Get Certified
BUILDING SERVICES PTY LTD

Address: PO Box 1232
Mona Vale NSW 1660
Tel: 0284111532
Fax:
Email: greg@getcertified.net.au
ABN: 30 123 3390 429

23 November 2014

Our ref.: 140216

The General Manager
Pittwater Council
PO Box 882,
Mona Vale NSW 1660

Dear Sir/Madam,

Re: 2a Livistona Lane Palm Beach
Construction Certificate No. 140216

Development application No.: NO108/14

Get Certified Building Services Pty Ltd has issued a Construction Certificate under Part 4A of the Environmental Planning and Assessment Act 1979 for the above premises.

Please find enclosed the following documentation:

- Construction Certificate No. 140216
- Copy of application for Construction Certificate.
- Documentation used to determine the application for the Construction Certificate as detailed in Schedule 1 of the Certificate.
- Cheque for Council's registration fee.

Our client has been advised of the necessity to submit to Council the Notice of Commencement of building works 48 hours prior to the commencement of works.

Should you need to discuss any issues, please do not hesitate to contact the Accredited Building Surveyor Greg Hough.

Yours faithfully,

Greg Hough
Accredited Certifier
Get Certified Building Services Pty Ltd

$36 REC: 370919 26/11/14

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CONSTRUCTION CERTIFICATE 140216

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

APPLICANT DETAILS

Applicant:	Vimiera Pty Ltd
Address:	2 The Point Road Woolwich NSW 2110
Contact Details:	**Phone**: 8247 9000 **Fax:**

OWNER DETAILS

Name of person having benefit of the development consent:	Vimiera Pty Ltd
Address:	2 The Point Road Woolwich NSW 2110
Contact Details:	**Phone**: 8247 9000

RELEVANT CONSENTS

Consent Authority/Local Government Area:	Pittwater Council
Development Consent No:	NO108/14, , **Date issued:** 14/08/2014

PROPOSAL

Address of Development:	2a Livistona Lane Palm Beach NSW 2108
Lot/DP/Zoning:	Lot 1 DP 1125750 Zone:
Building Classification:	Class 1a,10b
Scope of building works covered by this Notice:	Construction of Dwelling & Swimming Pool & Associated Landscaping
Value of Construction Certificate (Incl GST):	$2,806,750.00
Plans and Specifications approved:	Schedule 1
Fire Safety Schedule:	N/A
Exclusions:	
Critical stage inspections;	See attached Notice

CERTIFYING AUTHORITY

Certifying Authority:	Greg Hough
Accreditation Body:	Building Professionals Board Registration No. 0186

I certify that work completed in accordance with the documentation accompanying the application for this certificate (with such modifications, if any, verified by me as may be shown on that documentation) will comply with the requirements of the Environmental Planning & Assessment Regulation 2000 as referred to in s.81A(5) of the Environmental Planning & Assessment Act 1979.

The documents listed in Schedule 1 accompanied the application for this certificate.

Dated this: 23/11/2014

Greg Hough
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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Fax:
Email: greg@getcertified.net.au
ABN: 30 123 3390 429

SCHEDULE 1: APPROVED PLANS AND SPECIFICATIONS

1. Endorsed Architectural plans

PREPARED BY	DOCUMENT	DRAWING NO	REVDATE
bkh Architects	Architectural Plans	A.00.00 to A.05.01	

2. Endorsed Structural plans

PREPARED BY	DOCUMENT	DRAWING NO	REVDATE
istruct Consulting Engineers	Structural Engineering Details	S01 to S09	1 & 4

3. Endorsed Engineering plans

PREPARED BY	DOCUMENT	DRAWING NO	REVDATE
Northern Beaches Consulting Engineers Pty Ltd	Stormwater plans & Soil & Erosion Control Plan	D01 to D05	A & B

4. Endorsed Landscape plans

PREPARED BY	DOCUMENT	DRAWING NO	REVDATE
Arcadia Landscape Architecture	Landscape Plan	000 to 502	

5. Endorsed Other documents

PREPARED BY	DOCUMENT	DRAWING NO	REVDATE
Arcadia Landscape Architectural Pty Ld	Landscape Plan Certification		
	LSL Receipt		
Pittwater Council	Council Approval For Modified Color Palette		
AAA Traffic Control Pty Ltd	Construction Traffic Management Plan		
Pacific Plus Constructions	Construction Management Plan		
	Sydney Water Stamped Plan		
Pittwater Council	Section 139 Consent - Roads Act 1093		
	Forms 2A & 2B		
Crozier Geotechnical Consultants	Revised Getechnical Report		
istruct Cosulting Engineers	Builk Excavation Plan		
Crozier Geotechnical Consultants	Dilapidation Reports of 2 & 3 Livistona Place		
	Building Specification		

Get Certified
BUILDING SERVICES PTY LTD

Address: PO Box 1232
Mona Vale NSW 1660
Tel: 0284111532
Fax:
Email: greg@getcertified.net.au
ABN: 30 123 3390 429

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:	Vimiera Pty Ltd
Address:	2 The Point Road Woolwich NSW 2110
Contact Details:	**Phone**: 8247 9000

RELEVANT CONSENTS

Consent Authority/Local Government Area:	Pittwater Council
Development Consent No:	NO108/14, , **Date issued:** 14/08/2014
Construction Certificate Number: 140216	**Date issued:** 23/11/2014

PROPOSAL

Address of Development:	2a Livistona Lane Palm Beach NSW 2108
Scope of building works covered by this Notice:	Construction of Dwelling & Swimming Pool & Associated Landscaping

PRINCIPAL CERTIFYING AUTHORITY

Certifying Authority:	Greg Hough
Accreditation Body:	Building Professionals Board
	Registration No. 0186

The owner has appointed Greg Hough as the Principal Certifying Authority as stated in the Construction Certificate Application lodged with Get Certified Building Services Pty Ltd for the building works identified in this Notice.

I, Greg Hough, Accredited Certifier of Get Certified Building Services Pty Ltd located at PO Box 1232 Mona Vale NSW 1660 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: 23/11/2014

Greg Hough
Principal Certifying Authority

RECEIVED 30/10/14

COPY

Get Certified
BUILDING SERVICES PTY LTD

Please Tick Service / Application Required:

- ☑ **CONSTRUCTION CERTIFICATE**
- ☐ **COMPLYING DEVELOPMENT CERTIFICATE UNDER AFFORDABLE RENTAL HOUSING SEPP 2009 (GRANNY FLAT)**
- ☐ **COMPLYING DEVELOPMENT CERTIFICATE UNDER SEPP-COMPLYING DEVELOPMENT CODE 2008**

Environmental Planning and Assessment Act 1979

- ☑ **APPOINT GREG HOUGH AS PRINCIPAL CERTIFYING AUTHORITY**

Application No: CC140216

Subject land:

Address: 2A LIVISTONA LN, PALM BEACH Postcode: 2108

Lot & DP: LOT 1 DP 1125750 Area of site: 719 m²

Description of development:

Type of application: ☑ new application ☐ modification to existing approved certificate

Description of proposed works: CONSTRUCTION OF A TWO ~~STOREY~~ & THREE STOREY BUILDING OVER 5 LEVELS WITH ASSOCIATED SWIMMING POOL, GARAGE & LANDSCAPING

Applicant's details (Applicant must have Owner's Consent - refer to page 2):

Unless otherwise raised all invoicing will be forwarded to the applicant.

Name/s: *(In block letters)* PHILIP SALTER

Address: 2 THE POINT RD. WOOLWICH N.S.W 2110

Telephone No: (Business) 8247 9000 (Private) .....

(Mobile) 0418 155 715 (Fax No.) .....

(Email Address) PHILP.SALTER@MATSAL.COM.AU

Consent of owners:

I / we consent to:

- The making of this application
- At such time as the application is determined as approved I hereby appoint Greg Hough of Get Certified Building Services P/L as the Principal Certifying Authority for this development.
- Contract for Certification Services has been entered into.

Owners details:

Name/s: *(In block letters)* PHILIP SALTER

Address: 2 THE POINT RD WOOLWICH N.S.W 2110

Telephone No: (Business) 8247 9000 (Private) .....

(Mobile) 0418 155 715 (Fax No.) .....

(Email Address) PHILIP.SALTER@MATSAL.COM.AU

Signature/s: ..... Date: 28.10.14

Development consent details (*Construction Certificate Application Only*):

Development application No: N0108/14 Date of determination: 14th AUGUST 2014

Contract Value of Work *(building)*: $ 2,806,750 (including GST)

Builder / owner-builder details *(if known at this stage)*:

Name/s: Pacific Plus Constructions Pty Ltd

Address: .....

Contract licence No. or Permit No. in case of an owner builder: 195011C

Contact details: Phil Studwick - 9939 8103

Email Address: .....

Building Code of Australia building classification *(if known)*: 1a, 10a & 10b

Privacy

The personal details requested on this form are required under the Environmental Planning and Assessment Act 1979 and will only be used in connection with the requirements of this legislation. Access to this information is restricted to Get Certified Building Services Pty Ltd and other people authorised under the Act.

Signature of Applicant

Sign: _____ Date: 28th/10/2014

SCHEDULE TO CONSTRUCTION CERTIFICATE/COMPLYING DEVELOPMENT APPLICATION
(This information will be sent to the Australian Bureau of Statistics)

All new buildings:

Please complete the following:

- Number of storeys (including underground floors) — 5
- Gross floor area of new building (m^2) — 260 m^2
- Gross site area (m^2) — 719 m^2

All new buildings:

Please complete the following details of residential structures:

- Number of dwellings to be constructed — 1
- Number of pre-existing dwellings on site — 0
- Number of dwellings to be demolished — 0
- Will the new dwelling (s) be attached to other new Buildings? — Yes ☐ No ☑
- Will the new dwelling (s) be attached to existing Buildings? — Yes ☐ No ☑
- Does the site contain a dual occupancy? (NB dual occupancy = two dwellings on the same site) — Yes ☐ No ☑

All new buildings:

Please indicate the materials to be used in the construction of the new building(s):

Walls	Code	Roof	Code	Floor	Code	Frame	Code
Brick (double)	☐ 11	Tiles	☐ 10	Concrete or slate	☑ 20	Timber	☐ 40
Brick (veneer)	☑ 12	Concrete or slate	☑ 20	Timber	☐ 40	Steel	☑ 60
Concrete or stone	☑ 20	Fibre cement	☐ 30	Other	☐ 80	Aluminium	☑ 70
Fibre Cement	☐ 30	Steel	☐ 60	Not Specified	☐ 90	Other	☐ 80
Timber	☑ 40	Aluminium	☐ 70			Not specified	☐ 90
Curtain glass	☐ 50	Other	☐ 80				
Steel	☐ 60	Not specified	☐ 90				
Aluminium	☑ 70						
Other	☐ 80						
Not Specified	☐ 90						

ARCADIA
LANDSCAPE ARCHITECTURE
Lower Deck Jones Bay Wharf Suite 68 26-32 Pirrama Road Pyrmont NSW 2009
p 61 2 9571 6259 f 61 2 9571 7930 w www.arcadiala.com.au

DESIGN CERTIFICATE BY THE CONSULTANT

PROJECT: **2A LIVISTONA LANE PALM BEACH NSW 2108**

LANDSCAPE ARCHITECTS: **Arcadia Landscape Architecture P/L**

ABN: 83 148 994 870

To whom it may concern,

This Consultant's Certificate is given in relation to the Landscape Documentation carried out by Arcadia Landscape Architecture P/L.

Arcadia Landscape Architecture hereby certifies that the landscape design prepared including the Construction Certificate Drawings listed below has been documented to our best knowledge in accordance with the approved Development Application NO108/14 issued 14.08.2014 by Pittwater Council for the modifications to the residential project at 2A Livistona Lane, Palm Beach, NSW 2108 (Lot 1 DP 1125750).

000	COVER SHEET	2
301	HARDWORKS PLAN	2
401	SOFTWORKS PLAN	2
501	LANDSCAPE DETAILS	2
502	LANDSCAPE DETAILS	2

The landscape design also complies to the best of our knowledge with the following:

(a) All relevant Council codes,
(b) Development Control Plan,
(c) Local Environmental Plan,
(d) Council policies,
(e) All Development Consent Conditions issued by Pittwater Council.

Yours Faithfully- For Arcadia Landscape Architecture Pty Ltd.

Alex Longley

Principal

Date: 14th November 2014

Levy Online Payment Receipt

Building and Construction

VIMIERA PTY LTD
L 8 151 MACQUARIE ST
SYDNEY NSW 2000

Application Details:

Applicant Name:	**VIMIERA PTY LTD**
Levy Number:	**5078866**
Application Type:	**CC**
Application Number:	**N0108/14**
Approving Authority:	**PITTWATER COUNCIL**

Work Details:

Site Address:	**2A LIVISTONA LANE** **PALM BEACH NSW 2108**
Value of work:	**$2,806,750**
Levy Due:	**$9,823.00**

Payment Details:

LSC Receipt Number:	**182220**
Payment Date:	**27/10/2014 12:28:52 PM**
Bank Payment Reference:	**771274198**
Levy Paid:	**$9,823.00**
Credit card surcharge:	**$39.29**
Total Payment Received:	**$9,862.29**

Greg Hough

From: Jake Eaton [jake@bkh.com.au]
Sent: Friday, October 24, 2014 11:41 AM
To: Greg Hough
Cc: Alex Papas; Jodie
Subject: Fwd: Building Colours

Hi Greg,

Please see below confirmation from Rebecca Englund for the modified colour palette.

Thanks

Jake

Burley Katon Halliday

Jake Eaton

bkh

Sydney
Burley Katon Halliday Pty Ltd
46A Macleay Street Suite 2.10
Potts Point NSW 2011
Australia

Postal: PO Box 1698, Potts Point, NSW 1335, Australia

p +61 (2) 9332 2233
f + 61 (2) 9360 2048
e jake@bkh.com.au
w www.bkh.com.au

Nominated Architect
Jake Eaton 8430 (NSW ARB) 17974 (ARBV)

Begin forwarded message:

> **From:** "Rebecca Englund" <Rebecca_Englund@pittwater.nsw.gov.au>
> **Date:** 24 October 2014 8:41:50 AM AEDT

To: "Jake Eaton" <jake@bkh.com.au>
Subject: Building Colours

Morning Jake,

The proposed colour schedule, demonstrated on A00.00[2] dated 26.09.2014, is considered consistent with the provisions of Pittwater Council's DCP.
I can confirm that the use of "Timeless Grey" is an acceptable replacement for "Milton Moon", in accordance with condition C16.

