sealer using the finest possible abrasive (no coarser than 320 grit) and avoid cutting through the colour Take special care with round surfaces and edges

Repair of galvanizing
General For galvanized surfaces which have been subsequently welded prime the affected area

Primer To APAS-2916, two pack

Tinting
General Tint each coat of an opaque coating system so that each has a noticeably different tint from the preceding coat except for top coats in systems with more than one top coat

Door leafs
Drying Leave doors fixed open to allow drying Do not allow door hardware accessories or the like to damage the door finish during the drying process

40 4 SELECTIONS

40 4.1 PAINT SYSTEMS

Paint system description by brand
General Where nominated in the **Painting schedule** apply the paint system specified in the **Brand name paint system tables** Only ultra premium paints are to be used, "trade" or "professional" paints are **NOT** to be used

Number of coats
General Unless specified as one coat or two coat systems each paint system consists of at least 3 coats

40 4 2 PAINTING SCHEDULES

Requirement

Paint the following surfaces with the following paint systems

SURFACE	PAINT SYSTEM	COLOUR
Internal walls generally	Low gloss latex interior	Allow for 3 different selected colours
Internal walls wet areas	Semi gloss latex interior	Allow for 2 different selected colours
Internal ceilings - generally	Flat latex	1 colour
Internal ceilings to wet areas	Low gloss latex interior	1 colour
Internal timber trim (eg reveals skirtings etc)	Full gloss solvent borne interior	Allow for 2 different selected colours
Steel door frames	Full gloss solvent borne	Allow for 2 different selected colours
External timber door leaves	Gloss latex exterior	Allow for 2 different selected colours
Internal timber door leaves	Gloss latex interior	Allow for 2 different selected colours
External cladding & sheeting that is not pre finished	Semi gloss latex exterior	Allow for 3 different selected colours
External timber balustrades	Semi gloss latex exterior	1 Colour
Timber decking	Water based decking oil with slip resistant additive	Natural

Exclusions schedule

- Exclude the following surfaces from painting and corrosion protection systems
- flexible duct connections rubber hoses and mountings and other non metallic flexible fittings
- metals plated or specially finished for appearance bronze brass copper and stainless steel
- aluminium frames,
- fair faced brickwork coloured blockwork, stonework, artificial stone and exposed aggregates,
- galvanised steel balustrades & handrails unless otherwise specified
- floors, paving, roads unless otherwise specified
- concealed structural timber framing,
- those parts of timber fixtures, such as insides of cupboards, not visible when doors are closed,
- unless otherwise specified
- self finish surface such as glass and plastic laminates

40 4 3 PAINT BRAND SCHEDULE

Requirement

Use the following brands and paint types

Paint Type	Proprietary Item
Full gloss solvent borne	DULUX Professional Full Gloss Enamel
Semi-gloss solvent borne	DULUX Professional Semi Gloss Enamel
Flat latex	DULUX Professional Flat Acrylic
Low gloss latex interior	DULUX Professional Low Sheen Acrylic'
Semi gloss latex interior	DULUX Professional Semi Gloss Acrylic'
Gloss latex interior	DULUX 'Wash & Wear 101 Advanced Gloss Acrylic'
Gloss latex exterior	DULUX 'Weathershield Gloss Acrylic
Timber Decking Oil	DULUX Intergrain UltraDeck
Timber Decking Slip Resistant additive	DULUX Intergrain UltraGrip

Alternatives

Ultra premium lines by HAYMES, TAUBMANS & WATTYL only by prior approval from the Superintendent

40 5 COMPLETION

40 5 1 COMPLETION

Maintenance manual

Submit the paint manufacturer's published recommendations for maintenance

Appendix A

INTERNAL FINISHES SCHEDULE

Location	Floor			Walls					Ceiling			Remarks
Name	Basic Const	Sub Finish	Finish		Basic Const	Sub Finish	Finish	Skirting	Basic Const	Sub Finish	Finish	
Classroom A	TMB	SPW	FCP	North	TMB ALF GL	PBD1	PT/PIN PDC	TMB	TMB	PBD1	PT	
				South	TMB ALF GL	PBD1	PT PDC	TMB				
				East	TMB ALF GL	PBD1	PT/PIN PDC	TMB				
				West	TMB	PBD1	PT	TMB				
Classroom B	TMB	SPW	FSV	North	TMB ALF GL	PBD1	PT PDC	TMB	TMB	PBD1	PT	Practical Activities Bench and Overhead Cupboards to East wall
				South	TMB ALF GL	PBD1	PT/PIN PDC	TMB				
				East	TMB ALF GL	PBD1	PT/PIN PDC	TMB				
				West	TMB ALF GL	PBD1	PT PDC	TMB				
Store 1	TMB	SPW	FSV	North	TMB	PBD1	PT	-	TMB	PBD1	PT	Open Selving to west and south walls
				South	TMB	PBD1	PT	-				
				East	TMB	PBD1	PT					
				West	TMB	PBD1	PT	-				
Store 2	TMB	SPW	FSV	North	TMB	PBD1	PT		TMB	PBD1	PT	Open Selving to west and south walls
				South	TMB	PBD1	PT					
				East	TMB	PBD1	PT	-				
				West	TMB	PBD1	PT					
Store 3	CONC	MFF	FCS	North	TMB	WFC	PT		TMB	FC	PT	
				South	TMB	WFC	PT	-				
				East	TMB	WFC	PT					
				West	TMB	WFC	PT					
Ofice	TMB	SPW	FCP	North	TMB	PBD1	PT	TMB	TMB	PBD1	PT	
				South	TMB ALF GL	PBD1	PT PDC	TMB				
				East	TMB	PBD1	PT	TMB				
				West	TMB	PBD1	PT	TMB				
Kitchen	TMB	SPW	FSV	North	TMB ALF GL	PBD2	PT/WCT PDC		TMB	PBD1	PT	Bench cupboards to north east and west wall Overhead cupboards to east wall Under bench shelving to south wall WCT splashbacks
				South	TMB ALF GL	PBD2	PT/WCT PDC					
				East	TMB	PBD2	PT/WCT	TMB				
				West	TMB	PBD2	PT/WCT	TMB				

Appendix A

INTERNAL FINISHES SCHEDULE

Location	Floor			Walls					Ceiling			Remarks
Name	Basic Const	Sub Finish	Finish		Basic Const	Sub Finish	Finish	Skirting	Basic Const	Sub Finish	Finish	
Pupil Toilets	CONC	CFC	FCT	North	TMB ALF GL	PBD2	PT/WCT PDC	FCT	TMB	PBD2	PT	
				South	TMB	PBD2	PT/WCT	FCT				
				East	TMB ALF GL	PBD2	PT/WCT PDC	FCT				
				West	TMB	PBD2	PT/WCT	FCT				
Acc WC	CONC	CFC	FCT	North	TMB ALF GL	PBD2	PT/WCT PDC	FCT	TMB	PBD2	PT	
				South	TMB	PBD2	PT/WCT	FCT				
				East	TMB	PBD2	PT/WCT	FCT				
				West	TMB ALF GL	PBD2	PT/WCT PDC	FCT				
Classroom C	EX TMB	EX SPB	FCP	North	EX TMB	EX PBD	PT	EX TMB	EX TMB	EX PBD	PT	Operable wall with pinboard facing to east wall
				South	EX TMB	EX PBD	PT	EX TMB				
				East	TMB	PBD1	PT	TMB				
				West	EX TMB	EX PBD	PT	EX TMB				
Classroom D	EX TMB	EX SPB	FCP	North	EX TMB	EX PBD	PT	EX TMB	EX TMB	EX PBD	PT	Operable wall with pinboard facing to west wall
				South	EX TMB	EX PBD	PT	EX TMB				
				East	EX TMB	EX PBD	PT	EX TMB				
				West	TMB	PBD2	PT	TMB				

Appendix B

DOOR SCHEDULE

Door No	Location	Frame Type	Leaf Type	Leaf Size	Keying	Hardware	Notes/Signage
D01	Classroom A	ALF	ALF/GL	2350x900	KA1-MK	**Lock/Latch**	Part of glazed operable wall system
						Handle	
						Furniture	
						Door Closer	
						Door Stop	
D02	Office	ALF	ALF/GL	2050x900	KA1-MK	**Lock/Latch**	
						Handle	
						Furniture	
						Door Closer	
						Door Stop	
D03	Store 1	TMB	FD3	pair 2040x750x35		**Lock/Latch**	Proprietary cavity sliding unit
						Handle	
						Furniture	
						Door Closer	
						Door Stop	
D04	Kitchen	ALF	FD2	2050x870x41	KA1 MK	**Lock/Latch**	
						Handle	
						Furniture	
						Door Closer	
						Door Stop	
D05	Classroom B	ALF	ALF/GL	2350x900	KA1 MKL	**Lock/Latch**	Part of glazed operable wall system
						Handle	
						Furniture	
						Door Closer	
						Door Stop	
D06	Pupil Toilets	ALF	FD2	2050x870x41	KA1-MK	**Lock/Latch**	
						Handle	
						Furniture	
						Door Closer	
						Door Stop	
D07	Acc WC	ALF	FD2	2050x870x41	KA1-MK	**Lock/Latch**	
						Handle	
						Furniture	
						Door Closer	
						Door Stop	

Appendix B

DOOR SCHEDULE

Door No	Location	Frame Type	Leaf Type	Leaf Size	Keying	Hardware	Notes/Signage
D08	Store 2	TMB	FD3	pair 2040x750x35		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	Proprietary cavity sliding unit
D09	Store 3	STL	STL	2400 X 2400		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	Roller Shutter Type 1
D10	Existing Staffroom	SF1	FD2	2040x870x41		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	
D11	Acc WC	SF1	FD2	2040x870x41		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	
D12	Hall Extension Store 3	STL	STL	2100 X 1400		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	Roller Shutter Type 1
D13	Undercroft Store 3	STL	STL	2000 X 1810		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	Roller Shutter Type 2 -/120/30 FRL
D14	Classroom D	TMB	FD2	2040x870x41		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	

Appendix B **DOOR SCHEDULE**

Door No	Location	Frame Type	Leaf Type	Leaf Size	Keying	Hardware	Notes/Signage
D15	Classroom C	TMB	FD2	2040x870x41		**Lock/Latch** **Handle** **Furniture** **Door Closer** **Door Stop**	
D16	Classroom C/D	ALF					Operable Wall as specified

25/09/2009
Senior Constable Rochelle Bird
Northern Beaches Police
Corner Fisher Road & St David Avenue
Dee Why 2099
Phone 9971 3339
Fax 9971 3375

NSW Police Force
www police nsw gov au

Ms Gina HAY
Executive Planner
Pittwater Council
P O Box 882
Mona Vale 1660
Phone 9970 1111
Fax 9970 7150

Dear Ms MUNN,

Reference **DA No N0363/09**

Address **Loquat Valley School 1973 Pittwater Road, Bayview NSW 2104 Lot A DP 360274**

Proposal **Addition of a lift and alternations and additions to existing classroom**

Applicant ***Sydney Anglican Schools Corporation***

Owner **Sydney Anglican Schools Corporation**

The subject site is located in the north of the Pittwater LGA, on the south western shore of Pittwater and occupies the corner of the Pittwater Road and Loquat Valley Road Immediate neighbours are a two storey residential dwelling to the west and four, two storey, residential dwellings to the north One of these properties is accessed directly from Pittwater Road, two from Jendi Avenue and one via a right of way from Pittwater Road, running along the northern boundary of the school

The existing development site is currently occupied by educational facilities contained in a collection of one, two and part three storey buildings The site also contains on site staff and visitor parking, open playground space and a tennis court

The proposed development

The school's library is located on the second floor of a two and part three storey building The staff room is also located in a single storey extension to this building, at a level half way between lower level classrooms and the upper level library Both facilities are only accessible by stairs The proposal seeks to redress the existing situation by installing a small passenger lift providing vertical access from the Classroom level to the Staff Room level and the Library level

Insert COMMAND/BRANCH
Insert Location
Insert Full Address
Telephone 02 xxxx xxxx Facsimile 02 xxxx xxxx ENet xxxxx EFax xxxxx TTY 9211 3776 (Hearing/Speech impaired)
ABN 43 408 613 180

An existing demountable classroom will be removed from the school and an existing two classroom, weatherboard building will be demolished A new classroom building being constructed is intended to free up an existing extra large classroom for conversion to two classrooms

After perusing the documents and plans associated with this proposal, Police believe this Development Application is sound There are a number of Crime Prevention Through Environmental Design (CPTED) factors that should be considered in this development and through these Police will make a number of recommendations

Surveillance

The attractiveness of crime targets can be reduced by providing opportunities for effective surveillance, both natural and technical Good surveillance means that people can see what others are doing People feel safe in public areas when they can easily *see and interact with others Would-be offenders are often deterred from committing* crime in areas with high levels of surveillance

- ***Lighting and Technical Supervision***

  Lighting should meet minimum Australian standards Effective lighting contributes to safety by improving visibility, increasing the chance that offenders can be detected and decreasing fear Special attention should be made to lighting the entry and exit points of the residential premises

  It is important the open spaces, pathways and communal areas are well supervised, by allowing natural surveillance of these sites Building alignment and pedestrian routes allow for this However poorly supervised and sporadically used pedestrian routes often feature in serious crime It is important that landscaping does not impinge on site lines and that these paths are well lit

  There is a proven correlation between dim lighting, fear, avoidance behaviour and crime opportunity Australian and New Zealand standard 1158 3 1 1999 for Pedestrian Areas (category P) sets out the requirements for lighting systems to provide a safe and comfortable visual environment for pedestrian movement This standard applies to access pathways, bicycle routes, car parks and other areas In determining the type and level of lighting needed to service these pathways, ANZS1158 3 1 1999 requires the identification of three conditions activity type, image and risk of crime The Standards adds

  "These criterion have been introduced so that a level of lighting maybe selected in order to mitigate actual or perceived crime The lighting will generally be one of a number of anti crime measures to be implemented at a location Two interconnected aspects are involved, actual crime and fear of crime" ANZS 1158 3 1 1999

  Pedestrian lighting can increase crime risk in some circumstances. Lighting is

an ineffective deterrent, for example, if criminals can see that a rear laneway, pathway or cycleway is poorly supervised (i e local guardians cannot see what is lit) In these situations lighting can aid the commission of predatory crime

It is recommended that there be sufficient lighting placed at ground level on the exterior areas of the lift to ensure that users of the lift have a clear view of the external areas when exiting the lift.

Territorial Reinforcement

With few exceptions, criminals do not want to be detected, challenged or apprehended For offenders, the capability of guardianship (to detect, challenge or apprehend) is an important consideration It is argued that employees are more effective as guardians (crime deterrents) than passing members of the community

Territorial reinforcement can be achieved through
- design that encourages people to gather in public space and to feel some responsibility for its use and condition
- design with clear transitions and boundaries between public and private space
- clear design cues on who is to use space and what it is to be used for Care is needed to ensure that territorial reinforcement is not achieved by making public spaces, private spaces, through gates and enclosures

- **Environmental Maintenance**

Clean, well-maintained areas often exhibit strong territorial cues Rundown areas negatively impact upon perceptions of fear and may affect community confidence to use public space and ultimately, it may affect crime opportunity Vandalism can induce fear and avoidance behaviour in a public space, therefore the rapid repair of vandalism and graffiti, the replacement of car park lighting and general site cleanliness is important to create a feeling of ownership Ownership increases the likelihood that people will report or attempt to prevent crime

Many graffiti vandals favour porous building surfaces, as 'tags' are difficult to remove Often a ghost image will remain even after cleaning Easily damaged building materials may be less expensive to purchase initially, but their susceptibility to vandalism can make them a costly proposition in the long term, particularly in at-risk areas

It is recommended that any new painted walls be painted with a graffiti resistant paint This will assist in easy cleaning of the wall and can be cost effective in the long term **It is recommended that a rapid removal policy be implemented to ensure that any graffiti is removed within 24 hours and the area is kept clean and maintained** Walls that are more at high risk of being

tagged usually those facing onto public space should be painted in darker colours Lighter colours usually attract graffiti more as they provide a clean light canvas for tags to be easily seen

It was noted that there were areas of shrubbery/ vegetation at the external areas near the lift **It is recommended that a landscaping maintenance plan be put in place** Ensure that these areas are regularly maintained to a reasonable height and thickness If the vegetation becomes thick and bushy ensure that it is thinned out to enable any persons to been seen if they are hiding in the bush As vegetation is growing near the external areas of the lift this can also become an entrapment issue enabling offenders to hide in the vegetation and use the lift as an area of entrapment With regular maintenance of the vegetation and good lighting outside the lift this will reduce the opportunity for crime to occur Ensure that all vegetation is trimmed well back from windows and doors This will assist in preventing persons from hiding and concealing themselves when attempting to gain entry into the premise

Access Control

Physical and symbolic barriers can be used to attract, channel or restrict the movement of people They minimise opportunities for crime and increase the effort required to commit crime By making it clear where people are permitted to go or not go, it becomes difficult for potential offenders to reach and victimise people and their property Illegible boundary markers and confusing spatial definition make it easy for criminals to make excuses for being in restricted areas

External doors and frames should be of solid construction **It is recommended that any doors be fitted with quality deadlock sets, which comply with the Australian/ New Zealand Standards and Fire Regulations (Australian Building Code) to enable persons to escape in emergency situations such as fires.** Security / screen doors can be installed to provide Australian Standards

External windows and frames should be of solid construction Window frames should be anchored to the building to prevent easy removal **It is recommended that all windows be fitted with quality key-operated lock sets. It is recommended that any glass within doors and windows be reinforced to restrict unauthorised access through these areas**

Ensure that the lift is fitted with an emergency device/ phone/ alarm etc in the event of an emergency or persons being trapped in the lift

If there are any questions in relation to this report please contact me at Dee Why Police Station on 9971 3339

Thanking you,

Rochelle BIRD
Senior Constable
Crime Prevention Officer
Northern Beaches Police

The NSW Police Force (NSWPF) has a vital interest in ensuring the safety of members of the community and their property By using recommendations contained in this evaluation, any person who does so, acknowledges that

It is not possible to make areas evaluated by the NSWPS absolutely safe for the community and their property

Recommendations are based upon information provided to, and observations made by the NSWPS at the time the evaluation was made

The evaluation is a confidential document and is for use by the council or organisation referred to on page one

The contents of this evaluation are not to be copied or circulated otherwise than for the purpose of the council or organisation referred to on page one

The NSW Police Service hopes that by using recommendations contained within this document, criminal activity will be reduced and the safety of members of the community and their property will be increased However, it does not guarantee that the area evaluated will be free from criminal activity if its recommendations are followed

REPORT

TO

SYDNEY ANGLICAN SCHOOLS CORPORATION

ON

GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY RISK ASSESSMENT

(In Accordance with Pittwater Council Risk Management Policy)

FOR

PROPOSED CLASSROOM BUILDING

AT

LOQUAT VALLEY ANGLICAN PREPARATORY SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

30 January 2009

Ref 22636SBrpt

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Postal Address PO Box 976 North Ryde BC NSW 1670

Tel 02 9888 5000 • Fax 02 9888 5001 • Email engineers@jkgroup net au • ABN 17 003 550 801

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO 1 – To be submitted with Development Application

Development Application for Sydney Anglican Schools Corporation
(Name of Applicant)

Address of site 1977 Pittwater Road, Bayview, NSW

Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report

I Daniel Bliss (Insert Name) on behalf of Jeffery and Katauskas Pty Ltd (Trading or Company Name)

on this the 30 January 2009 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least $2million

~~I~~ we have

Please mark appropriate box

☑ Prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines and the Pittwater Council Policy

☐ ~~Am~~ Are willing to technically verify that the detailed Geotechnical Report referenced below has been prepared in accordance with the Australian Geomechanics Society s Landslide Risk Management Guidelines and the Pittwater Council Geotechnical Risk Management Policy

☐ Have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with paragraph 6 3 (Property Located in Zone H3) of the Pittwater Council Geotechnical Risk Management Policy ~~I~~ we confirm that the results of the risk assessment are compliance with the Geotechnical Risk Management Policy and further detailed geotechnical reporting is not required for the subject site which is zoned H3

☐ Have examined the site and the proposed development/alteration in detail and ~~am~~ are of the opinion that the Development Application only involves Minor Development/Alterations that do not require a Detailed Geotechnical Risk Assessment and hence my report is in accordance with the Geotechnical Risk Management Policy requirements for Minor Development/Alterations

☐ Provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details

Report Title Geotechnical Investigation and Slope Stability Risk Assessment for Proposed classroom building, Lilyvale Anglican Preparatory School, 1977 Pittwater Road, Bayview, NSW

Report Date 30 January 2009 Report Ref: 22636Srpt

Author Daniel Bliss of Jeffery and Katauskas Pty Ltd

Documentation which relate to or are relied upon in report preparation

See text of Report

~~I am~~ we are aware that the above Geotechnical Report prepared for the abovementioned site is to be submitted in support of a Development Application for this site and will be relied on by Pittwater Council as the basis for ~~ensuring~~ ensure that the Geotechnical Risk Management aspects of the proposed development have been adequately addressed to achieve an Acceptable Risk Management level for the life of the structure taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk, as discussed in the Report

Signature

Name Daniel Bliss

Chartered Professional Status MIEAust, CPEng, NPER

Membership No 969495

Company Jeffery and Katauskas Pty Ltd

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER

FORM NO 1(a) - Checklist Of Requirements For Geotechnical Risk Management Report for Development Application

Development Application for Sydney Anglican Schools Corporation
Name of Applicant

Address of site _____

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report This checklist is to accompany the Geotechnical Report and its certification (Form No 1)

Geotechnical Report Details

Report Title ~~Geotechnical investigation and slope stability risk assessment for Proposed classroom~~ Building at Loquat Valley Anglican Preparatory School
Report Date 30 January 2009 Report Ref No 22636Sbrpt
Author Daniel Bliss of Jeffery and Katauskas Pty Ltd

Please mark appropriate box

- [x] Comprehensive site mapping conducted 14/1/09 (date)
- [x] Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1 200 (as appropriate)
- [x] Subsurface investigation required
  - [ ] No Justification
  - [x] Yes Date conducted 14/1/09
- [x] Geotechnical model developed and reported as an inferred subsurface type section
- [x] Geotechnical hazards identified
  - [x] Above the site
  - [x] On the site
  - [x] Below the site
  - [x] Beside the site
- [x] Geotechnical hazards described and reported
- [x] Risk assessment conducted in accordance with Council s Policy
  - [x] Consequence analysis
  - [x] Frequency analysis
- [x] Risk calculation
- [x] Risk assessment for property conducted in accordance with Council s Policy
- [x] Risk assessment for loss of life conducted in accordance with Council s Policy
- [x] Assessed risks have been compared to Acceptable Risk Management criteria as defined in the Geotechnical Risk Management Policy for Pittwater
- [x] Opinion has been provided that the design can achieve the Acceptable Risk Management criteria provided that the ~~specified conditions are achieved~~ recommendations presented in the Report are adopted
- [x] Design Life Adopted
  - [x] 100 years
  - [ ] Other (specify)
- [x] Development Conditions to be applied to all four phases as described in Pittwater Geotechnical Risk Management Policy have been specified
- [x] Additional action to remove risk where reasonable and practical have been identified and included in the report
- [ ] Risk assessment within Bushfire Asset Protection Zone

~~I am~~ we are aware that Pittwater Council will rely on the Geotechnical Report to which this checklist applies as the basis for ~~ensuring~~ continuing that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an Acceptable Risk Management level for the life of the structure taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk as discussed in the Report

Signature
Name Daniel Bliss
Chartered Professional Status MIEAust, CPEng, NPER
Membership No 969495
Company Jeffery and Katauskas Pty Ltd

TABLE OF CONTENTS

1 INTRODUCTION

This report presents the results of our geotechnical investigation and slope stability risk assessment for the proposed classroom building at the western end of Loquat Valley Anglican Preparatory School at 1977 Pittwater Road, Bayview, NSW The assessment was commissioned by Mr Bruce Litchfield of the Sydney Anglican Schools Corporation by returned Acceptance of our Proposal, Ref P30401SB, in consultation with Mr Geoff Gillman of Midson Management

Details of the proposed development are presented in Section 5 below In summary, however, a small extension to an existing classroom building and a new classroom building is proposed in the north-western corner of the school

This report has been prepared in accordance with the requirements of the Geotechnical Risk Management Policy for Pittwater (2007) as discussed in Section 5 below It is understood that the report will be submitted to Council as part of the DA documentation Our report is preceded by the completed Council Forms 1 and 1a The purpose of the subsurface investigation was to obtain geotechnical information on subsurface conditions as a basis for comments and recommendations on footings for the new building and extension

For the purposes of this report "the site" has been taken as the north-western corner of the school property where the new development is proposed A detailed stability assessment of the remainder of the school property is outside the scope of this assessment Nevertheless, the new development will not affect the stability of the remainder of the school property

2 ASSESSMENT METHODOLOGY

2 1 Walkover Survey

The stability assessment is based upon a detailed inspection of the topographic, surface drainage and geological conditions of the site and its immediate environs These features were compared to those of other similar properties in neighbouring locations to provide a comparative basis for assessing the risk of instability affecting the proposed development The attached Appendix A defines the terminology adopted for the risk assessment together with a flow chart illustrating the Risk Management Process based on the guidelines given in AGS 2007c (Reference 1)

A summary of our observations is presented in Section 3 below Our specific recommendations regarding the proposed development are discussed in Section 7 following our geotechnical assessment

The attached Figure 2 presents a geotechnical site plan showing the principle geotechnical features present at the site Figure 2 is based on the survey plan prepared by Whelans Insites Pty Ltd (Ref C189, dated 12 January 2009) Additional features on Figure 2 have been measured by hand held inclinometer and tape measure techniques and hence are only approximate Should any of the features be critical to the proposed development, we recommend they be located more accurately using instrument survey techniques Figure 3 presents a typical cross-section through the site based on the survey data augmented by our mapping observations

2 2 Subsurface Investigation

Boreholes BH1 to BH3 were auger drilled using our JK350 rig to depths of 7 5m below the existing ground surface These rig drilled boreholes were limited to the southern end of the proposed building as rig access was not possible across the

existing rubber softfall surfacing because the weight of the rig may have damaged the rubber softfall covering most of the site To supplement the rig drilled boreholes, BH4 was drilled using a hand auger to a depth of 2m, with an adjacent Dynamic Cone Penetrometer (DCP) test to refusal at a depth of 2 9m

The borehole locations, as shown on Figure 1, were set out by taped measurements from existing surface features and inferred site boundaries Prior to drilling, the borehole locations were electromagnetically scanned for buried services by a specialist sub-contractor The approximate surface levels of the boreholes and DCP test, as shown on the borehole logs and DCP test result, were estimated by interpolating between spot levels shown on the supplied survey plan by Whelans Insites Pty Ltd The datum of the levels is not shown on the survey plan and has, therefore, been taken as an 'Assumed' site datum

The apparent compaction of the fill, and the strength or relative density of the natural soils was assessed with reference to Standard Penetration Test (SPT) 'N' values and the DCP test results The strength of the underlying sandstone was assessed by observation of the drilling resistance of a tungsten carbide (TC) bit attached to the augers, together with examination of the recovered rock chips and subsequent correlation with laboratory moisture content tests It must be noted that this method of rock strength assessment is approximate and variations of one strength order should not be unexpected If rock strengths have any great significance to the design then further investigations may be advisable

Groundwater observations were made both during and on completion of borehole drilling No long term ground water monitoring was carried out

Our geotechnical engineer, Mr Matthew Pearce, set out the borehole locations, nominated the sampling and testing locations, and prepared logs of the strata encountered The borehole logs, which include field test results and groundwater

observations, are attached to this report, together with the DCP test results, and a set of explanatory notes, which describe the investigation techniques, and their limitations, and define the logging terms and symbols used

Selected samples were tested by Soil Test Services Pty Ltd (STS), a NATA registered laboratory, to determine moisture contents of rock chip samples The results of the laboratory testing are summarised in Table A Contamination testing of the site soils was outside the scope of this investigation

3 SUMMARY OF OBSERVATIONS

The following observations were made during the walkover inspection These observations should be read in conjunction with the attached Figure 2

- The school property is located within a valley which runs off the face of the Bayview escarpment Locally the valley runs west to east, with the existing school buildings located on the hillside on the northern side of the valley The existing buildings are located on slopes which fall towards the south, generally at about 10°, but with steeper sections at about 20°
- The existing school buildings have either been constructed above the hillside slope or cut partly into the slope The two main brick buildings (two or three stories) have been cut into the slope with the lowest level of each building constructed within the cut area The remaining buildings are of one or two stories and are of timber construction with weatherboard cladding All buildings appeared to be in good external condition
- In amongst the existing school buildings were several retaining walls of timber or masonry construction Most of these walls were 1m or less in height and appeared to be in good condition

- Within the base of the valley was a grassed playground area, which slopes down towards the east at about 1°, an asphaltic concrete paved entry and parking area, and a tennis court in the south-eastern corner of the school
- The area of the proposed new classroom was located within the base of the valley and was grass covered at its southern end, but was mostly covered with a rubber softfall surfacing and free standing children's play equipment
- The classroom building that will be extended comprised a two storey weatherboard building, with the first floor comprising an attic level The floor of the building was elevated slightly above the surrounding ground surface with the floor supported on timber columns This building appeared to be in good external condition
- To the north-west and north-east of the above building was a treated pine log retaining wall of maximum 1 1m in height, with the building being located below the wall In front (south-east) of the building was a garden bed supported by a block retaining wall of about 0 4m in height Both these walls appeared to be in good condition
- To the north-east of the building was another single storey weatherboard classroom building with its floor level at about the level of the attic of the subject building The floor of this adjacent building was supported on timber columns so that it was elevated above the ground surface, with water tanks located within the sub-floor space
- To the north-west of the school was a right-of-way providing access to several residential properties Immediately to the north-west of the building that will be extended, the hillside slopes up from the school property at about 15° to 20° to the driveway of a house that is located about 15m to 20m from the common boundary
- The property to the west of the school was occupied by a two storey rendered house located about 4m from the common boundary To the north of the house and opposite the site of the proposed new classroom, an inground swimming pool was located about 3m from the common boundary The ground

surface levels between the school property and this adjacent property were consistent across the common boundary

- To the south of the school was Loquat Valley Road and to the east was Pittwater Road

4 SUBSURFACE CONDITIONS

In summary, the boreholes encountered fill covering alluvial clays and sands over sandstone bedrock Further comments on the subsurface conditions encountered are provided below Reference should be made to the borehole logs for detailed descriptions of the subsurface conditions encountered

Fill

Fill was encountered in all boreholes to depths ranging from 1m to 1 9m The fill comprised a silty sand topsoil, sandy silty clay, sandy clay, clayey sand and silty clay and based on the SPT and DCP test results was assessed to poorly to moderately compacted

Alluvial Soils

The alluvial soils initially comprised sandy silty clay and silty clay becoming silty sand with depth The clays were assessed to be of very soft strength and the silty sands of very loose relative density, with SPT 'N' values ranging from 0 (sunk under weight of hammer) to 3

Sandstone

Sandstone was encountered in BH1 to BH3 at depths ranging from 5 4m to 5 6m The sandstone was assessed to be distinctly weathered and of low to medium strength, but contained some clay bands and higher strength iron indurated bands DCP4 refused at a depth of 2 9m, which may indicate the depth to the top of the weathered sandstone considering that this test was carried out on the side of the

valley rather than the base as BH1 to BH3 were However, since such tests do not provide sample recovery the exact nature of the material that caused refusal could not be determined and it may have occurred on an obstruction or floater above the bedrock

Groundwater

Groundwater seepage was encountered during drilling at depths ranging from 1 7m to 2 2m, with the boreholes collapsing at these depth on completion On completion groundwater was also observed at depths ranging from 1 3m to 1 9m

5 PROPOSED DEVELOPMENT

Based on the supplied development sketches by Midson Management dated 26 November 2008 and discussions with Mr Gillman, we understand that the proposed additions to the school will comprise the following

- A single storey extension on the western side of the existing two storey classroom building located in the north-western corner of the school This extension will contain a kitchen and amenities
- A new single storey classroom building to the south of the existing two storey classroom building and offset about 3m from the western boundary of the school The floor level of the new classroom will be at RL4 47m, which is about 1m above the existing ground surface
- This new building and extension to the existing building will be constructed to match with the existing school buildings and will be of timber construction with timber weatherboard cladding The floor will be elevated above the surrounding ground surface and is likely to comprise a timber floor
- A new timber deck between the two buildings and to the east of the new building, requiring some rearrangement of the existing garden bed on the

southern side of the existing building Again this deck will be elevated above the surrounding ground surface

The layout of the proposed additions is shown on Figure 1

6 GEOTECHNICAL ASSESSMENT

The site of the proposed classroom building and extension to the existing building is located at the base of a hillside slope within the neighbouring property and within the school grounds to the north-east The site is located within a relatively flat area within the base of a valley running approximately west to east The results of the subsurface investigation indicate that the site is underlain by poorly compacted fill and very soft or very loose alluvial soils over sandstone bedrock at depths of about 3m at the northern end of the site to about 5 5m at the southern end No evidence of mass soil slope instability or downslope soil creep was observed within the school property or within the slope within the adjoining property

6 1 Potential Landslide Hazards

We consider that the potential landslide hazards associated with the site to be the following

A Stability of the hillside slope within property to the north-west

B Stability of the hillside slope within the school grounds to the north-east

C Stability of existing treated pine log retaining wall adjacent to existing building

The potential hazards A and C are indicated in schematic form on the attached Figure 3

6 2 Risk Analysis

The attached Table 1 summarises our qualitative assessment of each potential landslide hazard and of the consequences to property should the landslide hazard occur Based on the above, the qualitative risks to property have been determined The terminology adopted for this qualitative assessment is in accordance with Table A1 given in Appendix A Table 1 indicates that the assessed risk to property for all three hazards would be "Low", which would be considered acceptable in accordance with the criteria given in Reference 1 and the Pittwater Council Risk Management Policy

We have also used the indicative probabilities associated with the assessed likelihood of instability to calculate the risk to life The temporal and vulnerability factors that have been adopted are given in the attached Table 2 together with the resulting risk calculation Our assessed risk to life for the person most at risk is about 6×10^{-7} This would be considered to be acceptable in relation to the criteria given in Reference 1 and the Pittwater Council Risk Management Policy

6 3 Risk Assessment

The Pittwater Risk Management Policy requires suitable measures 'to remove risk' It is recognised that, due to the many complex factors that can affect a site, the subjective nature of a risk analysis, and the imprecise nature of the science of geotechnical engineering, the risk of instability for a site and/or development cannot be completely removed It is, however, essential that risk be reduced to at least that which could be reasonably anticipated by the community in everyday life and that landowners be made aware of reasonable and practical measures available to reduce risk as far as possible Hence, where the policy requires that 'reasonable and practical measures have been identified to remove risk', it means that there has been an active process of reducing risk, but it does not require the geotechnical engineer

to warrant that risk has been completely removed, only reduced, as removing risk is not currently scientifically achievable

Similarly, the Pittwater Risk Management Policy requires that the design project life be taken as 100 years unless otherwise justified by the applicant This requirement provides the context within which the geotechnical risk assessment should be made The required 100 years baseline broadly reflects the expectations of the community for the anticipated life of a residential structure and hence the timeframe to be considered when undertaking the geotechnical risk assessment and making recommendations as to the appropriateness of a development, and its design and remedial measures that should be taken to control risk It is recognised that in a 100 year period external factors that cannot reasonably be foreseen may affect the geotechnical risks associated with a site Hence, the Policy does not seek the geotechnical engineer to warrant the development for a 100 year period, rather to provide a professional opinion that foreseeable geotechnical risks to which the development may be subjected in that timeframe have been reasonably considered

Our assessment of the probability of failure of existing structural elements such as retaining walls (where applicable) is based upon a visual appraisal of their type and condition at the time of our inspection Where existing structural elements such as retaining walls will not be replaced as part of the proposed development, where appropriate we identify the time period at which reassessment of their longevity seems warranted

In preparing our recommendations given below we have adopted the above interpretations of the Risk Management Policy requirements We have also assumed that no activities on surrounding land which may affect the risk on the subject site would be carried out We have further assumed that all Council's buried services are, and will be regularly maintained to remain, in good condition

We consider that our risk analysis has shown that the site and existing and proposed development can achieve the 'Acceptable Risk Management' criteria in the Pittwater Risk Management Policy provided that the recommendations given in Section 7 below are adopted These recommendations form an integral part of the Landslide Risk Management Process

7 COMMENTS AND RECOMMENDATIONS

We consider that the proposed development may proceed provided the following specific design, construction and maintenance recommendations are adopted to maintain and reduce the present risk of instability of the site and to control future risks These recommendations address geotechnical issues only and other conditions may be required to address other aspects

7 1 Conditions Recommended to Establish the Design Parameters

7 1 1 The subsurface investigation indicated that the site is underlain by poorly compacted fill and very soft or very loose alluvial soils The weak nature of these soils is indicated by the very low SPT results with 'N' values of 0 to 3, where 0 represents the SPT sampler sinking under the weight of the hammer with no blows of the hammer required to penetrate the soils Therefore, all footings for the extension and the new building must be founded within the underlying sandstone bedrock as this represents the only competent foundation material In addition, as shown on the survey plan for the site, a culvert crosses the site between the two proposed buildings and all footings would need to found below this culvert so that additional loads are not placed on the culvert

7 1 2 The proposed structures should be supported on piles founded within the sandstone bedrock Due to the shallow groundwater levels and the poor quality soils, bored piers would not be appropriate as they would almost

certainly collapse during drilling Driven piles would be suitable for the ground conditions, but the vibrations generated by driving the piles would be unacceptable and may damage the adjacent existing buildings The most suitable pile type for this site would be auger, grout injected (CFA) piles

7 1 3 CFA Piles founded within the sandstone bedrock of at least low strength may be designed for an allowable bearing pressure of 1000kPa Higher bearing pressures may be possible within the sandstone of medium strength or higher, but additional cored boreholes would be required to allow a greater assessment of the rock quality to justify the use of higher bearing pressures

7 1 4 Since the floor of the buildings will be elevated above the surround ground surface no excavations or filling works are proposed If changes to the proposed development are made which then require excavation or filling, further geotechnical advice must be obtained on suitable temporary and permanent batters slopes and retaining walls

7 1 5 Some low height retaining walls may be constructed to support new garden beds and such walls may be design as cantilevered walls based on a triangular earth pressure distribution using an active earth pressure coefficient, K_a, of 0 33 and a bulk unit weight of 20kN/m^3, assuming horizontal backfill surfaces All surcharge loads must be allowed for in the design of such walls The retaining walls should be provided with complete and permanent drainage of the ground behind the walls The subsoil drains should incorporate a non-woven geotextile fabric, e g Bidim A34, to act as a filter against subsoil erosion

7 1 6 The surface water discharging from the new roof and paved areas must be diverted to outlets for controlled discharge to the existing stormwater system which appears to drain to the existing culvert We note that the

area is low lying and at the foot of a major hillslope Surface water flows may be considerable in wet weather periods

7 1 7 The guidelines for Hillside Construction given in Appendix B should also be adopted

7 2 Conditions Recommended to the Detailed Design to be Undertaken for the Construction Certificate

7 2 1 All structural design drawings must be reviewed by the geotechnical engineer who should endorse that the recommendations contained in this report have been adopted in principle

7 2 2 The structural engineer must indicate on the structural drawings the design life of all structures and structural elements

7 2 3 All hydraulic design drawings must be reviewed by the geotechnical engineer who should endorse that the recommendations contained in this report have been adopted in principle

7 3 Conditions Recommended During the Construction Period

7 3 1 The geotechnical engineer must inspect pile drilling and compare pile founding depths with the results of the subsurface investigation as inspection of drill cutting during the drilling of CFA piles will not be possible

7 3 2 If they are to be retained, the existing stormwater system, sewer and water mains must be checked for leaks by using static head and pressure tests under the direction of the hydraulic engineer or architect, and repaired if found to be leaking

7 3 3 An 'as-built' drawing of all buried services at the site must be prepared (including all pipe diameters, pipe depths, pipe types, inlet pits, inspection pits, etc)

7 3 4 The geotechnical engineer must confirm that the proposed alterations and additions have been completed in accordance with the geotechnical reports

7 4 Conditions Recommended for Ongoing Management of the Site/Structure(s)

The following recommendations have been included so that the current and future owners and operators of the subject property are aware of their responsibilities

7 4 1 All existing and proposed surface (including roof) and subsurface drains must be subject to ongoing and regular maintenance by the property owners In addition, such maintenance must also be carried out by a plumber at no more than ten yearly intervals, including provision of a written report confirming scope of work completed (with reference to the 'as-built' drawing) and identifying any required remedial measures

7 4 2 The existing retaining walls must be inspected by a structural engineer at no more than ten yearly intervals, including the provision of a written report confirming scope of work completed and identifying any required remedial measures

7 4 3 No cut or fill in excess of 0 5m (eg for landscaping, buried pipes, retaining walls, etc), is to be carried out on site without prior consent from Pittwater Council

7 4 4 Where the structural engineer has indicated a design life of less than 100 years then the structure and/or structural elements must be inspected by a structural engineer at the end of their design life, including a written report confirming scope of work completed and identifying the required

remedial measures to extend the design life over the remaining 100 year period

8 GENERAL COMMENTS

Occasionally, the subsurface conditions between the completed boreholes may be found to be different (or may be interpreted to be different) from those expected Variation can also occur with groundwater conditions, especially after climatic changes If such differences appear to exist, we recommend that you immediately contact this office

The offsite disposal of soil will most likely require classification in accordance with the Department of Environment & Climate Change (NSW) guidelines as Virgin Un-Excavated Natural Material (VENM), General Solid, Restricted Solid or Hazardous waste We can complete the necessary classification and testing if you wish to commission us As testing requires about seven days to complete, allowance should be made for such testing in the construction program unless testing is completed prior to construction If contamination is found to be present then substantial further testing and delays should be expected We strongly recommend this issue be addressed prior to commencement of excavation on site

Should you have any queries regarding this report, please do not hesitate to contact the undersigned

For and on behalf of
JEFFERY AND KATAUSKAS PTY LTD

Daniel Bliss
Senior Associate

Reviewed by

for Paul Stubbs
Principal

Reference 1 Australian Geomechanics Society (2007c) *'Practice Note Guidelines for Landslide Risk Management'*, Australian Geomechanics, Vol 42, No 1, March 2007, pp63-114

TABLE 1
SUMMARY OF RISK ASSESSMENT TO PROPERTY

POTENTIAL LANDSLIDE HAZARD	Hazard A	Hazard B	Hazard C
	Instability of Hillside Slope within Property to the North-West	**Instability of Hillside slope within School Grounds to the North-East**	**Instability of Existing Treated Pine Log Retaining Wall Adjacent to the Existing Building**
Assessed Likelihood	Unlikely	Unlikely	Unlikely
Assessed Consequences	Medium	Medium	Medium
Risk	Low	Low	Low
Comments	Assumes building footings founded within bedrock	Assumes building footings founded within bedrock	Wall appears in good condition