Kind Regards,
Rebecca

PITTWATER COUNCIL

Rebecca Englund |Senior Planner |Development Assessment
1 Park Street Mona Vale NSW 2103| PO Box 882 Mona Vale NSW 1660
ph: 02 9970 1250 | fax: 02 9970 1200 | rebecca_englund@pittwater.nsw.gov.au

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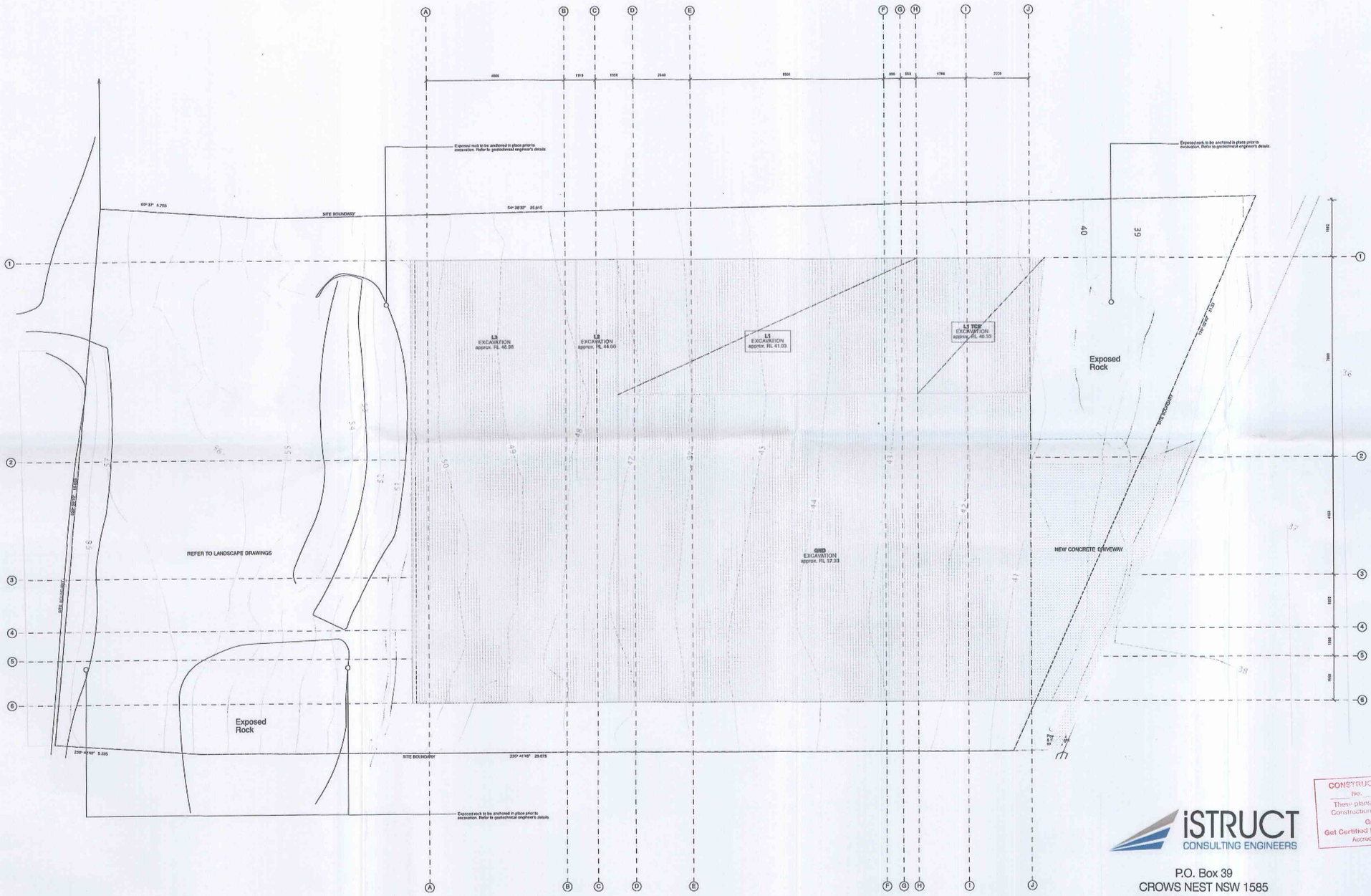
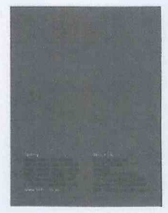


1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS



iSTRUCT
CONSULTING ENGINEERS
P.O. Box 39
CROWS NEST NSW 1585
info@istruct.com.au
www.istruct.com.au

CONSTRUCTION CERTIFICATE
No. H/216
These plans form part of the above Construction Certificate as issued by
Greg Rough of
Get Certified Building Services Pty Ltd
Accreditation No. BPB0196

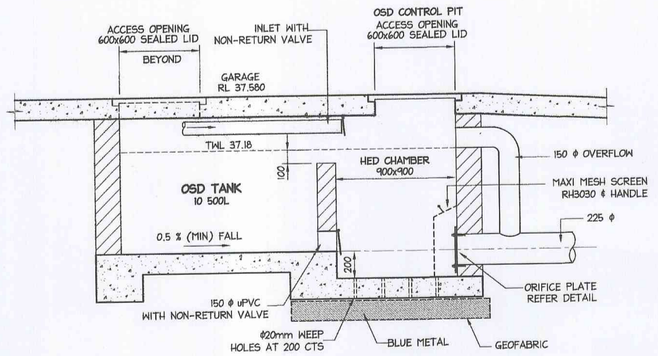
DAMIAN IGNCO
BE(HONS) MIEAUST CPENG NPER.
14/11/14.

SALTER RESIDENCE
29 Lilliebrook Lane Palm Beach
Lot 1, DP 1125758

TENDER DOCUMENTATION

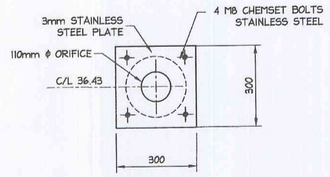
Drawing
BULK EXCAVATION PLAN
GROUND

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JC	13.03.2014	3246	A06.00



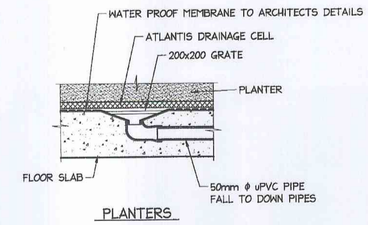
OSD TANK & HED CHAMBER DETAIL

SCALE = 1:20



ORIFICE PLATE DETAIL

SCALE = 1:10

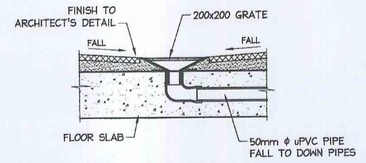


PLANTERS

'RWO' - RAINWATER OUTLET DETAIL

SCALE = 1 : 10

OR TO ARCHITECT'S DETAIL



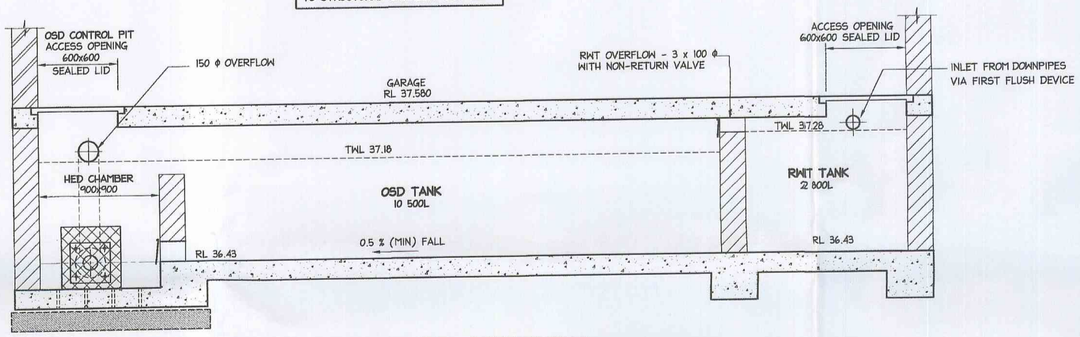
BALCONY/TERRACE

'RWO' - RAINWATER OUTLET DETAIL

SCALE = 1 : 10

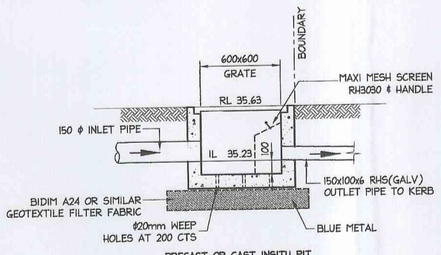
OR TO ARCHITECT'S DETAIL

STRUCTURE BY OTHERS TO STRUCTURAL ENGINEERS DETAILS



OSD TANK & RAINWATER TANK DETAIL

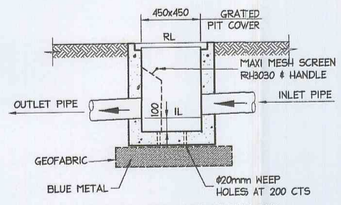
SCALE = 1:20



PRECAST OR CAST INSITU PIT
REFER STORMWATER NOTES
ALTERNATIVE POLYPROPYLENE PIT BY MANUFACTURER

BOUNDARY PIT DETAIL

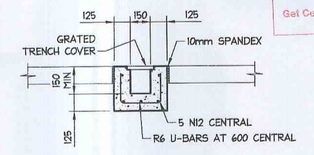
SCALE = 1 : 20



PRECAST OR CAST INSITU PIT
REFER STORMWATER NOTES
ALTERNATIVE POLYPROPYLENE PIT BY MANUFACTURER

450x450 PIT DETAIL

SCALE = 1 : 20



OR PRECAST GRATED DRAIN
ALTERNATIVE POLYPROPYLENE DRAIN BY MANUFACTURER

'GD' - TYPICAL GRATED DRAIN

SCALE = 1 : 20

CONSTRUCTION CERTIFICATE
No. 14/240
These plans form part of the above Construction Certificate as issued by
Greg Hough of
Get Certified Building Services Pty Ltd
Accreditation No: BPB0186

ISSUED FOR CONSTRUCTION CERTIFICATE SUBMISSION ONLY

IF IN DOUBT ASK

Northern Beaches Consulting Engineers Pty Ltd.

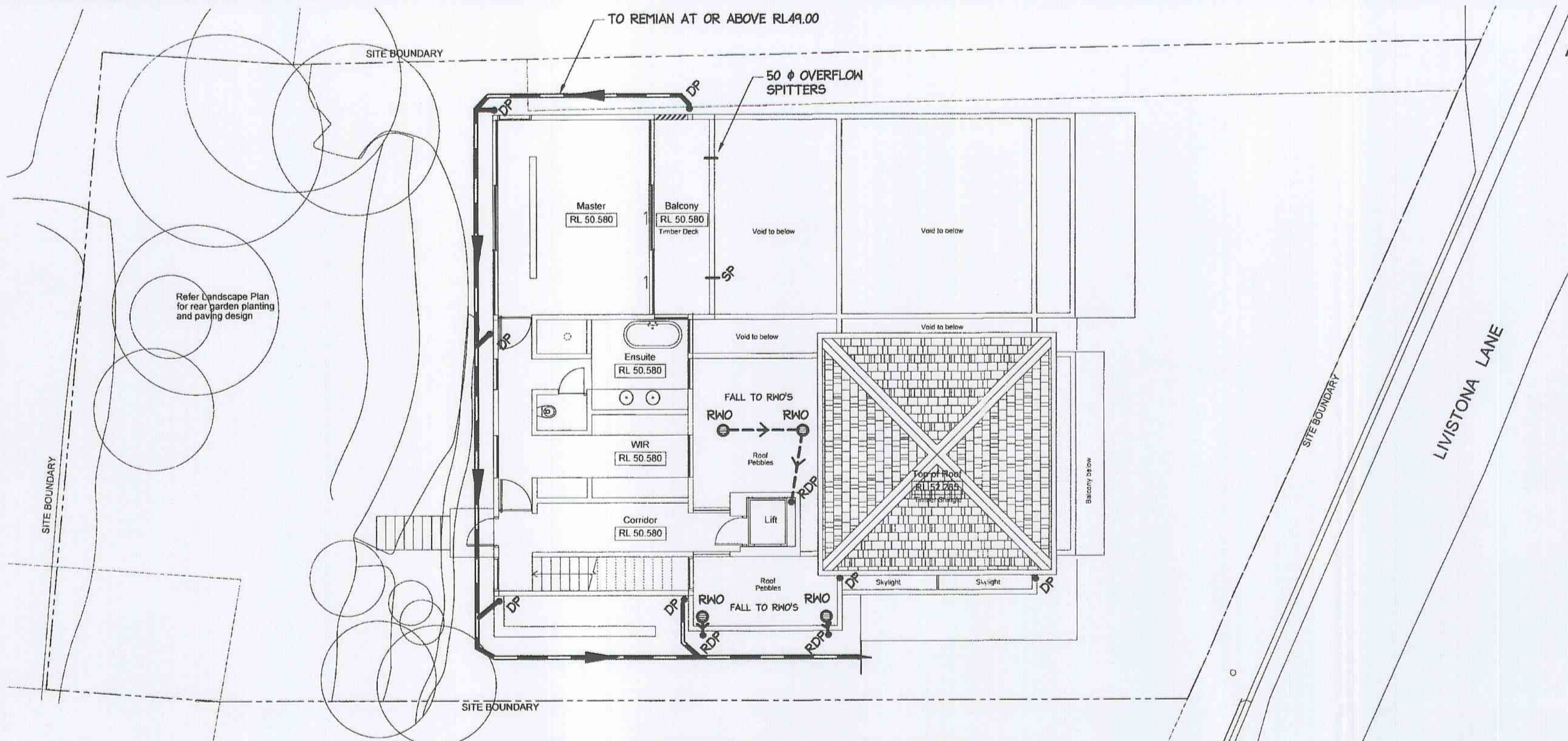
A1

Date:	Rev:	Amendment:	By:
31-10-2014	B	ISSUE FOR CC	MC
04-04-2014	A	ISSUE FOR DA	MC

DOCUMENT CERTIFICATION
Date : 6/11/14
Stewart McGeady
B.E.(Civil), MIEAust, P.Eng
(Director Northern Beaches Consulting Engineers)

NORTHERN BEACHES Consulting Engineers P/L.
A.C.N. 076 121 616 A.B.N. 24 076 121 616
Suite 207, 30 FISHER ROAD
DEE WHY N.S.W. 2099
Ph: (02) 9984 7000 Fax: (02) 9984 7444
e-mail : nbc@nbcconsulting.com.au
web page : www.nbcconsulting.com.au

Architect:	BKH ARCHITECTS
Client:	PHIL SLATER
Project:	NEW RESIDENCE 2a LIVISTONA LANE PALM BEACH
Drawing Title:	STORMWATER MANAGEMENT DETAILS
Date:	APRIL 2014
Design:	CH/MW
Drawn:	MC
Checked:	
Job No:	140143
Drawing No:	D04
Rev:	B

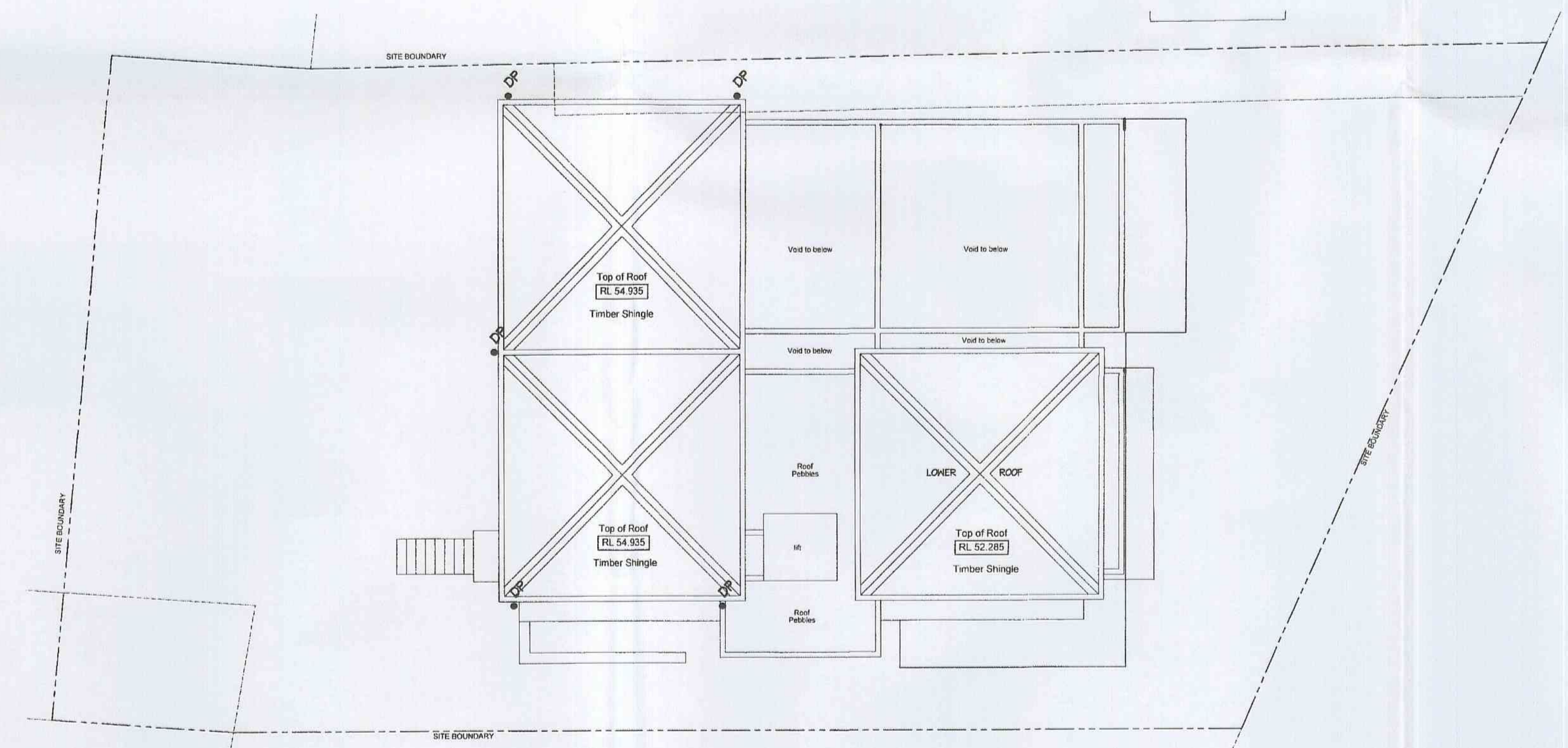


ALL ROOF DOWNPIPES 'DP' TO BE DIRECTED TO RWT

ALL 'RWO' & 'RDP' TO BE DIRECTED TO OSD HED CHAMBER

LEVEL 4 & LOWER ROOF- DRAINAGE PLAN

SCALE = 1 : 100



ALL ROOF DOWNPIPES TO BE DIRECTED TO RWT

UPPER ROOF - DRAINAGE PLAN

SCALE = 1 : 100

LEGEND

DP	DOWNPIPE
RDP	DOWNPIPE TO COLLECT RWO'S
	STORMWATER PIPE FLOW DIRECTION
PIT	STORMWATER PIT
RWO	200x200 RAINWATER OUTLET
GD	GRATED DRAIN
OSD	ONSITE DETENTION TANK
RWT	RAINWATER RE-USE TANK

NOTE:
DRAINAGE LINE LOCATIONS ARE INDICATIVE ONLY AND MAY VARY DUE TO CONSTRAINTS.
IF IN DOUBT CONTACT THE ENGINEER.

STORMWATER NOTES:

1 - ALL PIPES TO BE 100mm ϕ UNLESS NOTED OTHERWISE.
2 - ALL PIPES TO BE uPVC TO AS 1254-2002 UNLESS NOTED OTHERWISE.
3 - ALL PIPES TO BE LAYED AT 1 % MINIMUM GRADE UNLESS NOTED OTHERWISE.
4 - ALL PIPES SHALL BE LAID ON A 75mm SAND BED, COMPACTED TO 100% S.M.D.D. BELOW PAVEMENTS. (NO COMPACTION REQUIRED BELOW LANDSCAPING) COVER TO SURFACE FROM TOP OF PIPE TO BE 300mm MINIMUM. BACKFILL TO BE ADEQUATELY CONSOLIDATED AROUND PIPES BY METHOD OF RAMMING AND WATERING IN. TRENCHES TO BE FILLED WITH GRANULAR MATERIAL AS SPECIFIED.
5 - ALL DOWN PIPES TO BE 100mm ϕ UNLESS NOTED OTHERWISE.
6 - DOWN PIPE LOCATIONS ARE INDICATIVE ONLY. LOCATIONS TO BE CONFIRMED WITH ARCHITECT PRIOR TO COMMENCEMENT WITH WORK.
7 - PROVIDE CLEANING EYES AT ALL DOWNPIPES.
8 - ALL PITS TO BE CAST INSITU OR, IF PRECAST, APPROVED BY ENGINEER. CAST INSITU PITS TO HAVE 150mm THICK CONCRETE WALLS AND BASE. WALLS TO BE REINFORCED WITH 1 N12 TOP TIE UNLESS NOTED OTHERWISE. CAST INSITU PITS GREATER THAN 1000 DEEP TO BE MINIMUM 900x600 AND TO HAVE 150mm THICK CONCRETE WALLS AND BASE. WALLS TO BE REINFORCED WITH N12 AT 300 EACH WAY UNLESS NOTED OTHERWISE.
9 - ALL PITS GREATER THAN 1000mm DEEP SHALL HAVE STEP IRONS AS PER COUNCIL STANDARDS.
10 - ALL WORK TO BE IN ACCORDANCE WITH LOCAL COUNCIL STANDARDS AND SPECIFICATIONS.
11 - PRIOR TO COMMENCING ANY SITE WORKS THE CONTRACTOR SHALL IMPLEMENT EROSION CONTROL MEASURES TO APPROVED SEDIMENT AND EROSION CONTROL PLAN, EPA GUIDELINES AND COUNCIL SPECIFICATIONS. ALL MEASURES TO REMAIN IN PLACE UNTIL COMPLETION AND STABILIZATION OF THE SITE TO COUNCIL SATISFACTION.
12 - ALL LEVELS SHOWN ARE TO AHD
13 - ENSURE THAT ALL PITS AND STORMWATER PIPES ARE LOCATED CLEAR FROM TREE ROOT SYSTEMS.
14 - ALL EXISTING EARTHENWARE PIPES TO BE UPGRADED TO uPVC.
15 - ALL WORKS TO BE IN ACCORDANCE WITH AS 3500-2003 NATIONAL PLUMBING DRAINAGE CODE PART 3 - STORMWATER DRAINAGE.
16. - UNLESS NOTED OTHERWISE, SUB-SOIL DRAINS ARE TO BE INSTALLED IN ACCORDANCE WITH AS3500.3 ALONGSIDE WALLS THAT IMPEDE THE NATURAL FLOW OF GROUNDWATER. THIS MAY ALSO INVOLVE TRENCHING INTO THE CLAY OR ROCK SUBGRADE TO DIRECT GROUNDWATER AWAY FROM STRUCTURES.
17. - IF NOT INDICATED ON PLANS, PROVIDE LEAF CATCHERS TO ALL DOWNPIPES.
18. - ORIFICE PLATE MUST BE INSTALLED PRIOR TO INSTALLATION OF THE ROOF DRAINAGE SYSTEM AND CONNECTION OF THE SITE STORMWATER SYSTEM TO THE ONSITE DETENTION TANK.

CONSTRUCTION CERTIFICATE
No. 14/216
These plans form part of the above Construction Certificate as issued by
Greg Hough of
Get Certified Building Services Pty Ltd
Accreditation No. BPB0186

www.dialbeforeyoudig.com.au
DIAL 1100 BEFORE YOU DIG

NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE

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31-10-2014	B	ISSUE FOR CC	MC
04-04-2014	A	ISSUE FOR DA	MC

DOCUMENT CERTIFICATION
Date : 6/11/14
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B.E.(Civil),MIEAust,P.Eng
(Director Northern Beaches Consulting Engineers)

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web page : www.nbconsulting.com.au

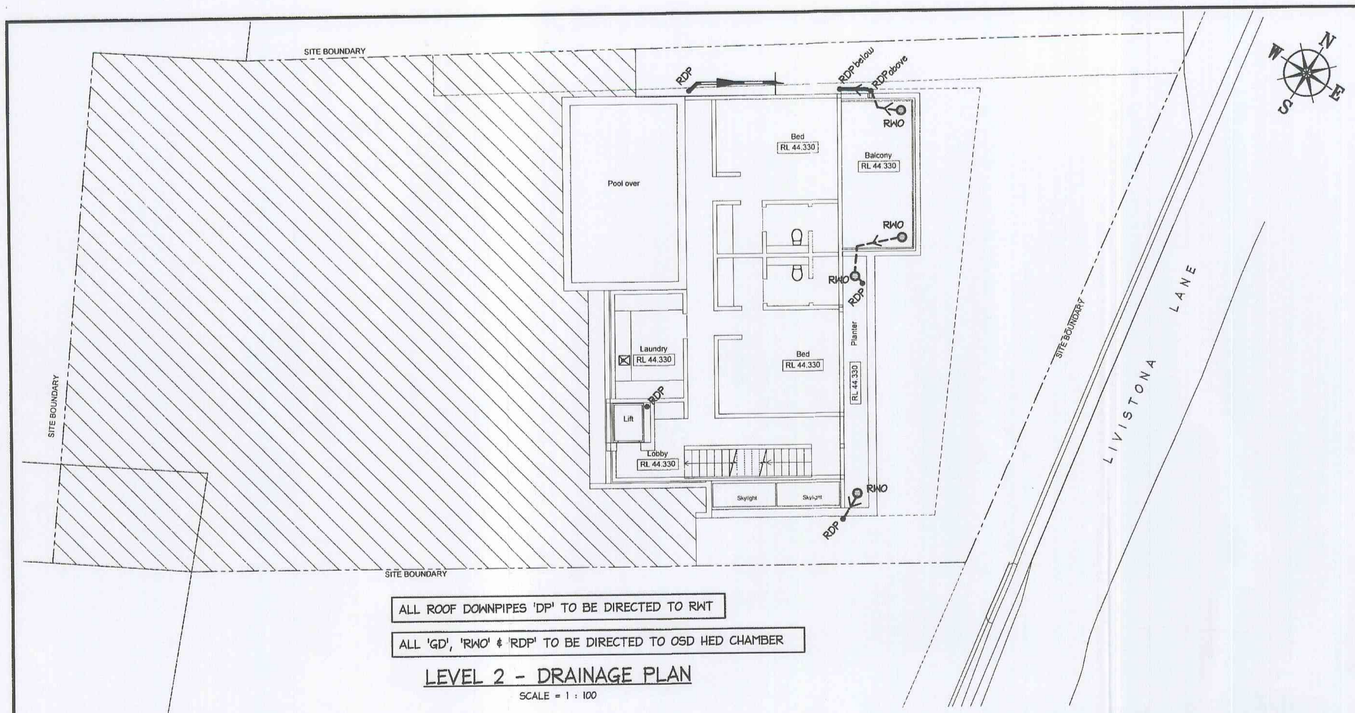
Architect: BKH ARCHITECTS
Client: PHIL SLATER

Project: NEW RESIDENCE
2a LIVISTONA LANE PALM BEACH

Drawing Title: STORMWATER MANAGEMENT DRAINAGE PLANS

Date:	Design:	Drawn:	Checked:
APRIL 2014	CH/MW	MC	

Job No:	Drawing No:	Rev:
140143	D03	B

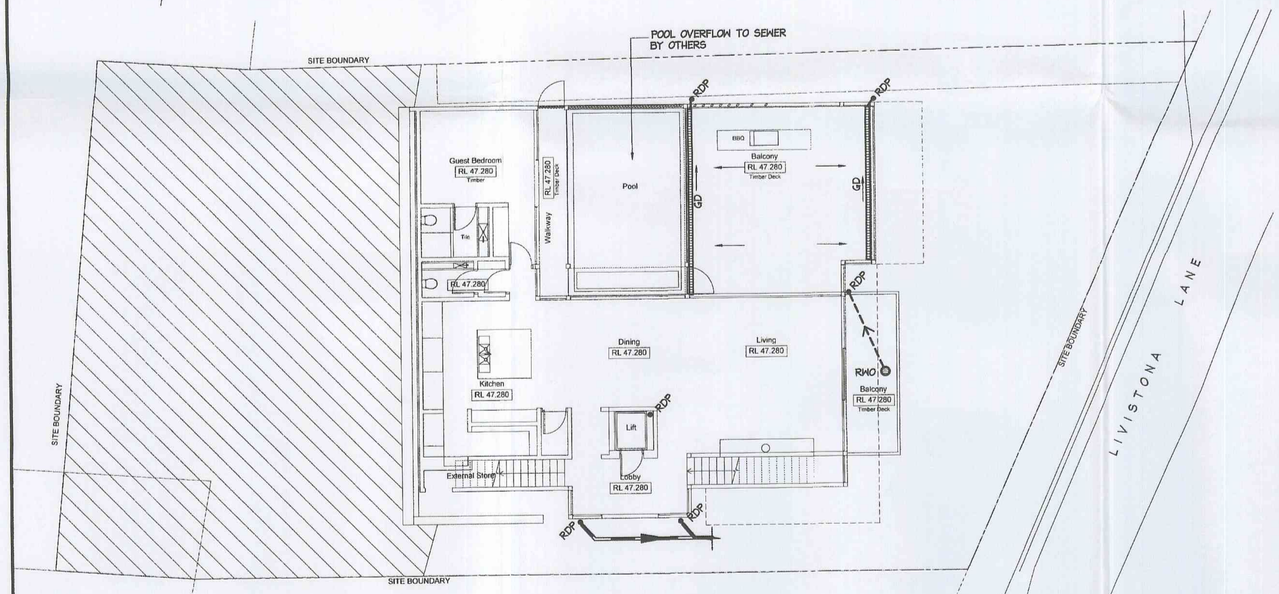


ALL ROOF DOWNPIPES 'DP' TO BE DIRECTED TO RWT

ALL 'GD', 'RWO' & 'RDP' TO BE DIRECTED TO OSD HED CHAMBER

LEVEL 2 - DRAINAGE PLAN

SCALE = 1 : 100



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LEVEL 3 - DRAINAGE PLAN

SCALE = 1 : 100

RAINWATER RE-USE TANKS:

1. CONSIDERING THE ROOF CATCHMENT AREA, LOCATION OF PROPERTY, INTENDED USE OF RAINWATER AND GARDEN SIZE WE RECOMMEND PROVIDING A RAINWATER TANK FOR USE AS PER BASIX REQUIREMENTS, SYDNEY WATER AND NSW HEALTH REQUIRMENTS FOR NON DRINKING USE ONLY AS FOLLOWS:
   a) TO WATER GARDEN AREAS b) WASHING CARS c) FILLING SWIMMING POOLS, SPAS AND ORNAMENTAL PONDS, d) CONNECT TO W.C. e) CONNECT TO WASHING MACHINE. f) USED IN HOT WATER SYSTEMS.
2. THE TANKS PROVIDED WILL REDUCE PRESSURE ON COUNCIL'S STORMWATER INFRASTRUCTURE.
3. REFERENCES:
   COOMBES P.J. & KUCZERA G. (2001), 'RAINWATER TANK DESIGN FOR WATER SUPPLY & STORMWATER MANAGEMENT.' STORMWATER INDUSTRY ASSOCIATION REGIONAL CONFERENCE.
   PATRICK DUPONT & STEVE SHACKEL, 'RAINWATER'
   AUSTRALIAN GOVERNMENT (2004), 'GUIDANCE ON USE OF RAINWATER TANKS'
4. ALL CONNECTIONS TO PLUMBING AND RAINWATER TANKS TO BE IN ACCORDANCE WITH SYDNEY WATERS' GUIDE 'INSTALLING A RAINWATER TANK' AVAILABLE AT www.sydneywater.com.au
5. PROVIDE A DUAL SUPPLY SYSTEM AND BACKFLOW PREVENTION SYSTEM IN ACCORDANCE WITH 'BASIX-DESIGN GUIDE FOR SINGLE DWELLINGS' BY NSW DEPARTMENT OF INFRASTRUCTURE, PLANING AND NATURAL RESOURCES.
6. IF NOT SPECIFIED ON PLANS, THE FIRST FLUSH SYSTEM IS TO HAVE A MINIMUM SIZE OF 20L PER 100m2 OF ROOF CATCHMENT AREA PRIOR TO ENTERING THE RAINWATER TANK. INDIVIDUAL SITE ANALYSIS IS REQUIRED IN HEAVILY POLLUTED AREAS TO DETERMINE IF LARGER VOLUMES OF FIRST FLUSH RAINWATER ARE TO BE DIVERTED. IF IN DOUBT, CHECK WITH LOCAL HEALTH AUTHORITIES.
7. SCREENED DOWNPIPE RAINWATER HEAD OR OTHER SUITABLE LEAF AND DEBRIS DEVICE TO BE INSTALLED ON EACH DOWNPIPE. SCREEN MESH TO BE 4-6mm AND DESIGNED TO BE SELF-CLEANING.
8. FIRST FLUSH DEVICES, OR APPROVED ALTERATIVE, TO BE INSTALLED WITH AN AUTOMATED DIVERSION AND DRAINAGE SYSTEM, THAT IS, NO MANUAL DIVERSION AND DRAINAGE VALVES. REFER TYPICAL FLUSH OUT PIT FOR DETAILS.
9. BEFORE PURCHASING MATERIALS OR PAINT TO BE USED ON ROOF CATCHMENT AREAS, THE MANUFACTURER'S RECOMMENDATIONS ON LABELS AND BROCHURES FOR RAINWATER TANK SUITABILITY TO BE READ AND ADHERED TO.
10. PRE-STORAGE PITS FOR UNDERGROUND RAINWATER STORAGE TANKS AND FLUSH OUT PITS MAY ASSIST IN LIMITING SILT, AND PREVENT VERMIN, INSECTS (INCLUDING MOSQUITOES) AND DEBRIS FROM ENTERING THE RAINWATER STORAGE AREA.
11. BUILDER/PLUMBER TO ENSURE THE INSTALLATION OF THE RAINWATER TANK SYSTEM IS IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND THE RAINWATER TANK DESIGN AND INSTALLATION HANDBOOK - HB 230-2008. IF IN DOUBT CONTACT ENGINEER.
12. RAINWATER TANK TO BE WATER PROOFED IN ACCORDANCE WITH HB 230-200B

CONSTRUCTION CERTIFICATE
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LEGEND

DP	DOWNPIPE
RDP	DOWNPIPE TO COLLECT RWO'S
	STORMWATER PIPE FLOW DIRECTION
PIT	STORMWATER PIT
RWO	200x200 RAINWATER OUTLET
GD	GRATED DRAIN
OSD	ONSITE DETENTION TANK
RWT	RAINWATER RE-USE TANK

NOTE:
DRAINAGE LINE LOCATIONS ARE INDICATIVE ONLY AND MAY VARY DUE TO CONSTRAINTS.
IF IN DOUBT CONTACT THE ENGINEER.