TABLE 2
SUMMARY OF RISK ASSESSMENT TO LIFE

POTENTIAL LANDSLIDE HAZARD	Hazard A	Hazard B	Hazard C
	Instability of Hillside Slope within Property to the North-West	**Instability of Hillside slope within School Grounds to the North-East**	**Instability of Existing Treated Pine Log Retaining Wall Adjacent to the Existing Building**
Assessed Likelihood	Unlikely	Unlikely	Unlikely
Indicative Annual Probability	10^{4}	10^{4}	10^{4}
Persons at Risk	Persons within or near extended classroom	Persons within or near extended classroom	Persons within or near extended classroom
Number of Persons Considered	25	25	25
Duration of Use of Area Affected (Temporal Probability)	Say 5 hours per day, 5 days per week, 42 weeks per year = 0 12	Say 5 hours per day, 5 days per week, 42 weeks per year = 0 12	Say 5 hours per day, 5 days per week, 42 weeks per year = 0 12
Vulnerability to Life if Failure Occurs Whilst Person Present	0 05 Building unlikely to collapse, would only be struck by debris	0.05 Building unlikely to collapse, would only be struck by debris	0 05 Building unlikely to collapse, would only be struck by debris
Risk for Person Most at Risk	6×10^{7}	6×10^{7}	6×10^{7}
Total Risk	$1\ 5 \times 10^{5}$	$1\ 5 \times 10^{5}$	$1\ 5 \times 10^{5}$

115 Wicks Road
Macquarie Park NSW 2113
PO Box 976
North Ryde Bc 1670
Telephone 02 9888 5000
Facsimile 02 9888 5001

SOIL TEST SERVICES
ABN 43 002 145 173

Ref No 22636SB
Table A Page 1 of 1

TABLE A
SUMMARY OF MOISTURE CONTENT TEST RESULTS

AS 1289 TEST METHOD 2 1 1

BOREHOLE NUMBER	DEPTH m	MOISTURE CONTENT %
1	5 80-6 00	6 7
1	7 30-7 50	4 3
2	5 80-6 00	5 6
2	7 30-7 50	5 2
3	5 80-6 00	4 1

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No 1 1/2

BOREHOLE LOG

Client SYDNEY ANGLICAN SCHOOLS CORPORATION

Project PROPOSED CLASSROOM BUILDING

Location LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

Job No 22636SB **Method** SPIRAL AUGER JK350 **R L Surface** ≈ 3 5m

Date 14-1-09 **Datum** ASSUMED

Logged/Checked by M P /

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
					N = 4 3,2 2	0			FILL Silty sand topsoil, fine to medium grained brown, with root fibres	D			GRASS COVER
									FILL Sandy silty clay, low to medium plasticity brown, grey and red brown, with igneous and sandstone gravel				APPEARS POORLY COMPACTED
ON COMPLET- ION ▼					N = 1 0 0,1	1		CL	SANDY SILTY CLAY low to medium plasticity dark grey	MC>PL	VS	-	ORGANIC ODOUR ALLUVIAL
					N = 1 1,0,1	2							
						3							
					N = 2 1,1,1	4		SM	SILTY SAND fine to medium grained grey	W	VL		
						5							
						6			SANDSTONE fine to medium grained, red brown and grey, with iron indurated and clay bands	DW	L M		LOW 'TC BIT RESISTANCE WITH MODERATE BANDS
						7							

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CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No 1 2/2

BOREHOLE LOG

Client SYDNEY ANGLICAN SCHOOLS CORPORATION
Project PROPOSED CLASSROOM BUILDING
Location LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

Job No 22636SB **Method** SPIRAL AUGER JK350 **R L Surface** ≈ 3 5m
Date 14-1-09 **Datum** ASSUMED
Logged/Checked by M P /

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
				■					SANDSTONE fine to medium grained red brown and grey with iron indurated and clay bands	DW	L M		
									END OF BOREHOLE AT 7 5m				
						8							
						9							
						10							
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd

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Borehole No 2 1/2

BOREHOLE LOG

Client SYDNEY ANGLICAN SCHOOLS CORPORATION

Project PROPOSED CLASSROOM BUILDING

Location LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

Job No 22636SB **Method** SPIRAL AUGER JK350 **R L Surface** ≈ 3 5m

Date 14-1-09 **Datum** ASSUMED

Logged/Checked by M P /

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
					N = 15 2,6,9	0			FILL Silty sand topsoil, fine to medium grained, brown, with root fibres	M			GRASS COVER
									FILL Sandy clay, low to medium plasticity brown and grey, with brick and sandstone fragments	MC<PL			APPEARS MODERATELY COMPACTED
▼ ON COMPLETION					N = 0 0,0,0	1		CL	SANDY SILTY CLAY low plasticity dark grey and brown	MC>PL	VS		
					N = 0 0 0,0	3							
					N = 1 1,1 0	4		SM	SILTY SAND fine to medium grained grey	W	VL		
						5							
						6		-	SANDSTONE fine to medium grained, red brown and grey with iron indurated bands	DW	L M		LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
						7							MODERATE RESISTANCE

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BOREHOLE LOG

Borehole No 2 2/2

Client	SYDNEY ANGLICAN SCHOOLS CORPORATION
Project	PROPOSED CLASSROOM BUILDING
Location	LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

Job No 22636SB **Method** SPIRAL AUGER JK350 **R L Surface** ≈ 3 5m
Date 14-1-09 **Datum** ASSUMED
Logged/Checked by M P /

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
				■					SANDSTONE fine to medium grained, red brown and grey with iron indurated bands	DW	L M		
									END OF BOREHOLE AT 7 5m				
						8							
						9							
						10							
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd
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Borehole No **3** 1/2

BOREHOLE LOG

Client SYDNEY ANGLICAN SCHOOLS CORPORATION

Project PROPOSED CLASSROOM BUILDING

Location LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

Job No 22636SB **Method** SPIRAL AUGER JK350 **R L Surface** ≈ 3 6m

Date 14-1-09 **Datum** ASSUMED

Logged/Checked by M P /

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
						0			FILL Silty sand topsoil, fine to medium grained, dark brown, with root fibres and a trace of clay	D-M			GRASS COVER
					N = 5 4,3,2				FILL Clayey sand, fine to medium grained, brown, with sandstone gravel and ash	M			APPEARS POORLY COMPACTED
▼ ON COMPLETION						1		CL	SILTY CLAY low plasticity dark grey and brown	MC>PL	VS		ALLUVIAL ORGANIC ODOUR
					N = 0 SUNK 0	2							
								SM	SILTY SAND fine to medium grained, grey	W	VL		
					N = 1 1,0,1	3							
						4							
					N = 3 1,2,1	5							
						6			SANDSTONE fine to medium grained, red brown and grey, with iron indurated bands	DW	L M	-	LOW TO MODERATE 'TC' BIT RESISTANCE
						7							

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Borehole No 3 2/2

BOREHOLE LOG

Client SYDNEY ANGLICAN SCHOOLS CORPORATION
Project PROPOSED CLASSROOM BUILDING
Location LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

Job No 22636SB **Method** SPIRAL AUGER JK350 **R L Surface** ≈ 3 6m
Date 14-1-09 **Datum** ASSUMED
Logged/Checked by M P / [illegible]

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
									SANDSTONE fine to medium grained red brown and grey with iron indurated bands	DW	L M		
									END OF BOREHOLE AT 7 5m				
						8							
						9							
						10							
						11							
						12							
						13							
						14							

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No 4 1/1

BOREHOLE LOG

Client SYDNEY ANGLICAN SCHOOLS CORPORATION

Project PROPOSED CLASSROOM BUILDING

Location LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW

Job No 22636SB **Method** SPIRAL AUGER JK350 **R L Surface** ≈ 3 8m

Date 14-1-09 **Datum** ASSUMED

Logged/Checked by M P /dm

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
					REFER TO DCP TEST RESULTS	0			FILL Silty clay, medium plasticity orange brown and dark brown, with a trace of ash	MC > PL			APPEARS POORLY TO MODERATELY COMPACTED
ON COMPLETION						2		SM	SILTY SAND fine to medium grained grey	W	L MD		ALLUVIAL
									END OF BOREHOLE AT 2 0m				BOREHOLE TERMINATED DUE TO COLLAPSE BELOW GROUNDWATER

Jeffery and Katauskas Pty Ltd

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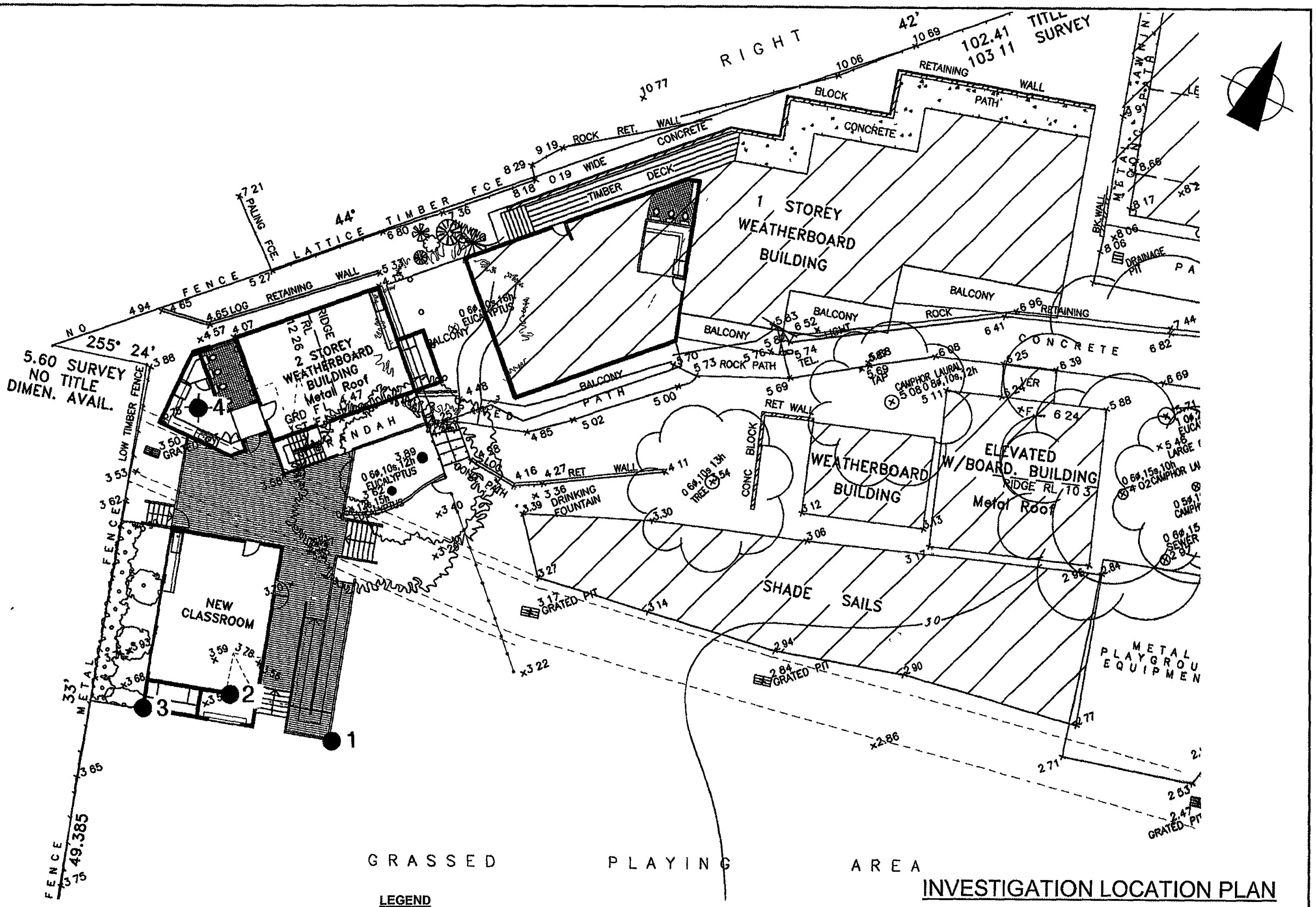
DYNAMIC CONE PENETRATION TEST RESULTS

Client	SYDNEY ANGLICAN SCHOOLS CORPORATION		
Project.	PROPOSED CLASSROOM BUILDING		
Location	LOQUAT VALLEY ANGLICAN SCHOOL, 1977 PITTWATER ROAD, BAYVIEW, NSW		
Job No	22636SB	Hammer Weight & Drop	9kg/510mm
Date	14-1-09	Rod Diameter	16mm
Tested By	M P	Point Diameter	20mm

	Number of Blows per 100mm Penetration						
Test Location	RL ~3 8m						
Depth (mm)	4						
0 - 100	3						
100 - 200	3						
200 - 300	3						
300 - 400	4						
400 - 500	2						
500 - 600	2						
600 - 700	1						
700 - 800	2						
800 - 900	3						
900 - 1000	2						
1000 - 1100	3						
1100 - 1200	4						
1200 - 1300	3						
1300 - 1400	2						
1400 - 1500	3						
1500 - 1600	3						
1600 - 1700	3						
1700 - 1800	3						
1800 - 1900	3						
1900 - 2000	4						
2000 - 2100	4						
2100 - 2200	17						
2200 - 2300	13						
2300 - 2400	14						
2400 - 2500	9						
2500 - 2600	15						
2600 - 2700	16						
2700 - 2800	14						
2800 - 2900	20						
2900 - 3000	REFUSAL						

Remarks

1 The procedure used for this test is similar to that described in AS1289 6 3 2-1997 Method 6 3 2
2 Usually 8 blows per 20mm is taken as refusal
3 Survey datum is assumed



INVESTIGATION LOCATION PLAN

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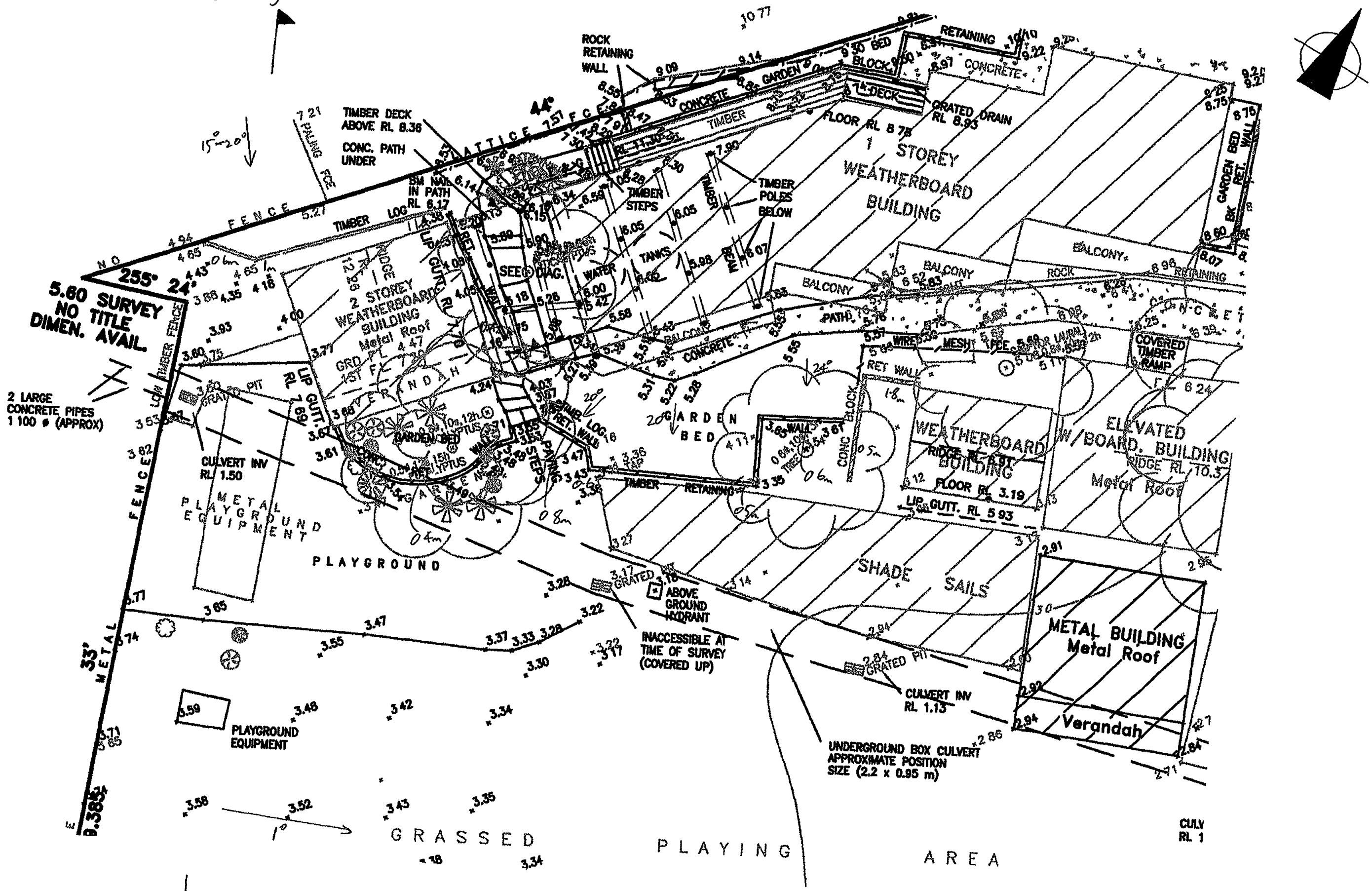
Report No 22636SB Figure No 1

Section
See Figure 3



SCALE (m)

0 10

GEOTECHNICAL SKETCH PLAN

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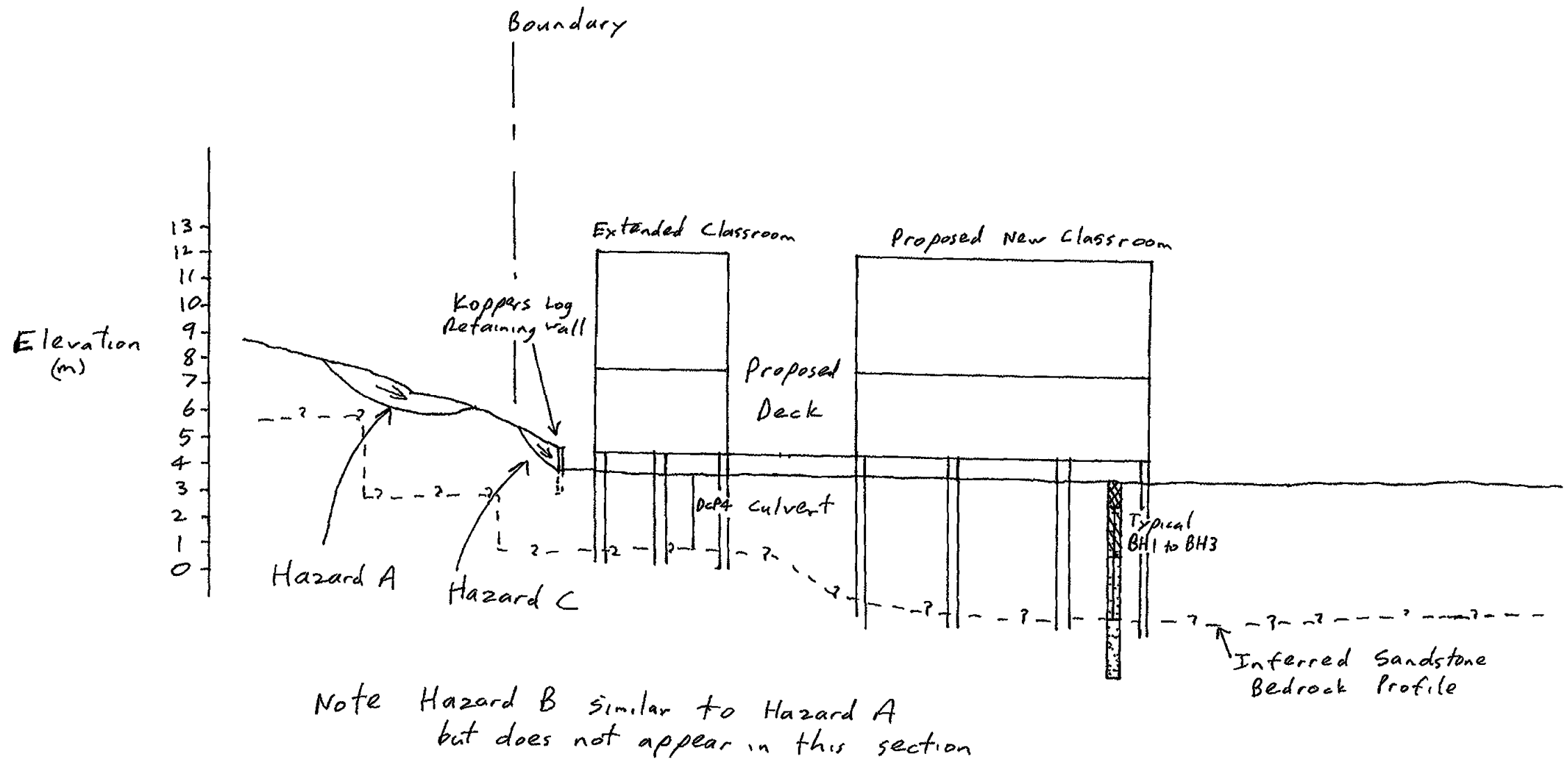
Report No 22636SB Figure No 2



Note Hazard B similar to Hazard A but does not appear in this section

GEOTECHNICAL SKETCH SECTION SHOWING LANDSLIDE HAZARDS

SCALE (m)

0 10

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Report No 22636SB **Figure No 3**

TOPOGRAPHY

Symbol *Ground Profile*

convex
concave
well defined or angular break of slope

convex
concave
poorly defined or smooth change of slope

breaks of slope
changes of slope
convex and concave too close together to allow the use of separate symbols

sharp
rounded
ridge crest

3 Cliff or escarpment or sharp break 40° or more (estimated height in metres)

15 Uniform Slope
10 Concave Slope
8 Convex Slope
Slope direction and angle (Degrees)

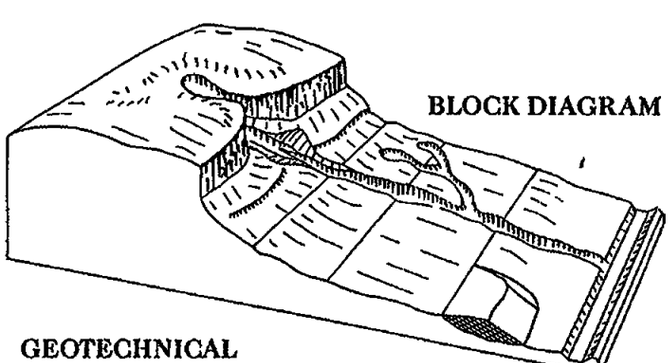
Top
Bottom
Cut or fill slope, arrows pointing down slope

Hummocky or irregular ground

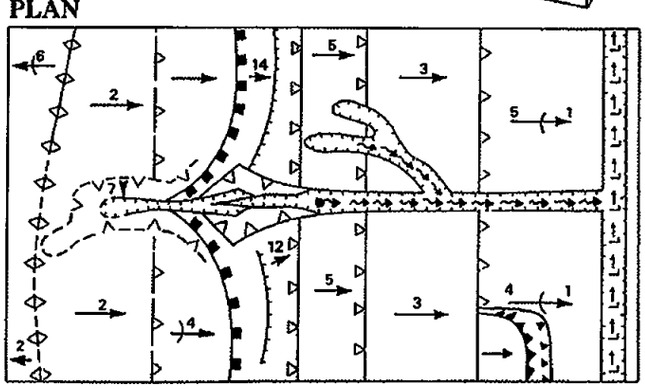
OTHER FEATURES

Boulder
Seepage/spring
Swallow hole for runoff
Natural water course
Open drain, unlined
Open drain, lined
Fenceline
Property boundary
Dry Stone Wall
J —— J 200 Major joint in rock face (opening in millimetres)
– T – T – 10 Tension crack (opening in millimetres)
Masonry or concrete wall
Ponding water
Boggy or swampy area

EXAMPLE OF USE OF TOPOGRAPHIC SYMBOLS



GEOTECHNICAL PLAN



GEOTECHNICAL MAPPING SYMBOLS

Jeffery and Katauskas Pty Ltd
Report No 22636SB Figure No 4

APPENDIX A

LANDSLIDE RISK MANAGEMENT TERMINOLOGY

APPENDIX A
LANDSLIDE RISK MANAGEMENT

Definition of Terms and Landslide Risk

Risk Terminology	Description
Acceptable Risk	A risk for which, for the purposes of life or work, we are prepared to accept as it is with no regard to its management Society does not generally consider expenditure in further reducing such risks justifiable
Annual Exceedance Probability (AEP)	The estimated probability that an event of specified magnitude will be exceeded in any year
Consequence	The outcomes or potential outcomes arising from the occurrence of a landslide expressed qualitatively or quantitatively, in terms of loss, disadvantage or gain, damage, injury or loss of life
Elements at Risk	The population, buildings and engineering works, economic activities, public services utilities, infrastructure and environmental features in the area potentially affected by landslides
Frequency	A measure of likelihood expressed as the number of occurrences of an event in a given time See also 'Likelihood' and 'Probability'
Hazard	A condition with the potential for causing an undesirable consequence (the landslide) The description of landslide hazard should include the location, volume (or area), classification and velocity of the potential landslides and any resultant detached material, and the likelihood of their occurrence within a given period of time
Individual Risk to Life	The risk of fatality or injury to any identifiable (named) individual who lives within the zone impacted by the landslide, or who follows a particular pattern of life that might subject him or her to the consequences of the landslide
Landslide Activity	The stage of development of a landslide, pre failure when the slope is strained throughout but is essentially intact, failure characterised by the formation of a continuous surface of rupture, post failure which includes movement from just after failure to when it essentially stops, and reactivation when the slope slides along one or several pre-existing surfaces of rupture Reactivation may be occasional (eg seasonal) or continuous (in which case the slide is 'active')
Landslide Intensity	A set of spatially distributed parameters related to the destructive power of a landslide The parameters may be described quantitatively or qualitatively and may include maximum movement velocity, total displacement, differential displacement, depth of the moving mass, peak discharge per unit width, or kinetic energy per unit area
Landslide Risk	The AGS Australian GeoGuide LR7 (AGS, 2007e) should be referred to for an explanation of Landslide Risk
Landslide Susceptibility	The classification, and volume (or area) of landslides which exist or potentially may occur in an area or may travel or retrogress onto it Susceptibility may also include a description of the velocity and intensity of the existing or potential landsliding
Likelihood	Used as a qualitative description of probability or frequency
Probability	A measure of the degree of certainty This measure has a value between zero (impossibility) and 1 0 (certainty) It is an estimate of the likelihood of the magnitude of the uncertain quantity, or the likelihood of the occurrence of the uncertain future event These are two main interpretations (i) Statistical – frequency or fraction – The outcome of a repetitive experiment of some kind like flipping coins It includes also the idea of population variability Such a number is called an 'objective' or relative frequentist probability because it exists in the real world and is in principle measurable by doing the experiment

Risk Terminology	Description
Probability ***(continued)***	(ii) Subjective probability (degree of belief) – Quantified measure of belief, judgment, or confidence in the likelihood of an outcome, obtained by considering all available information honestly, fairly, and with a minimum of bias Subjective probability is affected by the state of understanding of a process, judgment regarding an evaluation, or the quality and quantity of information It may change over time as the state of knowledge changes
Qualitative Risk Analysis	An analysis which uses word form, descriptive or numeric rating scales to describe the magnitude of potential consequences and the likelihood that those consequences will occur
Quantitative Risk Analysis	An analysis based on numerical values of the probability, vulnerability and consequences and resulting in a numerical value of the risk
Risk	A measure of the probability and severity of an adverse effect to health, property or the environment Risk is often estimated by the product of probability x consequences However, a more general interpretation of risk involves a comparison of the probability and consequences in a non-product form
Risk Analysis	The use of available information to estimate the risk to individual, population, property, or the environment, from hazards Risk analyses generally contain the following steps scope definition, hazard identification and risk estimation
Risk Assessment	The process of risk analysis and risk evaluation
Risk Control or Risk Treatment	The process of decision-making for managing risk and the implementation or enforcement of risk mitigation measures and the re-evaluation of its effectiveness from time to time, using the results of risk assessment as one input
Risk Estimation	The process used to produce a measure of the level of health, property or environmental risks being analysed Risk estimation contains the following steps frequency analysis, consequence analysis and their integration
Risk Evaluation	The stage at which values and judgments enter the decision process, explicitly or implicitly, by including consideration of the importance of the estimated risks and the associated social, environmental and economic consequences, in order to identify a range of alternatives for managing the risks
Risk Management	The complete process of risk assessment and risk control (or risk treatment)
Societal Risk	The risk of multiple fatalities or injuries in society as a whole one where society would have to carry the burden of a landslide causing a number of deaths, injuries, financial, environmental and other losses
Susceptibility	See 'Landslide Susceptibility'
Temporal Spatial Probability	The probability that the element at risk is in the area affected by the landsliding, at the time of the landslide
Tolerable Risk	A risk within a range that society can live with so as to secure certain net benefits It is a range of risk regarded as non-negligible and needing to be kept under review and reduced further if possible
Vulnerability	The degree of loss to a given element or set of elements within the area affected by the landslide hazard It is expressed on a scale of 0 (no loss) to 1 (total loss) For property, the loss will be the value of the damage relative to the value of the property, for persons, it will be the probability that a particular life (the element at risk) will be lost, given the person(s) is affected by the landslide

NOTE Reference should be made to Figure A1 which shows the inter-relationship of many of these terms and the relevant portion of Landslide Risk Management

Reference should also be made to the paper referenced below for Landslide Terminology and more detailed discussion of the above terminology

This appendix is an extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in Australian Geomechanics, Vol 42, No 1, March 2007, which discusses the matter more fully

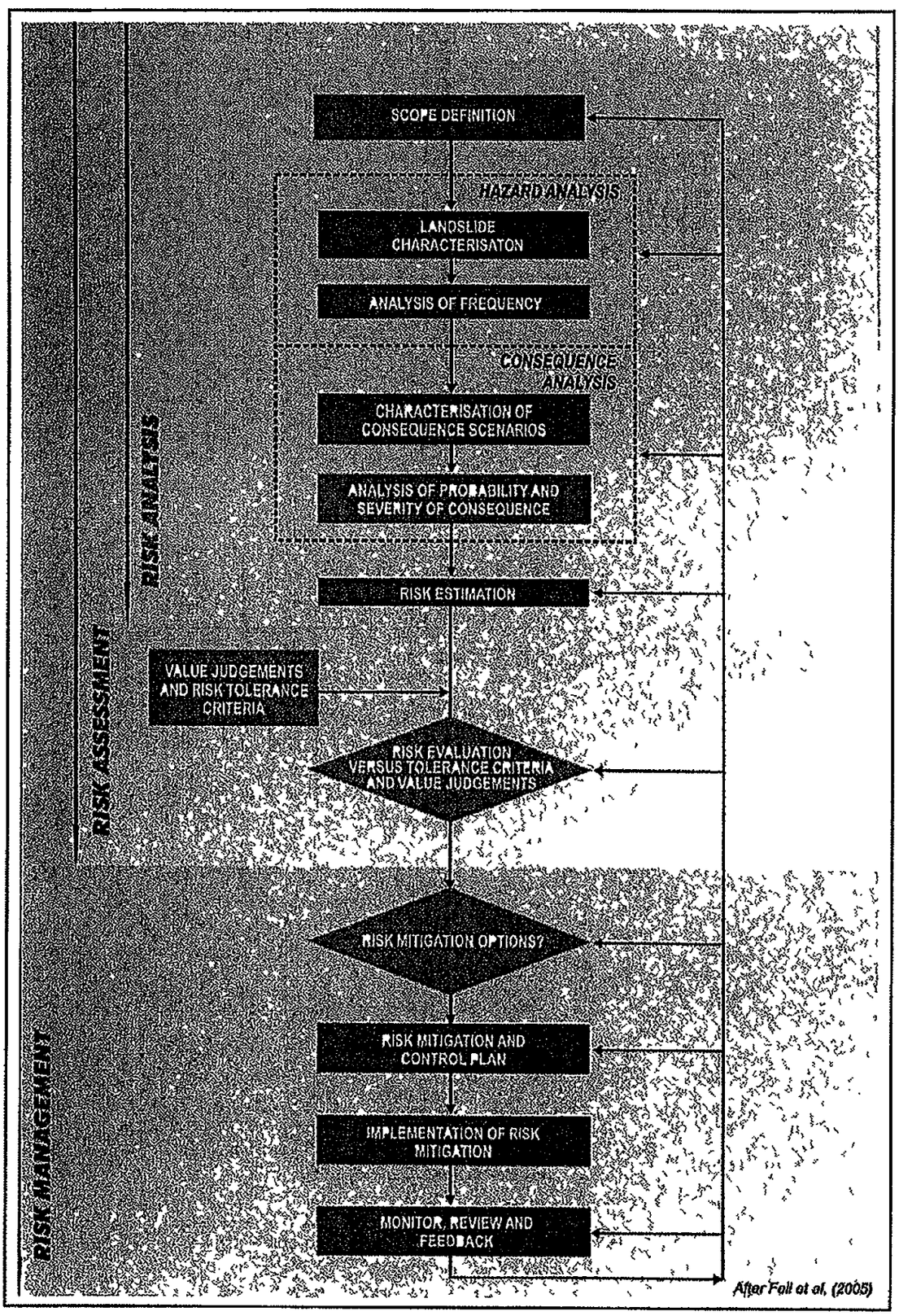


FIGURE A1. Flowchart for Landslide Risk Management

This figure is an extract from GUIDELINE FOR LANDSLIDE SUSCEPTIBILITY, HAZARD AND RISK ZONING FOR LAND USE PLANNING, as presented in Australian Geomechanics Vol 42, No 1, March 2007, which discusses the matter more fully

TABLE A1· LANDSLIDE RISK ASSESSMENT
QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY

QUALITATIVE MEASURES OF LIKELIHOOD

Approximate Annual Probability		Implied Indicative Landslide Recurrence Interval		Description	Descriptor	Level
Indicative Value	Notional Boundary					
10^{1}	$5x10^{-2}$	10 years	20 years	The event is expected to occur over the design life	ALMOST CERTAIN	A
10^{2}	$5x10^{3}$	100 years	200 years	The event will probably occur under adverse conditions over the design life	LIKELY	B
10^{-3}	$5x10^{-4}$	1000 years	2000 years	The event could occur under adverse conditions over the design life	POSSIBLE	C
10^{-4}	$5x10^{5}$	10,000 years	20,000 years	The event might occur under very adverse circumstances over the design life	UNLIKELY	D
10^{5}	$5x10^{-6}$	100,000 years	200,000 years	The event is conceivable but only under exceptional circumstances over the design life	RARE	E
10^{-6}		1,000,000 years		The event is inconceivable or fanciful over the design life	BARELY CREDIBLE	F

Note (1) The table should be used from left to right, use Approximate Annual Probability or Description to assign Descriptor, not *vice versa*

QUALITATIVE MEASURES OF CONSEQUENCES TO PROPERTY

Approximate Cost of Damage		Description	Descriptor	Level
Indicative Value	Notional Boundary			
200%	100%	Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation Could cause at least one adjacent property major consequence damage	CATASTROPHIC	1
60%	40%	Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works Could cause at least one adjacent property medium consequence damage	MAJOR	2
20%	10%	Moderate damage to some of structure and/or significant part of site requiring large stabilisation works Could cause at least one adjacent property minor consequence damage	MEDIUM	3
5%	1%	Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works	MINOR	4
0 5%		Little damage (Note for high probability event (Almost Certain) this category may be subdivided at a notional boundary of 0 1% See Risk Matrix)	INSIGNIFICANT	5

Notes (2) The Approximate Cost of Damage is expressed as a percentage of market value, being the cost of the improved value of the unaffected property which includes the land plus the unaffected structures

(3) The Approximate Cost is to be an estimate of the direct cost of the damage, such as the cost of reinstatement of the damaged portion of the property (land plus structures), stabilisation works required to render the site to tolerable risk level for the landslide which has occurred and professional design fees and consequential costs such as legal fees, temporary accommodation It does not include additional stabilisation works to address other landslides which may affect the property

(4) The table should be used from left to right, use Approximate Cost of Damage or Description to assign Descriptor, not vice versa

Extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in Australian Geomechanics Vol 42 No 1 March 2007 which discusses the matter more fully

TABLE A1 LANDSLIDE RISK ASSESSMENT
QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (continued)

QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY

LIKELIHOOD		CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)				
	Indicative Value of Approximate Annual Probability	1 CATASTROPHIC 200%	2 MAJOR 60%	3 MEDIUM 20%	4 MINOR 5%	5 INSIGNIFICANT 0 5%
A – ALMOST CERTAIN	10^{1}				H	M or L (5)
B - LIKELY	10^{2}			H	M	L
C - POSSIBLE	10^{-3}		H	M	M	VL
D - UNLIKELY	10^{-4}	H	M	L	L	VL
E - RARE	10^{-5}	M	L	L	VL	VL
F - BARELY CREDIBLE	10^{-6}	L	VL	VL	VL	VL

Notes (5) Cell A5 may be subdivided such that a consequence of less than 0 1% is Low Risk
(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time

RISK LEVEL IMPLICATIONS

Risk Level		Example Implications (7)
		Unacceptable without treatment Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low, may be too expensive and not practical Work likely to cost more than value of the property
H	HIGH RISK	Unacceptable without treatment Detailed investigation, planning and implementation of treatment options required to reduce risk to Low Work would cost a substantial sum in relation to the value of the property
M	MODERATE RISK	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low Treatment options to reduce to Low risk should be implemented as soon as practicable
L	LOW RISK	Usually acceptable to regulators Where treatment has been required to reduce the risk to this level, ongoing maintenance is required
VL	VERY LOW RISK	Acceptable Manage by normal slope maintenance procedures

Note (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk, these are only given as a general guide

Extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in Australian Geomechanics Vol 42, No 1 March 2007 which discusses the matter more fully

AUSTRALIAN GEOGUIDE LR2 (LANDSLIDES)

What is a Landslide?

Any movement of a mass of rock, debris, or earth, down a slope, constitutes a "landslide" Landslides take many forms, some of which are illustrated More information can be obtained from Geoscience Australia, or by visiting its Australian landslide Database at www ga gov au/urban/factsheets/landslide jsp Aspects of the impact of landslides on buildings are dealt with in the book "Guideline Document Landslide Hazards" published by the Australian Building Codes Board and referenced in the Building Code of Australia This document can be purchased over the internet at the Australian Building Codes Board's website www abcb gov au

Landslides vary in size They can be small and localised or very large, sometimes extending for kilometres and involving millions of tonnes of soil or rock It is important to realise that even a 1 cubic metre boulder of soil, or rock, weighs at least 2 tonnes If it falls, or slides it is large enough to kill a person, crush a car, or cause serious structural damage to a house The material in a landslide may travel downhill well beyond the point where the failure first occurred, leaving destruction in its wake It may also leave an unstable slope in the ground behind it, which has the potential to fall again, causing the landslide to extend (regress) uphill, or expand sideways For all these reasons, both "potential" and "actual" landslides must be taken very seriously The present a real threat to life and property and require proper management

Identification of landslide risk is a complex task and must be undertaken by a geotechnical practitioner (GeoGuide LR1) with specialist experience in slope stability assessment and slope stabilisation

What Causes a Landslide?

Landslides occur as a result of local geological and groundwater conditions, but can be exacerbated by inappropriate development (GeoGuide LR8), exceptional weather, earthquakes and other factors Some slopes and cliffs never seem to change, but are actually on the verge of failing Others, often moderate slopes (Table 1), move continuously, but so slowly that it is not apparent to a casual observer In both cases, small changes in conditions can trigger a landslide with series consequences Wetting up of the ground (which may involve a rise in groundwater table) is the single most important cause of landslides (GeoGuide LR5) This is why they often occur during, or soon after, heavy rain Inappropriate development often results in small scale landslides which are very expensive in human terms because of the proximity of housing and people

Does a Landslide Affect You?