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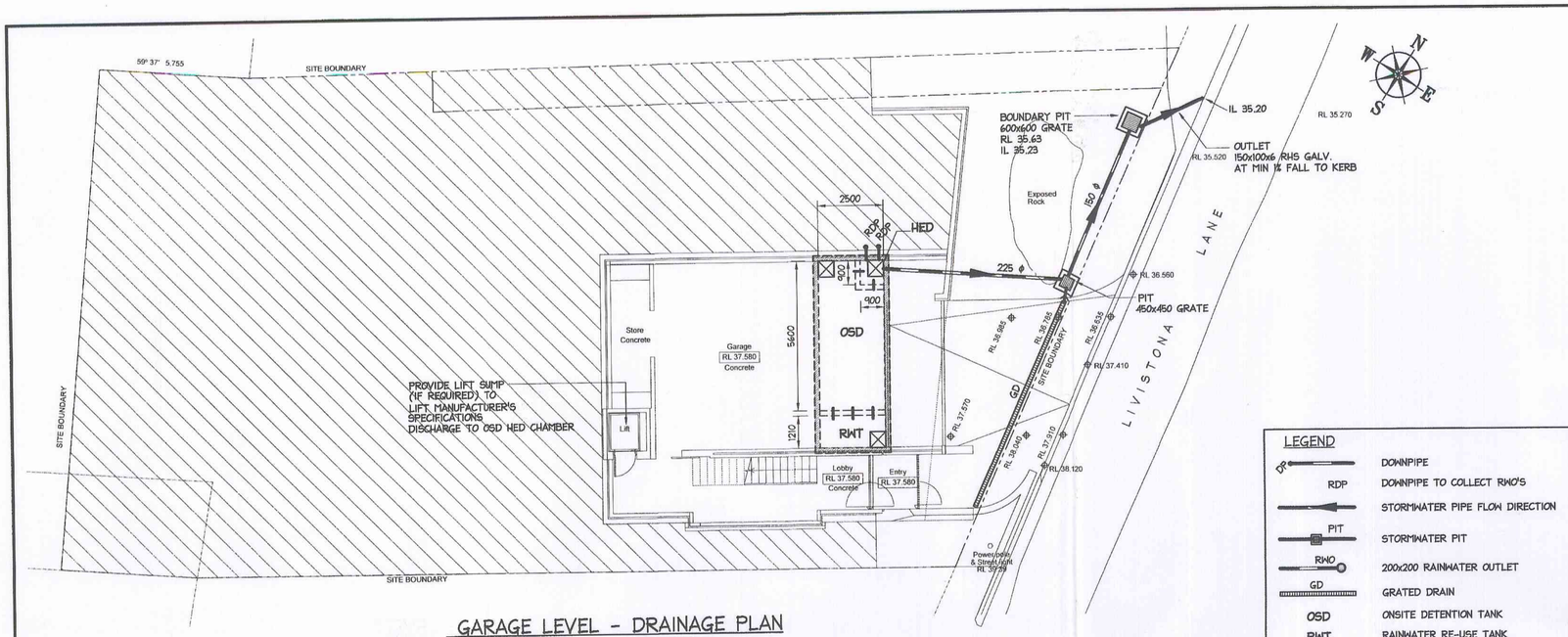
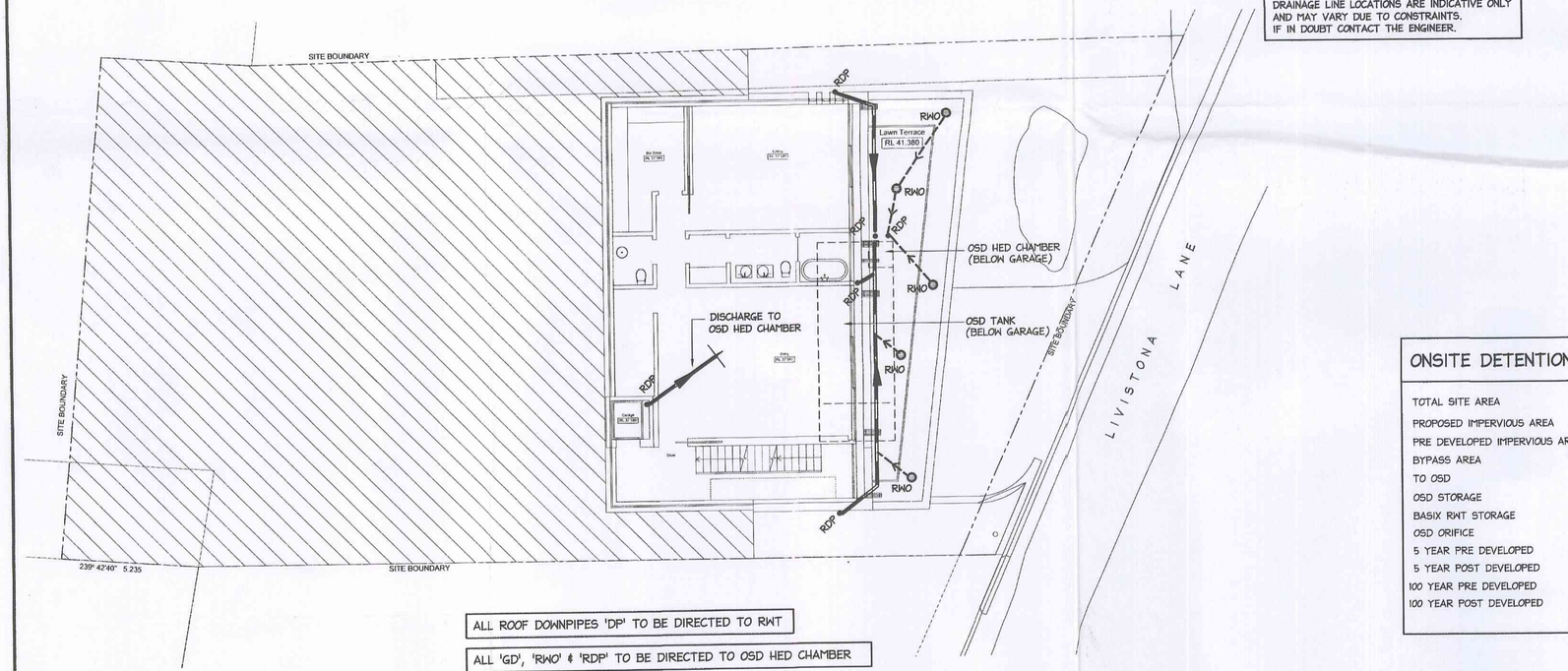
Architect: BKH ARCHITECTS	Project: NEW RESIDENCE 2a LIVISTONA LANE PALM BEACH	Date: APRIL 2014	Design: CH/MW	Drawn: MC	Checked:
Client: PHIL SLATER	Drawing Title: STORMWATER MANAGEMENT DRAINAGE PLANS	Job No: 140143		Drawing No: D02	Rev: B



GARAGE LEVEL - DRAINAGE PLAN

SCALE = 1 : 100



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ALL 'GD', 'RWO' & 'RDP' TO BE DIRECTED TO OSD HED CHAMBER

LEVEL 1 - DRAINAGE PLAN

SCALE = 1 : 100

LEGEND

DP	DOWNPIPE
RDP	DOWNPIPE TO COLLECT RWO'S
	STORMWATER PIPE FLOW DIRECTION
PIT	STORMWATER PIT
RWO	200x200 RAINWATER OUTLET
GD	GRATED DRAIN
OSD	ONSITE DETENTION TANK
RWT	RAINWATER RE-USE TANK

NOTE:
DRAINAGE LINE LOCATIONS ARE INDICATIVE ONLY AND MAY VARY DUE TO CONSTRAINTS. IF IN DOUBT CONTACT THE ENGINEER.

STORMWATER NOTES:

1 - ALL PIPES TO BE 100mm ϕ UNLESS NOTED OTHERWISE.
2 - ALL PIPES TO BE uPVC TO AS 1254-2002 UNLESS NOTED OTHERWISE.
3 - ALL PIPES TO BE LAYED AT 1 % MINIMUM GRADE UNLESS NOTED OTHERWISE.
4 - ALL PIPES SHALL BE LAID ON A 75mm SAND BED, COMPACTED TO 100% S.M.D.D. BELOW PAVEMENTS.
(NO COMPACTION REQUIRED BELOW LANDSCAPING)
COVER TO SURFACE FROM TOP OF PIPE TO BE 300mm MINIMUM.
BACKFILL TO BE ADEQUATELY CONSOLIDATED AROUND PIPES BY METHOD OF RAMMING AND WATERING IN. TRENCHES TO BE FILLED WITH GRANULAR MATERIAL AS SPECIFIED.
5 - ALL DOWN PIPES TO BE 100mm ϕ UNLESS NOTED OTHERWISE.
6 - DOWN PIPE LOCATIONS ARE INDICATIVE ONLY. LOCATIONS TO BE CONFIRMED WITH ARCHITECT PRIOR TO COMMENCEMENT WITH WORK.
7 - PROVIDE CLEANING EYES AT ALL DOWNPIPES.
8 - ALL PITS TO BE CAST INSITU OR, IF PRECAST, APPROVED BY ENGINEER. CAST INSITU PITS TO HAVE 150mm THICK CONCRETE WALLS AND BASE. WALLS TO BE REINFORCED WITH 1 N12 TOP TIE UNLESS NOTED OTHERWISE. CAST INSITU PITS GREATER THAN 1000 DEEP TO BE MINIMUM 900x600 AND TO HAVE 150mm THICK CONCRETE WALLS AND BASE. WALLS TO BE REINFORCED WITH N12 AT 300 EACH WAY UNLESS NOTED OTHERWISE.
9 - ALL PITS GREATER THAN 1000mm DEEP SHALL HAVE STEP IRONS AS PER COUNCIL STANDARDS.
10 - ALL WORK TO BE IN ACCORDANCE WITH LOCAL COUNCIL STANDARDS AND SPECIFICATIONS.
11 - PRIOR TO COMMENCING ANY SITE WORKS THE CONTRACTOR SHALL IMPLEMENT EROSION CONTROL MEASURES TO APPROVED SEDIMENT AND EROSION CONTROL PLAN, EPA GUIDELINES AND COUNCIL SPECIFICATIONS. ALL MEASURES TO REMAIN IN PLACE UNTIL COMPLETION AND STABILIZATION OF THE SITE TO COUNCIL SATISFACTION.
12 - ALL LEVELS SHOWN ARE TO AHD
13 - ENSURE THAT ALL PITS AND STORMWATER PIPES ARE LOCATED CLEAR FROM TREE ROOT SYSTEMS.
14 - ALL EXISTING EARTHENWARE PIPES TO BE UPGRADED TO uPVC.
15 - ALL WORKS TO BE IN ACCORDANCE WITH AS 3500-2003 NATIONAL PLUMBING DRAINAGE CODE PART 3 - STORMWATER DRAINAGE.
16. - UNLESS NOTED OTHERWISE, SUB-SOIL DRAINS ARE TO BE INSTALLED IN ACCORDANCE WITH AS3500.3 ALONGSIDE WALLS THAT IMPEDE THE NATURAL FLOW OF GROUNDWATER. THIS MAY ALSO INVOLVE TRENCHING INTO THE CLAY OR ROCK SUBGRADE TO DIRECT GROUNDWATER AWAY FROM STRUCTURES.
17. - IF NOT INDICATED ON PLANS, PROVIDE LEAF CATCHERS TO ALL DOWNPIPES.
18. - ORIFICE PLATE MUST BE INSTALLED PRIOR TO INSTALLATION OF THE ROOF DRAINAGE SYSTEM AND CONNECTION OF THE SITE STORMWATER SYSTEM TO THE ONSITE DETENTION TANK.

ONSITE DETENTION CALCULATIONS

TOTAL SITE AREA	=	719.8 m^2
PROPOSED IMPERVIOUS AREA	=	386.4 m^2 (42.6 %)
PRE DEVELOPED IMPERVIOUS AREA	=	0 m^2 (0 %)
BYPASS AREA	=	17.6 m^2
TO OSD	=	702.2 m^2
OSD STORAGE	=	10 500 L
BASIX RWT STORAGE	=	2 500 L
OSD ORIFICE	=	110mm ϕ
5 YEAR PRE DEVELOPED	=	22 l/s
5 YEAR POST DEVELOPED	=	22 l/s
100 YEAR PRE DEVELOPED	=	47 l/s
100 YEAR POST DEVELOPED	=	25 l/s (24 l/s FROM OSD)

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Architect: BKH ARCHITECTS	Project: NEW RESIDENCE 2a LIVISTONA LANE PALM BEACH	Date: APRIL 2014	Design: CH/MW	Drawn: MC	Checked:
Client: PHIL SLATER	Drawing Title: STORMWATER MANAGEMENT DRAINAGE PLANS	Job No: 140143		Drawing No: D01	Rev: B

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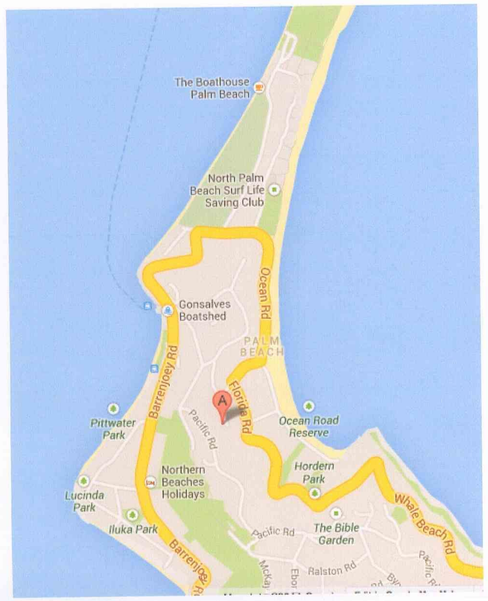
2a Livistona Lane, Palm Beach
Salter Residence
Lot 1, 1125750

LOCATION PLAN



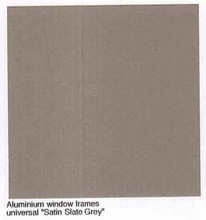
BASIX COMMITMENT

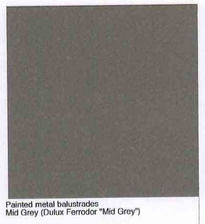
Fixtures	
The applicant must install showerheads with minimum of 3 star (>7.5 but < = 9 L/min) in all showers in the development	
The applicant must install a toilet flushing system with a minimum rating of 3 star in each toilet in the development	
The applicant must install taps with a minimum of 3 star in the kitchen in the development	
The applicant must install basin taps with a minimum rating of 3 star in each bathroom in the development	
Rainwater tank	
The applicant must install rainwater tank of at least 2500 litres on the site. This rainwater tank must meet, and be installed in acoradnace with, the requirements of all applicable regulatory authorities	
The applicant must configure the rainwater tank to collect rain runoff from at least 145sqm of the roof area of the development (excluding the area of the roof which drains to any stormwater tank or private dam)	
The applicant must connect the rainwater tank to:	
All toilets in the development	
The old water tap that supplies each clothes washer in the development	
At least one outdoor tap in the development (Note: NSW Health does not recommend that rainwater be used for human consumption in areas with potable water supply)	
A tap that is located within 10 metres of the swimming pool in the development	
Swimming Pool	
The swimming pool must not have a volume greater tahn 27 kilolitres	
The swimming pool must be outdoors	
Thermal Comfort Commitments - Simulation Method	
The applicant must construct the development in accordance with all thermal performance specifications set out in the Assessor Certificate, and in accordance with those aspects of the development application or application for a complying development certificate which were used to calculate those specifications	
Where there is an in-slab heating or cooling system, the applicant must install insulation with an R-value of not lesst than 1.0 around the vertical edges of the perimeter of the slab, and underneath the slab if it is a suspended floor.	
The applicant must construct the floors and walls of the dwelling in accordance with the specifications listerd in the table below	
Floor and Wall construction	
Floor- concrete slab on ground	152.0 sqm
Floor - suspended floor/open subfloor	4.0 sqm
Floor - suspended floor aboe garage	All or part of floor area
Hot Water	
The applicant must install the following hot water system in the development, or a system with a higher energy rating: solar (gas boosted) with a performance of 31 to 25 RECs or better	
Cooling System	
The applicant must install the following cooling system, or a system with a higher energy rathing, in at least 1 living area: 3 - phast airconditiong; Energy rating: EER 3.0 - 3.5	
The applicant must install the following cooling system, or a system with a higher energy rathing, in at least 1 bedroom: 3 - phase airconditioning; Energy rathing: EER 3.0 - 3.5	
Heating System	
The applicant must install the following cooling system, or a system with a higher energy rathing, in at least 1 living area: 3 - phast airconditiong; Energy rating: EER 3.0 - 3.5	
The applicant must install the following cooling system, or a system witha higer energy rathing, in at least 1 bedroom: 3 - phase airconditioning; Energy rathing: EER 3.0 - 3.5	
Ventilation	
The applicant must install the following exhaust systems in the development:	
At least 1 Bathroom: individual fan, ducted to facade or roof: Operation control: manual with on/off	
Kitchen: individual fan, ducted to facade or roof; Operation control: manual with on/off	
Laundry: Individual fan, ducted to facade or roof: Operation control: maual with on/off	
Artifical Lighting	
The applicant must ensure that the 'primary thpe of artifical lighting' is fluorescent or light emitting diode (LED) lighting in each of the following rooms, and where the word " dedicated" appears, the fittings for those lights must only be capable of accepting fluorescent or light emitting diode (LED) lamps	
at least 5 of the bedrooms/study : dedicated	
at least 3 of the living/dining rooms; dedicated	
the kitchen: dedicated	
all bathrooms/toilets; dedicated	
the laundry; dedicated	
all hallways; dedicated	
Natural Lighting	
The applicant must intall a window and/or skylight in 4 bedroom(s)/ toilet(s) in the development of natural lighting	
Swimming Pool	
The applicant must install the following heating system for the swimming pool in the development (or alternatively must not install any heating system for the swimming pool): solar only	
The applicant must install a timer for the swimming pool pump in the development	
Other	
The applicant must install a gas cooktop and electric oven in the kitchen of the dwelling	
Th applicant must install a fixed outdoor clothes drying line as part of the development	
The applicant must install a fixed door or sheltered clothes drying line as part of the development	

SCHEDULE OF FINISHES


Sandstone walling


Painted columns, beams & cladding -
Dark Grey colour (Dulux "Timeless Grey") As per **DA condition C.16**


Aluminium window frames
universal "Satin Slate Grey"


Painted metal balustrades
Mid Grey (Dulux Ferrodor "Mid Grey")


Natural uncoated timber privacy blades


Natural timber shingle roof

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

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bkh

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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE

DEVELOPMENT APPLICATION NO108/14

Drawing
COVER SHEET

Scale	Drawn	Date	Project No.	Drawing
	JE	25.09.2014	3316	**A.00.00[2]**

All works to be in accordance with Australian Standards, The Building Code of Australia, other relevant codes, and with Manufacturers' recommendations and instructions.
Do not scale from drawings. Verify all dimensions on site prior to construction.

SITE PLAN NOTES:

Driveway and footpath crossing will be constructed to council's requirements.

For location of impervious areas, stormwater & drainage connection details refer to stormwater concept plans by NB Consulting Pty Ltd

For vegetation, existing and proposed, refer to landscaping plans by Arcadia Landscape Architecture.

For natural features and contours, refer to Survey Plan by P.J. Baker & Associates Land Surveyors.

4
D.P. 1125750

Courtyard
RL 43.30

2 STOREY
BRICK & WEATHERBOARD
DWELLING
METAL ROOF

Top of roof
RL 48.90

Window 0.91x1.03
Head RL 47.26

Window 2.54x1.31
Head RL 45.54

Top of roof
RL 49.21

Timber deck
RL 40.48

Timber deck
RL 39.88

Concrete driveway

59° 37' 5.755

SITE BOUNDARY

54° 38'30" 35.615

1000

6500

2
D.P. 1125750

REAR PROPERTY
SUBSTANTIALLY ELEVATED

332° 59'10" 18.865

SITE BOUNDARY

Exposed Rock

Exposed Rock

2600

239° 42'40" 5.235

SITE BOUNDARY

235° 41'40" 29.075

Power/pole & Street light
RL 39.28

179° 02'40" 21.35

SITE BOUNDARY

LIVISTONA LANE

35

36

37

38

41

9A
D.P. 392124

7B
D.P. 392124

Top of gutters
RL 51.34

Tiled terrace
RL 48.84

Timber deck
RL 46.00

RL 44.23

Glass doors/windows 1.0m H

Top of roof
RL 51.26

1 & 2 STOREY
RENDERED BRICK
DWELLING
METAL ROOF

RL 44.50

RL 46.03

Top of roof
RL 53.40

RL 46.59

NORTH (MM)

1 CONSTRUCTION CERTIFICATE 22.10.2014

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bkh

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Lot 1, DP 1125750

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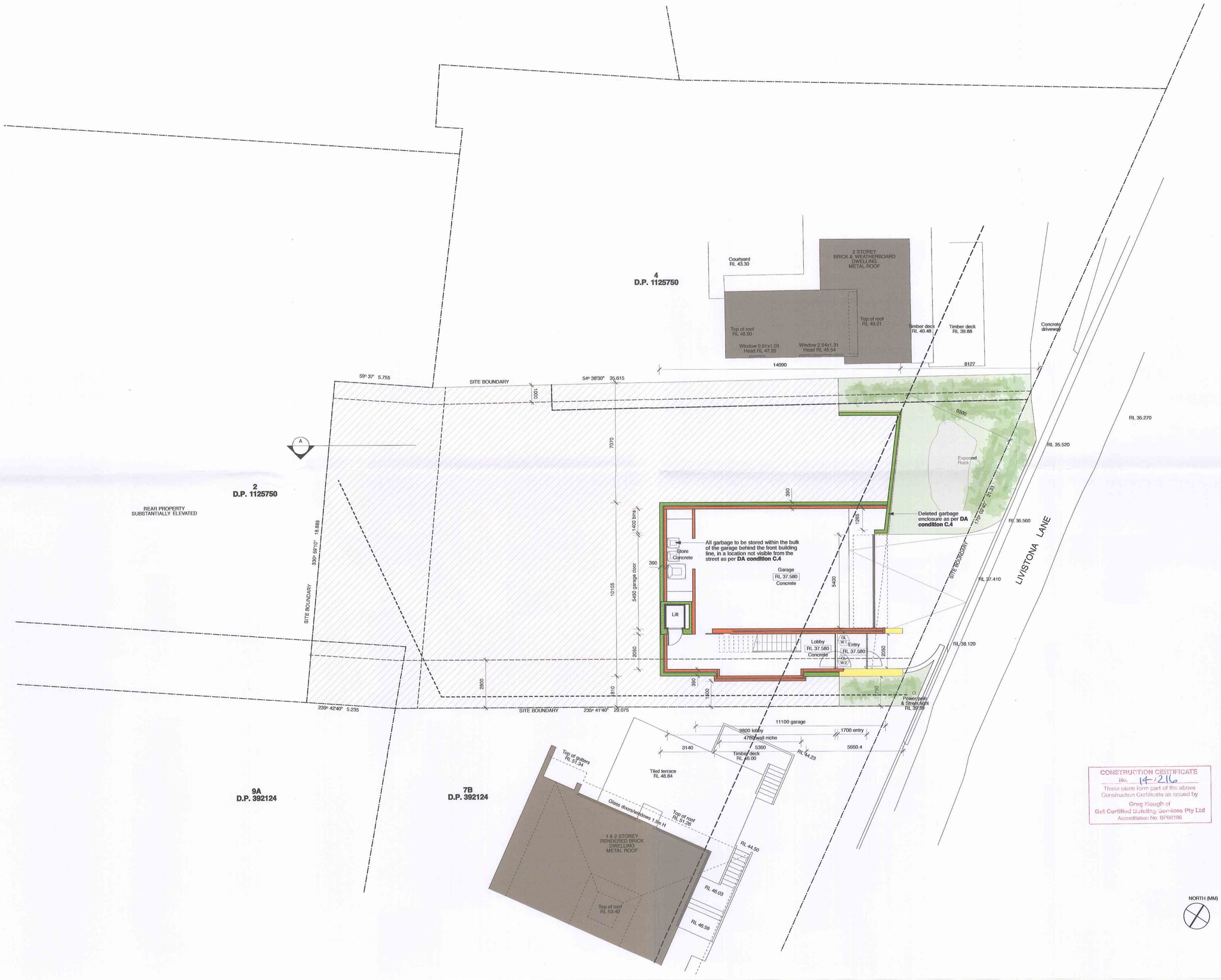
DEVELOPMENT APPLICATION NO108/14

Drawing
SITE PLAN

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	A.01.00[1]



DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

DRAWING NOTES

Refer to BASIX Certificate for thermal performance requirements, water and energy commitments.

All ceiling downlights to have fully sealed covers as per BASIX requirements.

2 CONSTRUCTION CERTIFICATE 07.11.2014

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

CONSTRUCTION CERTIFICATE
No. 14/216
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Accreditation No. BPB0186

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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

NORTH (MM)

Drawing
GENERAL ARRANGEMENT PLAN
GROUND - GARAGE & ENTRY

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.01.01[2]**

All works to be in accordance with Australian Standards, The Building Code of Australia, other relevant codes, and with Manufacturers' recommendations and instructions.
Do not scale from drawings. Verify all dimensions on site prior to construction.

DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

DRAWING NOTES

Refer to BASIX Certificate for thermal performance requirements, water and energy commitments.

All ceiling downlights to have fully sealed covers as per BASIX requirements.

4
D.P. 1125750

2
D.P. 1125750

9A
D.P. 392124

7B
D.P. 392124

REAR PROPERTY
SUBSTANTIALLY ELEVATED

Courtyard
RL 43.30

2 STOREY
BRICK & WEATHERBOARD
DWELLING
METAL ROOF

Top of roof
RL 48.90

Top of roof
RL 49.21

Window 0.91x1.03
Head RL 47.26

Window 2.54x1.31
Head RL 45.54

Timber deck
RL 40.48

Timber deck
RL 39.88

Concrete driveway

59° 37' 5.755

SITE BOUNDARY

54° 38'30" 35.615

9540

600

12075

4000

6500

1000

845

450

Sandstone clad block

Store
RL 41.380
Tile

Bunk room
RL 41.380
Tile

Tile

Lawn Terrace
RL 41.380

Tile

Rumpus
RL 41.380
Tile

Lift

Lobby
RL 41.380
Tile

Vessel basin

Sandstone clad block

4700

1800

15530

5690

2050

390

2800

1810

750

450

330° 59'10" 18.885

SITE BOUNDARY

239° 42'40" 5.235

SITE BOUNDARY

235° 41'40" 29.075

Power pole
& Street light
RL 39.39

Level 1 Lawn Terrace reduced so that no part of the terrace exceeds 4m in width, as measured from the external front wall of Level 1 to the external face of the proposed/ required retaining wall. Of this 4m width, the 800mm deep x 1m wide planter box that wraps around the perimeter is maintained as per **DA condition C.5**

Line of garage below

10140

2170

Top of gutters
RL 51.34

Tiled terrace
RL 48.84

Timber deck
RL 46.00

RL 44.23

Glass doors/windows 1.9m H

Top of roof
RL 51.26

1 & 2 STOREY
RENDERED BRICK
DWELLING
METAL ROOF

RL 44.50

RL 46.03

Top of roof
RL 53.40

RL 46.59

SITE BOUNDARY

LIVISTONA LANE

119° 02'40" 21.03

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

Drawing
GENERAL ARRANGEMENT PLAN
LEVEL 1 - RUMPUS & BUNKROOM

NORTH (MM)

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.01.02[1]**

DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

DRAWING NOTES

Refer to BASIX Certificate for thermal performance requirements, water and energy commitments.

All ceiling downlights to have fully sealed covers as per BASIX requirements.

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

CONSTRUCTION CERTIFICATE
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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

Drawing
GENERAL ARRANGEMENT PLAN
LEVEL 2 - BEDROOMS

NORTH (MM)

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.01.03[1]**

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Do not scale from drawings. Verify all dimensions on site prior to construction.

DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

DRAWING NOTES

Refer to BASIX Certificate for thermal performance requirements, water and energy commitments.

All ceiling downlights to have fully sealed covers as per BASIX requirements.

4
D.P. 1125750

2
D.P. 1125750

9A
D.P. 392124

7B
D.P. 392124

Courtyard
RL 43.30

2 STOREY
BRICK & WEATHERBOARD
DWELLING
METAL ROOF

Top of roof
RL 48.90

Top of roof
RL 49.21

Window 0.91x1.03
Head RL 47.26

Window 2.54x1.31
Head RL 45.54

Timber deck
RL 40.48

Timber deck
RL 39.88

Concrete driveway

SITE BOUNDARY

59° 37' 5.755

54° 38'30" 35.615

239° 42'40" 5.235

350° 59'10" 18.865

REAR PROPERTY
SUBSTANTIALLY ELEVATED

4840 | 1000 | 150 | 4300 | 6000 | 1150 | 12125

48.000 | 45.510

Fixed vertical timber privacy blades

Timber stud/lightweight clad

Guest Bedroom
RL 47.280
Timber

Walkway
RL 47.280
Timber Deck

Pool

Balcony
RL 47.280
Timber Deck

BBQ

Balcony below

Glazed pool fence as per AS 1926 - 1932

Motorised glazed pool fence as per AS 1926 - 1932

Pool fencing to strictly comply with AS 1926.1 — 2012 & Swimming Pools Act 1992

Tile

Pool
RL 47.280

Kitchen
RL 47.280
Timber

Dining
RL 47.280
Timber

Living
RL 47.280
Timber

Balcony
RL 47.280
Timber Deck

Planter below

Lift

Lobby
RL 47.280
Timber

External Stone

Timber stud/lightweight clad

Awning

Planter below

Power pole & Street light
RL 39.59

LIVISTONA LANE

SITE BOUNDARY

SITE BOUNDARY

1100 | 2100 | 1100 | 5650 | 2000 | 300

5840 | 4600 | 16300

Top of gutters
RL 51.34

Tiled terrace
RL 48.84

Timber deck
RL 46.00

RL 44.23

Glass doors/windows 1.9m H

Top of roof
RL 51.26

1 & 2 STOREY
RENDERED BRICK
DWELLING
METAL ROOF

RL 44.50

RL 46.03

RL 48.59

Top of roof
RL 53.40

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No. 14/216
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Accreditation No: BPB0186

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

Drawing
GENERAL ARRANGEMENT PLAN
LEVEL 3 - LIVING

NORTH (MM)

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.01.04[1]**

DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

DRAWING NOTES

Refer to BASIX Certificate for thermal performance requirements, water and energy commitments.

All ceiling downlights to have fully sealed covers as per BASIX requirements.