Any slope, cliff, cutting, or fill embankment may be a hazard which has the potential to impact on people, property, roads and services Some tell-tale signs that might indicate that a landslide is occurring are listed below

- Open cracks, or steps, along contours
- Groundwater seepage, or springs
- Bulging in the lower part of the slope
- Hummocky ground
- trees leaning down slope, or with exposed roots
- debris/fallen rocks at the foot of a cliff
- tilted power poles, or fences
- cracked or distorted structures

These indications of instability may be seen on almost any slope and are not necessarily confined to the steeper ones (Table 1) Advice should be sought from a geotechnical practitioner if any of them are observed Landslides do not respect property boundaries As mentioned above they can "run out" from above, "regress" from below, or expand sideways, so a landslide hazard affecting your property may actually exist on someone else's land

Local councils are usually aware of slope instability problems within their jurisdiction and often have specific development and maintenance requirements **Your local council is the first place to make enquiries if you are responsible for any sort of development or own or occupy property on or near sloping land or a cliff**

TABLE 1 – Slope Descriptions

Appearance	Slope Angle	Maximum Gradient	Slope Characteristics
Gentle	0° - 10°	1 on 6	Easy walking
Moderate	10° - 18°	1 on 3	Walkable Can drive and manoeuvre a car on driveway
Steep	18° - 27°	1 on 2	Walkable with effort Possible to drive straight up or down roughened concrete driveway, but cannot practically manoeuvre a car
Very Steep	27° - 45°	1 on 1	Can only climb slope by clutching at vegetation, rocks etc
Extreme	45° - 64°	1 on 0 5	Need rope access to climb slope
Cliff	64° - 84°	1 on 0 1	Appears vertical Can abseil down
Vertical or Overhang	84° - 90±°	Infinite	Appears to overhang Abseiler likely to lose contact with the face

Some typical landslides which could affect residential housing are illustrated below

Rotational or circular slip failures (Figure 1) - can occur on moderate to very steep soil and weathered rock slopes (Table 1) The sliding surface of the moving mass tends to be deep seated Tension cracks may open at the top of the slope and bulging may occur at the toe The ground may move in discrete "steps" separated by long periods without movement More rapid movement may occur after heavy rain

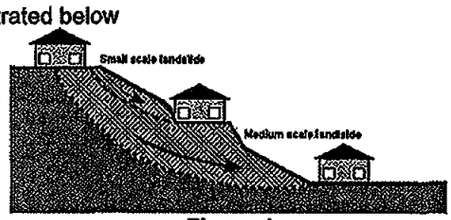


Figure 1

Translational slip failures (Figure 2) - tend to occur on moderate to very steep slopes (Table 1) where soil, or weak rock, overlies stronger strata The sliding mass is often relatively shallow It can move, or deform slowly (creep) over long periods of time Extensive linear cracks and hummocks sometimes form along the contours The sliding mass may accelerate after heavy rain


Figure 2

Wedge failures (Figure 3) - normally only occur on extreme slopes, or cliffs (Table 1), where discontinuities in the rock are inclined steeply downwards out of the face

Rock falls (Figure 3) - tend to occur from cliffs and overhangs (Table 1)

Cliffs may remain, apparently unchanged, for hundreds of years Collections of boulders at the foot of a cliff may indicate that rock falls are ongoing Wedge failures and rock falls do not "creep" Familiarity with a particular local situation can instil a false sense of security since failure, when it occurs, is usually sudden and catastrophic

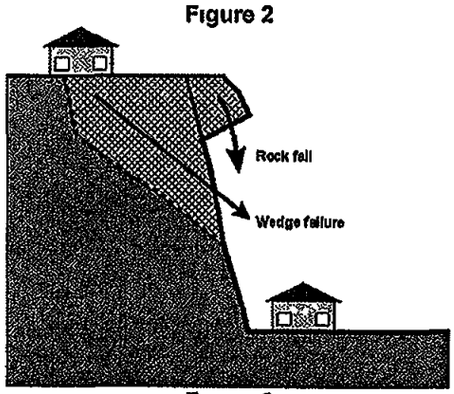


Figure 3

Debris flows and mud slides (Figure 4) - may occur in the foothills of ranges, where erosion has formed valleys which slope down to the plains below The valley bottoms are often lined with loose eroded material (debris) which can "flow" if it becomes saturated during and after heavy rain Debris flows are likely to occur with little warning, they travel a long way and often involve large volumes of soil The consequences can be devastating

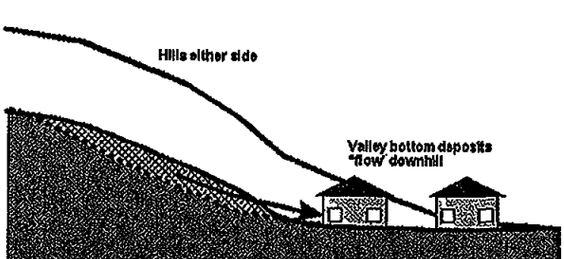


Figure 4

More information relevant to your particular situation may be found in other Australian GeoGuides

- GeoGuide LR1 - Introduction
- GeoGuide LR3 - Soil Slopes
- GeoGuide LR4 - Rock Slopes
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR7 - Landslide Risk
- GeoGuide LR8 - Hillside Construction
- GeoGuide LR9 - Effluent & Surface Water Disposal
- GeoGuide LR10 - Coastal Landslides
- GeoGuide LR11 - Record Keeping

The Australian GeoGuides (LR series) are a set of publications intended for property owners local councils planning authorities developers, insurers, lawyers and, in fact, anyone who lives with, or has an interest in, a natural or engineered slope, a cutting, or an excavation They are intended to help you understand why slopes and retaining structures can be a hazard and what can be done with appropriate professional advice and local council approval (if required) to remove reduce, or minimise the risk they represent The GeoGuides have been prepared by the Australian Geomechanics Society, a specialist technical society within Engineers Australia, the national peak body for all engineering disciplines in Australia, whose members are professional geotechnical engineers and engineering geologists with a particular interest in ground engineering The GeoGuides have been funded under the Australian governments National Disaster Mitigation Program

AUSTRALIAN GEOGUIDE LR7 (LANDSLIDE RISK)

Concept of Risk

Risk is a familiar term, but what does it really mean? It can be defined as *"a measure of the probability and seventy of an adverse effect to health, property, or the environment"* This definition may seem a bit complicated In relation to landslides, geotechnical practitioners (see GeoGuide LR1) are required to assess risk in terms of the likelihood that a particular landslide will occur and the possible consequences This is called landslide risk assessment The consequences of a landslide are many and varied, but our concerns normally focus on loss of, or damage to, property and loss of life

Landslide Risk Assessment

Some local councils in Australia are aware of the potential for landslides within their jurisdiction and have responded by designating specific "landslide hazard zones' Development in these areas is normally covered by special regulations If you are contemplating building, or buying an existing house, particularly in a hilly area, or near cliffs, then go first for information to your local council If you have any concern that you could be dealing with a landslide hazard that your local council is not aware of you should seek advice from a geotechnical practitioner

Landslide risk assessment must be undertaken by a geotechnical practitioner. It may involve visual inspection, geological mapping, geotechnical

investigation and monitoring to identify

- potential landslides (there may be more than one that could impact on your site),
- the likelihood that they will occur,
- the damage that could result,
- the cost of disruption and repairs, and
- the extent to which lives could be lost

Risk assessment is a predictive exercise, but since the ground and the processes involved are complex, prediction inevitably lacks precision If you commission a landslide risk assessment for a particular site you should expect to receive a report prepared in accordance with current professional guidelines and in a form that is acceptable to your local council, or planning authority

Risk to Property

Table 1 indicates the terms used to describe risk to property Each risk level depends on an assessment of how likely a landslide is to occur and its consequences in dollar terms Likelihood is the chance of it happening in any one year, as indicated in Table 2 Consequences are related to the cost of the repairs and perhaps temporary loss of use These two factors are combined by the geotechnical practitioner to determine the Qualitative Risk

TABLE 1 – RISK TO PROPERTY

Qualitative Risk		Significance - Geotechnical engineering requirements
Very high	VH	**Unacceptable** without treatment Extensive detailed investigation and research, planning and

Risk to Life

Most of us have some difficulty grappling with the concept of risk and deciding whether, or not, we are prepared to accept it However, without doing any sort of analysis, or commissioning a report from an "expert", we all take risks every day One of them is the risk of being killed in an accident This is worth thinking about, because it tells us a lot about ourselves and can help to put an assessed risk into a meaningful context By identifying activities that we either are, or are not, prepared to engage in, we can get some indication of the maximum level of risk that we are prepared to take This knowledge can help us to decide whether we really are able to accept a particular risk, or to tolerate a particular likelihood of loss, or damage, to our property (Table 2)

In Table 3, data from NSW for the years 1998 to 2002, and other sources, is presented A risk of 1 in 100,000 means that, in any one year, 1 person is killed for every 100,000 people undertaking that particular activity The NSW data assumes that the whole population undertakes the activity That is, we are all at risk of being killed in a fire, or of choking on our food, but it is reasonable to assume that only people who go deep sea fishing run a risk of being killed while doing it

It can be seen that the risks of dying as a result of falling, using a motor vehicle, or engaging in water-related activities (including bathing) are all greater than 1 100,000 and yet few people actively avoid situations where these risks are present Some people are averse to flying and yet it represents a lower risk than choking to death on food The data also indicate that, even when the risk of dying as a consequence of a particular event is very small, it could still happen to any one of us today If this were not so, there would be no risk at all and clearly that is not the case

In NSW, the planning authorities consider that 1 1,000,000 is the maximum tolerable risk for domestic housing built near an obvious hazard, such as a chemical factory Although not specifically considered in the NSW guidelines there is little difference between the hazard presented by a neighbouring factory and a landslide both have the capacity to destroy life and property and both are always present

TABLE 3 – RISK TO LIFE

Risk (deaths per participant per year)	Activity/Event Leading to Death (NSW data unless noted)
1 1,000	Deep sea fishing (UK)
1 1,000 to 1 10,000	Motor cycling, horse riding , ultra-light flying (Canada)
1 23,000	Motor vehicle use
1 30,000	Fall
1 70,000	Drowning
1 180,000	Fire/burn
1 660,000	Choking on food
1 1,000,000	Scheduled airlines (Canada)
1 2,300,000	Train travel
1 32,000,000	Lightning strike

More information relevant to your particular situation may be found in other AUSTRALIAN GEOGUIDES

- GeoGuide LR1 - Introduction
- GeoGuide LR2 - Landslides
- GeoGuide LR3 - Landslides in Soil
- GeoGuide LR4 - Landslides in Rock
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR8 - Hillside Construction
- GeoGuide LR9 - Effluent & Surface Water Disposal
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APPENDIX B

SOME GUIDELINES

FOR

HILLSIDE CONSTRUCTION

APPENDIX B – SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

	GOOD ENGINEERING PRACTICE	POOR ENGINEERING PRACTICE
ADVICE		
GEOTECHNICAL ASSESSMENT	Obtain advice from a qualified, experienced geotechnical consultant at early stage of planning and before site works	Prepare detailed plan and start site works before geotechnical advice
PLANNING		
SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk arising from the identified hazards and consequences in mind	Plan development without regard for the Risk
DESIGN AND CONSTRUCTION		
HOUSE DESIGN	Use flexible structures which incorporate properly designed brickwork, timber or steel frames, timber or panel cladding Consider use of split levels Use decks for recreational areas where appropriate	Floor plans which require extensive cutting and filling Movement intolerant structures
SITE CLEARING	Retain natural vegetation wherever practicable	Indiscriminately clear the site
ACCESS & DRIVEWAYS	Satisfy requirements below for cuts, fills retaining walls and drainage Council specifications for grades may need to be modified Driveways and parking areas may need to be fully supported on piers	Excavate and fill for site access before geotechnical advice
EARTHWORKS	Retain natural contours wherever possible	Indiscriminant bulk earthworks
CUTS	Minimise depth Support with engineered retaining walls or batter to appropriate slope Provide drainage measures and erosion control	Large scale cuts and benching Unsupported cuts Ignore drainage requirements
FILLS	Minimise height Strip vegetation and topsoil and key into natural slopes prior to filling Use clean fill materials and compact to engineering standards Batter to appropriate slope or support with engineered retaining wall Provide surface drainage and appropriate subsurface drainage	Loose or poorly compacted fill which if it fails, may flow a considerable distance (including onto properties below) Block natural drainage lines Fill over existing vegetation and topsoil Include stumps, trees, vegetation, topsoil, boulders building rubble etc in fill
ROCK OUTCROPS & BOULDERS	Remove or stabilise boulders which may have unacceptable risk Support rock faces where necessary	Disturb or undercut detached blocks or boulders
RETAINING WALLS	Engineer design to resist applied soil and water forces Found on bedrock where practicable Provide subsurface drainage within wall backfill and surface drainage on slope above Construct wall as soon as possible after cut/fill operation	Construct a structurally inadequate wall such as sandstone flagging, brick or unreinforced blockwork Lack of subsurface drains and weepholes
FOOTINGS	Found within bedrock where practicable Use rows of piers or strip footings oriented up and down slope Design for lateral creep pressures if necessary Backfill footing excavations to exclude ingress of surface water	Found on topsoil, loose fill, detached boulders or undercut cliffs
SWIMMING POOLS	Engineer designed Support on piers to rock where practicable Provide with under drainage and gravity drain outlet where practicable Design for high soil pressures which may develop on uphill side whilst there may be little or no lateral support on downhill side	
DRAINAGE		
SURFACE	Provide at tops of cut and fill slopes Discharge to street drainage or natural water courses Provide generous falls to prevent blockage by siltation and incorporate silt traps Line to minimise infiltration and make flexible where possible Special structures to dissipate energy at changes of slope and/or direction	Discharge at top of fills and cuts Allow water to pond bench areas
SUBSURFACE	Provide filter around subsurface drain Provide drain behind retaining walls Use flexible pipelines with access for maintenance Prevent inflow of surface water	Discharge of roof run-off into absorption trenches
SEPTIC & SULLAGE	Usually requires pump out or mains sewer systems, absorption trenches may be possible in some areas if risk is acceptable Storage tanks should be water-tight and adequately founded	Discharge sullage directly onto and into slopes Use of absorption trenches without consideration of landslide risk
EROSION CONTROL & LANDSCAPING	Control erosion as this may lead to instability Revegetate cleared area	Failure to observe earthworks and drainage recommendations when landscaping
DRAWINGS AND SITE VISITS DURING CONSTRUCTION		
DRAWINGS	Building Application drawings should be viewed by a geotechnical consultant	
SITE VISITS	Site visits by consultant may be appropriate during construction	
INSPECTION AND MAINTENANCE BY OWNER		
OWNER'S RESPONSIBILITY	Clean drainage systems, repair broken joints in drains and leaks in supply pipes Where structural distress is evident seek advice If seepage observed determine cause or seek advice on consequences	

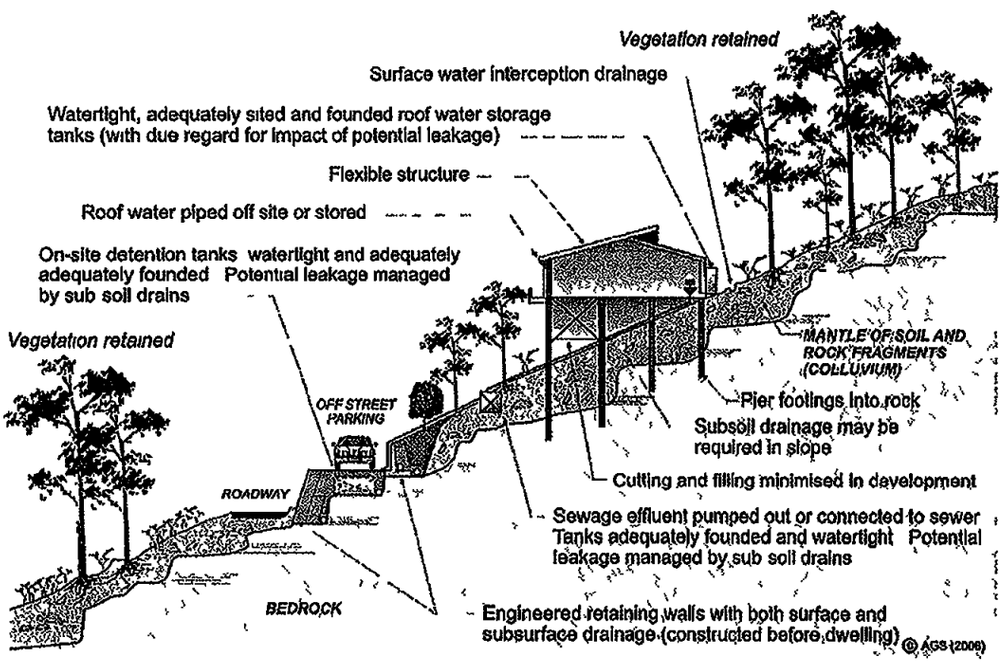
This table is an extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in *Australian Geomechanics*, Vol 42, No 1, March 2007 which discusses the matter more fully

AUSTRALIAN GEOGUIDE LR8 (CONSTRUCTION PRACTICE)

HILLSIDE CONSTRUCTION PRACTICE

Sensible development practices are required when building on hillsides, particularly if the hillside has more than a low risk of instability (GeoGuide LR7) Only building techniques intended to maintain, or reduce, the overall level of landslide risk should be considered Examples of good hillside construction practice are illustrated below

EXAMPLES FOR GOOD HILLSIDE CONSTRUCTION PRACTICE



WHY ARE THESE PRACTICES GOOD?

Roadways and parking areas - are paved and incorporate kerbs which prevent water discharging straight into the hillside (GeoGuide LR5)

Cuttings - are supported by retaining walls (GeoGuide LR6)

Retaining walls - are engineer designed to withstand the lateral earth pressures and surcharges expected, and include drains to prevent water pressures developing in the backfill Where the ground slopes steeply down towards the high side of a retaining wall, the disturbing force (see GeoGuide LR6) can be two or more times that due to level ground Retaining walls must be designed taking these forces into account

Sewage - whether treated or not is either taken away in pipes or contained in properly founded tanks so it cannot soak into the ground

Surface water - from roofs and other hard surfaces is piped away to a suitable discharge point rather than being allowed to infiltrate into the ground Preferably, the discharge point will be in a natural creek where ground water exits, rather than enters, the ground Shallow lined, drains on the surface can fulfill the same purpose (GeoGuide LR5)

Surface loads - are minimised No fill embankments have been built The house is a lightweight structure Foundation loads have been taken down below the level at which a landslide is likely to occur and, preferably, to rock This sort of construction is probably not applicable to soil slopes (GeoGuide LR3) If you are uncertain whether your site has rock near the surface, or is essentially a soil slope, you should engage a geotechnical practitioner to find out

Flexible structures - have been used because they can tolerate a certain amount of movement with minimal signs of distress and maintain their functionality

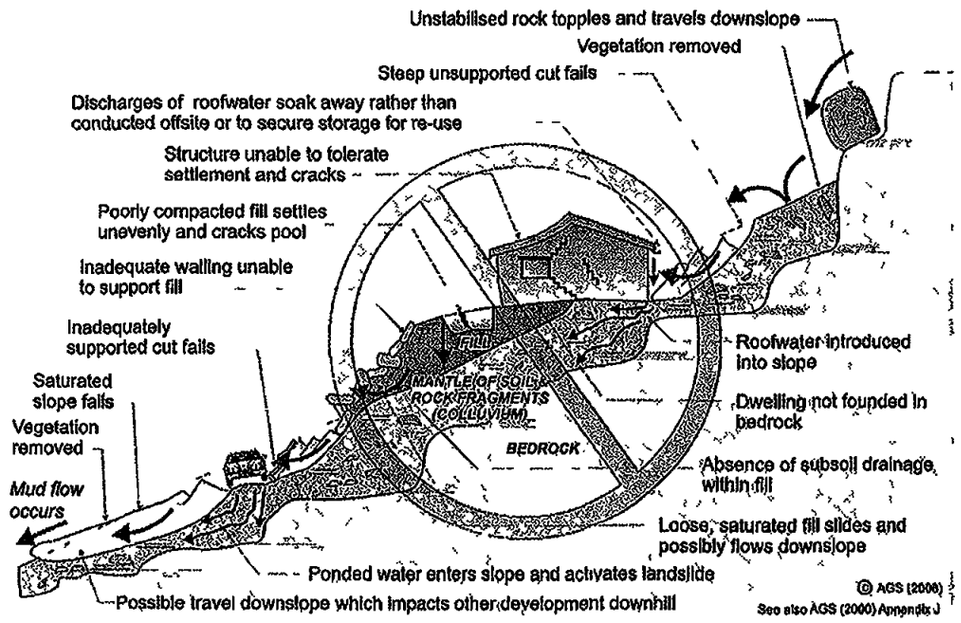
Vegetation clearance - on soil slopes has been kept to a reasonable minimum Trees, and to a lesser extent smaller vegetation, take large quantities of water out of the ground every day This lowers the ground water table, which in turn helps to maintain the stability of the slope Large scale clearing can result in a rise in water table with a consequent increase in the likelihood of a landslide (GeoGuide LR5) An exception may have to be made to this rule on steep rock slopes where trees have little effect on the water table, but their roots pose a landslide hazard by dislodging boulders

Possible effects of ignoring good construction practices are illustrated on page 2 Unfortunately, these poor construction practices are not as unusual as you might think and are often chosen because, on the face of it, they will save the developer, or owner, money You should not lose sight of the fact that the cost and anguish associated with any one of the disasters illustrated, is likely to more than wipe out any apparent savings at the outset

ADOPT GOOD PRACTICE ON HILLSIDE SITES

Extract from Geoguide LR8 – Hillside Construction Practice

EXAMPLES FOR POOR HILLSIDE CONSTRUCTION PRACTICE



WHY ARE THESE PRACTICES POOR?

Roadways and parking areas - are unsurfaced and lack proper table drains (gutters) causing surface water to pond and soaks into the ground

Cut and fill - has been used to balance earthworks quantities and level the site leaving unstable cut faces and added large surface loads to the ground Failure to compact the fill properly has led to settlement, which will probably continue for several years after completion The house and pool have been built on the fill and have settled with it and cracked Leakage from the cracked pool and the applied surface loads from the fill have combined to cause landslides

Retaining walls - have been avoided to minimise cost, and hand placed rock walls used instead Without applying engineering design principles, the walls have failed to provide the required support to the ground and have failed, creating a very dangerous situation

A heavy, rigid, house - has been built on shallow, conventional, footings Not only has the brickwork cracked because of the resulting ground movements, but it has also become involved in a man-made landslide

Soak-away drainage - has been used for sewage and surface water run off from roofs and pavements This water soaks into the ground and raises the water table (GeoGuide LR5) Subsoil drains that run along the contours should be avoided for the same reason If felt necessary subsoil drains should run steeply downhill in a chevron, or herringbone, pattern This may conflict with the requirements for effluent and surface water disposal (GeoGuide LR9) and if so, you will need to seek professional advice

Rock debris - from landslides higher up on the slope seems likely to pass through the site Such locations are often referred to by geotechnical practitioners as "debris flow paths" Rock is normally even denser than ordinary fill, so even quite modest boulders are likely to weigh many tonnes and do a lot of damage once they start to roll Boulders have been known to travel hundreds of metres downhill leaving behind a trail of destruction

Vegetation - has been completely cleared leading to a possible rise in the water table and increased landslide risk (GeoGuide LR5)

DON'T CUT CORNERS ON HILLSIDE SITES - OBTAIN ADVICE FROM A GEOTECHNICAL PRACTITIONER

More information relevant to your particular situation may be found in other Australian GeoGuides

- GeoGuide LR1 - Introduction
- GeoGuide LR2 - Landslides
- GeoGuide LR3 - Landslides in Soil
- GeoGuide LR4 - Landslides in Rock
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR7 - Landslide Risk
- GeoGuide LR9 - Effluent & Surface Water Disposal
- GeoGuide LR10 Coastal Landslides
- GeoGuide LR11 - Record Keeping

The Australian GeoGuides (LR series) are a set of publications intended for property owners local councils planning authorities developers, insurers, lawyers and, in fact anyone who lives with or has an interest in a natural or engineered slope a cutting or an excavation They are intended to help you understand why slopes and retaining structures can be a hazard and what can be done with appropriate professional advice and local council approval (if required) to remove, reduce, or minimise the risk they represent The GeoGuides have been prepared by the Australian Geomechanics Society, a specialist technical society within Engineers Australia the national peak body for all engineering disciplines in Australia, whose members are professional geotechnical engineers and engineering geologists with a particular interest in ground engineering The GeoGuides have been funded under the Australian governments' National Disaster Mitigation Program

Extract from Geoguide LR8 – Hillside Construction Practice

REPORT EXPLANATION NOTES

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
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REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section Not all notes are necessarily relevant to all reports

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (eg sandy clay) as set out below

Soil Classification	Particle Size
Clay	less than 0 002mm
Silt	0 002 to 0 06mm
Sand	0 06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination The strength terms are defined as follows

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc Where relevant, further information regarding rock classification is given in the text of the report In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone

SAMPLING

Sampling is carried out during drilling or from other excavations to allow engineering examination (and laboratory testing where required) of the soil or rock

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure Bulk samples are similar but of greater volume required for some test procedures

Undisturbed samples are taken by pushing a thin walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility Undisturbed sampling is generally effective only in cohesive soils

Details of the type and method of sampling used are given on the attached logs

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis

Test Pits These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close by structures Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location

Hand Auger Drilling A borehole of 50mm to 100mm diameter is advanced by manually operated equipment Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level

Continuous Spiral Flight Augers The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing This is a relatively economical means of drilling in clays and in sands above the water table Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples Augering below the groundwater table is of even lesser reliability than augering above the water table

Rock Augering Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted

Wash Boring The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration

Mud Stabilised Drilling Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc

Continuous Core Drilling A continuous core sample is obtained using a diamond tipped core barrel Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS The location of losses are determined on site by the supervising engineer, where the location is uncertain, the loss is placed at the top end of the drill run

Standard Penetration Tests Standard Penetration Tests (SPT) are used mainly in non cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3 1

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer with a free fall of 760mm It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued

The test results are reported in the following form

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N>30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays In such circumstances, the test results are shown on the borehole logs in brackets

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c" on the borehole logs, together with the number of blows per 150mm penetration

Static Cone Penetrometer Testing and Interpretation Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP) The test is described in Australian Standard 1289, Test F5 1

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm The results given in this report have been plotted from the digital data

The information provided on the charts comprise

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc Where shown, this information is presented for general guidance, but must be regarded as interpretive The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable

Portable Dynamic Cone Penetrometers Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration

Two relatively similar tests are used

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3 2) The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various Road Authorities
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3 3) This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling

LOGS

The borehole or test pit logs presented herein are an engineering and/or geological interpretation of the sub surface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions

The attached explanatory notes define the terms and symbols used in preparation of the logs

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open
- A localised perched water table may lead to an erroneous indication of the true water table
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction
- The use of water or mud as a drilling fluid will mask any groundwater inflow Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made

More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to perhaps weeks for low permeability soils Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric Identification of the extent of fill materials will also depend on investigation methods and frequency Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits Consequently, there is an increased risk of adverse engineering characteristics or behaviour If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soil for Engineering Purposes'* Details of the test procedure used are given on the individual report forms

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis Where the report has been prepared for a specific design proposal (eg a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building) If this happens, the company will be pleased to review the report and the sufficiency of the investigation work

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical aspects and recommendations or suggestions for design and construction However, the Company cannot always anticipate or assume responsibility for

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique
- Changes in policy or interpretation of policy by statutory authorities
- The actions of persons or contractors responding to commercial pressures

If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring

SITE ANOMALIES

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the company requests that it immediately be notified Most problems are much more readily resolved when conditions are exposed that at some later stage, well after the event

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available In circumstances where the discussion or comments section is not relevant to the contractual situation it may be appropriate to prepare a specially edited document The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related

Requirements could range from

i) a site visit to confirm that conditions exposed are no worse than those interpreted, to

ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or

iii) full time engineering presence on site

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GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML MH)


SAND (SP SW)

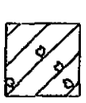

GRAVEL (GP, GW)

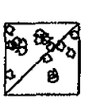

SANDY CLAY (CL CH)

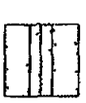

SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

ROCK


CONGLOMERATE


SANDSTONE


SHALE

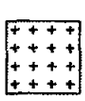

SILTSTONE, MUDSTONE CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE GABBRO


DOLERITE, DIORITE


BASALT ANDESITE


QUARTZITE

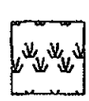
DEFECTS AND INCLUSIONS


CLAY SEAM

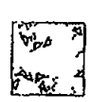

SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

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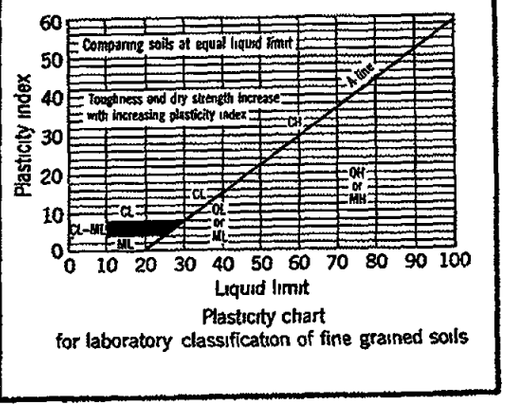
UNIFIED SOIL CLASSIFICATION TABLE

Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)						Group Symbols [a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes			*GW*	Well graded gravels gravel sand mixtures little or no fines	Give typical name indicate approximate percentages of sand and gravel maximum size angularity surface condition and hardness of the coarse grains local or geologic name and other pertinent descriptive information and symbols in parentheses For undisturbed soils add information on stratification degree of compactness, cementation, moisture conditions and drainage characteristics Example *Silty sand* gravelly about 20% hard angular gravel particles 12 mm maximum size rounded and subangular sand grains coarse to fine, about 15% non plastic fines with low dry strength well compacted and moist in place alluvial sand (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows Less than 5% *GW GP SW SP* More than 12% *GM GC SM SC* 5% to 12% *Borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *GW* Atterberg limits below A line, or *PI* less than 4 — Above A line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits above A line, with *PI* greater than 7 $C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *SW* Atterberg limits below A line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits below A" line with *PI* greater than 7
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)			*GM*	Silty gravels poorly graded gravel-sand-silt mixtures		
			Plastic fines (for identification procedures see *CL* below)			*GC*	Clayey gravels poorly graded gravel-sand-clay mixtures		
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes			*SW*	Well graded sands gravelly sands little or no fines		
			Predominantly one size or a range of sizes with some intermediate sizes missing			*SP*	Poorly graded sands gravelly sands, little or no fines		
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)			*SM*	Silty sands, poorly graded sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)			*SC*	Clayey sands poorly graded sand-clay mixtures		
Fine-grained soils More than half of material is *smaller* than 75 μm sieve size (The 75 μm sieve size is about the smallest particle visible to naked eye)	Identification Procedures on Fraction Smaller than 380 μm Sieve Size								
	Silts and clays liquid limit less than 50		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)			Give typical name indicate degree and character of plasticity amount and maximum size of coarse grains colour in wet condition odour if any local or geologic name, and other pertinent descriptive information and symbol in parentheses For undisturbed soils add information on structure, stratification consistency in undisturbed and remoulded states, moisture and drainage conditions Example *Clayey silt* brown slightly plastic small percentage of fine sand numerous vertical root holes firm and dry in place loess (*ML*)	
			None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands rock flour silty or clayey fine sands with slight plasticity		
			Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity gravelly clays sandy clays silty clays lean clays		
			Slight to medium	Slow	Slight	*OL*	Organic silts and organic silty-clays of low plasticity		
	Silts and clays liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			High to very high	None	High	*CH*	Inorganic clays of high plasticity fat clays		
			Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity		
Highly Organic Soils			Readily identified by colour odour spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils		



Plasticity chart
for laboratory classification of fine grained soils

NOTE 1) Soils possessing characteristics of two groups are designated by combinations of group symbols (e g GW-GC, well graded gravel-sand mixture with clay fines)

2) Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity

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ABN 17 003 550 801

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record	▽	Standing water level Time delay following completion of drilling may be shown
	C	Extent of borehole collapse shortly after drilling
	▶	Groundwater seepage into borehole or excavation noted during drilling or excavation
Samples	ES	Soil sample taken over depth indicated for environmental analysis
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated
	DB	Bulk disturbed sample taken over depth indicated
	DS	Small disturbed bag sample taken over depth indicated
	ASB	Soil sample taken over depth indicated, for asbestos screening
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis
	SAL	Soil sample taken over depth indicated, for salinity analysis
Field Tests	N = 17 4 7 10	Standard Penetration Test (SPT) performed between depths indicated by lines Individual figures show blows per 150mm penetration R as noted below
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer 'R refers to apparent hammer refusal within the corresponding 150mm depth increment
	VNS = 25	Vane shear reading in kPa of Undrained Shear Strength
	PID = 100	Photoionisation detector reading in ppm (Soil sample headspace test)
Moisture Condition (Cohesive Soils)	MC>PL	Moisture content estimated to be greater than plastic limit
	MC≈PL	Moisture content estimated to be approximately equal to plastic limit
	MC<PL	Moisture content estimated to be less than plastic limit
(Cohesionless Soils)	D	DRY runs freely through fingers
	M	MOIST does not run freely but no free water visible on soil surface
	W	WET free water visible on soil surface
Strength (Consistency) Cohesive Soils	VS	VERY SOFT Unconfined compressive strength less than 25kPa
	S	SOFT Unconfined compressive strength 25 50kPa
	F	FIRM Unconfined compressive strength 50 100kPa
	St	STIFF Unconfined compressive strength 100 200kPa
	VSt	VERY STIFF Unconfined compressive strength 200 400kPa
	H	HARD Unconfined compressive strength greater than 400kPa
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other tests
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (Id) Range (%) SPT N Value Range (Blows/300mm)**
	VL	Very Loose <15 0 4
	L	Loose 15 35 4-10
	MD	Medium Dense 35 65 10 30
	D	Dense 65 85 30 50
	VD	Very Dense >85 >50
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other tests
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise
Remarks	V bit	Hardened steel 'V' shaped bit
	'TC bit	Tungsten carbide wing bit
	T 60	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers

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LOG SYMBOLS

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock the mass structure and substance fabric are no longer evident, there is a large change in volume but the soil has not been significantly transported
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties ie it either disintegrates or can be remoulded, in water
Distinctly weathered rock	DW	Rock strength usually changed by weathering The rock may be highly discoloured usually by ironstaining Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock
Fresh rock	FR	Rock shows no sign of decomposition or staining

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding The test procedure is described by the International Journal of Rock Mechanics Mining Science and Geomechanics Abstract Volume 22 No 2, 1985

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low	EL	0 03	Easily remoulded by hand to a material with soil properties
Very Low	VL	0 1	May be crumbled in the hand Sandstone is "sugary" and friable
Low	L	0 3	A piece of core 150mm long x 50mm dia may be broken by hand and easily scored with a knife Sharp edges of core may be friable and break during handling
Medium Strength	M	1	A piece of core 150mm long x 50mm dia can be broken by hand with difficulty Readily scored with knife
High	H	3	A piece of core 150mm long x 50mm dia core cannot be broken by hand, can be slightly scratched or scored with knife rock rings under hammer
Very High	VH	10	A piece of core 150mm long x 50mm dia may be broken with hand held pick after more than one blow Cannot be scratched with pen knife rock rings under hammer
Extremely High	EH		A piece of core 150mm long x 50mm dia is very difficult to break with hand held hammer Rings when struck with a hammer

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

AS/NZS ISO 9001
Certified

REPORT

TO

SYDNEY ANGLICAN SCHOOLS CORPORATION

ON

GEOTECHNICAL ASSESSMENT
(In Accordance with Pittwater Council Risk Management Policy)

FOR

PROPOSED LIFT AND CLASSROOM ALTERATIONS

AT

LOQUAT VALLEY ANGLICAN PREPARATORY SCHOOL
1977 PITTWATER ROAD, BAYVIEW, NSW

12 January 2010

Ref 22636SB1rpt

Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

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PITTWATER COUNCIL

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO 1(a) - Checklist of Requirements For Geotechnical Risk Management Report for Development Application

Development Application for Sydney Anglican Schools Corporation
(Name of Applicant)
Address of site 1977 Pittwater Road, Bayview, NSW

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Geotechnical Report This checklist is to accompany the Geotechnical Report and its certification (Form No 1)

Geotechnical Report Details

Report Title Geotechnical Assessment for Proposed Lift and Classroom Alterations
Report Date 12 January 2010 Report Ref No 22636Sbrpt
Author Daniel Bliss
Author's Company/Organisation Jeffery and Katauskas Pty Ltd

Please mark appropriate box

☑ Comprehensive site mapping conducted 6/10/1/10 (date)

☑ Mapping details presented on contoured site plan with geomorphic mapping to a minimum scale of 1 200 (as appropriate)

☑ Subsurface investigation required
- ☑ No Justification conditions exposed
- ☐ Yes Date conducted

☑ Geotechnical model developed and reported as an inferred subsurface type section

☑ Geotechnical hazards identified
- ☑ Above the site
- ☐ On the site
- ☑ Below the site
- ☑ Beside the site

☑ Geotechnical hazards described and reported

☑ Risk assessment conducted in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009
- ☑ Consequence analysis
- ☑ Frequency analysis

☑ Risk calculation

☑ Risk assessment for property conducted in accordance with the Geotechnical Risk Management Policy for Pittwater 2009

☑ Risk assessment for loss of life conducted in accordance with the Geotechnical Risk Management Policy for Pittwater 2009

☑ Assessed risks have been compared to "Acceptable Risk Management criteria as defined in the Geotechnical Risk Management Policy for Pittwater - 2009

☑ Opinion has been provided that the design can achieve the Acceptable Risk Management criteria provided that the ~~specified conditions are achieved.~~ recommendations presented in the Report are adopted

☑ Design Life Adopted
- ☑ 100 years
- ☐ Other

specify

☑ Geotechnical Conditions to be applied to all four phases as described in the Geotechnical Risk Management Policy for Pittwater - 2009 have been specified

☑ Additional action to remove risk where reasonable and practical have been identified and included in the report

☐ Risk assessment within Bushfire Asset Protection Zone

We are ~~I am~~ aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies as the basis for confirming ~~ensuring~~ that the geotechnical risk management aspects of the proposal have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk as discussed in the Report

Signature
Name Daniel Bliss
Chartered Professional Status MIEAust CPEng
Membership No 969495
Company Jeffery & Katauskas Pty Ltd.

TABLE OF CONTENTS

1 INTRODUCTION

This report presents the results of our geotechnical assessment for the proposed lift and classroom alterations within Loquat Valley Anglican Preparatory School at 1977 Pittwater Road, Bayview, NSW The assessment was commissioned by Mr Peter Maskiell of the Sydney Anglican Schools Corporation by returned Acceptance of Proposal, Ref P31772SB, in consultation with Mr Graham Bunn of Midson Group

Jeffery and Katauskas Pty Ltd previous completed a geotechnical investigation and slope stability risk assessment for a proposed classroom building in the western corner of the school, the results of which are detailed in our report dated 30 January 2009 (Ref 22636SBrpt)

As shown on the supplied drawings by Midson Architecture (Project No MM0804, Drawing Nos DA01 and DA02, Revision A, dated 1/9/09) a new lift is proposed on the north-western side of the school grounds adjacent to the existing staff room and library The lift will be constructed within an existing garden bed and requires excavations to maximum depth of about 1 2m The structural drawings for the proposed lift have been completed by Birzulis Associates (Project No 4412, Drawing No S08, Issue A) and from review of these drawings it appears that the lift has been designed to be supported on natural clays adequate for an allowable bearing pressure of 200kPa Concrete block retaining walls have been allowed to support the excavations for the lift

Internal renovations are also proposed to two classrooms towards the western end of the school grounds These works will involve extension of the classroom onto an existing deck and other internal alterations No external structures are proposed as part of the classroom works

This report has been prepared in accordance with the requirements of the Interim Geotechnical Risk Management Policy for Pittwater (2009) as discussed in Section 4 below Our report is preceded by the completed Council Forms 1 and 1a

2 ASSESSMENT METHODOLOGY

The stability assessment is based upon a detailed inspection of the topographic, surface drainage and geological conditions of the site and its immediate environs For the purposes of this report "the site" comprises the location of the proposed lift and the classroom alterations and not the entire school grounds Site visits were made by our Senior Associate, Mr Daniel Bliss, on 6 and 11 January 2010 to inspect the site

The attached Appendix A defines the terminology adopted for the risk assessment together with a flow chart illustrating the Risk Management Process based on the guidelines given in AGS 2007c (Reference 1)

A summary of our observations is presented in Section 3 below Our specific recommendations regarding the proposed development are discussed in Section 5 following our geotechnical assessment

The attached Figure 1 presents a geotechnical site plan showing the principle geotechnical features present at the site Figure 1 is based on the survey plan prepared by Whelans Insites (Ref C189, dated 12/1/09) Additional features on Figure 1 have been measured by hand held inclinometer and tape measure techniques and hence are only approximate Should any of the features be critical to the proposed development, we recommend they be located more accurately using instrument survey techniques Figure 2 defines the mapping terms and symbols used

3 SUMMARY OF OBSERVATIONS

The following observations were made during our site visits

- The school property is located within a valley which runs off the face of the Bayview escarpment Locally the valley runs west to east, with the existing school buildings located on the hillside on the northern side of the valley The existing buildings are located on slopes which fall towards the south, generally at about 10°, but with steeper sections at about 20°
- The proposed lift is to be located within a garden bed adjacent to two existing buildings The existing buildings are of brick construction and appeared to be in good condition Immediately to the north-east of the proposed lift is an existing external set of stairs and immediately to the south-east is a concrete path or breezeway
- At the time of the site visit excavations had been undertaken for the proposed lift, ranging from about 0 4m below the surface of the existing breezeway to about 1 2m on the north-western side of the proposed lift These excavations had exposed a surface layer of topsoil within the garden and then residual silty clays with sandstone bands On 6 January 2010 water was observed ponding within the base of the excavation On 11 January 2010 the base of the excavation had been covered with plastic and the formwork and steel placed
- To the rear (north-west) of the excavation the garden bed slopes up to the school boundary at about 8° Beyond the school boundary was a driveway providing access to the properties to the north-west These properties are occupied by one and two storey houses that are located about 15m from the school boundary
- Garden beds are located along the north-western school boundary from the location of the lift to opposite the classrooms that are to be renovated The gardens are supported by brick, timber and concrete block retaining walls of up

to about 1 1m in height These retaining walls appeared to be in good condition

- The classroom building that is to be renovated comprises a one storey weatherboard building elevated above the hillside slope and supported on timber posts The building appeared to be in good condition
- Beyond the north-western boundary of the school opposite this weatherboard building the hillside slopes at about 15° to 20° with a driveway at the top of the slope The adjoining house is located more than 20m from the school boundary

4 GEOTECHNICAL ASSESSMENT

Based on the results of our previous geotechnical investigations and the conditions exposed on site, the subsurface conditions along the northern edge of the school comprise surface fill covering residual silty clays that grad into the sandstone bedrock

4 1 Potential Landslide Hazards

We consider that the potential landslide hazards associated with the site to be the following

A Stability of existing retaining walls along the northern side of the school

B Stability of proposed retaining walls for lift

C Stability of hillside slope below the classrooms to be renovated

D Stability of hillside slope within the properties to the north-west

4 2 Risk Analysis

The attached Table A summarises our qualitative assessment of each potential landslide hazard and of the consequences to property should the landslide hazard occur Based on the above, the qualitative risks to property have been determined The terminology adopted for this qualitative assessment is in accordance with Table A1 given in Appendix A Table A indicates that the assessed risk to property varies between "Low" which would be considered acceptable in accordance with the criteria given in Reference 1 and the Pittwater Council Risk Management Policy.