4
D.P. 1125750

2
D.P. 1125750

9A
D.P. 392124

7B
D.P. 392124

Courtyard
RL 43.30

2 STOREY
BRICK & WEATHERBOARD
DWELLING
METAL ROOF

Top of roof
RL 46.90

Top of roof
RL 49.21

Window 0.91x1.03
Head RL 47.26

Window 2.54x1.31
Head RL 45.54

Timber deck
RL 40.48

Timber deck
RL 39.88

Concrete driveway

22925

6300

59° 37' 5.755

SITE BOUNDARY

4850

1800

1000

54° 38'30" 35.615

1000

1000

600

W.13

Fixed vertical timber privacy louvres

Vertical sash

150

Master
RL 50.580
Timber

Balcony
RL 50.580
Timber Deck

Void to below

Void to below

Void to below

Void to below

Ensuite
RL 50.580
Timber

WIR
RL 50.580
Timber

Corridor
RL 50.580
Timber

Timber cladd/lightweight clad

Roof Pebbles

Roof Pebbles

Top of Roof
RL 52.285
Timber Shingle

Balcony below

Skylight

Skylight

5700

14150

900

1000

8300

1250

945

3100

2800

150

Refer Landscape Plan for rear garden planting and paving design

REAR PROPERTY SUBSTANTIALLY ELEVATED

306° 59'10" 18.885

SITE BOUNDARY

239° 42'40" 5.235

SITE BOUNDARY

235° 41'40" 29.075

SITE BOUNDARY

176° 32'40" 21.33

LIVISTONA LANE

Power pole & Street light
RL 39.39

1100

2100

5700

6000

4800

Top of gutters
RL 51.34

Tiled terrace
RL 48.84

Timber deck
RL 46.00

RL 44.23

Glass doors/windows 1.9m H

Top of roof
RL 51.20

1 & 2 STOREY
RENDERED BRICK
DWELLING
METAL ROOF

RL 44.50

RL 46.03

Top of roof
RL 53.40

RL 46.59

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No. 14/216
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1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

Drawing
GENERAL ARRANGEMENT PLAN
LEVEL 4 - MASTER

NORTH (MM)

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.01.05[1]**

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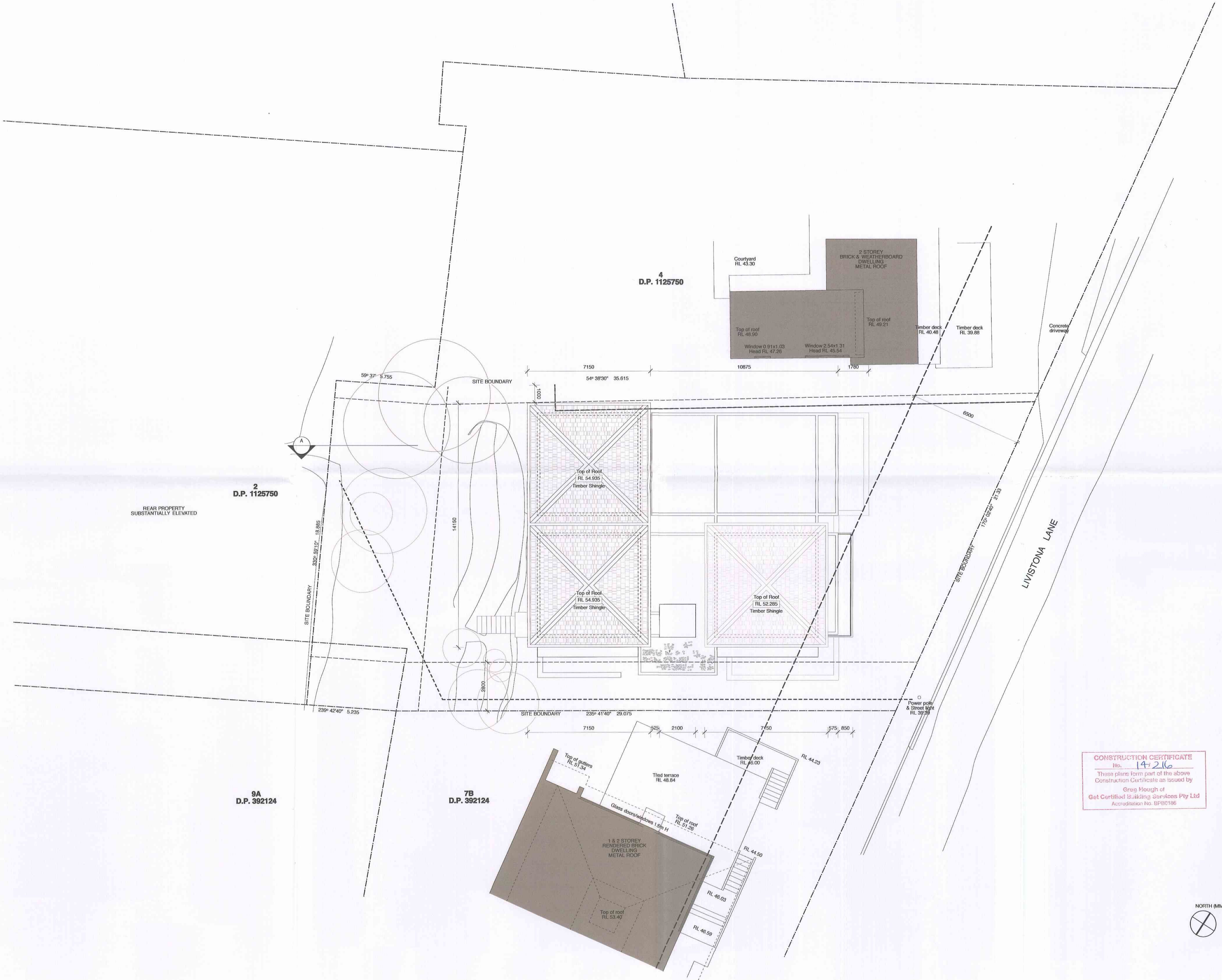

DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

DRAWING NOTES

Refer to BASIX Certificate for thermal performance requirements, water and energy commitments.

All ceiling downlights to have fully sealed covers as per BASIX requirements.

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE

DEVELOPMENT APPLICATION NO108/14

Drawing
GENERAL ARRANGEMENT PLAN
ROOF

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.01.06[1]**

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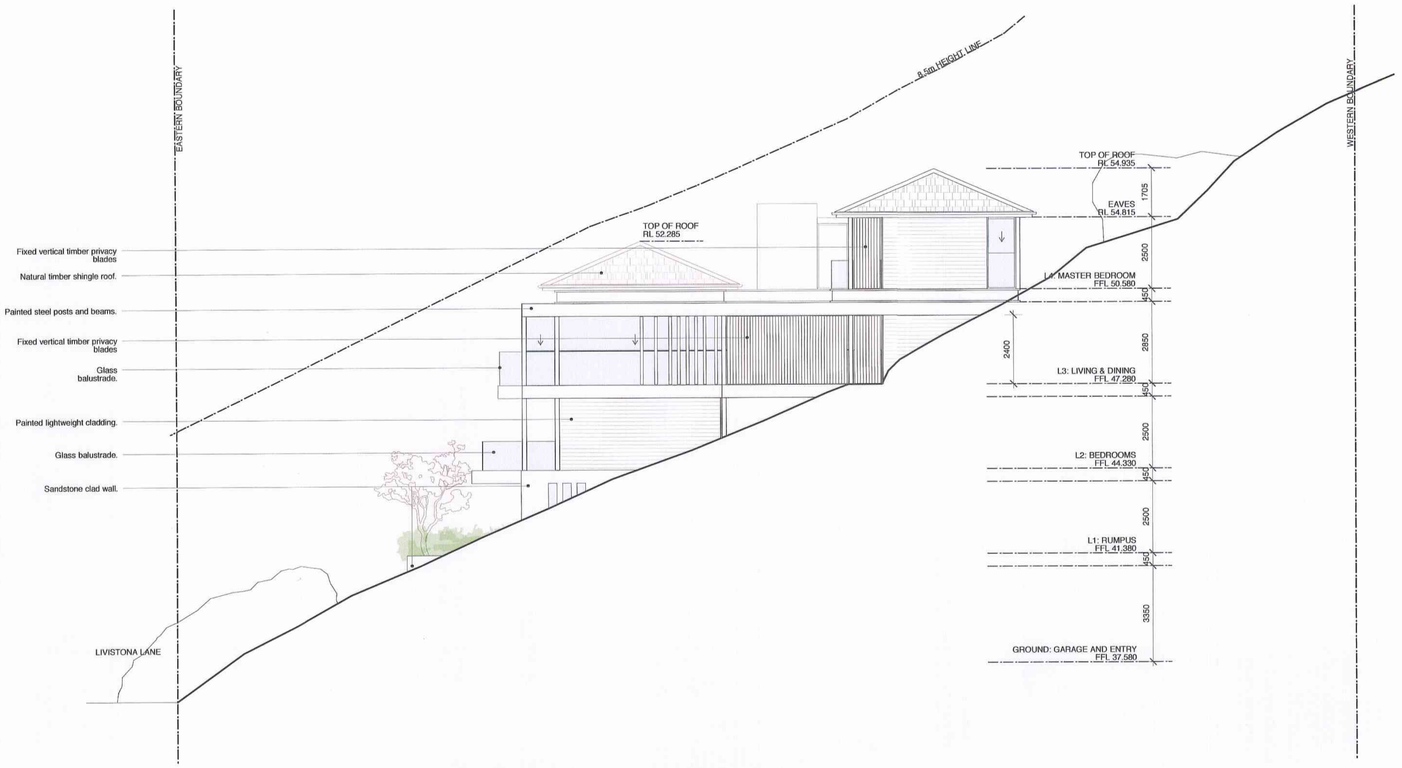

2 NORTH ELEVATION
Scale: 1:100

1 SOUTH ELEVATION
Scale: 1:100

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

CONSTRUCTION CERTIFICATE
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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

Drawing
ELEVATIONS
SOUTH & NORTH

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.02.01[1]**

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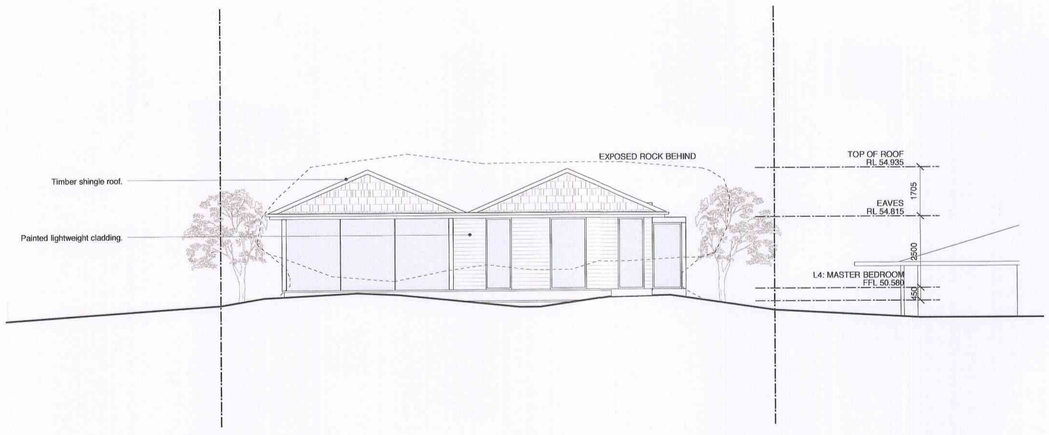
2 EAST ELEVATION
Scale: 1:100



1 WEST ELEVATION
Scale: 1:100

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1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

Drawing
ELEVATIONS
WEST & EAST

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.02.02[1]**

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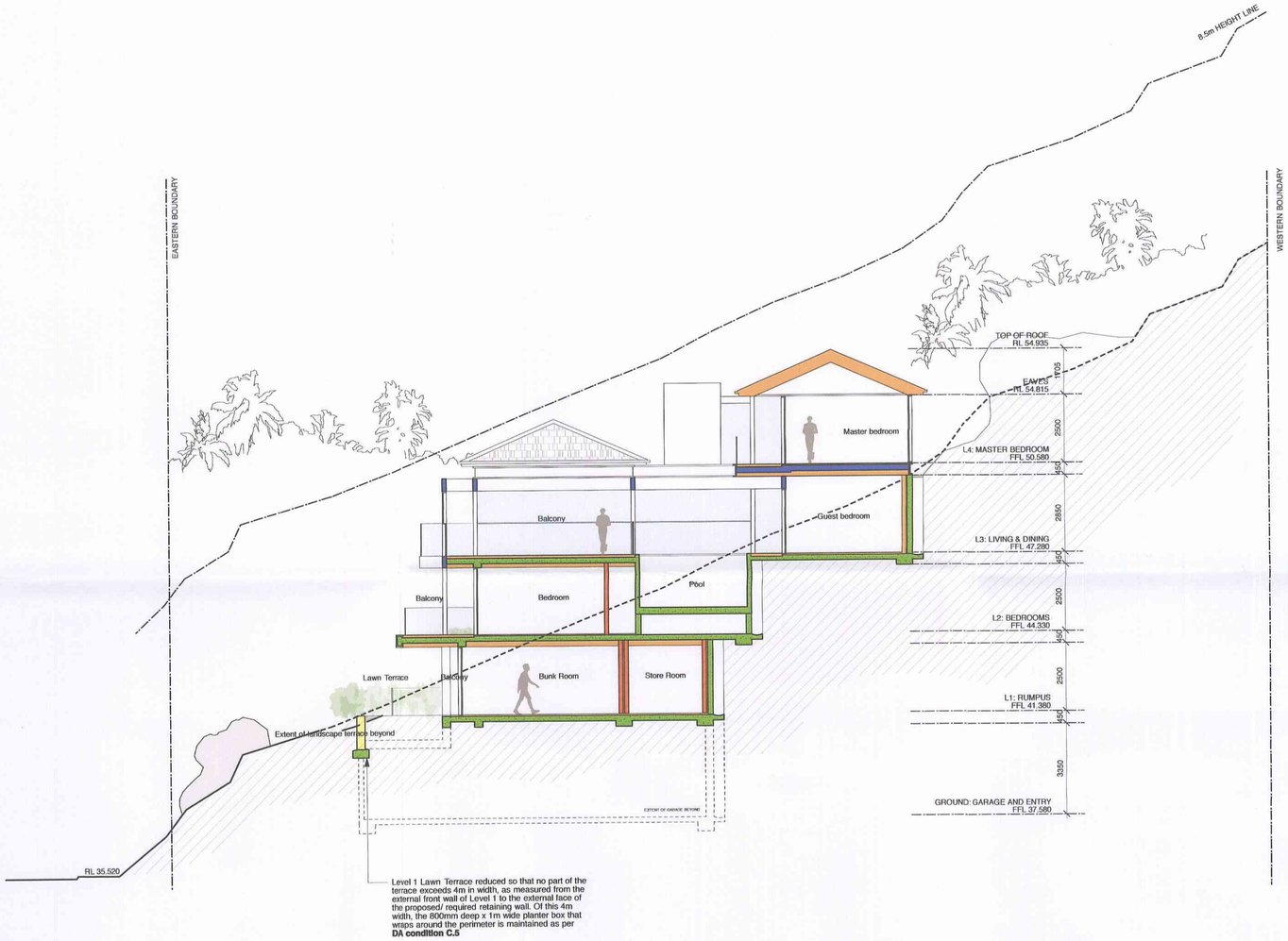

Level 1 Lawn Terrace reduced so that no part of the terrace exceeds 4m in width, as measured from the external front wall of Level 1 to the external face of the proposed/ required retaining wall. Of this 4m width, the 800mm deep x 1m wide planter box that wraps around the perimeter is maintained as per **DA condition C.5**

DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

1 CONSTRUCTION CERTIFICATE 22.10.2014

AMENDMENTS

CONSTRUCTION CERTIFICATE
No. K'216
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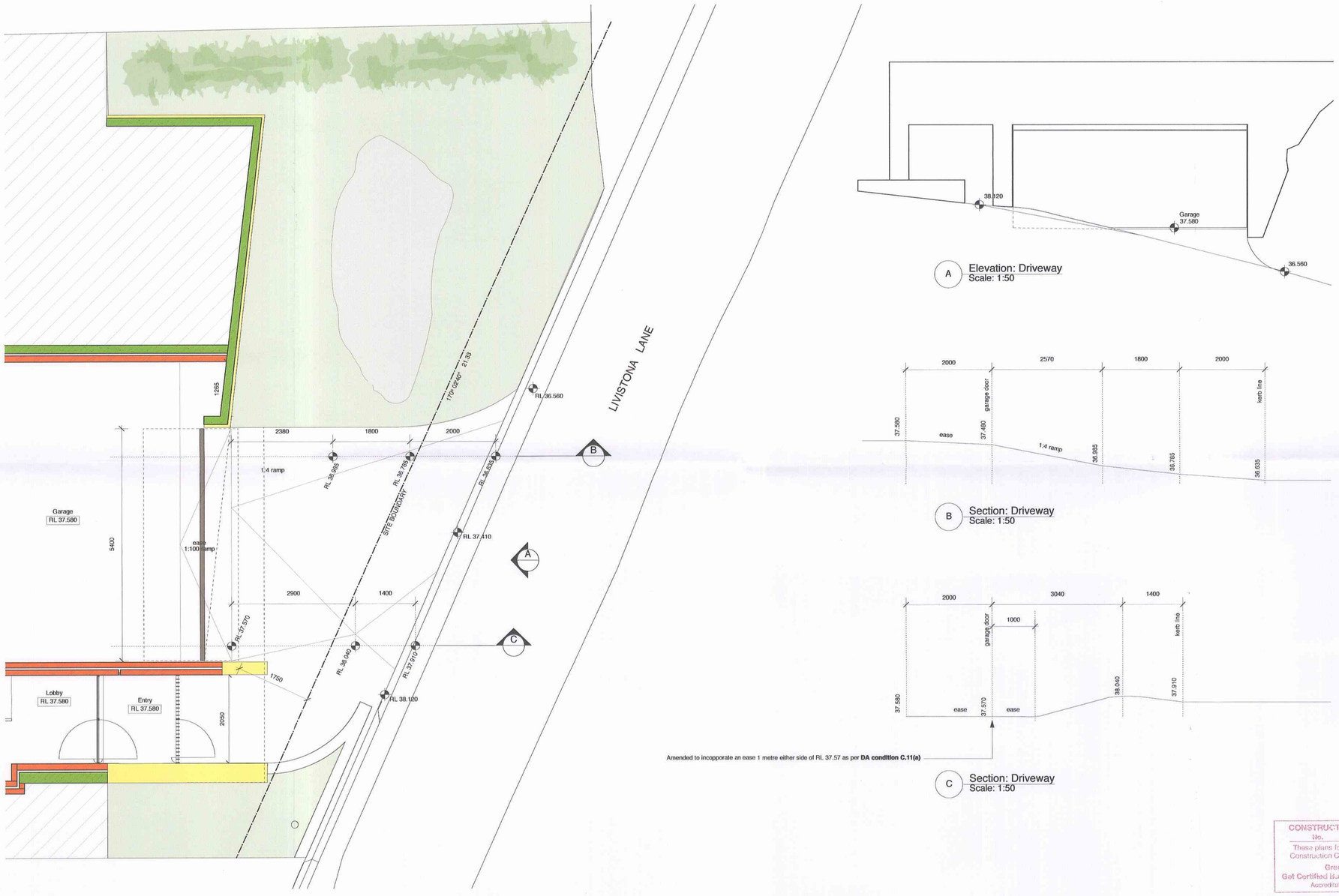
SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

Drawing
SECTIONS
SECTION A

Scale	Drawn	Date	Project No.	Drawing
1:100@A1	JE	25.09.2014	3316	**A.03.01[1]**



1 Plan: Driveway
Scale: 1:50

A Elevation: Driveway
Scale: 1:50

B Section: Driveway
Scale: 1:50

Amended to incopporate an ease 1 metre either side of RL 37.57 as per **DA condition C.11(a)**

C Section: Driveway
Scale: 1:50

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2 CONSTRUCTION CERTIFICATE 07.11.2014
1 CONSTRUCTION CERTIFICATE 22.10.2014
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SALTER RESIDENCE
2a Livistona Lane Palm Beach
Lot 1, DP 1125750

CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14

NORTH (MM)

Drawing
DETAIL PLAN
DRIVEWAY

Scale	Drawn	Date	Project No.	Drawing
1:50@A1	JE	25.09.2014	3316	**A.05.01[2]**

SALTER RESIDENCE
2A LIVISTONA LANE, PALM BEACH, NSW

LOCATION PLAN
Scale: NTS

DRAWING SCHEDULE

DRAWING NO.	DRAWING TITLE	REVISION
000	COVER SHEET	2
301	HARDWORKS PLAN	2
401	SOFTWORKS PLAN	2
501	LANDSCAPE DETAILS	2
502	LANDSCAPE DETAILS	2

PLANT SCHEDULE

13-148 LIVISTONA LANE PLANT SCHEDULE

CODE	BOTANIC NAME	COMMON NAME	MATURE SIZE (h x w) (m)	PROPOSED POT SIZE	QUANTITY
	TREES & PALMS				
Dd	*Dracaena draco*	Dragon Tree	7 x 4	400L	2
Eh	*Eucalyptus haemastoma*	Scribbly Gum	15 x 10	200L	6
	SHRUBS & ACCENTS				
Aa	*Agave attenuata*	Century Plant	1 x 1	300mm	37
As	*Acmena smithii 'Goodbye Neighbours'*	Lilly Pilly	8 x 3	45L	69
Dr	*Dianella revoluta 'Prestige'*	Flax Lily	0.5 x 0.5	200mm	39
Gr	*Grevillea 'Robyn Gordon'*	Robyn Gordon Grevillea	1.5 x 1.5	300mm	16
Lh	*Lomandra hystrix 'Tropic Cascade'*	Tropic Cascade	0.6 x 0.6	200mm	40
Lt	*Lomandra 'Tanika'*	Tanika	0.5 x 0.5	200mm	40
Mt	*Melaleuca thymifolia*	Thyme Honey Myrtle	1 x 1	300mm	9
Ps	*Patersonia sericea*	Silky Purple Flag	0.5 x 0.5	200mm	22
Ts	*Telopea speciosissima*	Waratah	3 x 2	45L	15
Wb	*Westringia 'Blue Gem'*	Blue Gem	1 x 1	300mm	20
Wf	*Westringia fruticosa 'Jervis Gem'*	Jervis Gem	1.5 x 1.5	300mm	10
	FERNS				
Ae	*Aspidistra elatior*	Cast Iron Plant	1 x 1	200mm	68
Ad	*Adiantum aethiopicum*	Maidenhair Fern	0.5 x 0.5	150mm	192
An	*Asplenium nidus*	Birds Nest Fern	1.5 x 1.5	200mm	47
Br	*Bromeliad Species*	Bromeliad	1 x 1	200mm	39
	GROUNDCOVERS				
Cg	*Carpobrotus glaucescens 'Aussie Rambler'*	Aussie Rambler	0.25 x spreading	150mm	50
Da	*Dichondra argentea 'Silver Falls'*	Silver Falls	0.2 x spreading	150mm	80
Sa	*Scaevola aemula 'Mauve Clusters'*	Fan Flower	0.25 x 1	150mm	42
	L2 PLANTER				
Aa	*Agave attenuata*	Century Plant	1 x 1	150mm	12
Da	*Dichondra argentea 'Silver Falls'*	Silver Falls	0.2 x spreading	150mm	30
Sse	*Senecio serpens*	Dwarf Chalk Sticks	0.2 x spreading	150mm	30

A1 100 200 300 400 500 600 700

Issue	Revision Description	Drawn	Check	Date
1	ISSUE FOR CONSTRUCTION CERTIFICATE	AM	AL	09.10.2014
2	REVISED ISSUE FOR CC	AM	AL	30.10.2014

CERTIFICATE
These plans form part of the above Construction Certificate as issued by Greg Hough of Get Certified Building Services Pty Ltd Accreditation No: BPB0186

Notes:

Use only figured dimensions. Any other required dimensions are to be referred to and supplied by the landscape architect.

All discrepancies to be referred to the project manager and Arcadia Landscape Architecture Pty Ltd prior to construction.

Ensure compliance with the Building Code of Australia and all relevant Australian Standards and Authority Requirements.

Client:
SALTER FAMILY

Landscape Architect:
Arcadia
LANDSCAPE ARCHITECTURE
lower deck jones bay wharf suite 68 / 26-32 pirrama rd
pyrmont 2009 nsw p 61 2 9571 6259 f 61 2 9571 7930

Project:
SALTER RESIDENCE
2A LIVISTONA LANE PALM BEACH

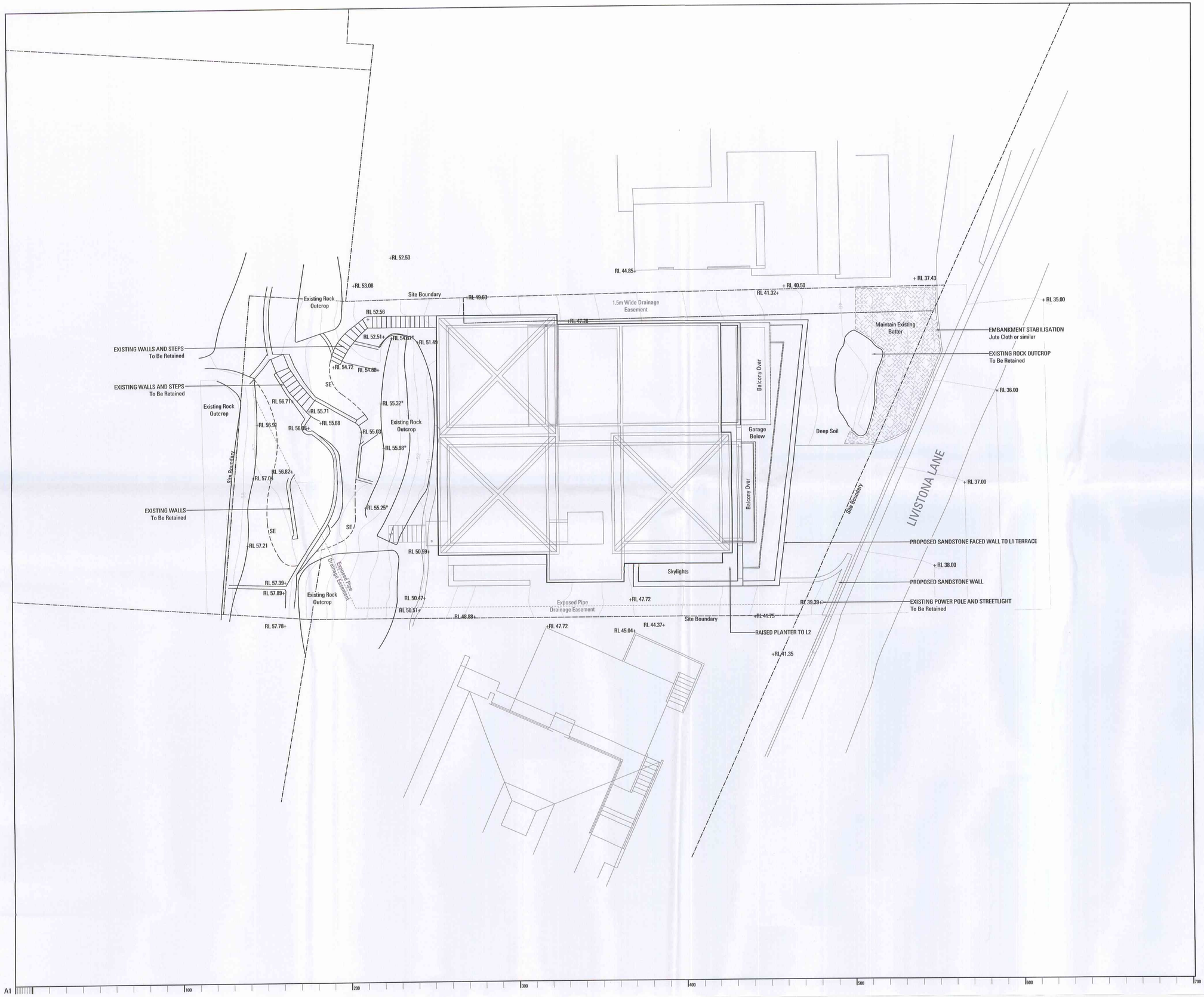
Stage of works:
CONSTRUCTION CERTIFICATE

Drawing Name:
COVER SHEET

CONSTRUCTION CERTIFICATE No. K12/16 These plans form part of the above Construction Certificate as issued by Greg Hough of Get Certified Building Services Pty Ltd Accreditation No: BPB0186

Scale: AS SHOWN @ A1

Job Number:	Drawing Number:	Issue:
13-148	000	2



Issue	Revision Description	Drawn	Check	Date
1	ISSUE FOR CONSTRUCTION CERTIFICATE	AM	AL	09.10.2014
2	REVISED ISSUE FOR CC	AM	AL	30.10.2014

LEGEND

HARDWORKS

- PAVED PATH
  To Match Existing
- SANDSTONE RETAINING WALL
  Refer Architects Drawings
- SE STEEL EDGING
  Refer Landscape Specification
- SANDSTONE FEATURE ROCKS
  Refer Landscape Specification
- LOW SANDSTONE ROCK WALL
  Refer Landscape Specification

Notes:

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Ensure compliance with the Building Code of Australia and all relevant Australian Standards and Authority Requirements.

Client:
SALTER FAMILY

CONSTRUCTION CERTIFICATE
No. 14/216
These plans form part of the above Construction Certificate as issued by
Greg Hough of
Get Certified Building Services Pty Ltd
Accreditation No. BPBC166

Landscape Architect:
Arcadia
LANDSCAPE ARCHITECTURE
lower deck jones bay wharf suite 68 / 26-32 pirrama rd
pyrmont 2009 nsw p 61 2 9571 6259 f 61 2 9571 7930

Project:
SALTER RESIDENCE
2A LIVISTONA LANE PALM BEACH

Stage of works:
CONSTRUCTION CERTIFICATE

Drawing Name:
HARDWORKS PLAN

Scale: 1:100 @ A1 (0 1 2 3 4 5m)

Job Number: 13-148

Drawing Number: 301

Issue: 2

Issue	Revision Description	Drawn	Check	Date
1	ISSUE FOR CONSTRUCTION CERTIFICATE	AM	AL	09.10.2014
2	REVISED ISSUE FOR CC	AM	AL	30.10.2014
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LEGEND

SOFTWORKS

- EXISTING TREES TO BE REMOVED
  Refer Landscape Specification
- EXISTING TREES TO BE RETAINED
  Refer Landscape Specification
- FEATURE TREE PLANTING
  Refer Landscape Specification
- SHRUB AND ACCENT PLANTING
  Refer Landscape Specification
- GROUNDCOVER PLANTING
  Refer Landscape Specification

Site Boundary
LIVISTONA LANE
Balcony Over
Turf
An x 3
Ad x 10
Br x 9
Ts x 5
Ae x 6
An x 6
Eh x 6
Dr x 17
Wf x 5
Ps x 22
Gr x 6
Wf x 5
As x 15
Sa x 30 (8/m2)
An x 5
Gr x 7
Ts x 6
Ae x 4
An x 3
Br x 20
Ae x 3
Ad x 16
Mt x 4
Ae x 6
Ad x 6
An x 3
Gr x 3
Dr x 22
Mt x 5
Sa x 12
Ae x 3
Ae x 5
Ad x 15 (8/m2)
Br x 10
Ad x 40 (8/m2)
Ad x 60
Ad x 45
As x 32 to form hedge
Ae x 5
An x 3
Ae x 3
Ts x 4
An x 3
Ae x 5
An x 3
Ae x 5
An x 3
Dd x 1
Native Grasses (4/m2)
Lh x 40
Lt x 40
Wb x 5
Cg x 40 (4/m2)
Aa x 30
Aa x 3
Sse x 10
Da x 30
to spill over face of wall
Aa x 3
Sse x 10
Aa x 3
Sse x 10
Aa x 3
Da x 80
to spill over
face of wall
Wb x 15
Dd x 1
Cg x 10
Aa x 7
As x 22
to form hedge
An x 3
Ae x 5
An x 3
Ae x 5
An x 3
Ae x 5
An x 3
Ae x 5
An x 3
Ae x 3
A1
100
200
300
400
500
600
700

CONSTRUCTION CERTIFICATE
No. 14/216
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Get Certified Building Services Pty Ltd
Accreditation No: BPB0186

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pyrmont 2009 nsw p 61 2 9571 6259 f 61 2 9571 7930

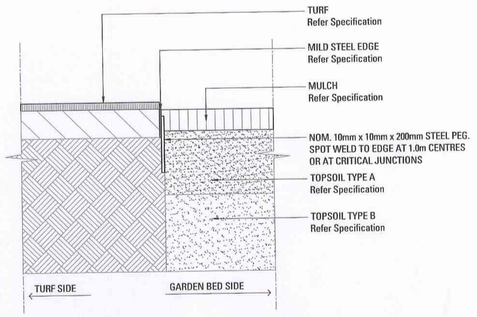
Project:
SALTER RESIDENCE
2A LIVISTONA LANE PALM BEACH

Stage of works:
CONSTRUCTION CERTIFICATE

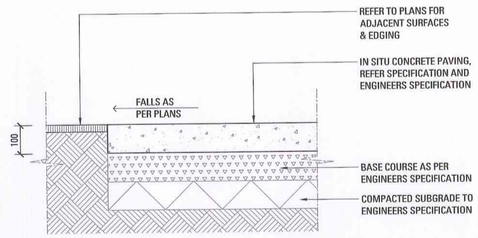
Drawing Name:
SOFTWORKS PLAN

Scale: 1:100 @ A1
0 1 2 3 4 5m

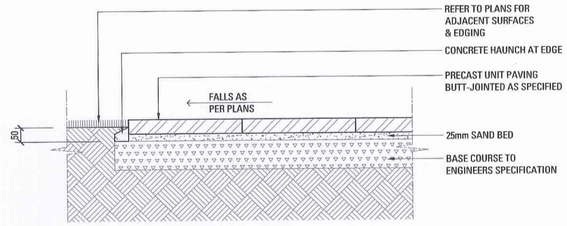
Job Number: 13-148
Drawing Number: 401
Issue: 2



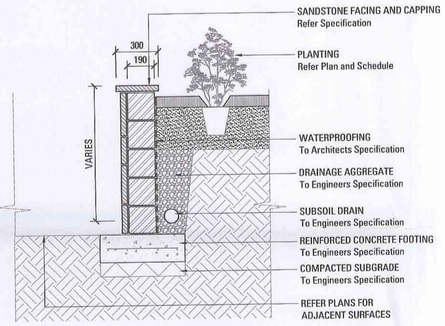
01/501 TYPICAL MILD STEEL EDGE
SCALE 1:10



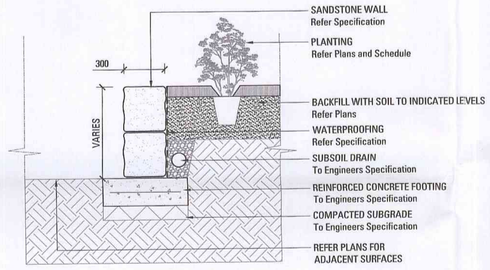
02/501 IN SITU CONCRETE PAVING
SCALE 1:10