We have also used the indicative probabilities associated with the assessed likelihood of instability to calculate the risk to life The temporal and vulnerability factors that have been adopted are given in the attached Table B together with the resulting risk calculation Our assessed risk to life for the person most at risk is about 10^{7} This would be considered to be acceptable in relation to the criteria given in Reference 1 and the Pittwater Council Risk Management Policy

4 3 Risk Assessment

The Pittwater Risk Management Policy requires suitable measures 'to remove risk' It is recognised that, due to the many complex factors that can affect a site, the subjective nature of a risk analysis, and the imprecise nature of the science of geotechnical engineering, the risk of instability for a site and/or development cannot be completely removed It is, however, essential that risk be reduced to at least that which could be reasonably anticipated by the community in everyday life and that landowners be made aware of reasonable and practical measures available to reduce risk as far as possible Hence, where the policy requires that 'reasonable and practical measures have been identified to remove risk', it means that there has been an active process of reducing risk, but it does not require the geotechnical engineer to warrant that risk has been completely removed, only reduced, as removing risk is not currently scientifically achievable

Similarly, the Pittwater Risk Management Policy requires that the design project life be taken as 100 years unless otherwise justified by the applicant This requirement provides the context within which the geotechnical risk assessment should be made The required 100 years baseline broadly reflects the expectations of the community for the anticipated life of a residential structure and hence the timeframe to be considered when undertaking the geotechnical risk assessment and making recommendations as to the appropriateness of a development, and its design and remedial measures that should be taken to control risk It is recognised that in a 100 year period external factors that cannot reasonably be foreseen may affect the geotechnical risks associated with a site Hence, the Policy does not seek the geotechnical engineer to warrant the development for a 100 year period, rather to provide a professional opinion that foreseeable geotechnical risks to which the development may be subjected in that timeframe have been reasonably considered

Our assessment of the probability of failure of existing structural elements such as retaining walls (where applicable) is based upon a visual appraisal of their type and condition at the time of our inspection Where existing structural elements such as retaining walls will not be replaced as part of the proposed development, where appropriate we identify the time period at which reassessment of their longevity seems warranted

In preparing our recommendations given below we have adopted the above interpretations of the Risk Management Policy requirements We have also assumed that no activities on surrounding land which may affect the risk on the subject site would be carried out We have further assumed that all Council's buried services are, and will be regularly maintained to remain, in good condition

We consider that our risk analysis has shown that the site and existing and proposed development can achieve the 'Acceptable Risk Management' criteria in the Pittwater Risk Management Policy provided that the recommendations given in Section 5

below are adopted These recommendations form an integral part of the Landslide Risk Management Process

5 COMMENTS AND RECOMMENDATIONS

We consider that the proposed development may proceed provided the following specific design, construction and maintenance recommendations are adopted to maintain and reduce the present risk of instability of the site and to control future risks These recommendations address geotechnical issues only and other conditions may be required to address other aspects

The recommendations given below are specifically related to the proposed lift The classroom alterations will only comprise internal renovations and so geotechnical aspects are not relevant for those works

5 1 Conditions Recommended to Establish the Design Parameters

5 1 1 From review of the structural drawings by Birzulis Associates it appears that the base of the lift has been design to be founded on material adequate for an allowable bearing pressure of 200kPa However, this should be confirmed by the structural engineer The residual silty clays encountered within the excavations are likely to achieve such a bearing pressure, but inspection of the cleaned out base must be completed to confirm that the material is adequate

5 1 2 The surface water discharging from the new roof and paved areas must be diverted to outlets for controlled discharge to the existing stormwater system

5 1 3 The proposed new retaining walls should be designed using the following parameters

- For cantilever walls, adopt a triangular lateral earth pressure distribution and an 'active' earth pressure coefficient, K_a, of 0 3, for the retained height, assuming a horizontal backfill surface
- A bulk unit weight of 20kN/m^3 should be adopted for the soil profile
- Any surcharge affecting the walls (e g traffic loading, live loading, compaction stresses, etc) should be allowed in the design
- The retaining walls should be provided with complete and permanent drainage of the ground behind the walls The subsoil drains should incorporate a non-woven geotextile fabric (e g Bidim A34), to act as a filter against subsoil erosion

5 1 4 The guidelines for Hillside Construction given in Appendix B should also be adopted

5 2 Conditions Recommended to the Detailed Design to be Undertaken for the Construction Certificate

5 2 1 Since the structural drawings have been completed, the structural engineer (Birzulis Associates) must review this report and confirm that their design satisfies the parameters given above The structural engineer will need to complete Pittwater Council's Form 2 (Part A) The structural confirmation must be forwarded to the geotechnical engineer for review to allow the geotechnical engineer to complete Pittwater Council's Form 2 (Part B)

5 2 2 The structural engineer must indicate on the structural drawings the design life of all structures and structural elements

5 2 3 All hydraulic design drawings must be reviewed by the geotechnical engineer who should endorse that the recommendations contained in this report have been adopted in principle

5 3 Conditions Recommended During the Construction Period

5 3 1 At the time of our site visit on 6 January 2010 the lift pit excavation base was covered with water so it could not be inspected On 11 January 2010 the base had been covered with plastic and the steel and formwork placed The base of the excavation must be inspected by the geotechnical engineer to confirm that the material is adequate for the required bearing pressure The water ponding within the excavation may have softened the clays and the geotechnical engineer will need to be confirm that all softened material has been removed This will require the removal of steel and plastic so that the geotechnical engineer can inspect the base A blinding layer of concrete may need to be placed to prevent softening if water seepage continues

5 3 2 Proposed material to be used for backfilling behind retaining walls must be approved by the geotechnical engineer prior to placement

5 3 3 The hydraulic and/or geotechnical engineer must inspect all subsurface drains prior to backfilling

5 3 4 The geotechnical engineer must confirm that the proposed alterations and additions have been completed in accordance with the geotechnical report

5 4 Conditions Recommended for Ongoing Management of the Site/Structure(s)

The following recommendations have been included so that the current and future owners of the subject property are aware of their responsibilities

5 4 1 All existing and proposed surface (including roof) and subsurface drains must be subject to ongoing and regular maintenance by the property owners In addition, such maintenance must also be carried out by a plumber at no more than ten yearly intervals, including provision of a written report confirming scope of work completed (with reference to the 'as-built' drawing) and identifying any required remedial measures

5 4 2 The existing retaining walls must be inspected by a structural engineer at no more than ten yearly intervals, including the provision of a written report confirming scope of work completed and identifying any required remedial measures

5 4 3 No cut or fill in excess of 0 5m (e g for landscaping, buried pipes, retaining walls, etc), is to be carried out on site without prior consent from Pittwater Council

5 4 4 Where the structural engineer has indicated a design life of less than 100 years then the structure and/or structural elements must be inspected by a structural engineer at the end of their design life, including a written report confirming scope of work completed and identifying the required remedial measures to extend the design life over the remaining 100 year period

6 GENERAL COMMENTS

It is possible that the subsurface soil, rock or groundwater conditions encountered during construction may be found to be different (or may be interpreted to be different) from those inferred from our surface observations in preparing this report Also, we have not had the opportunity to observe surface run-off patterns during heavy rainfall and cannot comment directly on this aspect If conditions appear to be at variance or cause concern for any reason, then we recommend that you immediately contact this office

This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose We have used a degree of care, skill and diligence normally exercised by consulting engineers in similar circumstances and locality No other

warranty expressed or implied is made or intended Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report The report shall not be reproduced except in full

Should you have any queries regarding this report, please do not hesitate to contact the undersigned

For and on behalf of
JEFFERY AND KATAUSKAS PTY LTD

Daniel Bliss
Senior Associate

Reviewed by

Paul Stubbs
Principal

Reference 1 Australian Geomechanics Society (2007c) *'Practice Note Guidelines for Landslide Risk Management'*, Australian Geomechanics, Vol 42, No 1, March 2007, pp63-114

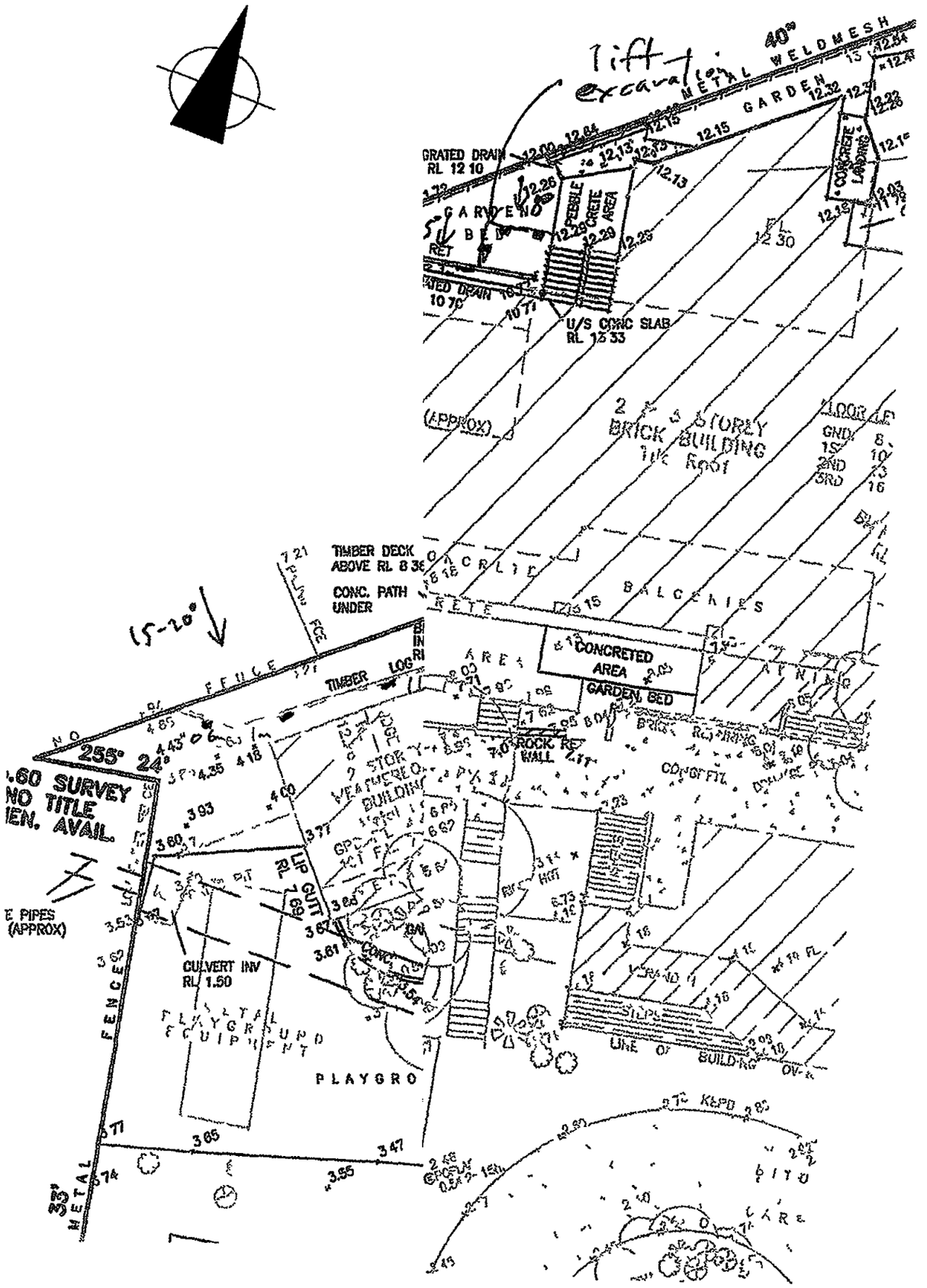
Reference 2 MacGregor, P, Walker B, Fell, R, and Leventhal, A (2007) *'Assessment of Landslide Likelihood in the Pittwater Local Government Area'*, Australian Geomechanics, Vol 42, No 1, March 2007, pp183-196

TABLE A
SUMMARY OF RISK ASSESSMENT TO PROPERTY

POTENTIAL LANDSLIDE HAZARD	Hazard A	Hazard B	Hazard C	Hazard D
	Instability of Existing Retaining Walls along north-western side of school	**Instability of Proposed Retaining Walls for Lift**	**Instability of Hillside Slope Below Classrooms to be Renovated**	**Instability of Hillside Slope within Properties to the North-West**
Assessed Likelihood	Unlikely	Rare	Unlikely	Unlikely
Assessed Consequences	Minor	Medium	Medium	Medium
Risk	Low	Low	Low	Low
Comments	Walls appears in good condition	Assumes engineer designed walls		

TABLE B
SUMMARY OF RISK ASSESSMENT TO LIFE

POTENTIAL LANDSLIDE HAZARD	Hazard A	Hazard B	Hazard C	Hazard D
	Instability of Existing Retaining Walls along north-western side of school	**Instability of Proposed Retaining Walls for Lift**	**Instability of Hillside Slope Below Classrooms to be Renovated**	**Instability of Hillside Slope within Properties to the North-West**
Assessed Likelihood	Unlikely	Rare	Unlikely	Unlikely
Indicative Annual Probability	10^{4}	10^{5}	10^{4}	10^{-4}
Persons at Risk	Persons along path on north-western side of school	Persons within or near lift	Persons within or near classroom	Persons on north-western side of school
Duration of Use of Area Affected (Temporal Probability)	Say average 0 5 hours per day, 5 days per week, 42 weeks per year = 0 012	Say maximum total 0 5 hours per day, 5 days per week, 42 weeks per year = 0 012	Say 5 hours per day, 5 days per week, 42 weeks per year = 0 12	Say average 3 hours per day, 5 days per week, 42 weeks per year = 0 072
Vulnerability to Life if Failure Occurs Whilst Person Present	0 05 persons only be struck by debris	1	0 5	0 05 Building unlikely to collapse, would only be struck by debris
Risk for Person Most at Risk	6×10^{8}	$1\ 2 \times 10^{7}$	6×10^{6}	$3\ 6 \times 10^{7}$

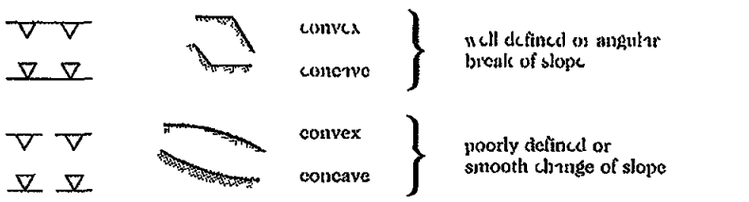


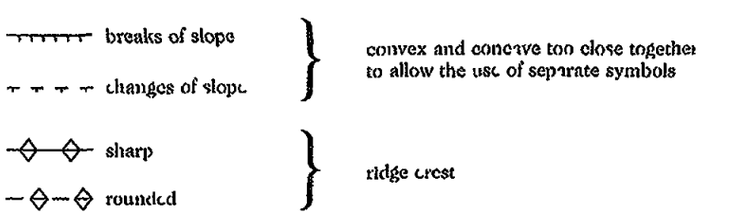
Jeffery and Katauskas Pty Ltd
CONSULTING GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

Report No 22636SB1 **Figure No 1**

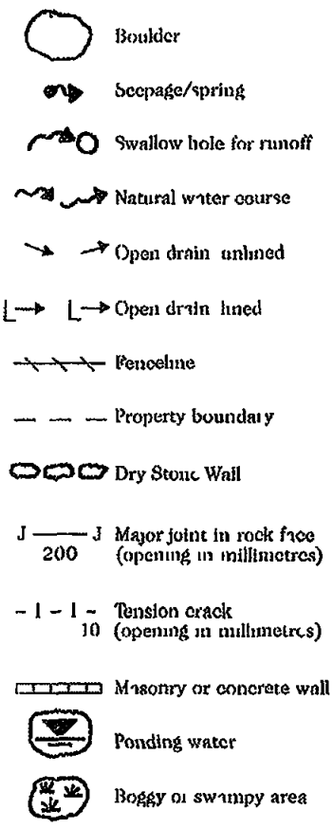
TOPOGRAPHY

Symbol *Ground Profile*

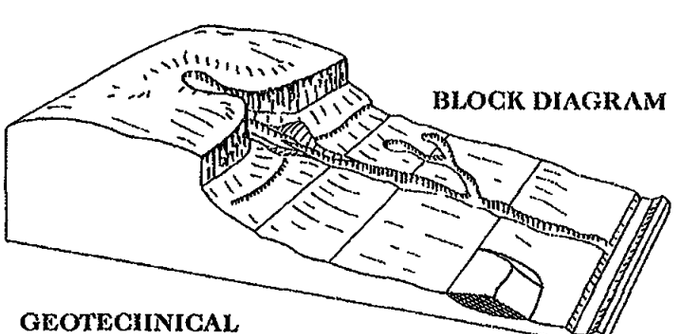




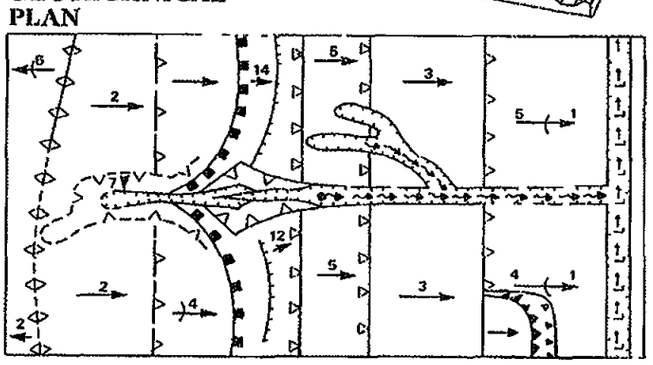
OTHER FEATURES



EXAMPLE OF USE OF TOPOGRAPHIC SYMBOLS



GEOTECHNICAL PLAN



(After Gardiner V & Dackombe R V (1983) Geomorphological Field Manual George Allen & Unwin)

GEOTECHNICAL MAPPING SYMBOLS

Jeffery and Katauskas Pty Ltd

Report No 22636SB1 Figure No 2

APPENDIX A

LANDSLIDE RISK MANAGEMENT TERMINOLOGY

APPENDIX A
LANDSLIDE RISK MANAGEMENT

Definition of Terms and Landslide Risk

Risk Terminology	Description
Acceptable Risk	A risk for which, for the purposes of life or work, we are prepared to accept as it is with no regard to its management Society does not generally consider expenditure in further reducing such risks justifiable
Annual Exceedance Probability (AEP)	The estimated probability that an event of specified magnitude will be exceeded in any year
Consequence	The outcomes or potential outcomes arising from the occurrence of a landslide expressed qualitatively or quantitatively, in terms of loss, disadvantage or gain, damage, injury or loss of life
Elements at Risk	The population, buildings and engineering works, economic activities, public services utilities, infrastructure and environmental features in the area potentially affected by landslides
Frequency	A measure of likelihood expressed as the number of occurrences of an event in a given time See also 'Likelihood' and 'Probability'
Hazard	A condition with the potential for causing an undesirable consequence (the landslide) The description of landslide hazard should include the location, volume (or area), classification and velocity of the potential landslides and any resultant detached material, and the likelihood of their occurrence within a given period of time
Individual Risk to Life	The risk of fatality or injury to any identifiable (named) individual who lives within the zone impacted by the landslide, or who follows a particular pattern of life that might subject him or her to the consequences of the landslide
Landslide Activity	The stage of development of a landslide, pre failure when the slope is strained throughout but is essentially intact, failure characterised by the formation of a continuous surface of rupture, post failure which includes movement from just after failure to when it essentially stops, and reactivation when the slope slides along one or several pre existing surfaces of rupture Reactivation may be occasional (eg seasonal) or continuous (in which case the slide is 'active')
Landslide Intensity	A set of spatially distributed parameters related to the destructive power of a landslide The parameters may be described quantitatively or qualitatively and may include maximum movement velocity, total displacement, differential displacement, depth of the moving mass, peak discharge per unit width, or kinetic energy per unit area
Landslide Risk	The AGS Australian GeoGuide LR7 (AGS, 2007e) should be referred to for an explanation of Landslide Risk
Landslide Susceptibility	The classification, and volume (or area) of landslides which exist or potentially may occur in an area or may travel or retrogress onto it Susceptibility may also include a description of the velocity and intensity of the existing or potential landsliding
Likelihood	Used as a qualitative description of probability or frequency
Probability	A measure of the degree of certainty This measure has a value between zero (impossibility) and 1 0 (certainty) It is an estimate of the likelihood of the magnitude of the uncertain quantity, or the likelihood of the occurrence of the uncertain future event These are two main interpretations (i) Statistical – frequency or fraction – The outcome of a repetitive experiment of some kind like flipping coins It includes also the idea of population variability Such a number is called an 'objective' or relative frequentist probability because it exists in the real world and is in principle measurable by doing the experiment

Risk Terminology	Description
Probability ***(continued)***	(iii) Subjective probability (degree of belief) – Quantified measure of belief, judgment, or confidence in the likelihood of an outcome, obtained by considering all available information honestly, fairly, and with a minimum of bias Subjective probability is affected by the state of understanding of a process, judgment regarding an evaluation, or the quality and quantity of information It may change over time as the state of knowledge changes
Qualitative Risk Analysis	An analysis which uses word form, descriptive or numeric rating scales to describe the magnitude of potential consequences and the likelihood that those consequences will occur
Quantitative Risk Analysis	An analysis based on numerical values of the probability, vulnerability and consequences and resulting in a numerical value of the risk
Risk	A measure of the probability and severity of an adverse effect to health, property or the environment Risk is often estimated by the product of probability x consequences However, a more general interpretation of risk involves a comparison of the probability and consequences in a non-product form
Risk Analysis	The use of available information to estimate the risk to individual, population, property, or the environment, from hazards Risk analyses generally contain the following steps scope definition, hazard identification and risk estimation
Risk Assessment	The process of risk analysis and risk evaluation
Risk Control or Risk Treatment	The process of decision-making for managing risk and the implementation or enforcement of risk mitigation measures and the re evaluation of its effectiveness from time to time, using the results of risk assessment as one input
Risk Estimation	The process used to produce a measure of the level of health, property or environmental risks being analysed Risk estimation contains the following steps frequency analysis, consequence analysis and their integration
Risk Evaluation	The stage at which values and judgments enter the decision process, explicitly or implicitly, by including consideration of the importance of the estimated risks and the associated social, environmental and economic consequences, in order to identify a range of alternatives for managing the risks
Risk Management	The complete process of risk assessment and risk control (or risk treatment)
Societal Risk	The risk of multiple fatalities or injuries in society as a whole one where society would have to carry the burden of a landslide causing a number of deaths, injuries, financial, environmental and other losses
Susceptibility	See 'Landslide Susceptibility'
Temporal Spatial Probability	The probability that the element at risk is in the area affected by the landsliding, at the time of the landslide
Tolerable Risk	A risk within a range that society can live with so as to secure certain net benefits It is a range of risk regarded as non-negligible and needing to be kept under review and reduced further if possible
Vulnerability	The degree of loss to a given element or set of elements within the area affected by the landslide hazard It is expressed on a scale of 0 (no loss) to 1 (total loss) For property, the loss will be the value of the damage relative to the value of the property, for persons, it will be the probability that a particular life (the element at risk) will be lost, given the person(s) is affected by the landslide

NOTE Reference should be made to Figure A1 which shows the inter relationship of many of these terms and the relevant portion of Landslide Risk Management

Reference should also be made to the paper referenced below for Landslide Terminology and more detailed discussion of the above terminology

This appendix is an extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in Australian Geomechanics, Vol 42, No 1, March 2007, which discusses the matter more fully

Ref Appendix A – Figure A1 Flowchart for Landslide Risk Management

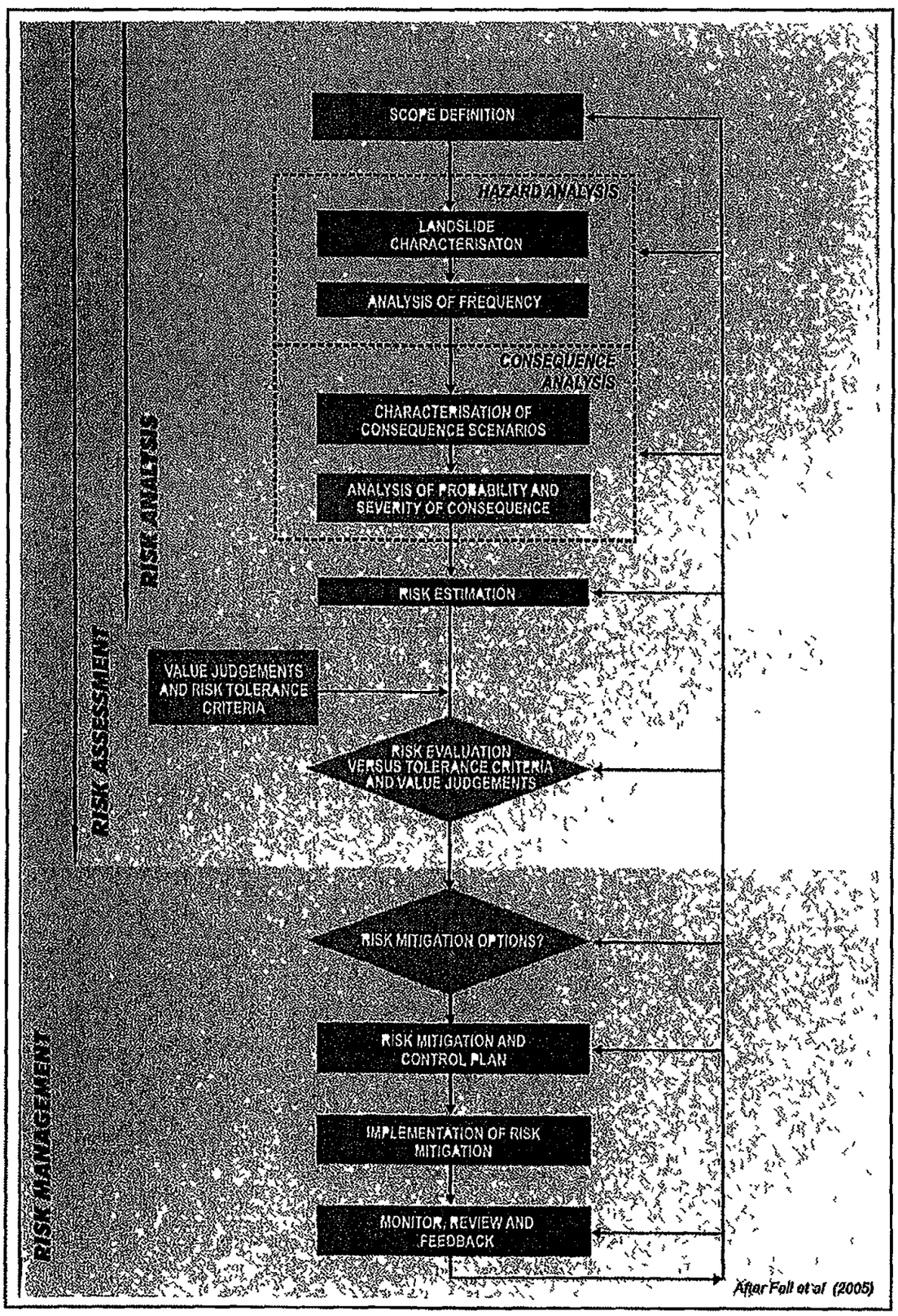


FIGURE A1 Flowchart for Landslide Risk Management

This figure is an extract from GUIDELINE FOR LANDSLIDE SUSCEPTIBILITY, HAZARD AND RISK ZONING FOR LAND USE PLANNING, as presented in Australian Geomechanics Vol 42, No 1, March 2007, which discusses the matter more fully

TABLE A1 LANDSLIDE RISK ASSESSMENT
QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY

QUALITATIVE MEASURES OF LIKELIHOOD

Approximate Annual Probability		Implied Indicative Landslide Recurrence Interval		Description	Descriptor	Level
Indicative Value	Notional Boundary					
10^{-1}	$5x10^{2}$	10 years	20 years	The event is expected to occur over the design life	ALMOST CERTAIN	A
10^{-2}	$5x10^{3}$	100 years	200 years	The event will probably occur under adverse conditions over the design life	LIKELY	B
10^{-3}	$5x10^{4}$	1000 years	2000 years	The event could occur under adverse conditions over the design life	POSSIBLE	C
10^{-4}	$5x10^{5}$	10,000 years	20,000 years	The event might occur under very adverse circumstances over the design life	UNLIKELY	D
10^{-5}	$5x10^{6}$	100,000 years	200,000 years	The event is conceivable but only under exceptional circumstances over the design life	RARE	E
10^{-6}		1,000,000 years		The event is inconceivable or fanciful over the design life	BARELY CREDIBLE	F

Note (1) The table should be used from left to right, use Approximate Annual Probability or Description to assign Descriptor, not *vice versa*

QUALITATIVE MEASURES OF CONSEQUENCES TO PROPERTY

Approximate Cost of Damage		Description	Descriptor	Level
Indicative Value	Notional Boundary			
200%	100%	Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation Could cause at least one adjacent property major consequence damage	CATASTROPHIC	1
60%	40%	Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works Could cause at least one adjacent property medium consequence damage	MAJOR	2
20%	10%	Moderate damage to some of structure, and/or significant part of site requiring large stabilisation works Could cause at least one adjacent property minor consequence damage	MEDIUM	3
5%	1%	Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works	MINOR	4
0 5%		Little damage (Note for high probability event (Almost Certain), this category may be subdivided at a notional boundary of 0 1% See Risk Matrix)	INSIGNIFICANT	5

Notes (2) The Approximate Cost of Damage is expressed as a percentage of market value, being the cost of the improved value of the unaffected property which includes the land plus the unaffected structures

(3) The Approximate Cost is to be an estimate of the direct cost of the damage, such as the cost of reinstatement of the damaged portion of the property (land plus structures), stabilisation works required to render the site to tolerable risk level for the landslide which has occurred and professional design fees and consequential costs such as legal fees temporary accommodation It does not include additional stabilisation works to address other landslides which may affect the property

(4) The table should be used from left to right, use Approximate Cost of Damage or Description to assign Descriptor, not vice versa

Extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in Australian Geomechanics Vol 42 No 1 March 2007 which discusses the matter more fully

TABLE A1. LANDSLIDE RISK ASSESSMENT
QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (continued)

QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY

LIKELIHOOD		CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)				
	Indicative Value of Approximate Annual Probability	1 CATASTROPHIC 200%	2 MAJOR 60%	3 MEDIUM 20%	4 MINOR 5%	5 INSIGNIFICANT 0 5%
A – ALMOST CERTAIN	10^{-1}				H	M or L (5)
B - LIKELY	10^{-2}			H	M	L
C - POSSIBLE	10^{-3}		H	M	M	VL
D - UNLIKELY	10^{-4}	H	M	L	L	VL
E - RARE	10^{-5}	M	L	L	VL	VL
F - BARELY CREDIBLE	10^{-6}	L	VL	VL	VL	VL

Notes (5) Cell A5 may be subdivided such that a consequence of less than 0 1% is Low Risk
(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time

RISK LEVEL IMPLICATIONS

Risk Level		Example Implications (7)
		Unacceptable without treatment Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low, may be too expensive and not practical Work likely to cost more than value of the property
H	HIGH RISK	Unacceptable without treatment Detailed investigation planning and implementation of treatment options required to reduce risk to Low Work would cost a substantial sum in relation to the value of the property
M	MODERATE RISK	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low Treatment options to reduce to Low risk should be implemented as soon as practicable
L	LOW RISK	Usually acceptable to regulators Where treatment has been required to reduce the risk to this level ongoing maintenance is required
VL	VERY LOW RISK	Acceptable Manage by normal slope maintenance procedures

Note (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk these are only given as a general guide

Extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in Australian Geomechanics Vol 42 No 1 March 2007 which discusses the matter more fully

AUSTRALIAN GEOGUIDE LR2 (LANDSLIDES)

What is a Landslide?

Any movement of a mass of rock, debris, or earth, down a slope, constitutes a "landslide" Landslides take many forms, some of which are illustrated More information can be obtained from Geoscience Australia, or by visiting its Australian landslide Database at www ga gov au/urban/factsheets/landslide jsp Aspects of the impact of landslides on buildings are dealt with in the book "Guideline Document Landslide Hazards" published by the Australian Building Codes Board and referenced in the Building Code of Australia This document can be purchased over the internet at the Australian Building Codes Board's website www abcb gov au

Landslides vary in size They can be small and localised or very large, sometimes extending for kilometres and involving millions of tonnes of soil or rock It is important to realise that even a 1 cubic metre boulder of soil, or rock, weighs at least 2 tonnes If it falls, or slides it is large enough to kill a person, crush a car, or cause serious structural damage to a house The material in a landslide may travel downhill well beyond the point where the failure first occurred, leaving destruction in its wake It may also leave an unstable slope in the ground behind it, which has the potential to fail again, causing the landslide to extend (regress) uphill, or expand sideways For all these reasons, both "potential" and "actual" landslides must be taken very seriously The present a real threat to life and property and require proper management

Identification of landslide risk is a complex task and must be undertaken by a geotechnical practitioner (GeoGuide LR1) with specialist experience in slope stability assessment and slope stabilisation

What Causes a Landslide?

Landslides occur as a result of local geological and groundwater conditions, but can be exacerbated by inappropriate development (GeoGuide LR8), exceptional weather, earthquakes and other factors Some slopes and cliffs never seem to change, but are actually on the verge of failing Others, often moderate slopes (Table 1), move continuously, but so slowly that it is not apparent to a casual observer In both cases, small changes in conditions can trigger a landslide with series consequences Wetting up of the ground (which may involve a rise in groundwater table) is the single most important cause of landslides (GeoGuide LR5) This is why they often occur during, or soon after, heavy rain Inappropriate development often results in small scale landslides which are very expensive in human terms because of the proximity of housing and people

Does a Landslide Affect You?

Any slope, cliff, cutting, or fill embankment may be a hazard which has the potential to impact on people, property, roads and services Some tell-tale signs that might indicate that a landslide is occurring are listed below

- Open cracks, or steps, along contours
- Groundwater seepage, or springs
- Bulging in the lower part of the slope
- Hummocky ground
- trees leaning down slope, or with exposed roots
- debris/fallen rocks at the foot of a cliff
- tilted power poles, or fences
- cracked or distorted structures

These indications of instability may be seen on almost any slope and are not necessarily confined to the steeper ones (Table 1) Advice should be sought from a geotechnical practitioner if any of them are observed Landslides do not respect property boundaries As mentioned above they can "run-out" from above, "regress" from below, or expand sideways, so a landslide hazard affecting your property may actually exist on someone else's land

Local councils are usually aware of slope instability problems within their jurisdiction and often have specific development and maintenance requirements **Your local council is the first place to make enquiries if you are responsible for any sort of development or own or occupy property on or near sloping land or a cliff.**

TABLE 1 – Slope Descriptions

Appearance	Slope Angle	Maximum Gradient	Slope Characteristics
Gentle	0° - 10°	1 on 6	Easy walking
Moderate	10° - 18°	1 on 3	Walkable Can drive and manoeuvre a car on driveway
Steep	18° - 27°	1 on 2	Walkable with effort Possible to drive straight up or down roughened concrete driveway, but cannot practically manoeuvre a car
Very Steep	27° - 45°	1 on 1	Can only climb slope by clutching at vegetation, rocks, etc
Extreme	45° - 64°	1 on 0 5	Need rope access to climb slope
Cliff	64° - 84°	1 on 0 1	Appears vertical Can abseil down
Vertical or Overhang	84° - 90±°	Infinite	Appears to overhang Abseiler likely to lose contact with the face

Some typical landslides which could affect residential housing are illustrated below

Rotational or circular slip failures (Figure 1) - can occur on moderate to very steep soil and weathered rock slopes (Table 1) The sliding surface of the moving mass tends to be deep seated Tension cracks may open at the top of the slope and bulging may occur at the toe The ground may move in discrete "steps" separated by long periods without movement More rapid movement may occur after heavy rain

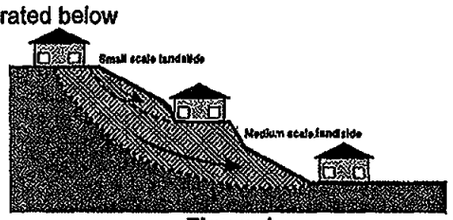


Figure 1

Translational slip failures (Figure 2) - tend to occur on moderate to very steep slopes (Table 1) where soil, or weak rock, overlies stronger strata The sliding mass is often relatively shallow It can move, or deform slowly (creep) over long periods of time Extensive linear cracks and hummocks sometimes form along the contours The sliding mass may accelerate after heavy rain


Figure 2

Wedge failures (Figure 3) - normally only occur on extreme slopes, or cliffs (Table 1) where discontinuities in the rock are inclined steeply downwards out of the face

Rock falls (Figure 3) - tend to occur from cliffs and overhangs (Table 1)

Cliffs may remain, apparently unchanged, for hundreds of years Collections of boulders at the foot of a cliff may indicate that rock falls are ongoing Wedge failures and rock falls do not "creep" Familiarity with a particular local situation can instil a false sense of security since failure, when it occurs, is usually sudden and catastrophic

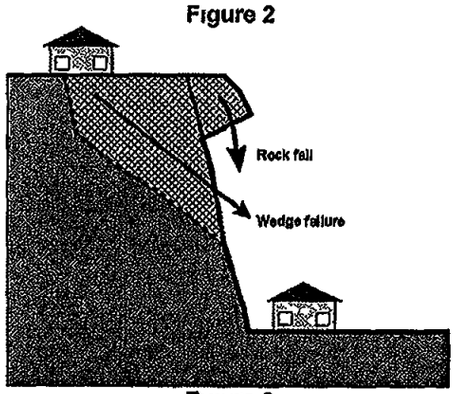


Figure 3

Debris flows and mud slides (Figure 4) - may occur in the foothills of ranges, where erosion has formed valleys which slope down to the plains below The valley bottoms are often lined with loose eroded material (debris) which can "flow" if it becomes saturated during and after heavy rain Debris flows are likely to occur with little warning, they travel a long way and often involve large volumes of soil The consequences can be devastating

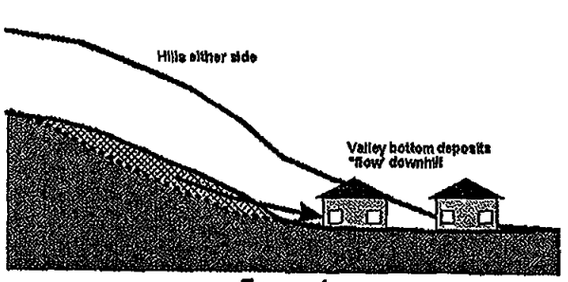


Figure 4

More information relevant to your particular situation may be found in other Australian GeoGuides

- GeoGuide LR1 - Introduction
- GeoGuide LR3 - Soil Slopes
- GeoGuide LR4 - Rock Slopes
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR7 - Landslide Risk
- GeoGuide LR8 - Hillside Construction
- GeoGuide LR9 - Effluent & Surface Water Disposal
- GeoGuide LR10 - Coastal Landslides
- GeoGuide LR11 - Record Keeping

The Australian GeoGuides (LR series) are a set of publications intended for property owners, local councils, planning authorities, developers, insurers, lawyers and in fact anyone who lives with, or has an interest in a natural or engineered slope, a cutting, or an excavation They are intended to help you understand why slopes and retaining structures can be a hazard and what can be done with appropriate professional advice and local council approval (if required) to remove reduce, or minimise the risk they represent. The GeoGuides have been prepared by the Australian Geomechanics Society, a specialist technical society within Engineers Australia, the national peak body for all engineering disciplines in Australia, whose members are professional geotechnical engineers and engineering geologists with a particular interest in ground engineering The GeoGuides have been funded under the Australian governments' National Disaster Mitigation Program

AUSTRALIAN GEOGUIDE LR7 (LANDSLIDE RISK)

Concept of Risk

Risk is a familiar term, but what does it really mean? It can be defined as *"a measure of the probability and seventy of an adverse effect to health, property, or the environment"* This definition may seem a bit complicated In relation to landslides, geotechnical practitioners (see GeoGuide LR1) are required to assess risk in terms of the likelihood that a particular landslide will occur and the possible consequences This is called landslide risk assessment The consequences of a landslide are many and varied, but our concerns normally focus on loss of, or damage to, property and loss of life

Landslide Risk Assessment

Some local councils in Australia are aware of the potential for landslides within their jurisdiction and have responded by designating specific "landslide hazard zones' Development in these areas is normally covered by special regulations If you are contemplating building, or buying an existing house, particularly in a hilly area, or near cliffs, then go first for information to your local council If you have any concern that you could be dealing with a landslide hazard that your local council is not aware of you should seek advice from a geotechnical practitioner

Landslide risk assessment must be undertaken by a geotechnical practitioner It may involve visual inspection, geological mapping, geotechnical

investigation and monitoring to identify:

- potential landslides (there may be more than one that could impact on your site),
- the likelihood that they will occur,
- the damage that could result,
- the cost of disruption and repairs, and
- the extent to which lives could be lost

Risk assessment is a predictive exercise, but since the ground and the processes involved are complex prediction inevitably lacks precision If you commission a landslide risk assessment for a particular site you should expect to receive a report prepared in accordance with current professional guidelines and in a form that is acceptable to your local council, or planning authority

Risk to Property

Table 1 indicates the terms used to describe risk to property Each risk level depends on an assessment of how likely a landslide is to occur and its consequences in dollar terms Likelihood is the chance of it happening in any one year, as indicated in Table 2 Consequences are related to the cost of the repairs and perhaps temporary loss of use These two factors are combined by the geotechnical practitioner to determine the Qualitative Risk

TABLE 1 – RISK TO PROPERTY

Qualitative Risk		Significance - Geotechnical engineering requirements
Very high	VH	**Unacceptable** without treatment Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low May be too expensive and not practical Work likely to cost more than the value of the property
High	H	**Unacceptable** without treatment Detailed investigation, planning and implementation of treatment options required to reduce risk to acceptable level Work would cost a substantial sum in relation to the value of the property
Moderate	M	**May be tolerated** in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low Treatment options to reduce to Low risk should be implemented as soon as possible
Low	L	**Usually acceptable** to regulators Where treatment has been needed to reduce the risk to this level, ongoing maintenance is required
Very Low	VL	**Acceptable** Manage by normal slope maintenance procedures

TABLE 2 – LIKELIHOOD

Likelihood	Annual Probability
Almost Certain	1 10
Likely	1 100
Possible	1 1,000
Unlikely	1 10,000
Rare	1 100,000
Barely credible	1 1 000 000

The terms "unacceptable", "tolerable" etc in Table 1 indicate how most people react to an assessed risk level However, some people will always be more prepared, or better able, to tolerate a higher risk level than others Some local councils and planning authorities stipulate a maximum tolerable risk level This may be lower than you feel is reasonable for your block but it is, nonetheless, a pre-requisite for development Reasons for this include the fact that a landslide on your block may pose a risk to neighbours and passers-by and that , should you sell, subsequent owners of the block may be more risk averse than you

Risk to Life

Most of us have some difficulty grappling with the concept of risk and deciding whether, or not, we are prepared to accept it However, without doing any sort of analysis, or commissioning a report from an "expert", we all take risks every day One of them is the risk of being killed in an accident This is worth thinking about, because it tells us a lot about ourselves and can help to put an assessed risk into a meaningful context By identifying activities that we either are, or are not, prepared to engage in, we can get some indication of the maximum level of risk that we are prepared to take This knowledge can help us to decide whether we really are able to accept a particular risk, or to tolerate a particular likelihood of loss, or damage, to our property (Table 2)

In Table 3, data from NSW for the years 1998 to 2002, and other sources, is presented A risk of 1 in 100,000 means that, in any one year, 1 person is killed for every 100,000 people undertaking that particular activity The NSW data assumes that the whole population undertakes the activity That is, we are all at risk of being killed in a fire, or of choking on our food, but it is reasonable to assume that only people who go deep sea fishing run a risk of being killed while doing it

It can be seen that the risks of dying as a result of falling, using a motor vehicle, or engaging in water-related activities (including bathing) are all greater than 1 100,000 and yet few people actively avoid situations where these risks are present Some people are averse to flying and yet it represents a lower risk than choking to death on food The data also indicate that, even when the risk of dying as a consequence of a particular event is very small, it could still happen to any one of us today If this were not so, there would be no risk at all and clearly that is not the case

In NSW, the planning authorities consider that 1 1,000,000 is the maximum tolerable risk for domestic housing built near an obvious hazard, such as a chemical factory Although not specifically considered in the NSW guidelines there is little difference between the hazard presented by a neighbouring factory and a landslide both have the capacity to destroy life and property and both are always present

TABLE 3 – RISK TO LIFE

Risk (deaths per participant per year)	Activity/Event Leading to Death (NSW data unless noted)
1 1,000	Deep sea fishing (UK)
1 1,000 to 1 10,000	Motor cycling, horse riding , ultra-light flying (Canada)
1 23,000	Motor vehicle use
1 30,000	Fall
1 70,000	Drowning
1 180,000	Fire/burn
1 660,000	Choking on food
1 1,000,000	Scheduled airlines (Canada)
1 2,300,000	Train travel
1 32,000,000	Lightning strike

More information relevant to your particular situation may be found in other AUSTRALIAN GEOGUIDES

- GeoGuide LR1 - Introduction
- GeoGuide LR2 - Landslides
- GeoGuide LR3 - Landslides in Soil
- GeoGuide LR4 - Landslides in Rock
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR8 - Hillside Construction
- GeoGuide LR9 - Effluent & Surface Water Disposal
- GeoGuide LR10 - Coastal Landslides
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The Australian GeoGuides (LR series) are a set of publications intended for property owners local councils planning authorities, developers, insurers lawyers and, in fact, anyone who lives with or has an interest in, a natural or engineered slope a cutting, or an excavation They are intended to help you understand why slopes and retaining structures can be a hazard and what can be done with appropriate professional advice and local council approval (if required) to remove, reduce, or minimise the risk they represent The GeoGuides have been prepared by the Australian Geomechanics Society, a specialist technical society within Engineers Australia, the national peak body for all engineering disciplines in Australia, whose members are professional geotechnical engineers and engineering geologists with a particular interest in ground engineering The GeoGuides have been funded under the Australian governments' National Disaster Mitigation Program

APPENDIX B

SOME GUIDELINES

FOR

HILLSIDE CONSTRUCTION

APPENDIX B – SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

	GOOD ENGINEERING PRACTICE	POOR ENGINEERING PRACTICE
ADVICE		
GEOTECHNICAL ASSESSMENT	Obtain advice from a qualified, experienced geotechnical consultant at early stage of planning and before site works	Prepare detailed plan and start site works before geotechnical advice
PLANNING		
SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk arising from the identified hazards and consequences in mind	Plan development without regard for the Risk
DESIGN AND CONSTRUCTION		
HOUSE DESIGN	Use flexible structures which incorporate properly designed brickwork, timber or steel frames, timber or panel cladding Consider use of split levels Use decks for recreational areas where appropriate	Floor plans which require extensive cutting and filling Movement intolerant structures
SITE CLEARING	Retain natural vegetation wherever practicable	Indiscriminately clear the site
ACCESS & DRIVEWAYS	Satisfy requirements below for cuts fills retaining walls and drainage Council specifications for grades may need to be modified Driveways and parking areas may need to be fully supported on piers	Excavate and fill for site access before geotechnical advice
EARTHWORKS	Retain natural contours wherever possible	Indiscriminant bulk earthworks
CUTS	Minimise depth Support with engineered retaining walls or batter to appropriate slope Provide drainage measures and erosion control	Large scale cuts and benching Unsupported cuts Ignore drainage requirements
FILLS	Minimise height Strip vegetation and topsoil and key into natural slopes prior to filling Use clean fill materials and compact to engineering standards Batter to appropriate slope or support with engineered retaining wall Provide surface drainage and appropriate subsurface drainage	Loose or poorly compacted fill, which if it fails, may flow a considerable distance (including onto properties below) Block natural drainage lines Fill over existing vegetation and topsoil include stumps trees, vegetation, topsoil, boulders building rubble etc in fill
ROCK OUTCROPS & BOULDERS	Remove or stabilise boulders which may have unacceptable risk Support rock faces where necessary	Disturb or undercut detached blocks or boulders
RETAINING WALLS	Engineer design to resist applied soil and water forces Found on bedrock where practicable Provide subsurface drainage within wall backfill and surface drainage on slope above Construct wall as soon as possible after cut/fill operation	Construct a structurally inadequate wall such as sandstone flagging, brick or unreinforced blockwork Lack of subsurface drains and weepholes
FOOTINGS	Found within bedrock where practicable Use rows of piers or strip footings oriented up and down slope Design for lateral creep pressures if necessary Backfill footing excavations to exclude ingress of surface water	Found on topsoil, loose fill, detached boulders or undercut cliffs
SWIMMING POOLS	Engineer designed Support on piers to rock where practicable Provide with under drainage and gravity drain outlet where practicable Design for high soil pressures which may develop on uphill side whilst there may be little or no lateral support on downhill side	
DRAINAGE		
SURFACE	Provide at tops of cut and fill slopes Discharge to street drainage or natural water courses Provide generous falls to prevent blockage by siltation and incorporate silt traps Line to minimise infiltration and make flexible where possible Special structures to dissipate energy at changes of slope and/or direction	Discharge at top of fills and cuts Allow water to pond bench areas
SUBSURFACE	Provide filter around subsurface drain Provide drain behind retaining walls Use flexible pipelines with access for maintenance Prevent inflow of surface water	Discharge of roof run-off into absorption trenches
SEPTIC & SULLAGE	Usually requires pump out or mains sewer systems, absorption trenches may be possible in some areas if risk is acceptable Storage tanks should be water-tight and adequately founded	Discharge sullage directly onto and into slopes Use of absorption trenches without consideration of landslide risk
EROSION CONTROL & LANDSCAPING	Control erosion as this may lead to instability Revegetate cleared area	Failure to observe earthworks and drainage recommendations when landscaping
DRAWINGS AND SITE VISITS DURING CONSTRUCTION		
DRAWINGS	Building Application drawings should be viewed by a geotechnical consultant	
SITE VISITS	Site visits by consultant may be appropriate during construction	
INSPECTION AND MAINTENANCE BY OWNER		
OWNER'S RESPONSIBILITY	Clean drainage systems, repair broken joints in drains and leaks in supply pipes Where structural distress is evident seek advice If seepage observed, determine cause or seek advice on consequences	

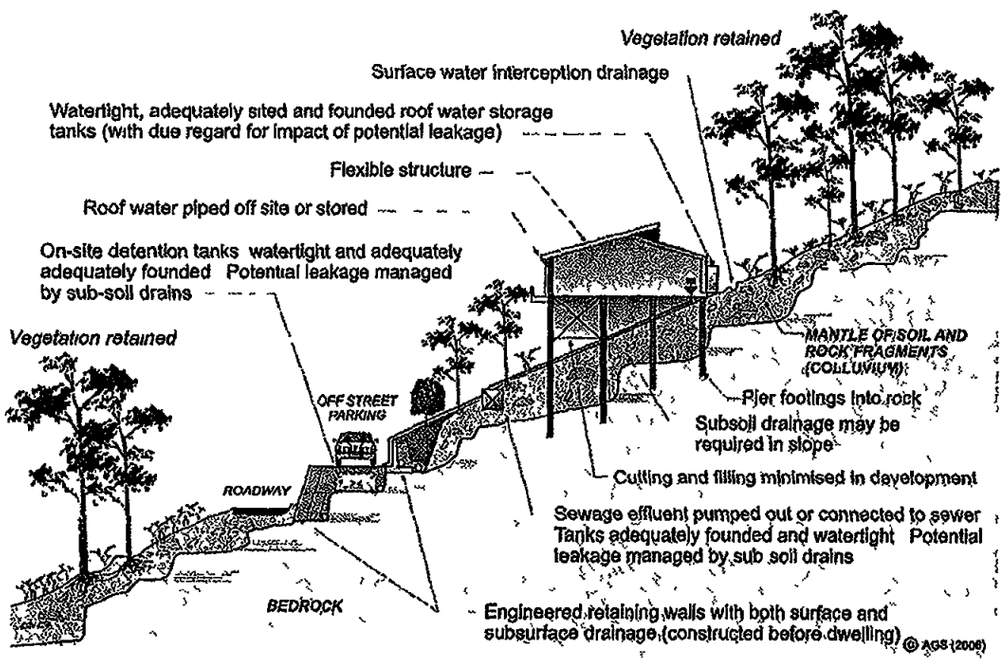
This table is an extract from PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT as presented in *Australian Geomechanics*, Vol 42, No 1, March 2007 which discusses the matter more fully

AUSTRALIAN GEOGUIDE LR8 (CONSTRUCTION PRACTICE)

HILLSIDE CONSTRUCTION PRACTICE

Sensible development practices are required when building on hillsides, particularly if the hillside has more than a low risk of instability (GeoGuide LR7) Only building techniques intended to maintain, or reduce, the overall level of landslide risk should be considered Examples of good hillside construction practice are illustrated below

EXAMPLES FOR **GOOD** HILLSIDE CONSTRUCTION PRACTICE



WHY ARE THESE PRACTICES GOOD?

Roadways and parking areas - are paved and incorporate kerbs which prevent water discharging straight into the hillside (GeoGuide LR5)

Cuttings - are supported by retaining walls (GeoGuide LR6)

Retaining walls - are engineer designed to withstand the lateral earth pressures and surcharges expected, and include drains to prevent water pressures developing in the backfill Where the ground slopes steeply down towards the high side of a retaining wall, the disturbing force (see GeoGuide LR6) can be two or more times that due to level ground Retaining walls must be designed taking these forces into account

Sewage - whether treated or not is either taken away in pipes or contained in properly founded tanks so it cannot soak into the ground

Surface water - from roofs and other hard surfaces is piped away to a suitable discharge point rather than being allowed to infiltrate into the ground Preferably, the discharge point will be in a natural creek where ground water exits, rather than enters, the ground Shallow lined, drains on the surface can fulfill the same purpose (GeoGuide LR5)

Surface loads - are minimised No fill embankments have been built The house is a lightweight structure Foundation loads have been taken down below the level at which a landslide is likely to occur and, preferably, to rock This sort of construction is probably not applicable to soil slopes (GeoGuide LR3) If you are uncertain whether your site has rock near the surface, or is essentially a soil slope you should engage a geotechnical practitioner to find out

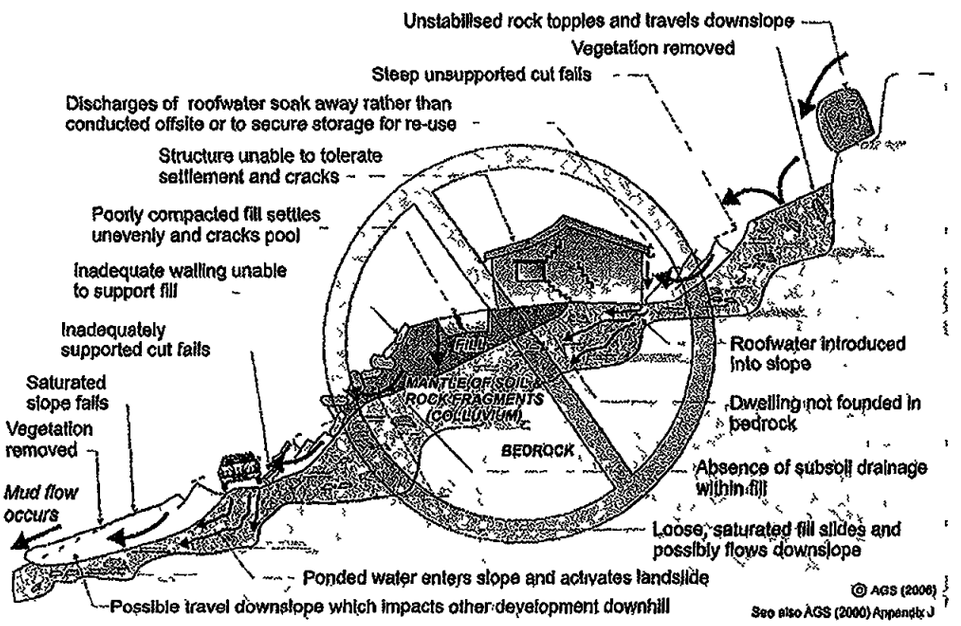
Flexible structures - have been used because they can tolerate a certain amount of movement with minimal signs of distress and maintain their functionality

Vegetation clearance - on soil slopes has been kept to a reasonable minimum Trees, and to a lesser extent smaller vegetation, take large quantities of water out of the ground every day This lowers the ground water table which in turn helps to maintain the stability of the slope Large scale clearing can result in a rise in water table with a consequent increase in the likelihood of a landslide (GeoGuide LR5) An exception may have to be made to this rule on steep rock slopes where trees have little effect on the water table, but their roots pose a landslide hazard by dislodging boulders

Possible effects of ignoring good construction practices are illustrated on page 2 Unfortunately, these poor construction practices are not as unusual as you might think and are often chosen because, on the face of it, they will save the developer, or owner, money You should not lose sight of the fact that the cost and anguish associated with any one of the disasters illustrated, is likely to more than wipe out any apparent savings at the outset

ADOPT GOOD PRACTICE ON HILLSIDE SITES
Extract from Geoguide LR8 – Hillside Construction Practice

EXAMPLES FOR POOR HILLSIDE CONSTRUCTION PRACTICE



WHY ARE THESE PRACTICES POOR?

Roadways and parking areas - are unsurfaced and lack proper table drains (gutters) causing surface water to pond and soaks into the ground

Cut and fill - has been used to balance earthworks quantities and level the site leaving unstable cut faces and added large surface loads to the ground Failure to compact the fill properly has led to settlement, which will probably continue for several years after completion The house and pool have been built on the fill and have settled with it and cracked Leakage from the cracked pool and the applied surface loads from the fill have combined to cause landslides

Retaining walls - have been avoided, to minimise cost and hand placed rock walls used instead Without applying engineering design principles, the walls have failed to provide the required support to the ground and have failed, creating a very dangerous situation

A heavy, rigid, house - has been built on shallow, conventional footings Not only has the brickwork cracked because of the resulting ground movements, but it has also become involved in a man-made landslide

Soak-away drainage - has been used for sewage and surface water run off from roofs and pavements This water soaks into the ground and raises the water table (GeoGuide LR5) Subsoil drains that run along the contours should be avoided for the same reason If felt necessary subsoil drains should run steeply downhill in a chevron, or herringbone, pattern This may conflict with the requirements for effluent and surface water disposal (GeoGuide LR9) and if so, you will need to seek professional advice

Rock debris - from landslides higher up on the slope seems likely to pass through the site Such locations are often referred to by geotechnical practitioners as "debris flow paths" Rock is normally even denser than ordinary fill, so even quite modest boulders are likely to weigh many tonnes and do a lot of damage once they start to roll Boulders have been known to travel hundreds of metres downhill leaving behind a trail of destruction

Vegetation - has been completely cleared, leading to a possible rise in the water table and increased landslide risk (GeoGuide LR5)

DON'T CUT CORNERS ON HILLSIDE SITES - OBTAIN ADVICE FROM A GEOTECHNICAL PRACTITIONER

More information relevant to your particular situation may be found in other Australian GeoGuides.

- GeoGuide LR1 - Introduction
- GeoGuide LR2 - Landslides
- GeoGuide LR3 - Landslides in Soil
- GeoGuide LR4 - Landslides in Rock
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR7 - Landslide Risk
- GeoGuide LR9 - Effluent & Surface Water Disposal
- GeoGuide LR10 Coastal Landslides
- GeoGuide LR11 - Record Keeping

The Australian GeoGuides (LR series) are a set of publications intended for property owners, local councils planning authorities developers, insurers lawyers and, in fact anyone who lives with, or has an interest in, a natural or engineered slope, a cutting or an excavation They are intended to help you understand why slopes and retaining structures can be a hazard and what can be done with appropriate professional advice and local council approval (if required) to remove, reduce, or minimise the risk they represent The GeoGuides have been prepared by the Australian Geomechanics Society a specialist technical society within Engineers Australia, the national peak body for all engineering disciplines in Australia whose members are professional geotechnical engineers and engineering geologists with a particular interest in ground engineering The GeoGuides have been funded under the Australian governments' National Disaster Mitigation Program

Extract from Geoguide LR8 – Hillside Construction Practice

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS
ABN 17 003 550 801

AS/N/S ISO 9001
Certified

PO BOX 976, NORTH RYDE BC NSW 1670
Tel 02 9888 5000 • Fax 02 9888 5001
Email engineers@jkgroup net au

13 January 2010
Ref 22636SB1let

Sydney Anglican Schools Corporation
C/- Midson Group
PO Box 671
EPPING NSW 1710

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

ATTENTION Mr Graham Bunn

Dear Sirs

GEOTECHNICAL REVIEW OF DRAWINGS
PROPOSED LIFT AND CLASSROOM ALTERATIONS
LOQUAT VALLEY ANGLICAN PREPARATORY SCHOOL
1977 PITTWATER ROAD, BAYVIEW, NSW

As requested, we have reviewed the supplied structural and hydraulic drawings for the above development in relation to our geotechnical slope stability risk assessment report dated 12 January 2010 (Ref 22636SB1rpt) The drawings reviewed were as follows

- Structural drawings by Birzulis Associates, Job No 4412, Drawing Nos S01, Issue C, dated 20/11/09, S02, Issue D, dated 27/11/09, S08, Issue B, dated 27/11/09, and S11, Issue B, dated 27/1/09 In addition, the structural engineer has supplied a signed copy of Pittwater Council's Form 2 – Part A confirming that the structural design meets the requirements of our geotechnical assessment report and has advised that the design life of the structural elements is 50 years We understand that the structural design life is to be added to the structural notes (Drawing No S01), but at the time of preparation of this letter the revised drawing had not been received
- Hydraulic drawings by David Buckle & Associates (NSW) Pty Ltd, Drawing Nos 2743-H00 to H04, Revision 1, dated 27/11/09 In addition, the hydraulic

engineer has confirmed in a letter dated 13 January 2010 (Ref 2743) that they have reviewed our geotechnical assessment report and confirm that the hydraulic design addresses the issues raised in the geotechnical assessment report

The drawings and other information were reviewed regarding geotechnical aspects of the proposed development and no calculation checks or structural assessments were made The review does not relieve the structural or hydraulic engineers of their responsibility for the design shown on the drawings

Following our review of the structural and hydraulic drawings as detailed above, it is considered that the drawings have been prepared taking into account the intent of the recommendations provided within our geotechnical slope stability risk assessment report dated 12 January 2010 (Ref 22636SB1rpt)

A completed copy of Pittwater Council's Form 2 – Part B, cross referenced to this letter, is attached

Geotechnical Inspections During Construction

Geotechnical inspections will be required during construction, which are detailed in Section 5 3 of our previous report The geotechnical inspections will need to be completed in order for the geotechnical engineer to complete Pittwater Council's Form 3 at the end of construction If all geotechnical inspections are not completed during construction, then only the issue of a qualified Form 3 would be able to be provided We recommend that the builder be made aware of the geotechnical inspections that are required during construction

Should you require any further information regarding the above please do not hesitate to contact the undersigned

Yours faithfully
For and on behalf of
JEFFERY AND KATAUSKAS PTY LTD

Daniel Bliss
Senior Associate

Encl Form 2 – Part B

PITTWATER COUNCIL

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO 2 – PART B – To be submitted with detailed design for Construction Certificate

PART B Declaration made by Geotechnical Engineer or Engineering Geologist and/or Coastal Engineer (where applicable) in relation to the incorporation of the Geotechnical issues into the project design

I, Daniel Bliss on behalf of Jeffery & Katauskas Pty Ltd
(insert name) (trading or company name)

on this the 13 January 2010
(date)

certify that I am a Geotechnical Engineer or Engineering Geologist and/or Coastal Engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2099 and I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least $2million I also certify that I have reviewed the design plans and structural design plans for the Construction Certificate Stage and that I am satisfied that

Please mark appropriate box

☑ the structural design meets the intent of the recommendations as set out in the Geotechnical Report or any revision thereto
☐ the structural design has considered the requirements set out in the Geotechnical Report for Excavation and Landfill both for the excavation/construction phase and the final installation in accordance with Clause 3 2 (b)(iv) of the Geotechnical Risk Management Policy

Geotechnical Report Details

Report Title	Geotechnical Assessment for Proposed Lift and classroom Alterations
Report Date	12 January 2010 Report Ref No 22636SBlrpt
Author	Daniel Bliss

Documentation which relates to or is relied upon in report preparation

Birzulis Structural drawings as detailed in letter dated
13 January 2010 (Ref 22636SBllet).

We / I am also aware that Pittwater Council relies on the processes covered by the Geotechnical Risk Management Policy including this certification as the basis for ~~confirming~~ ensuring that the geotechnical risk management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management level for the life of the structure taken as at least 100 years unless otherwise stated and justified

Signature
Name Daniel Bliss
Chartered Professional Status MIEAust CPEng
Membership No 969495
Company Jeffery & Katauskas Pty Ltd

This form to be read in conjaction with letter dated 13 January 2010 (Ref 22636SBllet) by Jeffery and Katauskas Pty Ltd.

URBAN CITY CONSULTING PTY LTD

General Application Form

Certification of building Work & Appointment of Principal Certifying Authority
Environmental Planning & Assessment Act 1979

Lodgement *Form to be forwarded to Urban City Consulting Pty Limited, PO Box 1201 Windsor NSW 2756*

If you have any problems please contact our office on (02) 4587 7000 or email us on info@urbancityconsulting.com.au

RECEIVED
19 JAN 2010
BY .....

Details of Application – tick appropriate box (es)

- ☑ **Prepare & Issue a Construction Certificate**
- ☐ **Prepare & Issue a Complying Development Certificate**
- ☑ **Prepare & Issue an Occupation Certificate**
  - ☑ **Interim** ☑ **Final**
- ☑ **Appointment of Principal Certifying Authority**

Applicant Details

Name Sydney Anglican Schools Corporation
c/o Midson Group
Address. P.O. Box 671
EPPING, NSW, 1710
Phone No. 9868 6923
Fax No. 9868 6924
Email. ithompson@midsongroup.com.au

I declare to the best of my knowledge and belief that the particulars hereon are correct in every detail and all of the information required has been provided

Appointment Of PCA ***I / We hereby appoint Troy Myers (Accreditation No BPB 0284) to act as the Principal Certifying Authority in respect to the above, pursuant to Sections 81A (2) (b) (ii) and 86 (1) of the Act.***

Applicant Signatures / s .....

Development Description

Description of Works Additions & Alterations to Existing Classroom & New lift

PO Box 1201 Windsor NSW 2756 | Ph 02 4587 7000 Fax. 02 4587 9044 | info@urbancityconsulting.com.au
www.urbancityconsulting.com.au

Licensed Builder / Owner Builder Details

Name Premier Building Group

Address P.O Box 1072

Phone No (02) 9979 8377

Fax No (02) 9979 8262

Email ftropea@premierbuild.com.au

Licence No 348226

Date of Commencement
Proposed date of Commencement 19 JAN 2010

(Note A minimum of 2 Days notice is required to be provided to the local Authority prior to work Commencing)

PCA Acceptance **I Troy Myers being an Accredited Certifier acknowledge being appointed as the PCA for the project as described on this document in accordance with clause 103 of the Environmental Planning & Assessment Regulation 2000**

PCA Signature _____

Certification Details – office use only
Complying Development Certificate ☐
Construction Certificate ☐
Occupation Certificate ☐

Certifying Authority **(Urban City Consulting Pty Ltd)**

Certificate No _____

Date of determination _____

Schedule to Construction Certificate Application

(for the Australian Bureau of Statistics)

Particulars of the proposal

What is the area of the land (m2)

No of storeys, including basement

Gross floor area of new building (m2)

Residential buildings only

Number of dwellings proposed

Number of pre-existing dwellings

Number of dwellings to be demolished

Will the new dwellings be attached to Any other new buildings?	☐	**Yes**	☐	**No**	
Will the new dwellings be attached to Existing buildings?	☐	**Yes**	☐	**No**	
Does the site contain a dual occupancy?	☐	**Yes**	☐	**No**	

Materials to be used – Residential Buildings

Place an (x) in the box which best describes the materials the new work will be constructed of

Walls	**Code**		**Roof**	**Code**	
Brick (double)	☐	**11**	**Tiles**	☐	**10**
Brick veneer	☐	**12**	**Concrete or slate**	☐	**20**
Concrete or stone	☐	**20**	**Fibrous cement**	☐	**30**
Fibrous cement	☐	**30**	**Steel**	☐	**60**
Timber	☐	**40**	**Aluminium**	☐	**70**
Curtain glass	☐	**50**	**Other**	☐	**80**
Steel	☐	**60**	**Unknown**	☐	**90**
Aluminium	☐	**70**			
Other	☐	**80**			
Unknown	☐	**90**			

Floor	**Code**		**Frame**	**Code**	
Concrete or slate	☐	**20**	**Timber**	☐	**40**
Timber	☐	**40**	**Steel**	☐	**60**
Other	☐	**80**	**Aluminium**	☐	**70**
Unknown	☐	**90**	**Other**	☐	**80**
			Unknown	☐	**90**

22nd December 2009

Midson Group Pty Ltd
PO Box 671
EPPING NSW 1710

Attn Mr Graham Bunn

Dear Sir,

RE LOQUAT VALLEY DA WORKS – DOCUMENTATION REQUIRED FOR CC

Please be advised all demolition works to be undertaken at this site are to comply with AS2601 and undertaken to comply with the Safe Work Method Statement forwarded to our on site foreman prior to commencement of works

WorkCover permits will also be forwarded to Premier Building Group

All demolition materials are to be transported to Kimbriki Waste Disposal Depot Copies of tipping dockets will be forwarded to Premier Building Group

In relation to Council DA consent item C6 points 1 – 4 please be advised

1 Temporary site fencing compliant to WorkCover regulations is to be installed around the demolition site Warning signage prominently displayed

2 Not applicable

3 All services are to be capped off by Premier Building Group contractors

Please do not hesitate to contact the undersigned should you require any further information on (02) 9979 8377 or ftropea@premierbuild com au

Yours faithfully,
PREMIER BUILDING GROUP

Frank Tropea
Director
ftropea@premierbuild com au
Mobile 0417 263 444

URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284

PITTWATER COUNCIL

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO 2 – PART A – To be submitted with detailed design for Construction Certificate

Development Application for SYDNEY ANGLICAN SCHOOLS CORPORATION
Name of Applicant

Address of site 1977 PITTWATER ROAD, BAYVIEW

PART A. Declaration made by Structural or Civil Engineer in relation to the incorporation of the Geotechnical Issues into the project design

I, MICHAEL GROGAN (insert name) on behalf of BIRZULIS ASSOCIATES PTY LTD (trading or company name)

on this the 13TH JANUARY 2010 (date)

certify that I am a Structural or Civil Engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 I am authorised by the above organisation/company to issue this document and to certify that the organisation/company has a current professional indemnity policy of at least $2million I also certify that I have prepared the below listed structural documents in accordance with the recommendations given in the Geotechnical Report for the above development and that

Please mark appropriate box

☑ the structural design meets the recommendations as set out in the Geotechnical Report or any revision thereto
☐ the structural design has considered the requirements set out in the Geotechnical Report for Excavation and Landfill both for the excavation/construction phase and the final installation in accordance with Clause 3 2 (b)(iv) of the Geotechnical Risk Management Policy

Geotechnical Report Details

Report Title GEOTECHNICAL ASSESSMENT FOR PROPOSED LIFT AND CLASSROOM ALTERATIONS
Report Date 12 JAN 2010
Author DANIEL BLISS
Author's Company/Organisation JEFFERY AND KATAUSKAS PTY LTD

Structural Documents list.

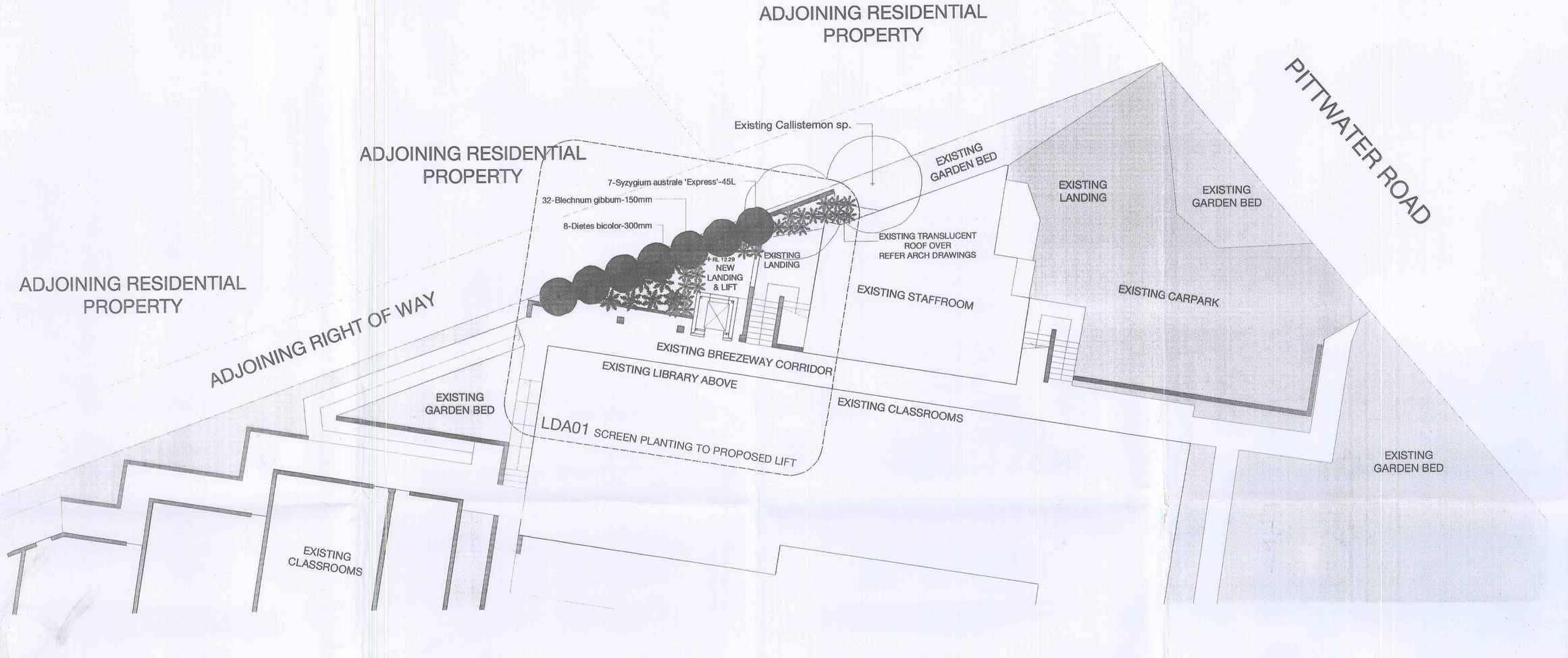
4412 – S01, S02, S08, S11

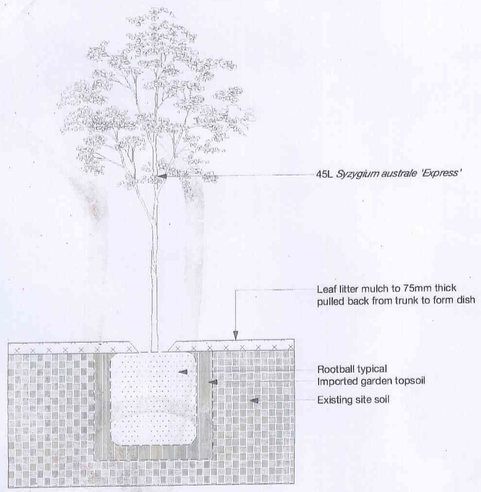
I am also aware that Pittwater Council relies on the processes covered by the Geotechnical Risk Management Policy including this certification as the basis for ensuring that the geotechnical risk management aspects of the proposed development have been adequately addressed to achieve an 'Acceptable Risk Management' level for the life of the structure taken as at least 100 years unless otherwise stated and justified

Signature
Name MICHAEL GROGAN
Chartered Professional Status MIEAUST, CPENG
Membership No 2125368
Company BIRZULIS ASSOCIATES

Registered Professional Engineer 2125368
Mr Michael Grogan
MIEAust CPEng (Structural)
NPER
Signature Date 13/01/10
Registered on the NPER in the area of practice of Structural
National Professional Engineers Register

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No BPB0284





LD01 Planting Detail
Scale: 1:20

PLANTING SCHEDULE

FERNS					
Quantity	Latin Name	Common Name	Spread	Height	Scheduled Size
32	*Blechnum gibbum*	Palm Fern	450	800	150mm
SHRUBS					
Quantity	Latin Name	Common Name	Spread	Height	Scheduled Size
8	*Dietes bicolor*	Dietes	600	800	300mm
TREES					
Quantity	Latin Name	Common Name	Spread	Height	Scheduled Size
7	*Syzygium australe 'Express'*	Lilly Pilly Express	1500	5000	45L

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No. BPB0284

0 5 10 M

REFERENCES

CONSULTANT	DRAWING ID	DATE OF ISSUE
Midson Architecture	LVAS_DA01A	01.09.2009

issue	date	revision
A	13/1/10	For Comment
B	13/1/10	For DA

note: DO NOT SCALE FROM DRAWING. USE FIGURED DIMENSIONS ONLY. CHECK ALL DIMENSIONS ON SITE BEFORE ANY MANUFACTURE OR CONSTRUCTION

project
Loquat Valley School

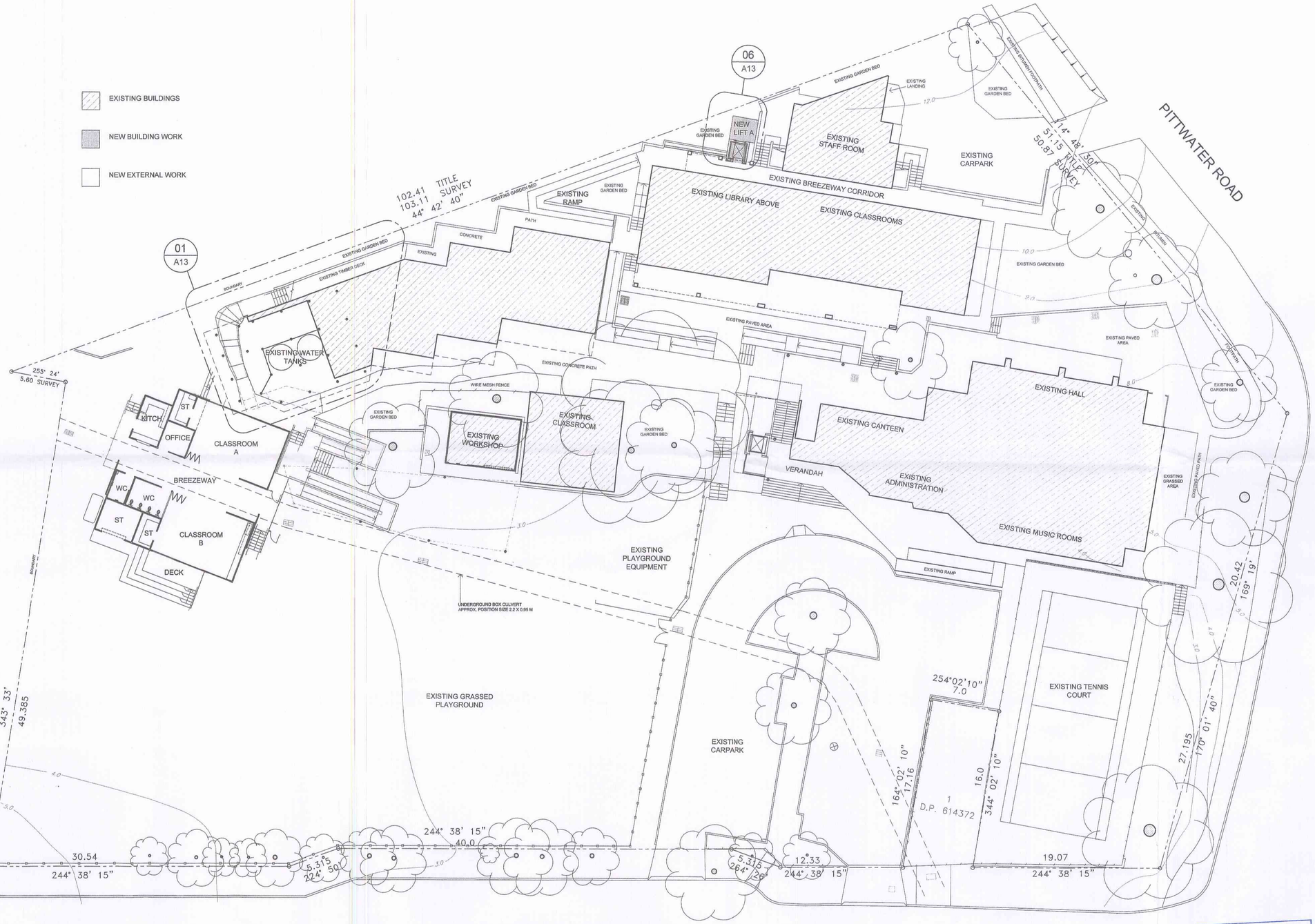
client
Sydney Anglican Schools Corporation

drawing
Planting to Screen Proposed Lift

Nick Johnston Landscapes Pty Ltd
14/1-3 Jubilee Avenue
Warriewood NSW 2102
Tel: 02) 9979 8885 Fax: 02) 9979 8591

		dwg no	rev
project no.	1001	LDA 01 B	
date	13.01.2010		
scale	1:50 @ A1		
drawn	MP		

FOR DEVELOPMENT APPLICATION



CHECK ALL DIMENSIONS ON SITE BEFORE COMMENCEMENT. WORK T FIGURED DIMENSIONS ONLY. REPORT ANY DISCREPANCIES TO THE ARCHITEC PRIOR TO THE COMMENCEMENT OF ANY WORK.

NOMINATED ARCHITECT: PETER GRAEME CALF 506

DOCUMENT CONTROL

ISSUE	DESCRIPTION	DAT
A	ISSUED FOR TENDER	28.09.0
B	COMPLYING DEVELOPMENT CERTIFICATE	26.10.0
C	FOR CONSTRUCTION	30.11.0
D	FOR CONSTRUCTION	14.12.0
E	FOR CONSTRUCTION	15.01.1

HYDRAULIC SERVICES

DBA David Buckle & Associates (NSW) P/L
ACN 106 282 875
38 Rowe St, Eastwood NSW 2122
Phone: 02 9804-8086 Fax: 02 9804-8685
Building Environmental Services

ELECTRICAL + MECHANICAL SERVICES

Shelmerdines Consulting Engineers
ABN 60 003 331 879
55 Hume Street
Crows Nest NSW 2065
Telephone: (02) 9436 3021
Facsimile: (02) 9439 8709
Email : mail@shelmerdines.com.au

STRUCTURAL ENGINEER

BIRZULIS
ASSOCIATES PTY. LTD.
ACN 003 797 011
CONSULTING ENGINEERS
E-MAIL: office@birzulisassociates.com
583 DARLING STREET ROZELLE NSW 2039
TELEPHONE: 9555 7230 FACSIMILE: 9555 7239

midson group pty ltd
a: 302/51 RAWSON ST, EPPING NSW 2121
t: +61 2 98686923 f: + 61 2 98686924
e: enquiries@midsongroup.com.au
w: www.midsongroup.com.au

CLIENT
SYDNEY ANGLICAN SCHOOLS CORPORATION

PROJECT TITLE
LOQUAT VALLEY ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

DRAWING TITLE
SITE PLAN

DRAWING NUMBER
A01

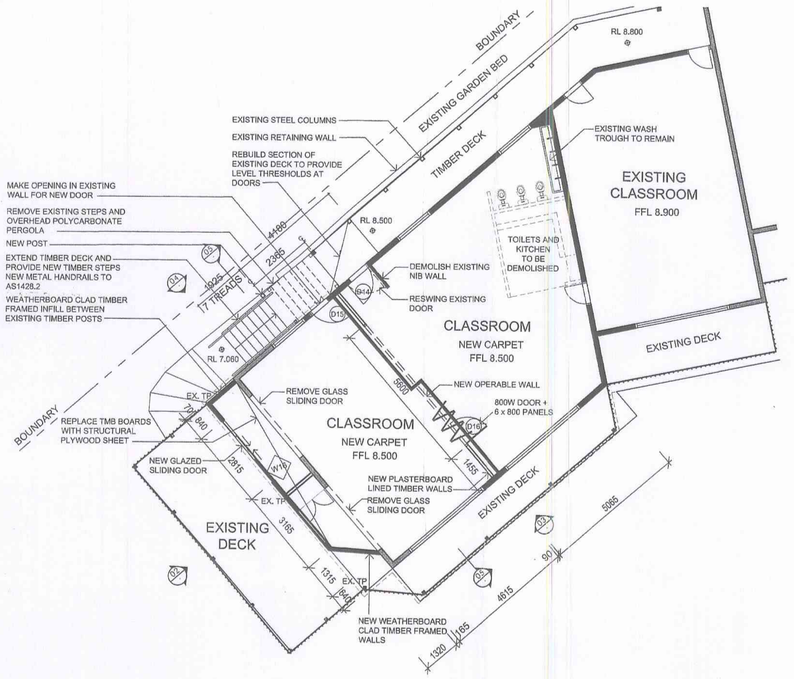
SCALE
1:200 @ A1

PROJECT NUMBER
MM0804

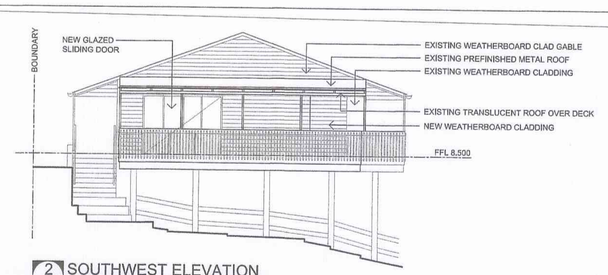
ISSUE
E

midson architecture

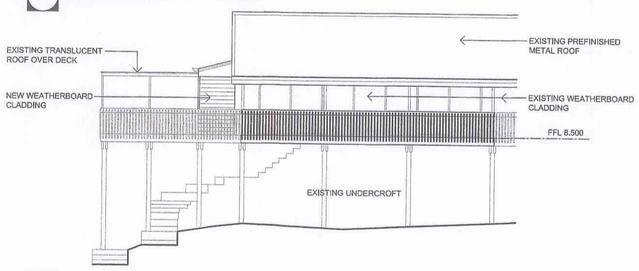
URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284



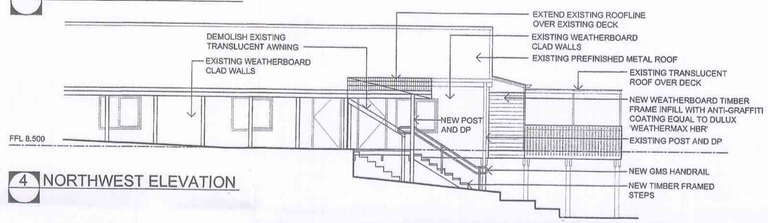
1 FIRST FLOOR PLAN



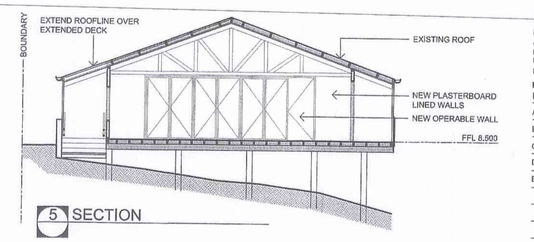
2 SOUTHWEST ELEVATION



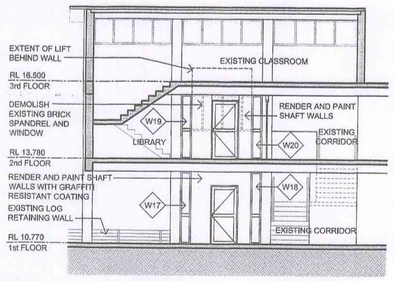
3 SOUTHEAST ELEVATION



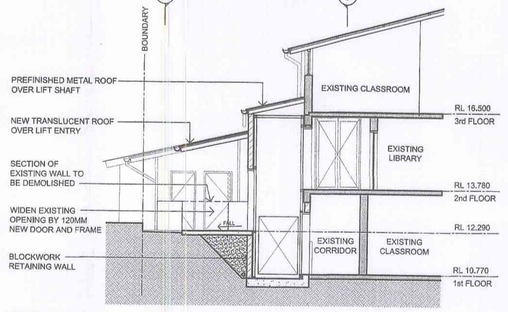
4 NORTHWEST ELEVATION



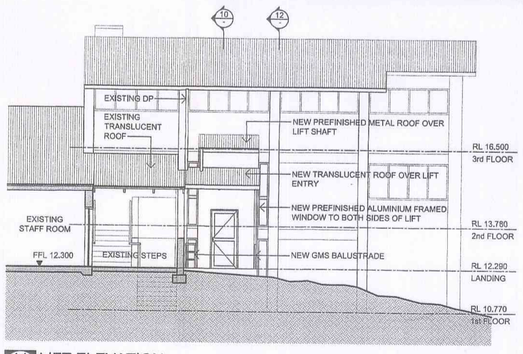
5 SECTION



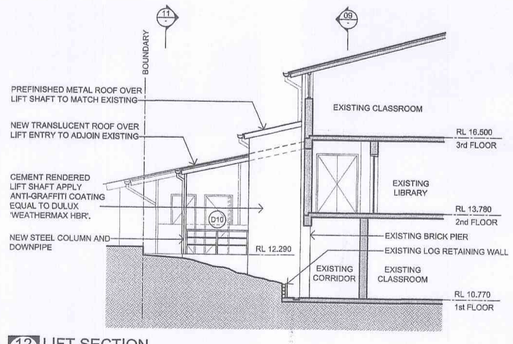
9 LIFT ELEVATION



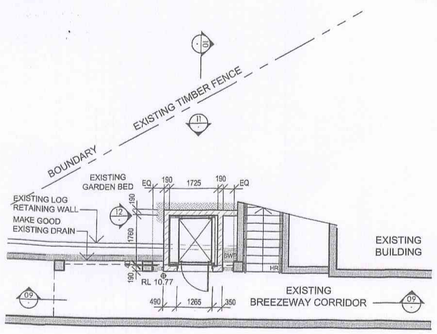
10 LIFT SECTION



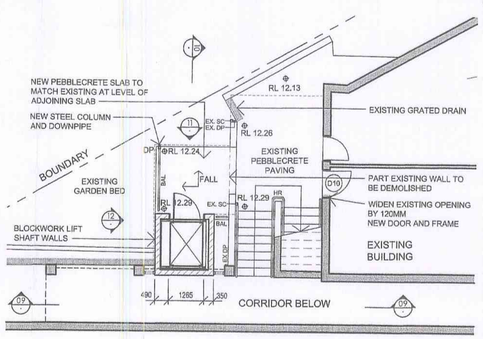
11 LIFT ELEVATION



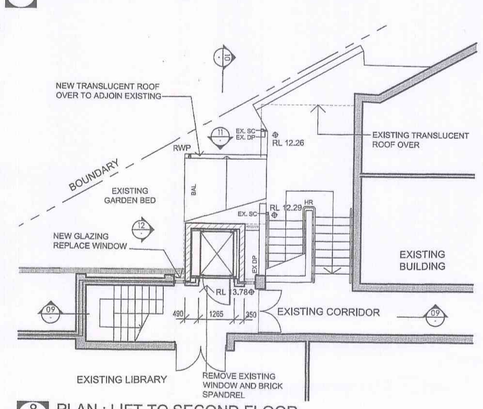
12 LIFT SECTION



6 PLAN : LIFT TO FIRST FLOOR



7 PLAN : LIFT TO STAFF ROOM FLOOR



8 PLAN : LIFT TO SECOND FLOOR

CHECK ALL DIMENSIONS ON SITE BEFORE COMMENCEMENT. WORK TO FIGURED DIMENSIONS ONLY. REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO THE COMMENCEMENT OF ANY WORK.

NOMINATED ARCHITECT: PETER GRAEME CALF 5063

DOCUMENT CONTROL

ISSUE	DESCRIPTION	DATE
A	ISSUED FOR TENDER	28.09.09
B	COMPLYING DEVELOPMENT CERTIFICATE	26.10.09
C	FOR CONSTRUCTION	30.11.09
D	FOR CONSTRUCTION	14.12.09
E	LIFT SHAFT AMENDED, WINDOW NOS ADDED	15.01.10
	ANTI-GRAFFITI COATING NOTED	

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CLIENT

SYDNEY ANGLICAN SCHOOLS CORPORATION

PROJECT TITLE

LOQUAT VALLEY ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

DRAWING TITLE

CLASSROOM ALTERATIONS
LIFT PLANS & ELEVATIONS

DRAWING NUMBER A13

SCALE 1:100 @ A1

PROJECT NUMBER MM0804

ISSUE E

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0294

midson architecture

CONSTRUCTION NOTES

GENERAL

01. These structural drawings shall be read in conjunction with all architectural and other consultant's drawings and specifications and with such other written instructions as may be issued during the course of the contract. Any discrepancy shall be referred to the Superintendent before proceeding with the work.

02. All materials and workmanship shall be in accordance with the relevant current Standards Australia Codes and with the Building Code of Australia.

03. All dimensions shown on these structural drawings shall be verified by the Contractor on site. These structural drawings shall not be scaled for dimensions.

04. The method of construction and the maintenance of safety during construction is the responsibility of the Contractor. If any structural element presents difficulty in respect of constructability or safety, the matter shall be referred to the Structural Engineer for resolution before proceeding with the work. Structural Engineer for resolution before proceeding with the work.

05. During construction the structure shall be maintained in a stable condition and no part shall be overstressed. The design, installation and maintenance of all temporary propping, bracing and shoring shall be provided by the Contractor to keep the works and excavations stable at all times. The cost of all such work shall be deemed to be included in the Contractor's Tender.

06. Structural elements have been designed for a design life of 50 years.

07. The structural design has incorporated the recommendations of the geotechnical assessment prepared by Jeffery Katauskas Pty Ltd.

FOUNDATIONS

01. Bored piers shall be in accordance with AS 2159 SAA Piling Code.

02. Bored piers have been designed for an allowable end bearing pressure intensity of 1000 kPa. bearing on low strength bedrock.

03. Strip footings and pad footings have been designed for an allowable bearing pressure intensity of 200 kPa. bearing in the stiff to very stiff natural clay materials.

04. The Contractor shall obtain approval from the Superintendent of the foundation material before placing reinforcement or concrete.

05. Footings shall be located centrally under walls and columns unless noted otherwise.

06. Footings shall be constructed and backfilled as soon as possible following excavation to avoid softening or drying out of the foundation material.

07. Bored piers shall be concreted on the same day that they are excavated.

08. The Contractor shall arrange for a representative from the geotechnical consultant to be present at the time of drilling all of the bored piers to determine the actual founding levels.

CONCRETE

01. All workmanship and materials shall be in accordance with AS 3600 current edition with amendments, except where varied by the contract documents.

02. Concrete Quality: Class = Normal
Slump = 80mm
Maximum size of aggregate in structural concrete= 20mm
Cement Type = SL
Admixtures = nil, unless noted otherwise or approved in writing.

For concrete cast in contact with ground provide the following additional properties: Minimum cement content = 370 kg/m3
Maximum water/cement ratio = 0.45

Concrete shall have a characteristic compressive strength at 28 days (f'c) as shown in the following table, unless noted otherwise on the drawings:-

ELEMENT	f'c MPa
Injected piers, footing beams, strip footings	25
Internal slabs and beams	32
External slabs and beams	32

03. Project control testing shall be carried out in accordance with AS 3600.

Exposure Classification	Interior	Exterior	Contact with Protected Ground	No

04. Clear concrete cover in mm to the reinforcement shall be as follows (unless noted otherwise on the drawings) :

Exposure Class AS 3600	Cast Against Formwork		Cast Against Ground		
			Ground	by membrane	Membrane
A1	20			30	
A2		30	30		50
B1		40			
B2		45			

Exposure classification for exterior concrete - B1.

All reinforcement shall be firmly supported on solid steel plastic tipped chairs. plastic chairs or concrete chairs at not greater than 1 metre centres both ways. Bars shall be tied at alternate intersections. In exposure conditions greater than B1 use only plastic chairs.

05. Concrete sizes shown do not include thicknesses of applied finishes.

06. Depths of beams are given first and include slab thicknesses.

07. For chamfers, drip grooves, reglets, etc., refer to Architect's details. maintain cover to reinforcement of these details.

08. No holes, chases or embedment of pipes other than those shown on the structural drawings shall be made in concrete members without the prior written approval of the Superintendent.

09. Construction joints where not shown shall be located to the approval of the Superintendent.

10. The finished concrete shall be a dense homogeneous mass, completely filling the formwork, thoroughly embedding the reinforcement and free of stone pockets. All concrete including slabs on ground and footings shall be compacted with mechanical vibrators.

11. Curing of all concrete is to be achieved by keeping surfaces continuously wet for a period of 7 days, and prevention of loss of moisture for a total of 14 days followed by a gradual drying out. Approved sprayed on curing compounds may be used where no floor finishes are proposed. Polythene sheeting or wet hessian may be used if protected from wind and traffic.

12. Construction support propping is to be left in place where needed to avoid overstressing the structure due to construction loading. No masonry or partition walls are to be constructed on suspended levels until all propping is removed and the member has absorbed its dead load deflection.

13. The Superintendent shall be given 48 hours notice for reinforcement inspection and concrete shall not be delivered until final approval obtained.

14. Conduits, pipes etc., shall only be located in the middle one third of slab depth and spaced at not less than 3 diameters. Pipes or conduits shall not be placed within the cover to the reinforcement.

15. Reinforcement symbols:
S Denotes Grade 230 S Hot Rolled Deformed Bars to AS 1302
N Denotes Grade 500 N Deformed Bars to AS 4671
R Denotes Grade 230 R Hot Rolled Plain Bars to AS 1302
SL-RL-L Denotes Grade 500 L Deformed Ribbed Welded Mesh to AS 4671
The figures following the symbol are the number of millimetres in the bar diameter. The figures following the mesh symbol SL-RL-L is the reference number for mesh to AS 4671.

16. Reinforcement is represented diagrammatically and not necessarily in true projection.

17. Splices in reinforcement shall be made only in positions shown or otherwise approved in writing by the Superintendent. Laps shall be in accordance with AS 3600 and not less than the development length for each bar.

18. Fabric reinforcement shall have splices made so that the overlap, measured between the outermost transverse wires of each sheet of fabric, is not less than the spacing of those wires plus 50mm.

19. Welding of reinforcement shall not be permitted unless shown on the structural drawings or approved by the Superintendent.

20. Joggles to bars shall be 1 bar diameter over a length of 12 bar diameters.

21. Bundled bars shall be tied together at 30 bar diameter centres with three wraps of tie wire.

22. Where transverse tie bars are not shown provide N12 at 400mm distribution bars unless noted otherwise. Splice distribution bars 500mm where necessary and provide 500mm splice length with main bars unless noted otherwise.

23. All dowels placed in joints in concrete slabs shall be placed within the following tolerances:
Level +/- 1 degree
Line +/- 1 degree
Position +/- 5mm

24. Sliding bearing strips supporting concrete slabs shall be composed of two layers of 0.4mm thick galvanised steel plate with an intermediate layer of grease (unless noted otherwise). The strips shall be the same width as the bearing surface.

PREPARATION FOR SLAB ON GROUND

01. Clear the area to be occupied by the pavement and its adjuncts. Break up and remove slabs, foundations, paving, etc found on the surface or within 300mm of the basecourse. Remove all topsoil and organic matter and grub out all roots and stumps. Remove all rubble remaining from excavations.

02. The subgrade material (natural ground below the excavational shall be thoroughly compacted by proof rolling with a minimum of 8 passes of a 10 tonne dead weight roller. This proof rolling shall be inspected by an approved geotechnical engineering consultant, engaged by the contractor, to determine the extent of replacement of any unsuitable material encountered.

03. Any soft, yielding, organic or other unsuitable material in the subgrade shall be removed for a depth of at least 300mm and holes so formed shall be filled with approved filling compacted in 150mm layers as specified below.

04. Bring all filling on to the site unless it can be provided from spoil recovered from the site. Filling shall be placed clean stable material, free of perishable material or any other material that will not form stable fill. The fill material shall be capable of consolidation so that it is firm and unyielding throughout its depth.

05. Place filling in layers not exceeding 200mm thick when measured loose. Bring filling to optimum moisture content (+/- 2%) by watering and compact each layer thoroughly and uniformly with a vibrating roller where practicable. Hand tamp in areas not accessible to a vibrating roller.

06. Consolidate each layer of filling to obtain a uniform density strictly between 98% and 102% of the standard maximum dry density of the material as determined by AS1289.5.1.1.

07. The basecourse layer (directly below the slab) shall consist of 100mm finished compacted thickness of crushed rock blinded with 25mm of sand.

08. The basecourse material shall be clean, tough, durable and free of any weathered or disintegrated stone, clay, organic matter or any other deleterious materials.

09. The crushed rock shall be compacted with approved equipment to obtain a uniform density of not less than 100% of the standard maximum dry density of the material as determined by AS1289.5.1.1.

10. Finish the basecourse to the following tolerances:
Variation from design level - 5mm
Variation from 3000mm straight edge - 5mm

11. All earthworks shall be carried out under Level 1 control as defined in AS 3798.

12. The Contractor shall allow for testing at the rate of one test per 200 square metres of surface area for each of the following finished surfaces, with a minimum of three tests for each compacted layer:
-Subgrade
-Basecourse (at surface of crushed rock)

13. The Contractor shall allow for testing at the rate of one test per 30 cubic metres for the filling, with a minimum of three tests for each compacted layer.

14. The location of all tests shall be to the approval of the Superintendent.

15. The Contractor shall obtain from a registered N.A.T.A. testing authority documented test evidence proving that the composition figures as required for the materials specified herein have been obtained. The cost of such work shall be deemed to be included in the Contractor's Tender.

BRICK RETAINING WALLS

01. All workmanship and materials shall be in accordance with AS 3700.

02. The minimum compressive strength of the clay bricks shall be 27 MPa.

03. Mortar for walls shall consist of a mix of 1 part of cement to 0.25 parts of hydrated lime to 3 parts well-graded sand and shall conform to the requirements of AS 3700. All walls shall be laid on full beds of mortar and all perpends shall be solidly filled with mortar.

04. Cavity fill grout for walls shall be in accordance with AS 3700 with a minimum characteristic compressive strength of 20 Mpa. The with a minimum characteristic compressive strength of 20 Mpa. The grout shall have a slump of 230mm +/- 30mm and the maximum size of aggregate shall be 10mm. Grout shall have a minimum cement content of 300kg/m3.

05. Reinforcement for walls shall be securely tied in position.

06. Walls shall have cavities cleaned of all mortar protrusions and shall be filled with grout in lifts of not more than 1800mm in height. All cavities are to be filled without the formation of voids. Clean-out holes shall be provided in the back-filled side at the base of retaining walls.

07. Do not backfill retaining walls until at least 14 days have elapsed after the completion of the grout filling of the walls.

08. Do not backfill retaining walls (other than cantilever walls) until a minimum of 7 days have elapsed from the time of completion of the floor construction at the top and bottom of the wall.

09. Backfill to retaining walls shall be a highly permeable granular material. Provide a subsoil drain at the base of the wall connected to the stormwater drainage system unless noted otherwise.

10. Provide vertical control joints in walls at maximum 8000mm centres.

MASONRY WALLS

01. All workmanship and materials shall be in accordance with AS 3700. Masonry units shall comply with AS 4455. Wall ties shall comply with AS 2699.

02. Walls shown on structural drawings are load-bearing walls, unless noted otherwise. Non-loadbearing walls shall be separated from the concrete structure above them with a minimum 20mm thick approved compressible isolation material.

03. No masonry walls which are supported by the concrete structure shall be erected until the formwork has been removed.

04. Masonry walls supporting concrete slabs and beams shall be trowelled smooth and screeded at the bearing surfaces with the slip material specified in the concrete notes.

05. The minimum compressive strength of clay masonry bricks shall be 27 MPa. Clay masonry bricks shall have a Characteristic Expansion value not exceeding 2 mm/m.

06. Concrete masonry blocks shall be of a minimum compressive strength Grade 15 in accordance with AS 4455.

07. Mortar for structural concrete masonry walls shall consist of a 1 part of cement to 0.25 parts of hydrated lime to 3 parts well-graded sand. Mortar for structural brick masonry walls shall consist of 1 part cement to 1 part hydrated lime to 6 parts well-graded sands. All mortar shall conform to requirements of AS 3700. Mortar admixtures shall not be used without the written approval of the Superintendent.

08. No chases or recesses are permitted in load bearing and structural masonry without the written approval of the Superintendent.

09. All load bearing and structural masonry shall be laid on full beds of mortar and all perpends shall be solidly filled with mortar.

10. Provide vertical control joints at 8m maximum centres, and 5m maximum from corners in masonry walls, unless noted otherwise on the drawings. All masonry walls supporting or supported by concrete floors shall be provided with vertical joints to match any control joints in the concrete.

11. Reinforcement for concrete masonry block walls shall be securely tied in position. Provide 20mm grout cover to the reinforcement unless noted otherwise.

12. Core fill grout for concrete masonry blocks shall be in accordance with AS 3700 with a minimum characteristic compressive strength of 20 MPa. The grout shall have a slump of 230mm +/- 30mm and the maximum size of aggregate shall be 10mm. Grout shall have a minimum cement content of 300 kg/m3.

13. Concrete masonry walls which are to be grout filled shall have cores cleaned of all mortar protrusions and shall be filled with grout in lifts of not more than 1200mm in height. Core fill grout shall be thoroughly compacted in place by internal vibrators. All cores are to be filled without the formation of voids. Clean-out holes shall be provided in the back-filled side at the base of retaining walls.

14. Unless noted otherwise on the drawings, all masonry walls shall be tied to adjoining steel and concrete columns with 30x1.6x300 long crimped galvanised steel straps at maximum 400mm centres vertically. Fix straps to steel columns with 2/M10 self drilling steel fasteners. Fix straps to concrete columns with 2/"Hilti DBZ" masonry anchors. All fixings shall be installed in strict accordance with the manufacturers instructions. (Alternative fixings may be submitted for approval.)

15. Unless noted otherwise on the drawings all masonry walls shall be tied to adjacent parallel steel members with 38 x 1.6 crimped galvanised steel straps at maximum 400mm centres to both the top and bottom of the steel member. The crimped ends of the straps shall be embedded a minimum of 90mm into the mortar joints. Fix straps to steel members with 2/M10-12 self drilling steel fasteners installed in strict accordance with the manufacturer's recommendations. (Alternative fixings may be submitted for approval).

16. Do not backfill retaining walls until at least 14 days have elapsed after the completion of the grout filling of the walls unless otherwise approved by the Superintendent.

17. Do not backfill retaining walls (other than cantilever walls) until a minimum of seven days have elapsed from the time of completion of the floor construction at the top and bottom of the wall.

18. Backfill to retaining walls shall be a highly permeable granular material. Provide a subsoil drain at the base of the wall connected to the stormwater drainage system unless noted otherwise.

MASONRY FLEXIBLE ANCHORS

01. All anchors shall be subject to the approval of the Superintendent.

02. All anchors shall be manufactured from hot dip galvanised steel plate.

03. All anchors shall permit horizontal and vertical movement in the plane of the wall but shall resist movement in a perpendicular direction to the plane of the wall, unless noted otherwise.

04. The anchors shall have the following minimum lateral working load capacities to resist forces in a perpendicular direction to the plane of the wall:

- Type WFA3 : 0.29 kN
- Type WFA4 : 0.70 kN
- Type WFA5 : 0.30 kN
- Type WFA6 : 0.21 kN
- Type WFA9 : 0.21 kN
- Type WFA10: 0.70 kN

CHEMICAL ANCHORS AND MASONRY ANCHORS

01. All anchors shall be subject to the approval of the Superintendent.

02. Chemical anchors shall consist of a threaded mild steel rod of the size nominated on the drawings embedded in and chemically bonded to the concrete. The chemicals used shall be such that they do not detrimentally affect the surrounding concrete. The rod shall be hot dip galvanised.

03. Masonry anchor sizes given on the structural drawings refer to the bolt diameter required.

04. All anchors shall be capable of developing a working load capacity in shear and tension of at least 80% of the maximum permissible values for the threaded rod or bolt size nominated.

05. All anchors shall be installed in strict accordance with the manufacturer's recommendations.

06. Holes drilled for anchors shall not penetrate reinforcement in suspended concrete slabs, beams, columns and walls. Any holes which are found in slabs with reinforcement shall be relocated as necessary and the initial hole shall be patched to the approval of the Superintendent.

DESIGN LOADS

01. The structural components detailed on these structural drawings have been designed in accordance with the relevant Standards Australia Code and the Building Code of Australia for the following loadings. Refer to architectural drawings for proposed floor usage.

02. Live Loads in accordance with AS1170.1-2002

Toilet Areas	- 2.0 kPa
Stairs, Corridors	- 4.0 kPa
Stores	- 5.0 kPa
Roofs	- 0.25 kPa
All other areas	- 3.0 kPa

03. Wind Loads in accordance with AS 1170.2-2002

Region	- A
Terrain Category	- 2

04. Earthquake resistance in accordance with AS 1170.4-1993

Structure Classification	- General Type II
Acceleration Coefficient	- 0.08
Site Factor	- 1.0
Important Factor	- 1.0
Earthquake Design Category	- B
Structural System	- Ductile Steel Frame, Regular Configuration

REINFORCED CONCRETE MASONRY RETAINING WALLS

01. All workmanship and materials shall be in accordance with AS 3700.

02. Concrete masonry blocks shall be of compressive strength Grade 15 in accordance with AS 2733. "DOUBLE U" BLOCKS

03. Mortar for concrete masonry walls shall consist of a 1 part of cement to 0.25 parts of hydrated lime to 3 parts well-graded sand and shall conform to the requirments of AS 3700. All concrete masonry walls shall be laid on full beds of mortar and all perpends shall be solidly filled with mortar.

04. Core fill grout for concrete masonry walls shall be in accordance with AS 3700 with a minimum characteristic compressive strength of 25 MPa. The grout shall have a slump of 230mm +/- 30mm and the maximum size of aggregate shall be 10mm.

05. Reinforcement for concrete masonry walls shall be securely tied in position. Provide 55mm cover to the reinforcement from the retaining face of the wall unless noted otherwise.

06. Concrete masonry walls shall have cores cleaned of all mortar protrusions and shall be filled with grout in lifts of not more than 1800mm in height. Core fill grout shall be thoroughly compacted in place by internal vibrators. All cores are to be filled without the formation of voids. Clean-out holes shall be provided in the back-filled side at the base of retaining walls.

07. Do not backfill retaining walls until at least 14 days have elapsed after the completion of the grout filling of the walls unless otherwise approved by the Superintendent.

08. Backfill to retaining walls shall be a highly permeable granular material. Provide a subsoil drain at the base of the wall connected to the drainage system unless noted otherwise.

STRUCTURAL STEEL

01. All workmanship and materials shall be in accordance with AS 4100 and AS 1554, except where varied by the contract documents.

02. Structural steel members shall be of the following grades unless noted otherwise on the drawings :

WB, WC, UB, UC, PFC, EA, UA	- Grade 300
RHS, SHS	- Grade C350
CHS with outside diameter equal to or exceeding 76mm	- Grade C350
CHS with diameter less than 76mm	- Grade C250
All other members	- Grade 250

03. The Contractor shall prepare workshop drawings and shall submit three copies of each drawing for review. Fabrication shall not commence until permission to use the relevant workshop drawings has been received. The contractor shall allow ten clear working days for this review of the workshop drawings.

04. Bolt Designations:

4.6/S	Denotes commercial bolts of grade 4.6 to AS 1111, snug tightened.
8.8/S	Denotes high strength structural bolts of grade 8.8 to AS 1252, snug tightened.
8.8/TB	Denotes high strength structural bolts of grade 8.8 to AS 1252, fully tensioned to AS 4100 as a bearing type joint.
8.8/TF	Denotes high strength structural bolts of grade 8.8 to AS 1252 fully tensioned to AS 4100 as a friction type joint with faying surfaces left uncoated.

05. Unless noted otherwise all bolts shall be M16 Grade 8.8/S. No connection shall have less than 2 bolts. All bolts, nuts and washers shall be hot dip galvanised.

06. /TB and /TF bolt categories shall be installed in accordance with Section 15 of AS 4100, using either the part-turn method or the direct-tension indicator method.

07. All welding shall be carried out in accordance with AS 1554.1. Electrodes shall be to either AS 1553. AS 1858. AS 2203 or AS 2717. as appropriate.

Unless noted otherwise, all fillet welds shall be 6mm continuous category SP using E48XX electrodes or equivalent. All butt welds shall be complete penetration butt welds category SP to AS 1554.1

The extent of non-destructive weld examination shall be as noted below. Radiographic or ultrasonic examination shall be to AS 1554.1, AS 2177.1 and AS 2207 as appropriate.

Type of weld and category	Examination method	Extent t% of total length of weld type)
Fillet welds. GP + SP	Visual inspection	100
Butt welds. GP	Visual inspection	100
Butt welds. SP	Visual inspection	100
	Radiographic or Ultrasonic inspection	10

All exposed welds shall be ground smooth.

08. Unless noted otherwise all cleat plates shall be 10mm thick.

09. Provide seal plates to hollow sections, with "breather" holes if members are to be hot dip galvanised.

10. All steelwork shall be securely temporarily braced as necessary to stabilise the structure during erection.

11. The contractor shall provide all necessary trimming members and cleats and drill all holes necessary for fixing steel to steel and other elements to steel whether or not detailed on the drawings.

12. All beams and rafters shall be fabricated and erected with natural camber up.

13. All members shall be supplied in single lengths. Splices shall only be permitted in locations shown on the structural drawings.

14. Steelwork intended to be concrete encased shall be unpainted. Encasing concrete shall be grade N25 providing a cover adequate to suit fire rating or exposure conditions. Concrete encasement shall be centrally reinforced with 5mm wire to AS 4671 or 6mm structural grade bars to AS 4671 at 150mm pitch.

15. Structural steelwork shall have surfaces cleaned and treated in accordance with the Specification below unless noted otherwise :-

16. All steelwork shall be abrasive blast cleaned to a Class 3 finish in accordance with AS 1627 Part 4 and zinc dip galvanised in accordance with AS 4680. The continuous average zinc coating mass shall be 600g/m2 (559g/m2 minimum).

17. All steelwork below finished floor level and finished ground level shall be abrasive blast cleaned to a Class 2.5 finish in accordance with AS 1627 Part 4 and painted with an epoxy paint complying with AS 2364 so that the minimum dry film thickness is 200 micrometres.

18. All other steelwork shall be abrasive blast cleaned to a Class 2.5 finish in accordance with AS 1627 Part 4 and painted with an inorganic zinc silicate paint complying with AS 2105 so that the minimum dry film thickness is 70 micrometres.
Refer to architectural drawings and specification for treatment of all steelwork that is fire rated.

TIMBER ROOF FRAMING

01. All timber design, materials and workmanship shall be in accordance with AS 1720 SAA Timber Structures Code and AS 1684 Residential Timber Framed Construction Code.

02. All timber used shall be to the approval of the Superintendent. Do not use timber susceptible to termite (white ant) attack. The minimum stress grade for the timber shall be F7. The joint group rating for the timber shall be J3 or better. Submit supplier's certificate as to stress grade of timber members. All timber shall be branded.

03. Unless noted otherwise on the drawings all framing shall be designed and installed by the manufacturer in accordance with the Specification and the relevant Australian Standards.

04. Trusses shall be installed at 600mm maximum centres.

05. The truss manufacturer shall provide any additional bracing he deems necessary. The cost of any additional bracing is to be included in the Contractor's tender.

06. Roof framing shall be designed to carry the live loads in accordance with AS 1170.1 and earthquake loads in accordance with AS 1170.4.

07. Roof framing shall be designed for wind loads in accordance with AS 1170.2 using the Wind Speeds for Region A and Terrain Category 3.

08. Roof framing shall be designed to carry the dead load of all timber framing, roof cladding, ceiling linings, folding doors, services etc. as shown on the Architect's and other Consultant's drawings.

09. All truss dimensions shall be obtained from the Architectural drawings.

10. Metal connector plates used for trusses shall be of 1.2mm minimum thickness fabricated from Grade 250 steel, zinc coated to a minimum 275 g/m2. Connector plates shall be used on both sides of trusses and shall be located to a tolerance of +/- 6mm.

11. Maximum permissible gap between any two adjacent timber truss members at a joint is 2mm.

12. Provide timber anti-twist blocks similar in size to truss top chord at adjacent end of top chord bracing (at both apex and heel ends of trusses). Fit tightly between trusses and fix to truss at each end using 2/100 x 3.15 diameter nails. At heel end of truss in addition fix to wall top plate using 4/100 x 3.75 diameter nails (with a minimum of 40mm embedment into each member).

13. Trusses shall be cambered by an amount equal to the total long term deflection under dead load (with a maximum tolerance of +/- 3mm).

* The total amount of the camber shall not exceed the smaller of the following values:-
- Truss span/1000
- 15mm

14. The difference in camber between a girder truss and any adjacent truss (and any two adjacent standard trusses) shall not exceed 5mm.

15. In addition to the deflection limits specified in the relevant Australian Standards, roof framing shall be designed to achieve the following additional deflection limits:-

LOAD CASE	MAXIMUM DEFLECTION
Dead Load	Span/360
Live Load	Span/240
Wind Load	Span/150

16. External timber shall be either hardwood durability Class 1 or Class 2 to AS 1720.2 or impregnated pine grade F7, pressure treated to AS 1604 and re-dried prior to use. Supplementary treatment shall be applied to all cut surfaces. Supply supporting documentation regarding preservation treatment.

17. The Contractor shall prepare workshop drawings for the roof trusses and roof framing and shall submit three copies of each drawing seven days prior to the commencement of fabrication.

18. The Contractor shall submit certification prepared by a qualified practicing structural engineer for the design and installation of all roof trusses and roof framing.

TIMBER WALL FRAMING

01. All timber design, materials and workmanship shall be in accordance with AS 1720 SAA Timber Structures Code and AS 1684 Residential Timber Framed Construction.

02. All timber used shall be to the approval of the Superintendent. Do not use timber susceptible to termite (white ant) attack. The minimum stress grade for the timber shall be F7. The joint group rating for the timber shall be J3 or better. Submit supplier's certificate as to stress grade of timber members. All timber shall be branded.

03. Unless noted otherwise on the drawings all framing shall be designed and installed by the manufacturer in accordance with the Specification and the relevant Australian Standards.

04. All framing shall be designed to carry the live loads in accordance with AS 1170.1 and earthquake loads in accordance with AS 1170.4.

05. All framing shall be designed for wind loads in accordance with AS 1170.2 using the Wind Speeds for Region A and Terrain Category 3.

06. All framing shall be designed to carry the dead load of all timber framing, cladding, linings, folding doors, services etc. as shown on the Architect's and other Consultant's drawings.

07. All framing dimensions shall be obtained from the Architectural drawings.

08. All wall framing shall be designed by the manufacturer in accordance with the specification. Wall framing shall be designed to resist all lateral loads. Sufficient bracing shall be provided to resist the full wind loads effects from both the walls and roof of the building in all directions.

09. All timber framed walls shall be braced in accordance with AS 1684 using 20 x 18 x 1.2 "Gang-Nail Maxibrace" steel angles or "Gang-Nail Speedbrace" steel straps or structural plywood bracing installed in strict accordance with AS 1684 and the manufacturer's recommendations.

10. 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 capable of supporting a vertical load of 50 kg per metre length of the shelf.
- Impact load of 2kN applied at the mid height of the wall.

11. 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	MAXIMUM DEFLECTION
Supporting face masonry walls	Span/1000
Stud walls under lateral loading	Span/500

12. All bolts in timber construction shall be M16 unless noted otherwise. Bolt holes shall be drilled each side. Washers under heads and nuts to be at least 2.5 times the bolt diameter unless noted otherwise.

13. All timber joints, connections and notches shall be a minimum of 100mm away from knots, severe sloping grain, gum veins or other significant defects.

14. All "Gang-Nail" framing anchors, straps etc. shall be installed in strict accordance with the manufacturer's recommendations and details.

15. External timber shall be either hardwood durability Class 1 or Class 2 to AS 1720.2 or impregnated pine grade F7, pressure treated to AS 1604 and re-dried prior to use. Supplementary treatment shall be applied to all cut surfaces. Supply supporting documentation regarding preservation treatment.

16. The Contractor shall prepare workshop drawings for the wall framing and shall submit three copies of each drawing seven days prior to the commencement of fabrication.

17. The Contractor shall submit certification prepared by a qualified practicing structural engineer for the design and installation of all wall framing.

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284

ISSUE	DESCRIPTION	APPROVED	DATE
D	DRAWING REVISED	MG	13.0LI0
C	FOR CONSTRUCTION		20JL09
B	COMPLYING DEVELOPMENT APPLICATION		19JL09
A	TENDER ISSUE		25.9.09

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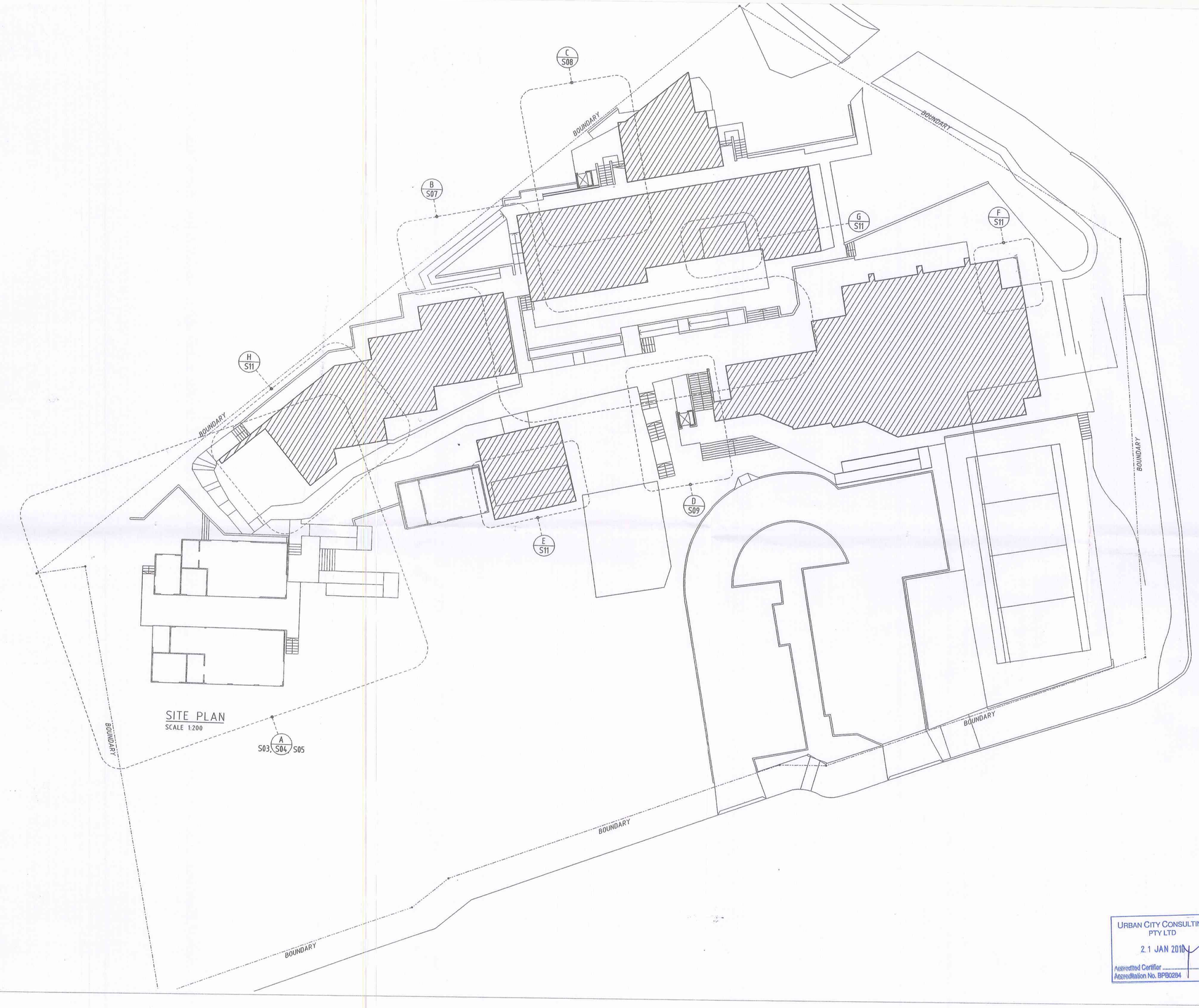
PROJECT
ALTERATIONS & ADDITIONS TO LOQUAT VALLEY ANGLICAN SCHOOL
1977 PITTWATER ROAD, BAYVIEW

TITLE
CONSTRUCTION NOTES

SCALES	DATE
as noted	MAY '09

DRAWN	DESIGN	VERIFIED	APPROVED
JSS	MG		

ISSUE	PROJECT No.	DRAWING No.
D	4412	S01



ISSUE	DESCRIPTION	APPROVED	DATE
D	DRAWING REVISED	HK	27.11.09
C	FOR CONSTRUCTION		20.11.09
B	COMPLYING DEVELOPMENT APPLICATION		19.10.09
A	TENDER ISSUE		25.9.09

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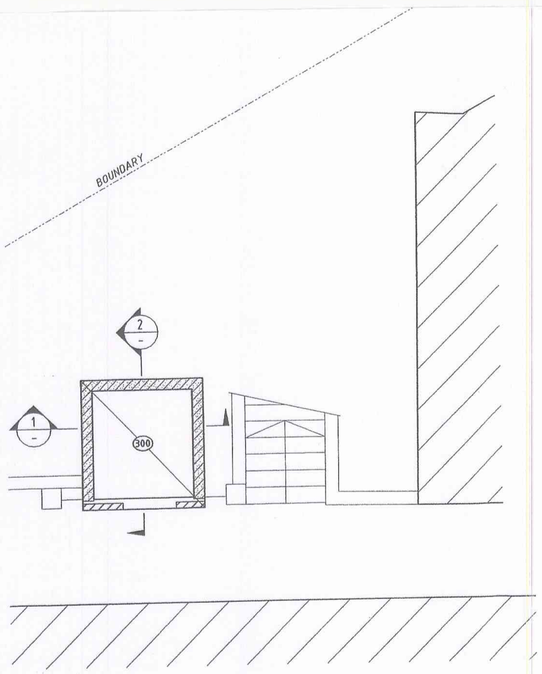
PROJECT
ALTERATIONS & ADDITIONS TO
LOQUAT VALLEY ANGLICAN SCHOOL
1977 PITTWATER ROAD, BAYVIEW

TITLE
KEY PLAN

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284

SCALES			DATE
as noted			MAY '09
DRAWN	DESIGN	VERIFIED	APPROVED
JSS	MG		

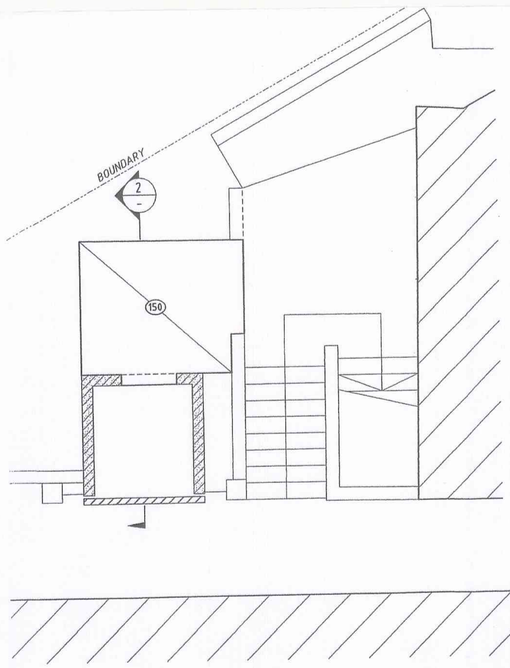
ISSUE	PROJECT No.	DRAWING No.
D	4412	S02



LEVEL 1 LIFT PLAN (AREA C)

SCALE 1:50

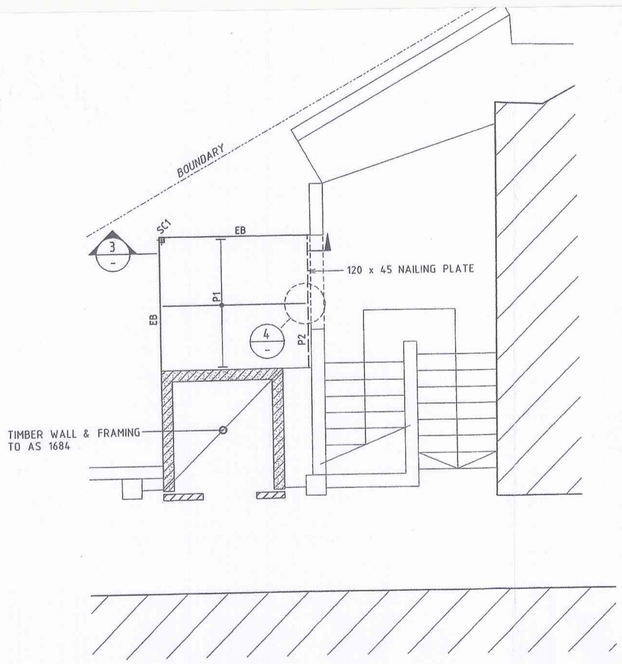
300 THICK BASE SLAB
N16 'U' BARS@150 CTS.
EACH WAY TOP & BTM.



LEVEL 2 LIFT PLAN (AREA C)

SCALE 1:50

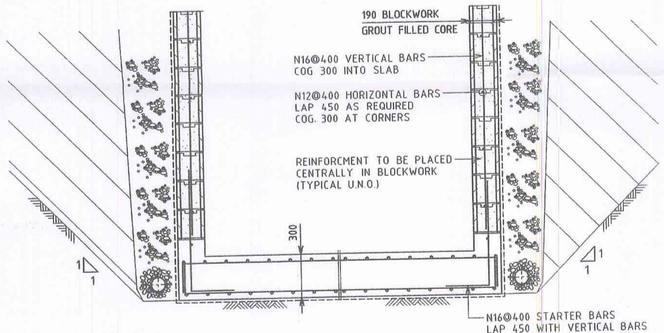
150 THICK SLAB
SL92 MESH TOP & BTM.



LEVEL 3 LIFT PLAN (AREA C)

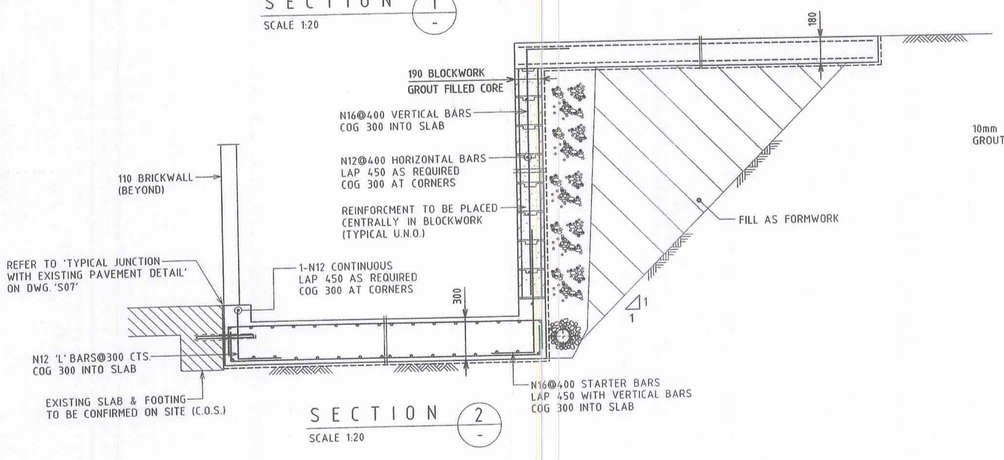
SCALE 1:50

SC1 - 89 x 89 x 6 SHS
EB - 150 x 100 x 12 UA
P1 - 120 x 45 SEASONED F8 @600 CTS.
P2 - 120 x 45 SEASONED F8 NAILING PLATE



SECTION 1

SCALE 1:20



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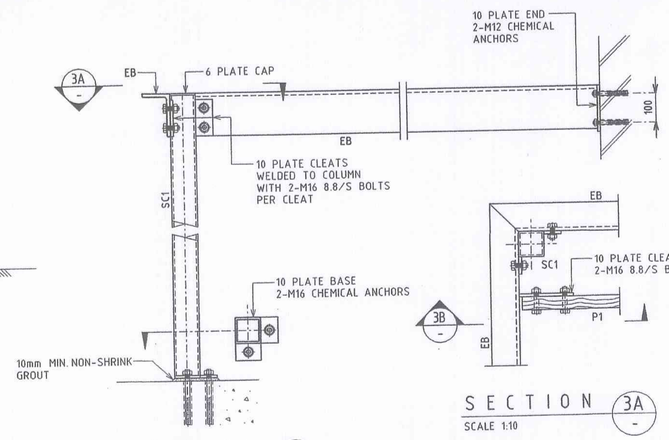
SCALE 1:20



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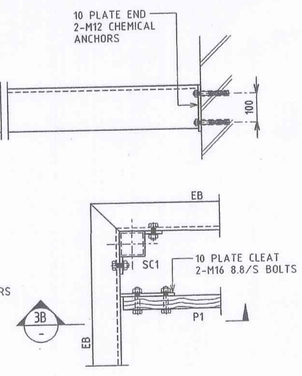
SCALE 1:10



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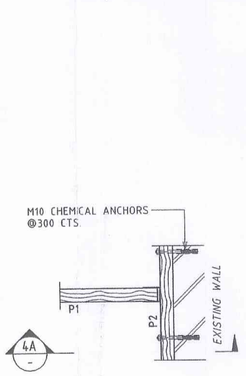
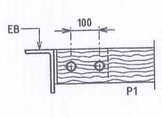


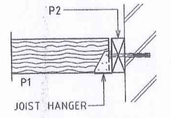
DETAIL 4

SCALE 1:10



SECTION 3B

SCALE 1:10



SECTION 4A

SCALE 1:10

ISSUE	DESCRIPTION	APPROVED	DATE
B	FOR CONSTRUCTION		27.8.09
A	TENDER ISSUE		25.9.09

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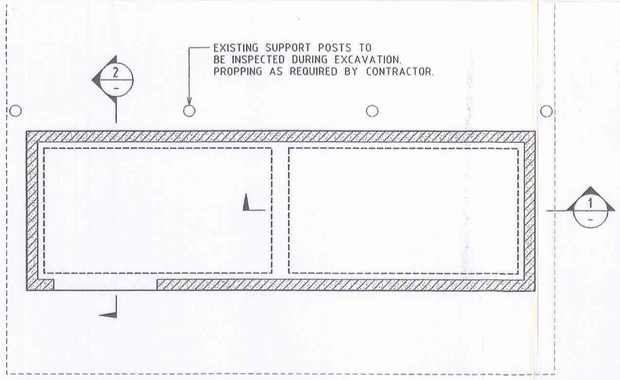
PROJECT
ALTERATIONS & ADDITIONS TO
LOQUAT VALLEY ANGLICAN SCHOOL
1977 PITTWATER ROAD, BAYVIEW

TITLE
LIFT PLANS, SECTIONS
& DETAILS
(AREA C)

SCALES			DATE
as noted			MAY '09
DRAWN	DESIGN	VERIFIED	APPROVED
JSS	MG		

ISSUE	PROJECT No.	DRAWING No.
B	4412	S08

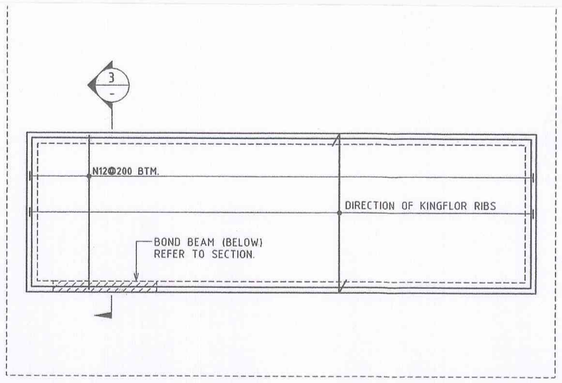
URBAN CITY CONSULTING
PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284



FOUNDATION PLAN (AREA E)

SCALE 1:50

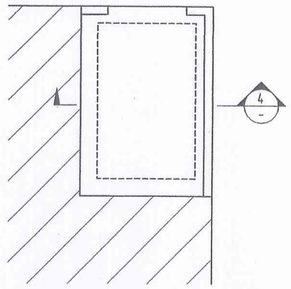
120 THICK RAFT SLAB
SL92 MESH TOP



CONCRETE LID PLAN (AREA E)

SCALE 1:50

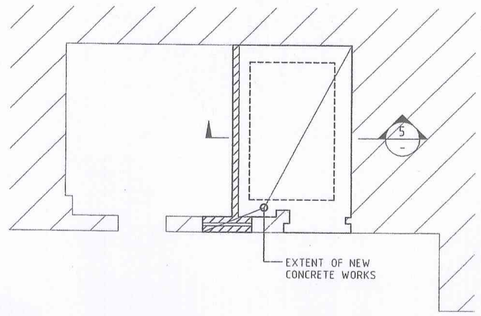
130 THICK SLAB ON 'RF55 KINGFLOOR 1mm BMT'
SL92 MESH TOP + EXTRAS AS SHOWN ON PLAN



PLAN (AREA F)

SCALE 1:50

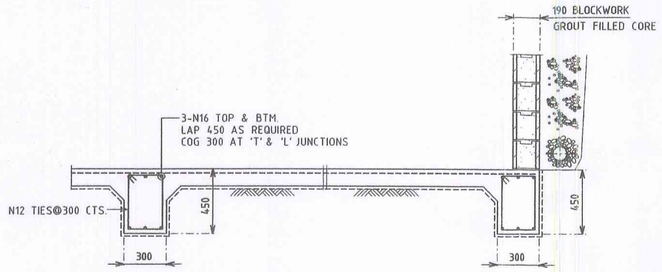
120 THICK RAFT SLAB
SL92 MESH TOP



PLAN (AREA G)

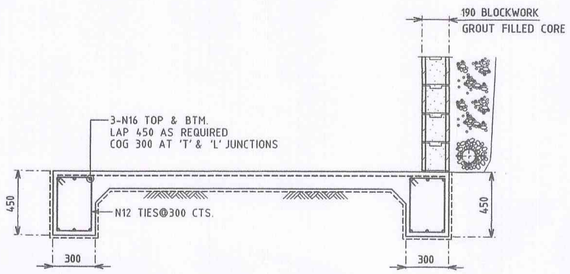
SCALE 1:50

120 THICK SLAB ON GROUND
SL92 MESH TOP



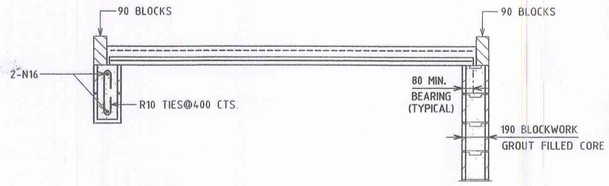
SECTION 1

SCALE 1:20



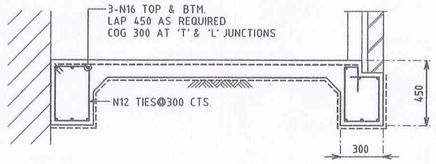
SECTION 2

SCALE 1:20



SECTION 3

SCALE 1:20



SECTION 4

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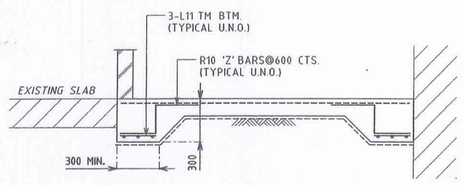
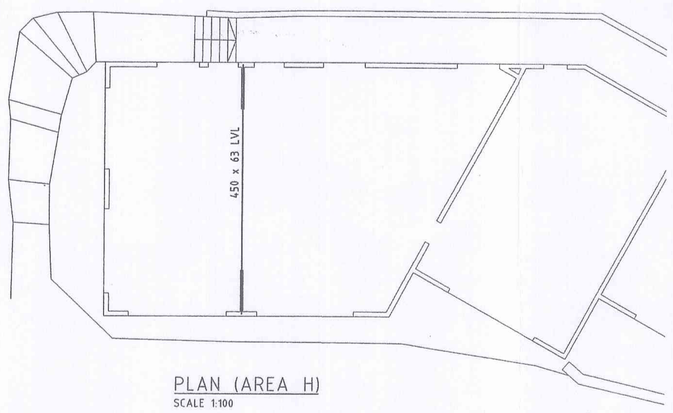


SECTION 5

SCALE 1:20



PLAN (AREA H)

SCALE 1:100

ISSUE	DESCRIPTION	APPROVED	DATE
B	FOR CONSTRUCTION		27.JL09
A	TENDER ISSUE		25.9.09

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PROJECT
ALTERATIONS & ADDITIONS TO
LOQUAT VALLEY ANGLICAN SCHOOL
1977 PITTWATER ROAD, BAYVIEW

TITLE
PLANS, SECTIONS & DETAILS
(AREA E, AREA F, AREA G &
AREA H)

SCALES			DATE
as noted			MAY '09
DRAWN	DESIGN	VERIFIED	APPROVED
JSS	MG		

ISSUE	PROJECT No.	DRAWING No.
B	4412	S11

URBAN CITY CONSULTING
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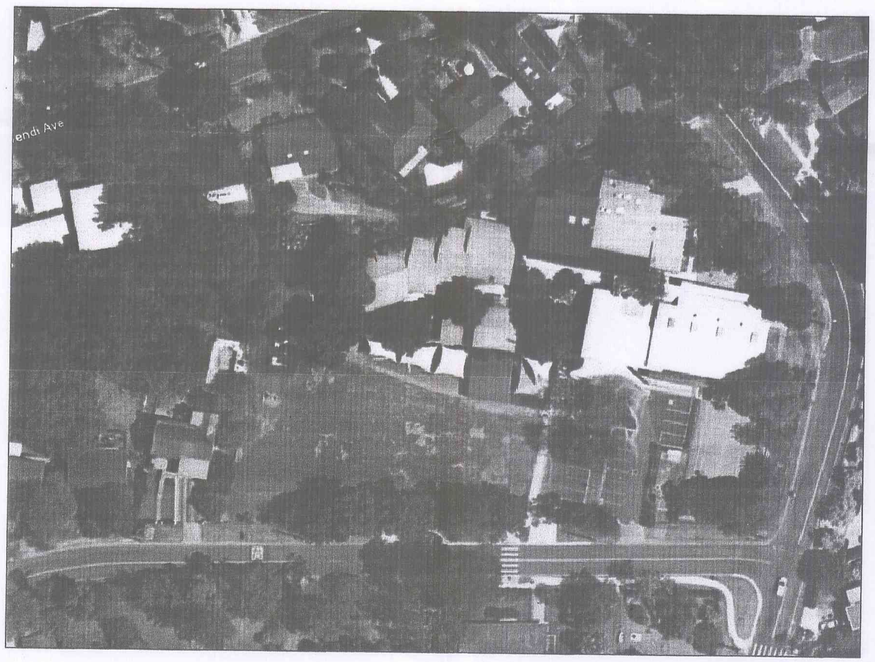
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284

HYDRAULIC SERVICES
FOR
Loquat Valley Anglican School
Alterations and Additions



LOCATION PLAN
REF. GOOGLE EARTH
N.T.S.

SYMBOLS:

- CHECK VALVE
- DOUBLE HEADED FIRE HYDRANT
- FIRE HYDRANT
- FIRE HOSE REEL
- HC HOSE COCK
- PIPE NODE
- PIPE RISER
- PIPE DROPPER
- P'TRAP
- STOP VALVE
- SERVICE CONTINUATION
- SWP REFERENCE
- STORMWATER PIT
- CONTINUATION OF SERVICE
- SERVICE NAME AND NUMBER (SS1)
- SIZE OF SERVICE (100)

LEGEND:

- COLD WATER
- COLD WATER EXISTING
- DOWNPIPE
- FIRE HYDRANT
- FIRE HYDRANT EXISTING
- FIRE HOSE REEL
- HOT WATER
- R RECYCLED
- RECYCLED EXISTING
- SEWER DRAINAGE
- STORMWATER
- STORMWATER EXISTING
- SUBSOIL DRAINAGE
- SUBSOIL DRAINAGE EXISTING
- VENT
- WARM WATER

ABBREVIATIONS:

BSN	BASIN	MINIMUM
BT	BUCKET TRAP	REDUCED LEVEL
BV	BACK VENT	RAINWATER
BWU	BOILING WATER UNIT	RAINWATER TANK
CO	CLEAROUT	SERWER DRAINAGE
CS	CLEANERS SINK	SHOWER
CW	COLD WATER	SINK
DHFH	DOUBLE HEADED FIRE HYDRANT	SEWER MAN HOLE
DT	DRINKING TROUGH	SOIL STACK
DP	DOWNPIPE	SUBSOIL DRAINAGE
DW	DISH WASHER	STORMWATER
EX	EXISTING	STORMWATER PIT
FH	FIRE HYDRANT	TUNDISH
FHR	FIRE HOSE REEL	TYPICAL
FW	FLOOR WASTE	URINAL
GTD	GRATED DRAIN	WATER CLOSET
HR	HOSE REEL	WARM WATER
HW	HOT WATER	WASTE STACK
IL	INVERT LEVEL	

DRAWING SCHEDULE

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284

0 10 20 30 40 50 100mm
100mm ON ORIGINAL SHEET

CAD FILE NAME: 2743 H00 - 1.dwg
LOCATION: G:\1work-dba Active Jobs\2743 Loquat Valley AC Classrooms\Current Dwgs & Xrefs\
X REFERENCES:

REVISION	REVISION DESCRIPTION	DATE
1	ISSUED FOR CONSTRUCTION	27.11.09
B	COMPLYING DEVELOPMENT	20.10.09
A	TENDER ISSUE	28.09.09
P2	PRE TENDER ISSUE	25.09.09
P1	PRELIMINARY ISSUE	23.09.09

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Building Environmental Services

CLIENT:
SYDNEY ANGLICAN SCHOOLS CORPORATION
PO BOX 465 HURSTVILLE B.C 1481

PROJECT MANAGER:
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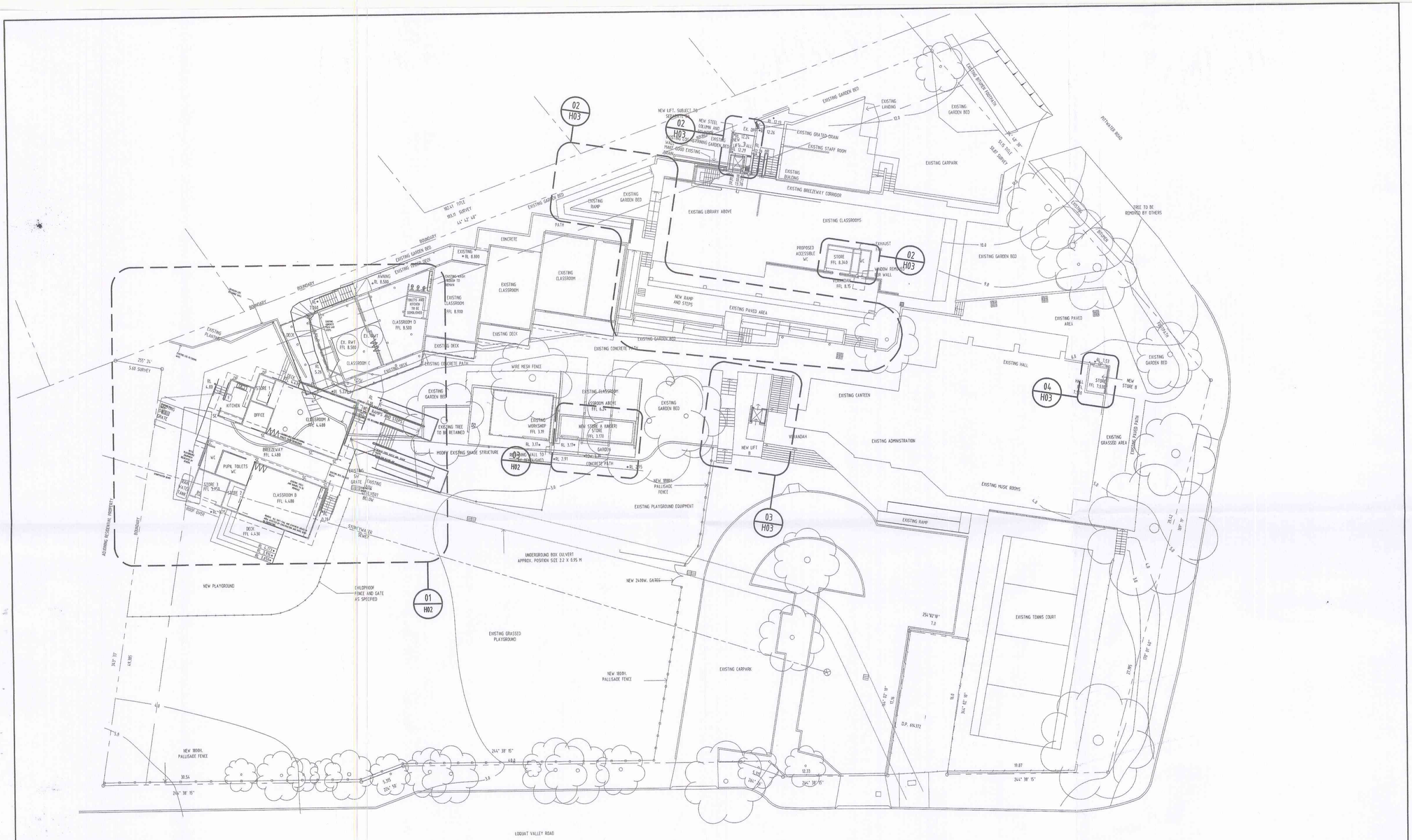
L3/51 RAWSON ST EPPING NSW 2121

ARCHITECT:
MIDSON MANAGEMENT
L3/51 RAWSON ST EPPING NSW 2121

PROJECT:
LOQUAT VALLEY
ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 PITTWATER RD BAYVIEW

DRAWING TITLE:
HYDRAULIC SERVICES
LEGEND, LOCATION PLAN AND DRAWING SCHEDULE

SCALE	AS SHOWN	DATE	SEPT 09
DRAWN	JW/LH	CHECKED	DB
SHEET	A1		
DRAWING No.	2743-H00	REVISION	1



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REVISION	REVISION DESCRIPTION	DATE
1	ISSUED FOR CONSTRUCTION	27.11.09
B	COMPLYING DEVELOPMENT	20.10.09
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ARCHITECT:
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PROJECT:
LOQUAT VALLEY
ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 PITTWATER RD BAYVIEW

DRAWING TITLE:
HYDRAULIC SERVICES
SITE PLAN &
DRAWING KEY PLAN

SCALE	1:200	DATE	SEPT 09
DRAWN	JW/LH	CHECKED	DB
SHEET	A1		
DRAWING No.	2743-H01	REVISION	1

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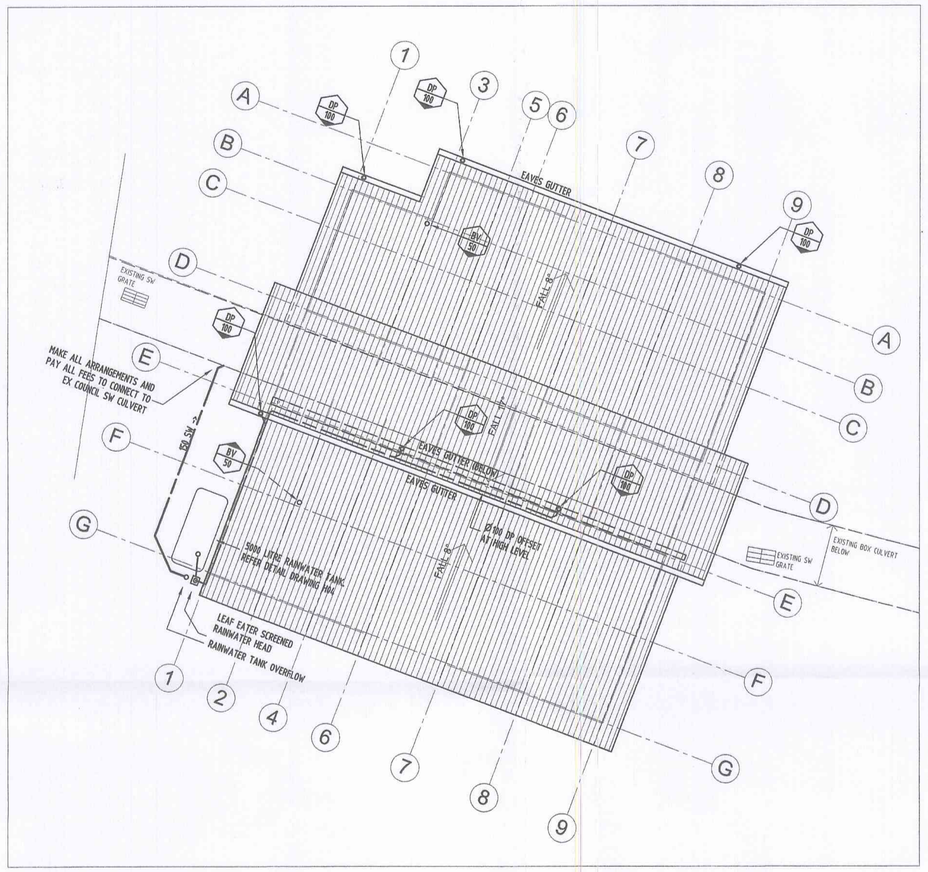
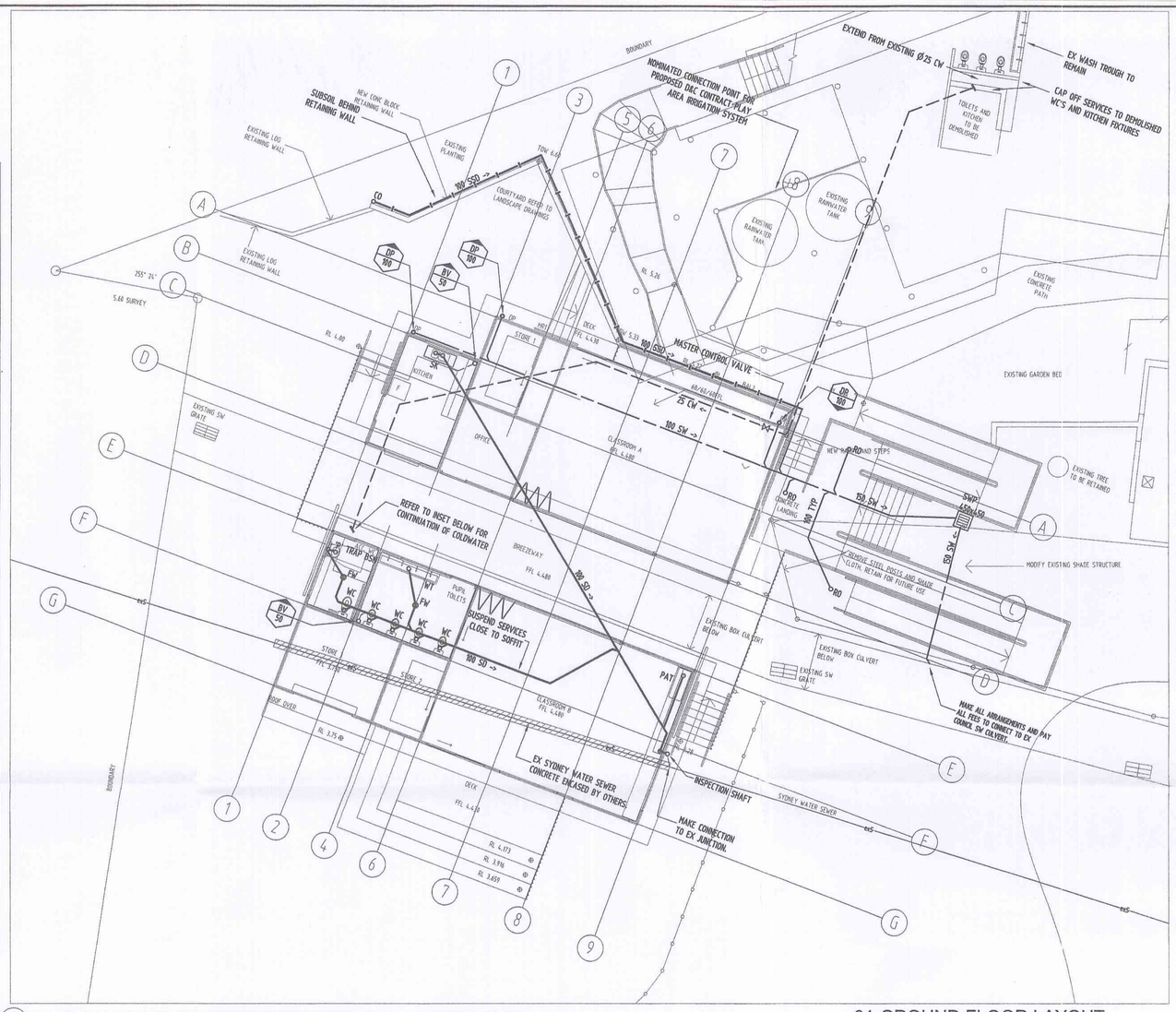
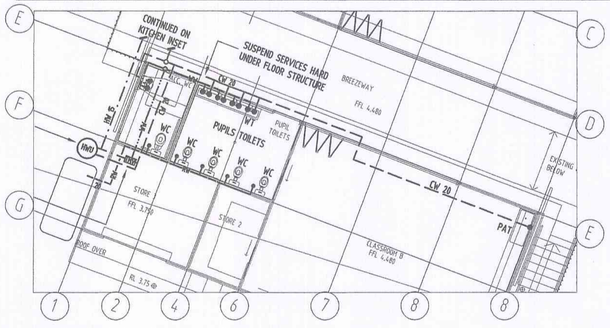
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0084



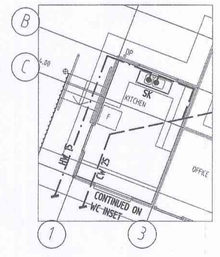
01-ROOF LAYOUT



01-GROUND FLOOR LAYOUT



WC HW & CW LAYOUT



KITCHEN HW & CW LAYOUT

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21 JAN 2010
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Accreditation No. BPB0281

0 10 20 30 40 50 100mm

100mm ON ORIGINAL SHEET

CAD FILE NAME: 2743 H02- 1.dwg
LOCATION: G:\1work-dba Active Jobs\2743 Loquat Valley AC Classrooms\Current Dwgs & Xrefs\
X REFERENCES:

REVISION	REVISION DESCRIPTION	DATE
1	ISSUED FOR CONSTRUCTION	27.11.09
B	COMPLYING DEVELOPMENT	20.10.09
A	TENDER ISSUE	28.09.09
P2	PRE TENDER ISSUE	25.09.09
P1	PRELIMINARY ISSUE	23.09.09

DBA David Buckle & Associates (NSW) P/l
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Phone: 02 9804-8086 Fax: 02 9804-8685
Building Environmental Services

CLIENT:
SYDNEY ANGLICAN SCHOOLS CORPORATION
PO BOX 465 HURSTVILLE B.C 1481

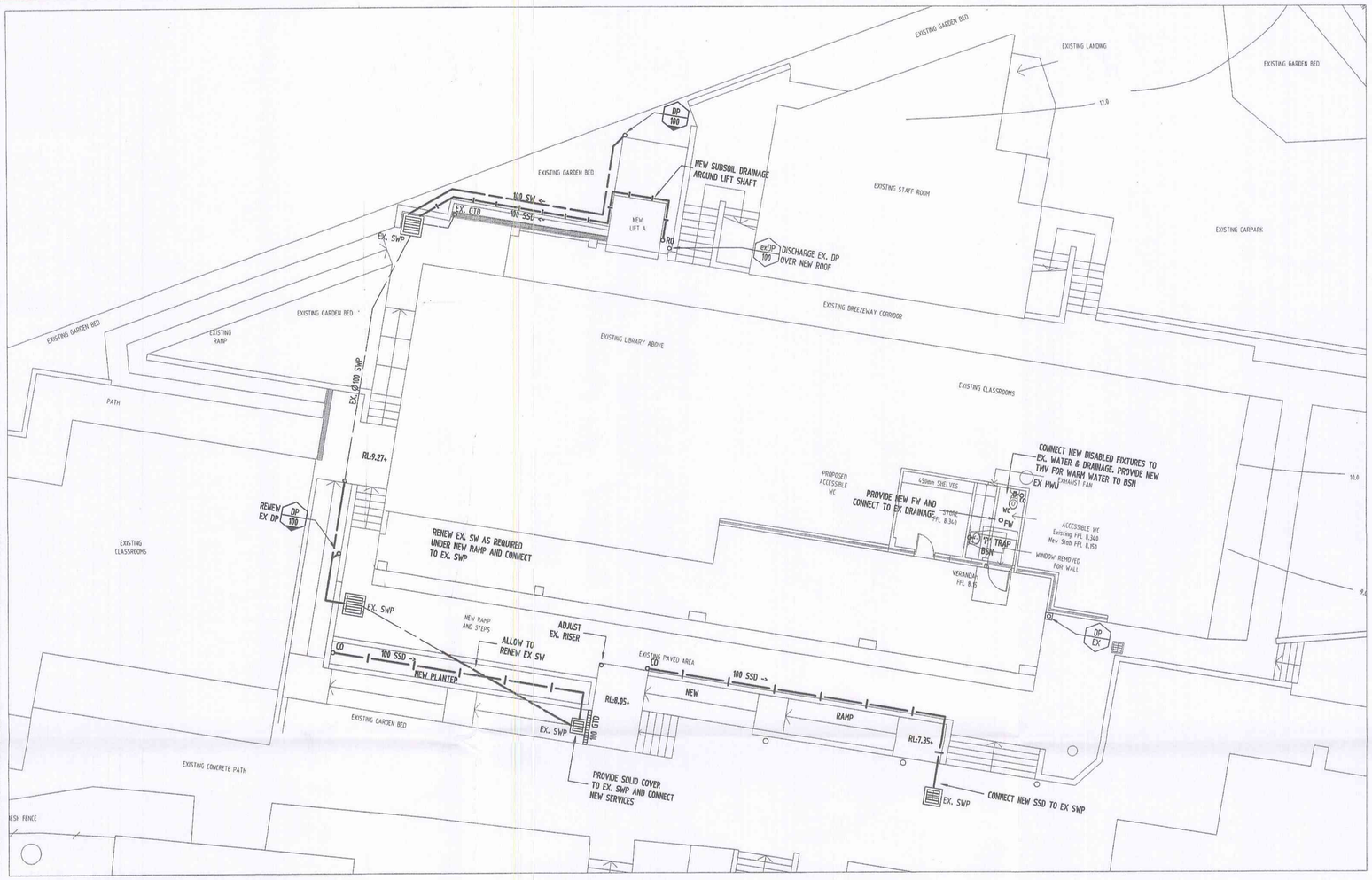
PROJECT MANAGER:
MIDSON MANAGEMENT
L3/51 RAWSON ST EPPING NSW 2121

ARCHITECT:
MIDSON MANAGEMENT
L3/51 RAWSON ST EPPING NSW 2121

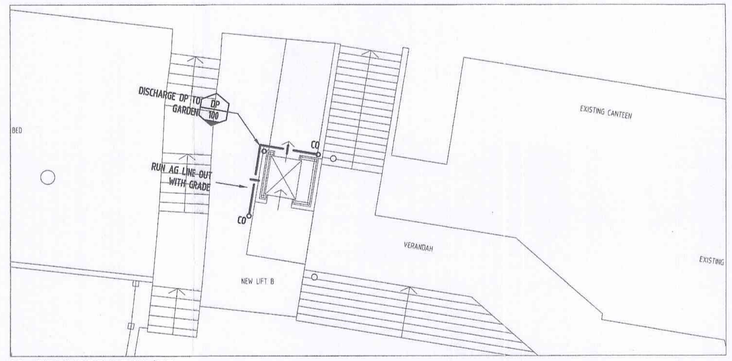
PROJECT:
LOQUAT VALLEY
ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 PITTWATER RD BAYVIEW

DRAWING TITLE:
HYDRAULIC SERVICES
01 NEW CLASSROOMS
AND ACCESS RAMPS

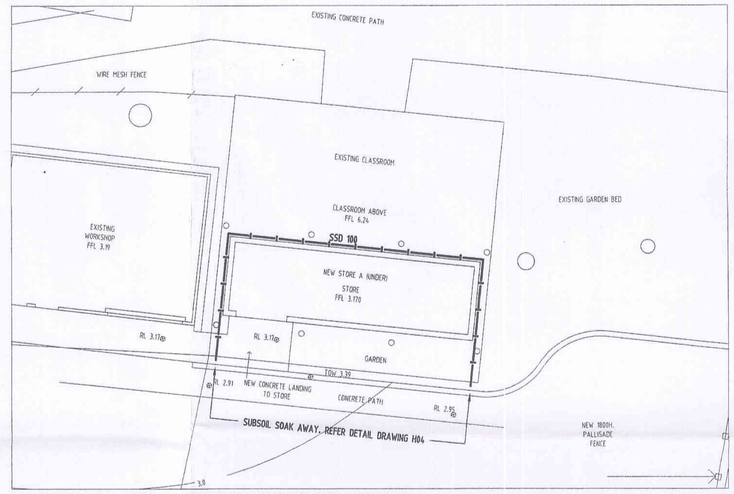
SCALE	1:100	DATE	SEPT 09
DRAWN	JW/LH	CHECKED	DB
SHEET	A1		
DRAWING No.	2743-H02	REVISION	1



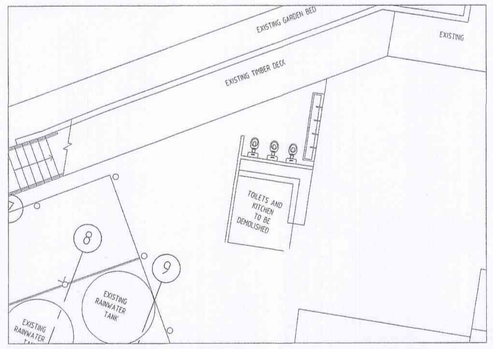
02 - PROPOSED NEW RAMPS, ACCESSIBLE WC & NEW LIFT



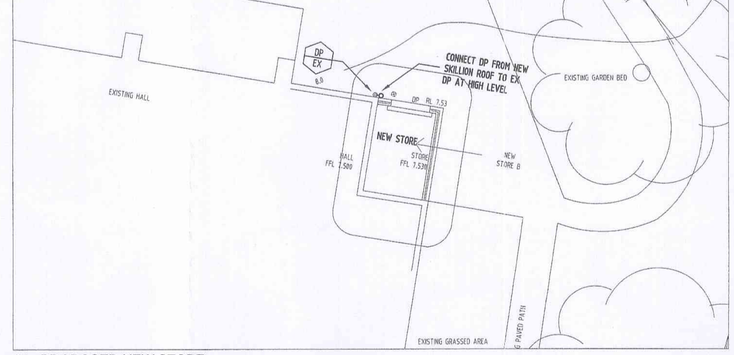
03 - PROPOSD NEW LIFT



04 - PROPOSED NEW STORE UNDER EXISTING CLASSROOM



06 - DEMOLITION OF EX FIXTURES



05 - PROPOSED NEW STORE

0 10 20 30 40 50 100mm

100mm ON ORIGINAL SHEET

CAD FILE NAME: 2743 H03- 1.dwg
LOCATION: G:\1work-dba Active Jobs\2743 Loquat Valley AC Classrooms\Current Dwgs & Xrefs\
X REFERENCES:

REVISION	REVISION DESCRIPTION	DATE
1	ISSUED FOR CONSTRUCTION	27.11.09
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PROJECT:
LOQUAT VALLEY
ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 PITTWATER RD BAYVIEW

DRAWING TITLE:
HYDRAULIC SERVICES
02 NEW RAMPS ACCESS WC & LIFT
03 NEW LIFT
04 & 05 NEW STORES

SCALE	1:100	DATE	SEPT 09
DRAWN	JW/LH	CHECKED	DB
SHEET	A1		
DRAWING No.	2743-H03	REVISION	1

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21 JAN 2010
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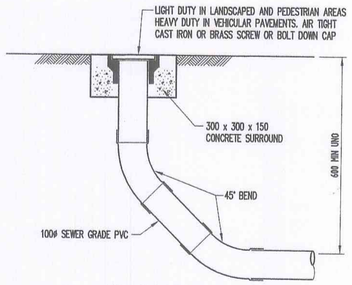
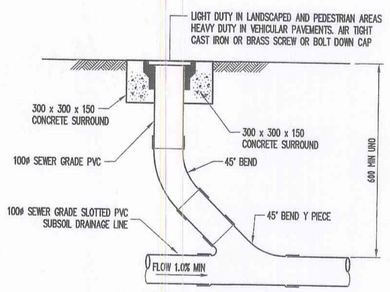


END CLEAROUT

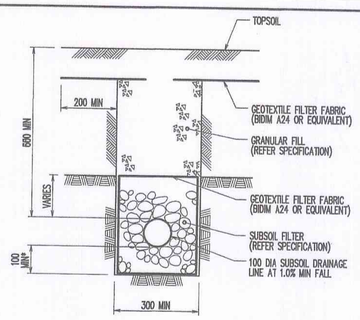
SCALE 1: 10

NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



INTERMEDIATE CLEAROUT

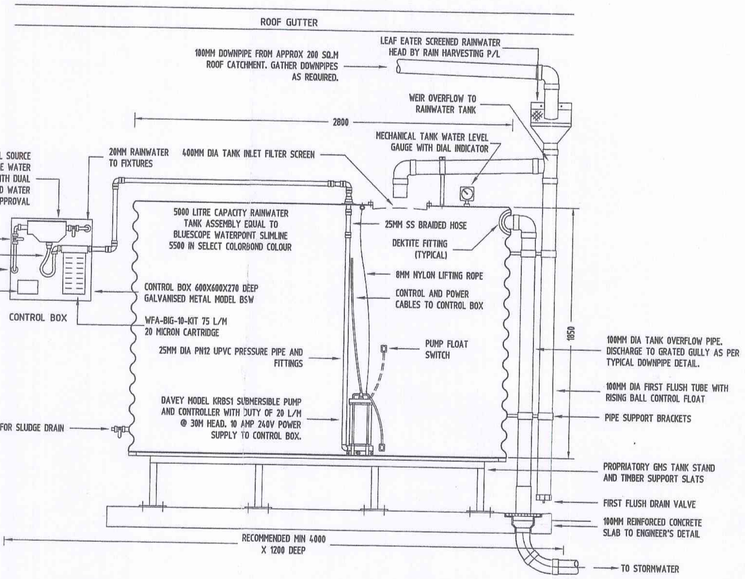
SCALE 1: 10



SUBSOIL IN ROCK

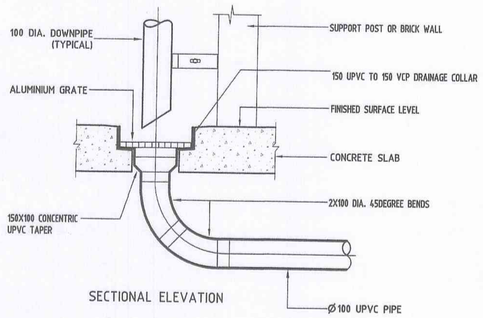
SCALE 1:10

* – REDUCE PIPE INVERT TO ZERO AT OUTLET OF PIPE



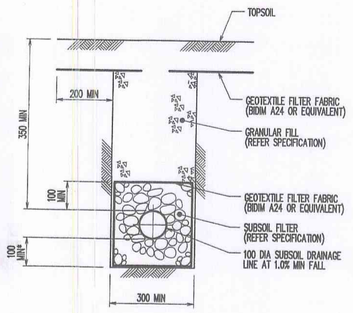
5000 LITRE BLUESCOPE SLIMLINE RAINWATER TANK DETAIL

N.T.S.



TYPICAL DOWNPIPE TERMINAL OVER GRATED DRAINAGE POINT

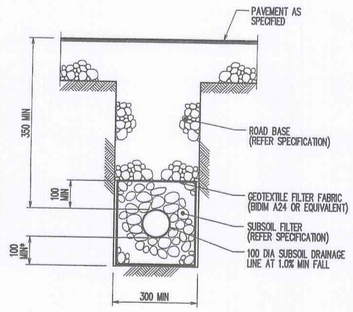
N.T.S.



SUBSOIL IN LANDSCAPED AREAS

SCALE 1:10

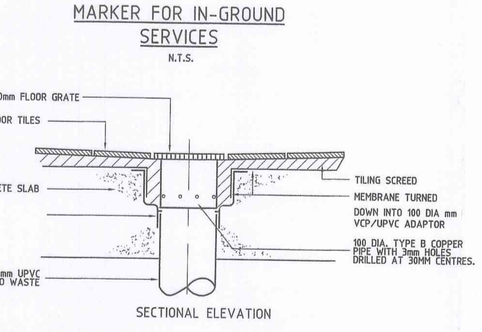
* – REDUCE PIPE INVERT TO ZERO AT OUTLET OF PIPE



SUBSOIL IN PAVED AREAS

SCALE 1:10

* – REDUCE PIPE INVERT TO ZERO AT OUTLET OF PIPE



ELEVATION

MARKER FOR IN-GROUND SERVICES

N.T.S.

SECTIONAL ELEVATION

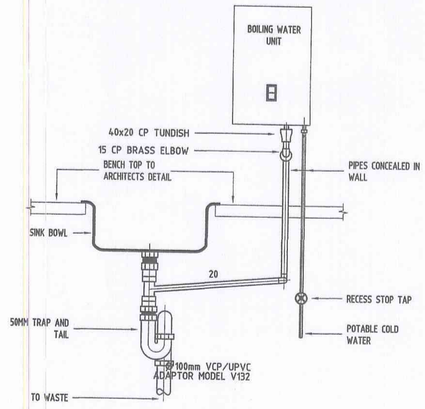
TYPICAL FLOOR & SHOWER WASTE RISER FOR TILED FLOORS

N.T.S.

0 10 20 30 40 50 100mm

100mm ON ORIGINAL SHEET

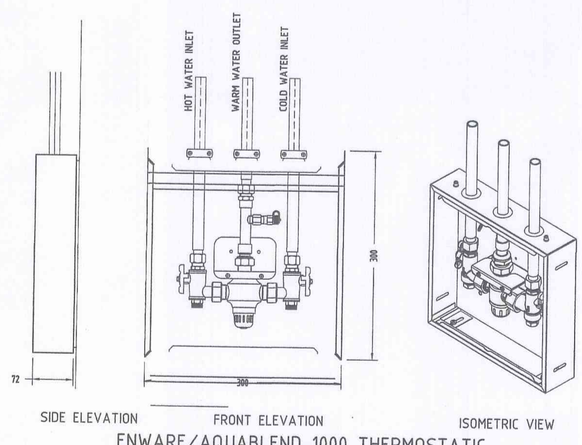
CAD FILE NAME: 2743 -H04 Details-1.dwg
LOCATION: G:\Work-dba Active Jobs\2743 Loquat Valley AC Classrooms\Current Dwgs & Xrefs\
X REFERENCES:



SECTIONAL ELEVATION

BOILING WATER UNIT DETAIL RELIEF PIPEWORK & TUNDISH DRAINAGE

N.T.S.



SIDE ELEVATION FRONT ELEVATION ISOMETRIC VIEW

ENWARE/AQUABLEND 1000 THERMOSTATIC MIXING VALVE CODE ATMS710E SURFACE MOUNTED IN SS WALL BOX

N.T.S.

GENERAL NOTES:

READ IN CONJUNCTION WITH THE ARCHITECTURAL AND ASSOCIATED SERVICES DRAWINGS

ALL WORK TO BE IN ACCORDANCE WITH THE SPECIFICATION, AUTHORITY'S REQUIREMENTS AND AS3500

CONFIRM LOCATION SIZE AND LEVELS OF ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORK

DISCONNECT AND REMOVE ALL EXISTING SERVICES TO THE AUTHORITY'S APPROVAL

PROVIDE SEWER DRAINAGE TO ALL MECHANICAL UNITS AS REQUIRED WHETHER SHOWN OR NOT «REFER ALSO MECHANICAL SERVICES DOCUMENTS»

URBAN CITY CONSULTING PTY LTD
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1977 PITTWATER RD BAYVIEW

DRAWING TITLE:
HYDRAULIC SERVICES
DETAIL SHEET

SCALE	NTS	DATE	SEPT 09
DRAWN	LH/JW	CHECKED	DB
SHEET	A1		
DRAWING No.	2743-H04	REVISION	1

EXISTING MAIN SWITCHBOARD

EXISTING DISTRIBUTION BOARD

NEW DISTRIBUTION BOARD

CONTROL PANEL BY ANOTHER TRADE

LETTERS ADJACENT DENOTES TYPE OF BOARD/PANEL AS FOLLOWS :–
DB – DISTRIBUTION BOARD
HS – HYDRAULIC SERVICES
LS – LIFT SERVICES

2A 28 WATT FLUORESCENT LUMINAIRE

2A 14 WATT FLUORESCENT LUMINAIRE

No. DENOTES NUMBER OF FLUORESCENT LAMPS
LETTER DENOTES TYPE OF LUMINAIRE AS FOLLOWS :–
A – SURFACE MOUNTED LUMINAIRE COMPLETE WITH PRISMATIC DIFFUSER AND EQUAL TO PIERLITE LIGHTING UNILUX PROFILE. LUMINAIRE SUITABLE FOR FOOD PREPARATION AREAS
B – BATTEN FLUORESCENT LUMINAIRE EQUAL TO PIERLITE LIGHTING 'HIGH5 LINEAR T5 BARE'
D – DIFFUSED FLUORESCENT LUMINAIRE EQUAL TO ELS 'KS SURFACE MOUNTED FLUORESCENT' CAT. No. 'KS120.228.53'
W – SURFACE MOUNTED WEATHERPROOF LUMINAIRE EQUAL TO PIERLITE LIGHTING 'FUTURIX'
SECOND LETTER ADJACENT DENOTES MOUNTING AS FOLLOWS:–
W – WALL MOUNTED

2x1C 28 WATT T5 WIRE SUSPENDED FLUORESCENT LUMINAIRE, WHITE POWDER COATED WITH FINNED LOUVRES EQUAL TO AUSTUBE 'AUS 190 BEAM' WHERE SHOWN LUMINAIRE SHALL BE FITTED WITH ADDITIONAL ACCESSORY, EG MOTION DETECTOR/EMERGENCY LIGHT/SPEAKER
No DENOTES NUMBER OF TUBES PER FITTING
No DENOTES NUMBER OF FITTINGS IN LINE SPACED EVENLY

Ⓐ 2x26 WATT TCD COMPACT FLUORESCENT SURFACE MOUNTED BULKHEAD EQUAL TO ELS LIGHTING 'SUMO 350' CAT No. NSG226/W

Ⓑ 2x26 WATT TCD COMPACT FLUORESCENT WALL MOUNTED LUMINAIRE EQUAL TO ELS LIGHTING 'SUMO 350' CAT No. NSG226/W

Ⓒ 26 WATT TC–TEL FLUORESCENT WALL MOUNTED LUMINAIRE EQUAL TO LIGMAN LIGHTING 'AUSTIN' CAT No. 30567

Ⓓ 70 WATT METAL HALIDE FLOODLIGHT LUMINAIRE EQUAL TO LIGMAN LIGHTING 'MUSTANG 1'

Ⓔ 10 WATT TUNGSTEN HALOGEN RECESSED NON–MAINTAINED MODE EMERGENCY LUMINAIRE EQUAL TO STANILITE CAT. No. SF10FP

EX 1. 4 WATT COLD CATHODE LONG–LIFE RUNNING MAN FLUORESCENT EMERGENCY EXIT LUMINAIRE
No. ADJACENT DENOTES TYPE OF LUMINAIRE AS FOLLOWS
1. – SINGLE SIDED EXIT LUMINAIRE EQUAL TO STANILITE 'QUICKFIT'
2. – DOUBLE SIDED EXIT LUMINAIRE EQUAL TO STANILITE 'QUICKFIT'

E 10 WATT FLUORESCENT NON–MAINTAINED EMERGENCY BATTEN LUMINAIRE COMPLETE WITH DIFFUSER AND EQUAL TO STANILITE MANUFACTURE 'PREMIUM EMERGENCY BATTEN'

EXISTING BULKHEAD LUMINAIRE TO BE RETAINED

EXISTING PARA–FLOOD LUMINAIRE TO BE RETAINED

EXISTING 36 WATT FLUORESCENT LUMINAIRE TO BE RETAINED

EXISTING 18 WATT FLUORESCENT LUMINAIRE TO BE RETAINED

EX EXISTING EXIT LUMINAIRE TO BE RETAINED

SWITCH & SWITCHWIRE

MD MOTION DETECTOR LIGHT SWITCH

SINGLE GENERAL PURPOSE OUTLET

DOUBLE GENERAL PURPOSE OUTLET

15A 15 AMP PLUG SOCKET OUTLET

1D DATA OUTLET WITH SHUTTER
No. OF RJ45 DATA OUTLETS

No. ADJACENT DENOTES MOUNTING HEIGHT IN mm
LETTERS ADJACENT DENOTES THE AS FOLLOWING :–
A – CBUS AUTOMATION SYSTEM CONTROLLED
B – MOUNTED ABOVE BENCH
CL – MOUNTED AT CEILING LEVEL
D – DUCT MOUNTED
W/P – WEATHERPROOF
DW – DISHWASHER MOUNTED 600 AFFL
REF – REFRIGERATOR

1. PERMANENTLY CONNECTED OUTLET No. – ADJACENT DENOTES NUMBER OF PHASES

600 DISABLED TOILET EMERGENCY PUSH BUTTON No. – DENOTES MOUNTING HEIGHT IN mm

DBS DISABLED TOILET BUZZER & INDICATOR LIGHT

HD HAND DRYER EQUAL TO J.D. MACDONALD 'AUTOBEAM'

CEILING FAN

F CEILING FAN SPEED CONTROLLER

S AV SPEAKER

VC AUDIO VISUAL SYSTEM VOLUME CONTROL

VI AUDIO VISUAL SYSTEM CABLING POINT

PRO FUTURE SHORT–THROW AV PROJECTOR (BY SCHOOL)

SB FUTURE AV SMARTBOARD (BY SCHOOL)

BD BUILDING DISTRIBUTOR

CD EXISTING CAMPUS DISTRIBUTOR

MDF EXISTING TELEPHONE MAIN DISTRIBUTION FRAME

S APPROXIMATE ROUTE OF NEW CABLING TO BE INSTALLED IN NEW CONDUITS/CABLE TRAY
C – COMMUNICATIONS CABLING FO – FIBRE OPTIC SEC – SECURITY S – SUBMAINS T – TELEPHONE

1x100 APPROXIMATE ROUTE OF SPARE CONDUITS
NO. AND DIA OF CONDUITS AS INDICATED

BUSBAR OR CABLING No OF STROKES – NUMBER OF PHASES

EXISTING BUSBAR OR CABLING No OF STROKES – NUMBER OF PHASES

50 TELEPHONE BLOCK CABLING No. DENOTES NUMBER OF PAIRS

C1 CONTACTOR COIL No. DENOTES UNIT NUMBER

TS ELECTRONIC TIME SWITCH

PE PHOTOELECTRIC CELL

EXISTING CIRCUIT BREAKER

CIRCUIT BREAKER
RCD – DENOTES CIRCUIT BREAKER WITH INTEGRAL RESIDUAL CURRENT DEVICE
SP – DENOTES CIRCUIT BREAKER WITH SURGE PROTECTION

EL1 PUSHBUTTON AND RELAY
No DENOTES UNIT NUMBER
EL DENOTES EMERGENCY LIGHTING TEST SWITCH

TIME DELAY CONTACT – INSTANT CLOSE, 2 HOUR DELAY TO OPEN

NORMALLY OPEN CONTACT

NORMALLY CLOSED CONTACT

EXISTING ACTIVE LINKS

EXISTING FUSE

M EXISTING SUPPLY AUTHORITY CT METERING

OFF MAN AUTO 3 POSITION SELECTOR SWITCH

7–P1 SUBCIRCUIT DESIGNATION
SUBCIRCUIT NUMBER
L – LIGHTING SUBCIRCUIT
P – POWER SUBCIRCUIT
SWITCHBOARD FROM WHICH SUBCIRCUIT ORIGINATES

R SECURITY SYSTEM MAGNETIC REED SWITCH

K SECURITY SYSTEM KEYPAD

PIR SECURITY SYSTEM PASSIVE INFRA–RED MOTION DETECTOR

PIR EXISTING SECURITY SYSTEM PASSIVE INFRA–RED MOTION DETECTOR

S SECURITY SYSTEM SMOKE DETECTOR

H SECURITY SYSTEM HEAT DETECTOR

DGP SECURITY SYSTEM DATA GATHERING PANEL

DGP EXISTING SECURITY SYSTEM DATA GATHERING PANEL

SAP EXISTING SECURITY SYSTEM CONTROL PANEL

C COMMUNICATION/SECURITY CABLING PIT

P POWER CABLING PIT

PVC PHOTO VOLTAIC CELLS

SOLAR SOLAR POWER SYSTEM
– REFER TO ES–5 – SOLAR POWER SCHEMATIC

SINV SOLAR POWER SYSTEM STRING INVERTER

SLCD SOLAR POWER LCD DISPLAY

SWEB SOLAR POWER WEB BOX

SMRT SOLAR POWER SMART METER

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284

CONSTRUCTION ISSUE

THESE DRAWINGS ARE ISSUED FOR CONTRACT PROCEDURE IN ACCORDANCE WITH THE SPECIFICATION

THE DRAWINGS ARE DIAGRAMMATIC/ SCHEMATIC ONLY SUITABLE FOR THE PREPARATION OF WORKSHOP DWGS. THEY SHALL NOT BE USED AS WORKING DRAWINGS.

FOR DATUM AND SETOUT REFER TO ARCHITECTURAL/STRUCTURAL DRAWINGS AS APPLICABLE

FABRICATION/INSTALLATION SHALL ONLY PROCEED ON EXAMINED SHOP DRAWINGS.

SHELMERDINES
CONSULTING ENGINEERS
D. Taylor 27.11.09

No.	Description	Drn by	Ckd by	Date
C	CONSTRUCTION ISSUE	DT		27.11.09
B	COMPLYING DEVELOPMENT APPLICATION	DT		19.10.09
A	TENDER ISSUE	DT		25.9.09

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CLIENT
SYDNEY ANGLICAN SCHOOLS CORPORATION

PROJECT
LOQUAT VALLEY ANGLICAN SCHOOL ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

ELECTRICAL SERVICES
LEGEND

DATE SEPT. 2009	SCALE NTS@A1
DRAWN DT	CHECKED -
DRAWING No 5337-ES-1	ISSUE No C

ACCESSIBLE WC REFER TO DRAWING No. 5337–ES–4

NEW LIFT SUBMAIN AND TELEPHONE CABLE TO BE INSTALLED IN CONDUIT IN ACCESSIBLE CRAWL SPACE AT BACK OF BUILDING

NEW LIFT A REFER TO DRAWING No. 5337–ES–5

UNDERBORE EXISTING BREEZEWAY PEBBLECRETE SURFACE FROM NEW LIFT PIT TO ACCESSIBLE CRAWL SPACE FOR NEW CABLING

EXISTING CAMPUS DISTRIBUTOR LOCATED IN LIBRARY ON TOP LEVEL

CONNECT NEW LUMINAIRE TO EXISTING LIGHTING SUBCIRCUIT

COMMUNICATIONS CABLING TO RISE ADJACENT COLUMN AND RUN VIA EXISTING COVERED WAY

LOCATION OF EXISTING SECURITY PANEL TO BE CONFIRMED ON SITE

NEW CABLING TO BE INSTALLED IN CONDUIT UNDER EXISTING BUILDING

EXISTING CLASSROOM ALTERATION ABOVE REFER TO DRAWING No. 5337–ES–4

NEW DISTRIBUTION BOARD DB–7 LOCATED IN BUILDING TO BE DEMOLISHED TO BE DISCONNECTED AND MADE SAFE

EXISTING DISTRIBUTION BOARD DB–7 LOCATED IN BUILDING TO BE DEMOLISHED TO BE DISCONNECTED AND MADE SAFE

NEW CLASSROOM BLOCK REFER TO DRAWING No. 5337–ES–3

NEW STORE BUILDING REFER TO DRAWING No. 5337–ES–4

NEW STORE EXTENSION REFER TO DRAWING No. 5337–ES–4

NEW SUBMAINS & TELEPHONE CABLE TO DROP DOWN WALL IN CONDUIT

NEW FLOODLIGHT LUMINAIRE TO REPLACE EXISTING

NEW LIFT SUBMAINS AND TELEPHONE CABLES TO BE INSTALLED IN UNDERGROUND CONDUIT BY SAW CUTTING AND REPAIRING EXISTING CONCRETE OR UNDER NEW SECTIONS OF CONCRETE.

MODIFY PROGRAMMING OF EXISTING SECURITY ALARM PANEL FOR NEW BUILDING

NEW LIFT B REFER TO DRAWING No. 5337–ES–5

EXISTING BUILDING
EXISTING BREEZEWAY CORRIDOR
STORE
MSB
DB–1
VERANDAH
2x100
DB–4
DB–5
HALL
STORE
HALL DB
LS–2
EXISTING STEPS
DB–2
CLASSROOM ABOVE
EXISTING WORKSHOP
STORE
GARDEN
DB–7
C&SEC
2x50 REFER NOTE 13
BD
CLASSROOM A
KITCH
SEC
OFFICE
2x80 REFER NOTE 3
BREEZEWAY
WC
CLASSROOM B
DECK
ROAD

NOTES

1. FOR LEGEND REFER TO DRAWING No. 5337–ES–1.
2. FINAL LOCATION OF ALL EQUIPMENT SHALL BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
3. CONDUITS INDICATED ARE SPARES AND ARE IN ADDITION TO THE CONDUITS REQUIRED FOR CABLING TO BE INSTALLED UNDER THIS CONTRACT.
4. ALL SPARE CONDUITS ARE TO BE SEALED WITH NON–SETTING WATERPROOF COMPOUND AT EACH END.

CONSTRUCTION ISSUE

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SHELMERDINES
CONSULTING ENGINEERS
D. Taylor 27.11.09

No.	Description	Drn by	Ckd by	Date
C	CONSTRUCTION ISSUE	DT		27.11.09
B	COMPLYING DEVELOPMENT APPLICATION	DT		19.10.09
A	TENDER ISSUE	DT		25.9.09

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w: www.midsongroup.com.au

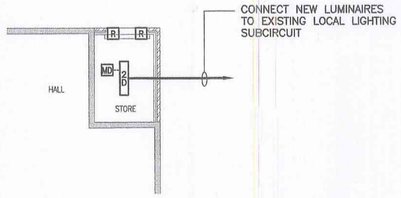
CLIENT
SYDNEY ANGLICAN SCHOOLS CORPORATION

PROJECT
LOQUAT VALLEY ANGLICAN SCHOOL ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

ELECTRICAL SERVICES
SITE PLAN

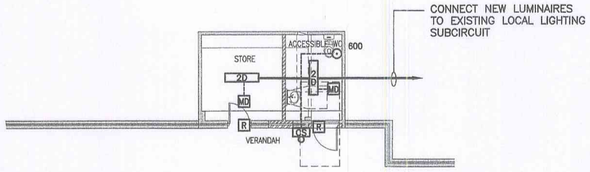
URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284

DATE	SEPT. 2009	SCALE	1:200@A1
DRAWN	DT	CHECKED	-
DRAWING No	5337-ES-2	ISSUE No	C



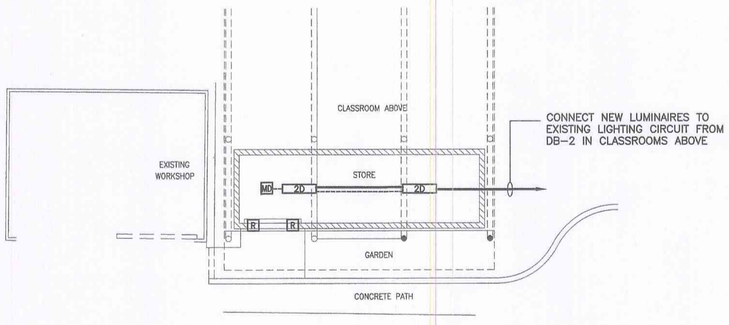
NEW STORE EXTENSION TO EXISTING HALL BUILDING

REFER NOTE 4



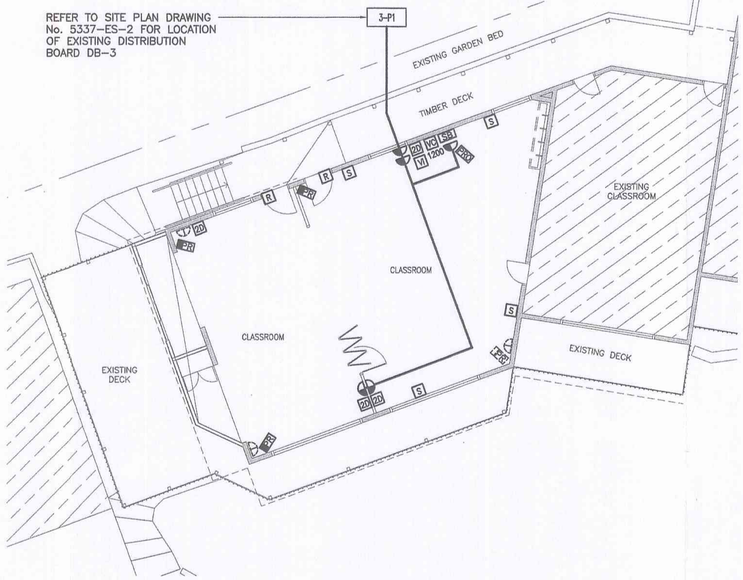
ACCESSIBLE WC

REFER NOTE 4



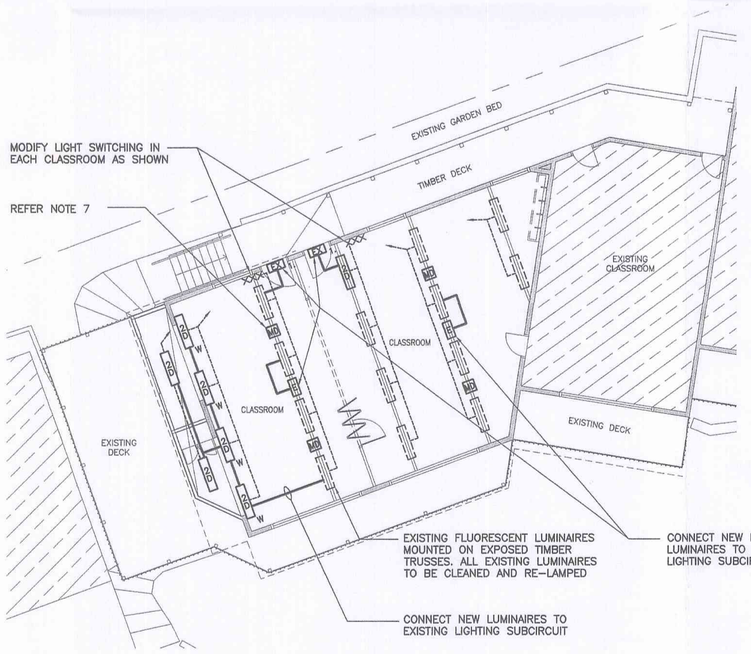
NEW SORE BUILDING

REFER NOTE 4



EXISTING CLASSROOM ALTERATIONS – POWER LAYOUT

REFER NOTE 4



EXISTING CLASSROOM ALTERATIONS – LIGHTING LAYOUT

REFER NOTE 4

NOTES

1. FOR LEGEND REFER TO DRAWING No. 5337–ES–1.
2. FINAL LOCATION OF ALL OUTLETS AND EQUIPMENT SHALL BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
3. ALL OUTLETS SHALL BE MOUNTED AT 300mm AFFL UNLESS OTHERWISE INDICATED.
4. FOR LOCATION OF WORKS REFER TO SITE PLAN DRAWING No. 5337–ES–2.
5. DISCONNECT AND REMOVE ALL EQUIPMENT MADE REDUNDANT BY THE NEW WORKS.
6. AREAS THAT SHOW NO NEW WORK SHALL REMAIN AS EXISTING.
7. REFER TO DETAILS SHEET DRAWING No. 5337–ES–7 FOR TYPICAL SWITCHING ARRANGEMENT OF CLASSROOMS.

CONSTRUCTION ISSUE

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FABRICATION/INSTALLATION SHALL ONLY PROCEED ON EXAMINED SHOP DRAWINGS.

SHELMERDINES
CONSULTING ENGINEERS

D. Taylor
27.11.09

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CLIENT

SYDNEY ANGLICAN SCHOOLS CORPORATION

PROJECT

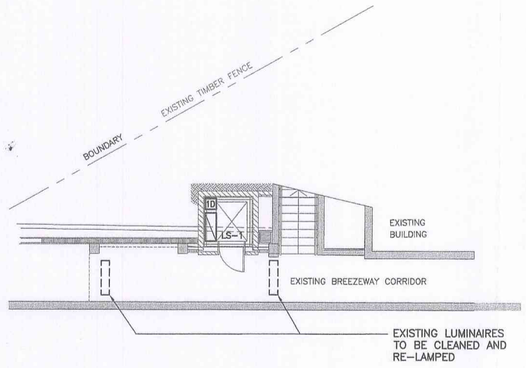
LOQUAT VALLEY
ANGLICAN SCHOOL
ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

ELECTRICAL SERVICES

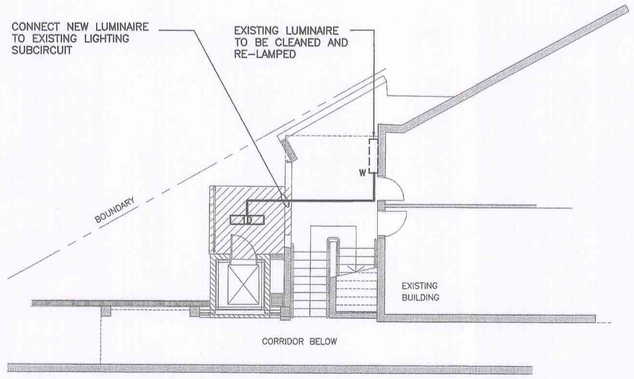
MISCELLANEOUS
POWER AND LIGHTING LAYOUTS

DATE	SCALE
SEPT. 2009	1:100@A1
DRAWN DT	CHECKED -
DRAWING No 5337-ES-4	ISSUE No C

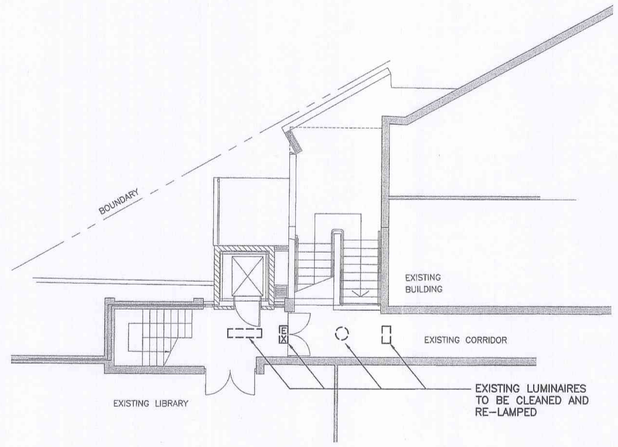
URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No. BPB0284



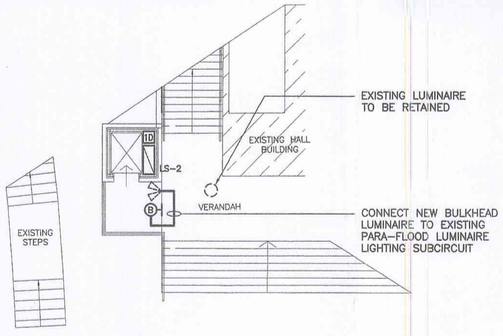
LIFT A TO FIRST FLOOR



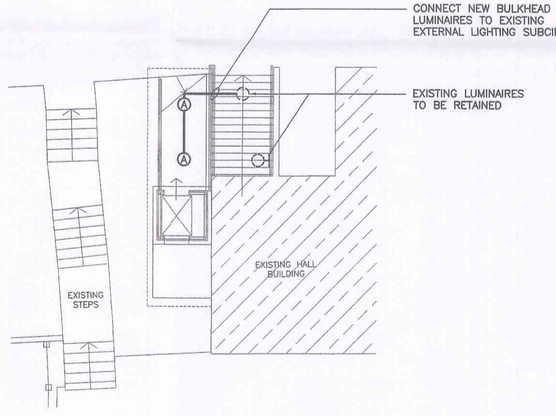
LIFT A TO STAFF ROOM FLOOR



LIFT A TO SECOND FLOOR



LIFT B LOWER FLOOR



LIFT B UPPER FLOOR

NOTES

1. FOR LEGEND REFER TO DRAWING No. 5337-ES-1.
2. FINAL LOCATION OF ALL OUTLETS AND EQUIPMENT SHALL BE CONFIRMED ON SITE PRIOR TO INSTALLATION.
3. DISCONNECT AND REMOVE ALL EQUIPMENT MADE REDUNDANT BY THE NEW WORKS.
4. FOR LOCATION OF WORKS REFER TO SITE PLAN DRAWING No. 5337-ES-2.

CONSTRUCTION ISSUE

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SHELMERDINES
CONSULTING ENGINEERS

D. Taylor
27.11.09

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CLIENT
SYDNEY ANGLICAN SCHOOLS CORPORATION

PROJECT
LOQUAT VALLEY ANGLICAN SCHOOL ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

ELECTRICAL SERVICES
LIFT A AND LIFT B POWER AND LIGHTING LAYOUTS

DATE SEPT. 2009	SCALE 1:100@A1
DRAWN DT	CHECKED -
DRAWING No 5337-ES-5	ISSUE No C

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
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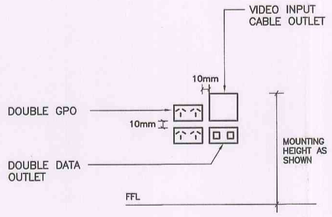

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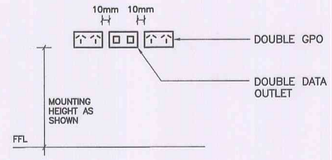

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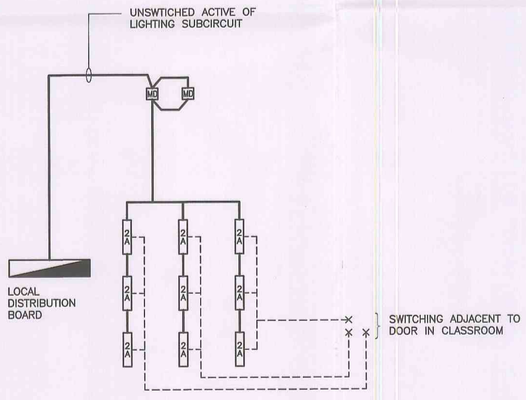
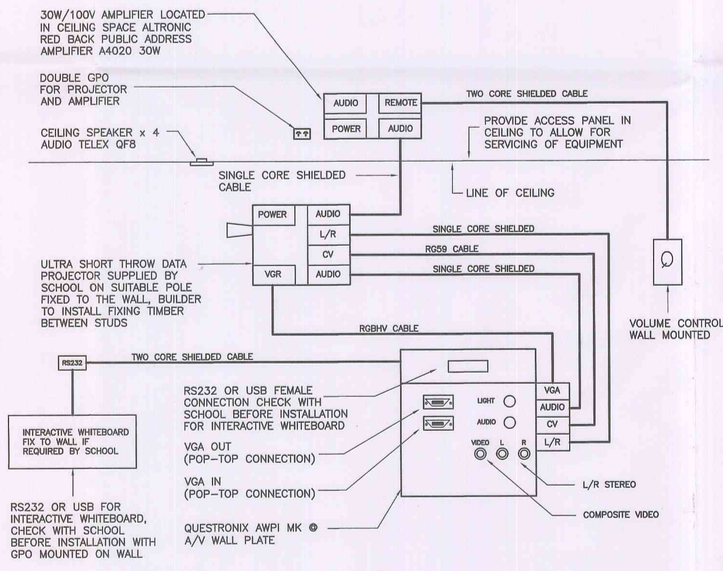


NEW CLASSROOM LIGHTING SWITCHING ARRANGEMENT

NOTES: NUMBER & TYPE OF LIGHTS TO BE AS PER LIGHTING LAYOUT DRAWINGS



AUDIO VISUAL CABLING SCHEMATIC

NOTE: FOR FULL DETAILS OF REQUIRED AV CABLING AND EQUIPMENT REFER TO SPECIFICATION

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier .....
Accreditation No. BPB0284

NOTES

1. FOR LEGEND REFER TO DRAWING No. 5337-ES-1.

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D. Taylor 27.11.09

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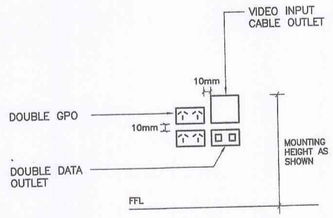
PROJECT
LOQUAT VALLEY ANGLICAN SCHOOL ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

ELECTRICAL SERVICES
DETAILS SHEET

DATE SEPT. 2009	SCALE NTS@A1
DRAWN DT	CHECKED -
DRAWING No 5337-ES-7	ISSUE No C



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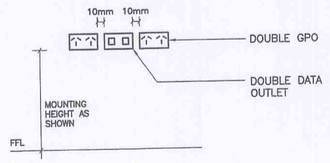

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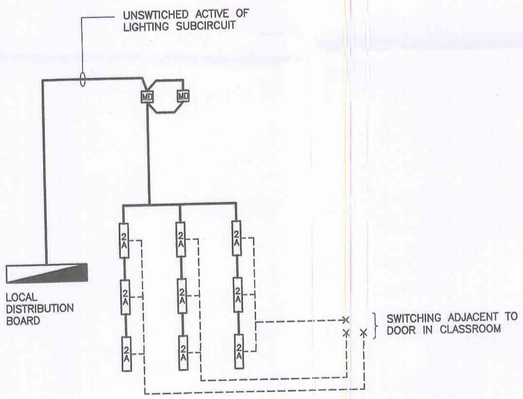
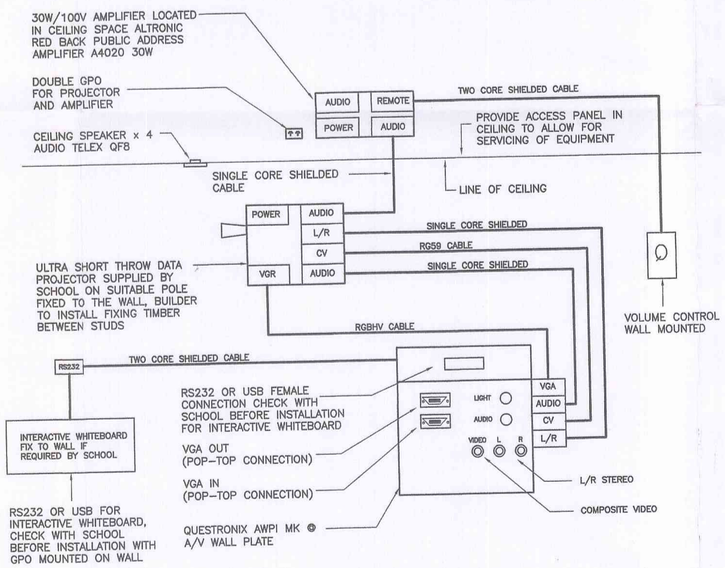


NEW CLASSROOM LIGHTING SWITCHING ARRANGEMENT

NOTES: NUMBER & TYPE OF LIGHTS TO BE AS PER LIGHTING LAYOUT DRAWINGS



AUDIO VISUAL CABLING SCHEMATIC

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CONSULTING ENGINEERS

D. Taylor 27.11.09

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PROJECT
LOQUAT VALLEY ANGLICAN SCHOOL ALTERATIONS AND ADDITIONS
1977 Pittwater Road Bayview

ELECTRICAL SERVICES
DETAILS SHEET

DATE SEPT. 2009	SCALE NTS@A1
DRAWN DT	CHECKED -
DRAWING No 5337-ES-7	ISSUE No C

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
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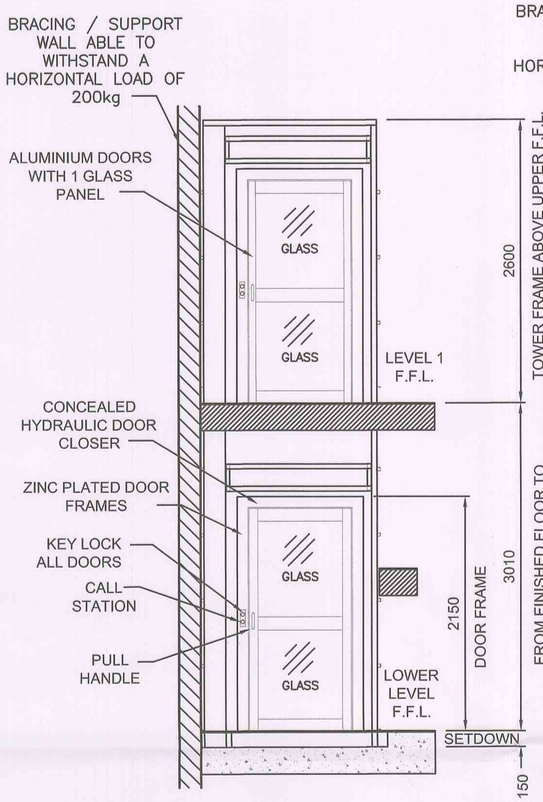
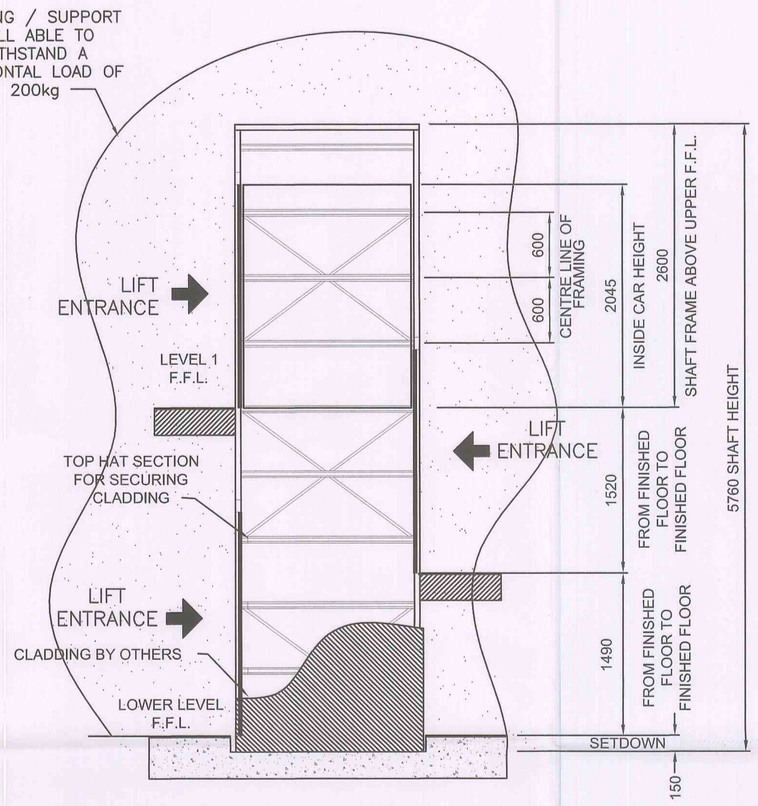
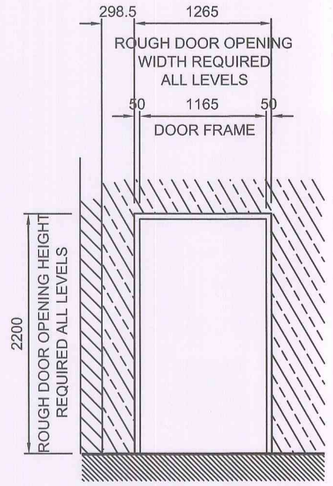
Accreditation No. BPB0284



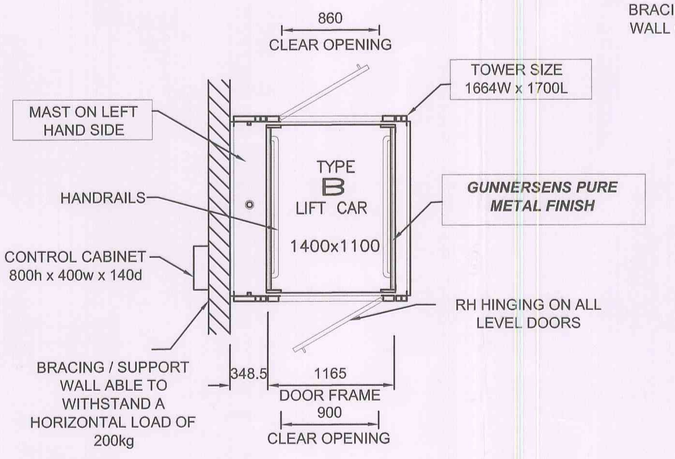
FRONT ELEVATION



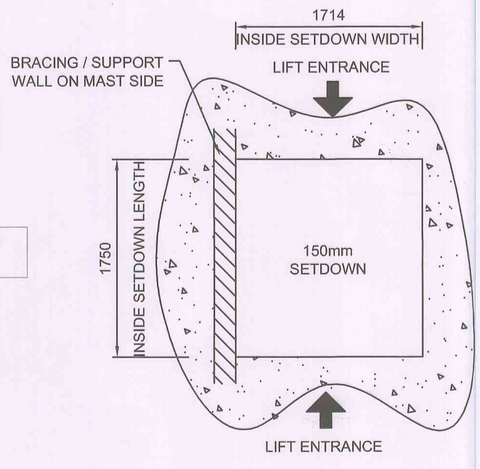
SIDE ELEVATION



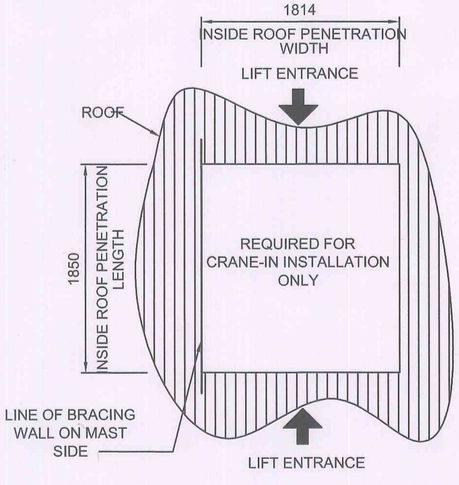
ROUGH DOOR OPENING DETAIL



PLAN



SETDOWN / FLOOR PENETRATION DETAIL



ROOF PENETRATION DETAIL

CAD1348–1

MASTER LIFTS
A.B.N. 23–746–062–497

Sydney Office
Suite 22, The Shed
1 Pitt Street
Loftus, NSW 2232

Ph: (02) 9543 7474
Fax: (02) 9543 7478

Contessa
Model 2000 BCA Type B

CRANE–IN INSTALLATION

LOW RESONANCE ECO SCREW DRIVE

Manufactured in Australia by an Australian owned company

COMPLIANCE WITH AS. 1735 Pt.16
BCA. E 3.6

NOTE:
THE CONTESSA 2000BCA COMES IN ITS OWN STRUCTURAL ALUMINIUM FRAME.

APART FROM A BRACING / SUPPORT WALL, THERE IS NO REQUIREMENT FOR A STRUCTURAL SHAFT TO BE CONSTRUCTED

CARRYING CAPACITY UP TO 340kg

CLIENT SIGNATURE

CLIENT
LOQUAT VALLEY ANGLICAN SCHOOL THREE STOP LIFT

INSTALLATION ADDRESS
1977 PITTWATER ROAD
BAYVIEW

ARCHITECT/BUILDER/DESIGNER

URBAN CITY CONSULTING PTY LTD
21 JAN 2010
Accredited Certifier
Accreditation No. BPB0284

DRAWN: M HEALY	CHECKED:
DATE: 23–12–09	SCALE: N.T.S.
REVISION: A	
JOB NO:	1 OF 1