03/501 PRECAST UNIT PAVERS ON GRADE
SCALE 1:10



04/501 CONCRETE BLOCK RETAINING WALL WITH STONE FACING AND CAPPING
SCALE 1:20



05/501 SANDSTONE RETAINING WALL
SCALE 1:20

Issue	Revision Description	Drawn	Check	Date
1	ISSUE FOR CONSTRUCTION CERTIFICATE	AM	AL	05.10.2014
2	REVISED ISSUE FOR CC	AM	AL	30.10.2014
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pyrmont 2009 nsw p 61 2 9571 6259 f 61 2 9571 7930

Project:
SALTER RESIDENCE
2A LIVISTONA LANE PALM BEACH

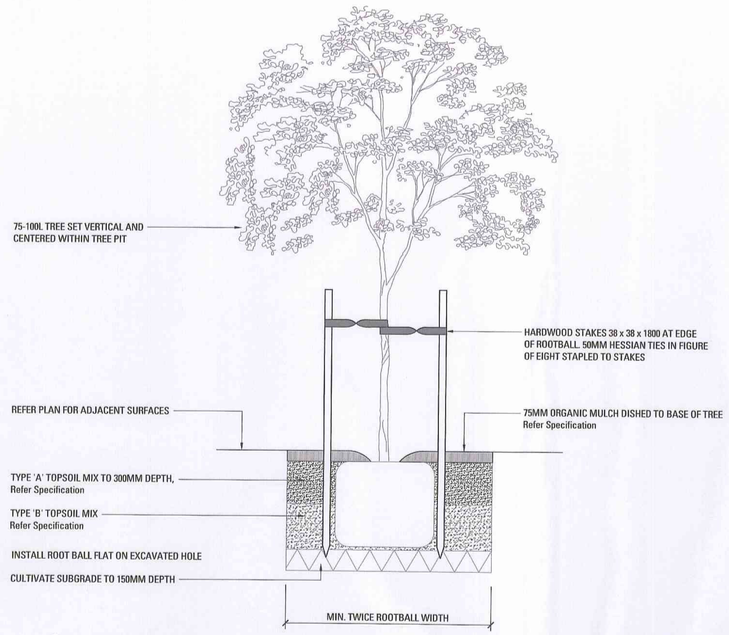
Stage of works:
CONSTRUCTION CERTIFICATE

Drawing Name:
LANDSCAPE DETAILS

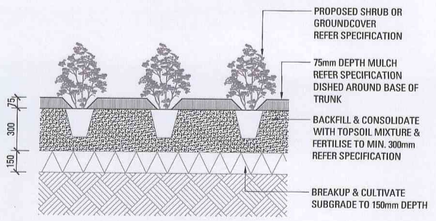
Scale: AS SHOWN @A1

Job Number:	Drawing Number:	Issue:
13-148	501	2

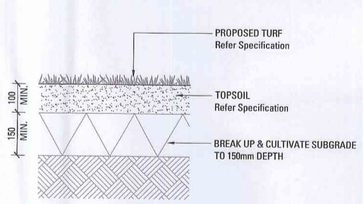
A1 100 200 300 400 500 600 700



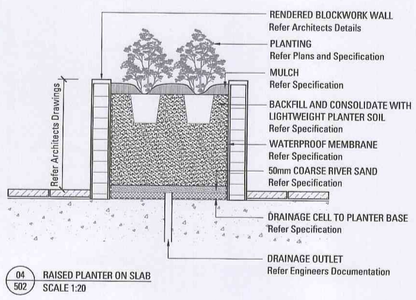
01 / 502 TREE PLANTING 75-100L
SCALE 1:20



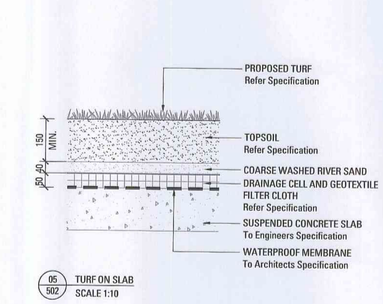
02 / 502 SHRUB OR GROUNDCOVER IN PLANTING BED
SCALE 1:20



03 / 502 TURF ON GRADE
SCALE 1:10



04 / 502 RAISED PLANTER ON SLAB
SCALE 1:20



05 / 502 TURF ON SLAB
SCALE 1:10

LANDSCAPE SPECIFICATION NOTES

SERVICES
BEFORE LANDSCAPE WORK IS COMMENCED THE LANDSCAPE CONTRACTOR IS TO ESTABLISH THE POSITION OF ALL SERVICE LINES AND ENSURE TREE PLANTING IS CARRIED OUT AT LEAST 3 METRES AWAY FROM THESE SERVICES. SERVICE LIDS, VENTS AND HYDRANTS SHALL BE LEFT EXPOSED AND NOT COVERED BY ANY LANDSCAPE FINISHES (TURFING, PAVING, GARDEN BEDS ETC.) FINISH ADJOINING SURFACES FLUSH WITH PIT LIDS.

ABORIST MANAGEMENT OF TREE PROTECTION
A QUALIFIED AND APPROVED ABORIST IS TO BE CONTRACTED TO UNDERTAKE OR MANAGE THE INSTALLATION OF PROTECTIVE FENCING, AND TO UNDERTAKE SUCH MEASURES AS HE DEEMS APPROPRIATE TO PRESERVE THE SUBJECT TREES TO BE RETAINED. THE ARBORIST IS TO BE RETAINED FOR THE ENTIRE CONTRACT PERIOD TO UNDERTAKE ONGOING MANAGEMENT AND REVIEW OF THE TREES.

DRAINAGE CELL AND FILTER FABRIC
FOR ON-SLAB AREAS INSTALL AN APPROVED 'DRAINAGE CELL' PRODUCT TO COMPREHENSIVELY COVER THE BOTTOM OF ALL PLANTERS. OVER DRAINAGE CELL TO ON-SLAB AREAS, A POLYFELT GEOTEXTILE LINING (AS SUPPLIED BY 'POLYFELT TS' OR APPROVED EQUIVALENT) IS TO BE INSTALLED TO COVER THE BOTTOM OF ALL PLANTERS, TURNED UP 300MM AND TAPED TO THE PLANTER SIDES TO ENSURE SOIL MIX DOES NOT ESCAPE INTO DRAINAGE OUTLETS/HOLES. INSTALL MIN. 50MM COARSE RIVER SAND OVER ALL GEOTEXTILE LINING PRIOR TO INSTALLATION OF SOIL MIX.

PLANTING MIXTURE
SHALL BE HOMOGENOUS BLEND OF SOIL AND ADDITIVES IN THE FOLLOWING PROPORTIONS:
EXISTING SITE SOIL IF SUITABLE OR
IMPORTED TOPSOIL 50%
COMPOST 30%
D/W SAND 20%
SOIL TESTING OF EXISTING SITE SOIL IS TO BE UNDERTAKEN TO ASSESS SUITABILITY OF USE AS PLANTING TOPSOIL AND COMPLIANCE WITH AUSTRALIAN STANDARDS.

MULCH APPLICATION
PLACE MULCH TO THE REQUIRED DEPTH, (REFER TO DRAWINGS) CLEAR OF PLANT STEMS, AND RAKE TO AN EVEN SURFACE FINISHING 25MM BELOW ADJOINING LEVELS. ENSURE MULCH IS WATERED IN AND TAMPED DOWN DURING INSTALLATION.

MULCH TYPE
PINE BARK: FROM MATURE TREES, GRADED IN SIZE FROM 15MM TO 30MM, FREE FROM WOOD SLIVERS. DARK BROWN IN COLOUR AND TEXTURE.

COMPOST
SHALL BE WELL ROTTED VEGETATIVE MATERIAL OR ANIMAL MANURE, OR OTHER APPROVED MATERIAL, FREE FROM HARMFUL CHEMICALS, GRASS AND WEED GROWTH AND WITH NEUTRAL PH. PROVIDE A CERTIFICATE OF PROOF OF PH UPON REQUEST.

PLANT MATERIAL
ALL PLANTS SUPPLIED ARE TO CONFORM WITH THOSE SPECIES LISTED IN THE PLANT SCHEDULE ON THE DRAWINGS. GENERALLY PLANTS SHALL BE VIGOROUS, WELL ESTABLISHED, HARDENED OFF, OF GOOD FORM CONSISTENT WITH SPECIES OR VARIETY, NOT SOFT OR FORCED, FREE FROM DISEASE OR INSECT PESTS WITH LARGE HEALTHY ROOT SYSTEMS AND NO EVIDENCE OF HAVING BEEN RESTRICTED OR DAMAGED. TREES SHALL HAVE A LEADING SHOOT. IMMEDIATELY REJECT DRIED OUT, DAMAGED OR UNHEALTHY PLANT MATERIAL BEFORE PLANTING. ALL STOCK IS TO BE CONTAINER GROWN FOR A MINIMUM OF SIX (6) MONTHS PRIOR TO DELIVERY TO SITE

FERTILISER MASS PLANTING AREAS:
FERTILISER SHALL BE 'NUTRICOTE' OR APPROVED EQUIVALENT IN GRANULE FORM INTENDED FOR SLOW RELEASE OF PLANT NUTRIENTS OVER A PERIOD OF APPROXIMATELY NINE MONTHS. THOROUGHLY MIX FERTILISER WITH PLANTING MIXTURE AT THE RECOMMENDED RATE, PRIOR TO INSTALLING PLANTS.

TURF
SHALL BE SIR WALTER BUFFALO. SHIRLEYS NO. 17 OR APPROVED EQUAL LAWN FOOD SHALL BE THOROUGHLY MIXED INTO THE TOPSOIL PRIOR TO PLACING TURF.

TREES IN GRASS AND SUPER ADVANCED TREES:
PELLETS SHALL BE IN THE FORM INTENDED TO UNIFORMLY RELEASE PLANT FOOD ELEMENTS FOR A PERIOD OF APPROXIMATELY NINE MONTHS EQUAL TO SHIRLEYS KOKEI PELLETS, ANALYSIS 6.3:1.8:2.9. KOKEI PELLETS SHALL BE PLACED AT THE TIME OF PLANTING TO THE BASE OF THE PLANT, 50MM MINIMUM FROM THE ROOT BALL AT A RATE OF TWO PELLETS PER 300MM OF TOP GROWTH TO A MAXIMUM OF 8 PELLETS PER TREE.

STAKING AND TYING
STAKES SHALL BE STRAIGHT HARDWOOD, FREE FROM KNOTS AND TWISTS, POINTED AT ONE END AND SIZED ACCORDING TO SIZE OF PLANTS TO BE STAKED.
A. 5-15 LITRE SIZE PLANT 1X(1200X25X25MM)
B. 35-75 LITRE SIZE PLANT 2X(1500X38X38MM)
C. 100 GREATER THAN 200LITRE 3X(1800X50X50MM)
TIES SHALL BE 50MM WIDE HESSIAN WEBBING OR APPROVED EQUIVALENT NAILED OR STAPLED TO STAKE. DRIVE STAKES A MINIMUM ONE THIRD OF THEIR LENGTH, AVOIDING DAMAGE TO THE ROOT SYSTEM, ON THE WINDWARD SIDE OF THE PLANT.

IRRIGATION SYSTEM
SUPPLY AN AUTOMATIC WATERING SYSTEM USING 'TORO IRRIGATION SYSTEM' OR SIMILAR APPROVED, WITH MICRO-JET SPRINKLER HEADS AND LOW DENSITY, RUBBER MODIFIED POLYPROPYLENE RETICULATION, TO INCLUDE FILTERS, BENDS JUNCTIONS, ENDS AND OTHER ANCILLARY EQUIPMENT. THE LANDSCAPER SHALL NOMINATE HIS SOURCE OF SUPPLY FOR THE WATERING SYSTEM AND OBTAIN APPROVAL FROM THE SUPERINTENDENT BEFORE PLACING ORDERS FOR EQUIPMENT OR SUPPLY.

A SCHEMATIC PLAN OF THE PROPOSED IRRIGATION SYSTEM IS TO BE PREPARED BY THE CONTRACTOR, SHOWING SOLENOIDS, PIPE DIAMETERS, AND ALL NOZZLE AND TRICKLE ATTACHMENT TYPES (INCLUDING SPRAY/HEAD ANGLE), FOR REVIEW BY THE SUPERINTENDENT PRIOR TO INSTALLATION

THE CONTRACTOR IS TO LIASE WITH THE HYDRAULIC ENGINEER AND COUNCIL AS NECESSARY, TO ENSURE THE THE IRRIGATION SYSTEM CONFORMS WITH ALL THE COUNCIL AND WATER BOARD CODES AND REQUIREMENTS.

PROVIDE AN AUTOMATIC CONTROLLER THAT PROVIDES FOR TWO WEEK SCHEDULING AND HOURLY MULTI-CYCLE OPERATION. THE CONTROLLER SHALL MANUAL OVERRIDE. PROGRAMMING SHALL BE UNDERTAKEN BY THE CONTRACTOR WHO SHALL ADVISE ON THE OPERATION OF THE SYSTEM.

PROVISION OF SECURE HOUSING FOR THE AUTOMATIC IRRIGATION CONTROLLER TO BE LOCATED IN ASSOCIATION WITH THE LANDSCAPE CONTRACTOR AND LOCATION CONFIRMED BY THE SUPERINTENDENT. WIRING TO CONNECT REMOTE SOLENOID LOCATIONS IS TO BE PROVIDED. THE CONTROLLER SHALL BE LOCATED IN A DRY PLACE, PROTECTED FROM THE WEATHER, AND ALL CABLE CONNECTIONS SHALL BE MADE WITH WATERPROOF CONNECTORS.

WATER SUPPLY POINTS TO BE SUPPLIED BY BUILDER.

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE AND GUARANTEE SATISFACTORY OPERATION OF THE IRRIGATION SYSTEM.

AFTER THE SYSTEM HAS BEEN INSTALLED TO THE SATISFACTION OF THE SUPERINTENDENT, THE INSTALLATION SHALL BE TESTED UNDER KNOWN WORKING CONDITIONS. ACCEPTANCE OF THE INSTALLED PLANT AND EQUIPMENT SHALL BE SUBJECT TO THESE BEING SATISFACTORY.

TREATED PINE TIMBER EDGING
TIMBER EDGE: 100 X 25MM CCA TREATED RADIATA PINE TIMBER STAKES: 50 X 50 X 500MM CCA TREATED RADIATA PINE-SHARPENED AT ONE END. INSTALL IN LOCATIONS SHOWN ON THE DRAWINGS FLUSH TO FINISHED SURFACE LEVELS.

TURF
TURF ALL LANDSCAPE AREAS AS SHOWN ON THE LANDSCAPE DRAWINGS. TURF IS TO HAVE AN EVEN THICKNESS OF NOT LESS THAN 25MM. OBTAIN TURF FROM AN APPROVED GROWER. FURNISH A WARRANTY FROM THE GROWER THAT THE TURF IS FREE FROM WEEDS AND OTHER FOREIGN MATTER. DELIVER TURF TO THE SITE WITHIN 24 HOURS OF BEING CUT, AND LAY IT WITHIN 24 HOURS OF BEING DELIVERED.

TO PREPARE GRADED AREAS TO RECEIVE TURF, EXCAVATE THE AREA AND CULTIVATE SO AS TO ALLOW FOR IMPORTING OF 100MM OF TURF UNDERLAY SOIL. REMOVE ALL STONES OVER 50MM Ø AND REMOVE ALL WEEDS AND FOREIGN MATTER. SPREAD SOIL MIX A.B.S TO A DEPTH OF 100MM AND GRADE TO APPROPRIATE LEVELS TO ACHIEVE GENERAL EVEN GRADES TO DRAINAGE OUTLETS INSTALLED BY OTHERS.

LAY THE TURF ALONG THE LAND CONTOURS WITH STAGGERED, CLOSE BUTTED JOINTS, SO THAT THE FINISHED TURF SURFACE IS FLUSH WITH ADJACENT FINISHED SURFACES OF PAVING AND THE LIKE. AS SOON AS PRACTICABLE AFTER LAYING, ROLL THE TURF WITH A ROLLER WEIGHING NOT MORE THAN 90KG PER METRE OF WIDTH FOR SANDY OR LIGHT SOILS.

WATER AS NECESSARY TO KEEP THE SOIL MOIST TO A DEPTH OF 100MM. PROTECT NEWLY TURFED AREAS AGAINST TRAFFIC UNTIL GRASS IS ESTABLISHED. FERTILISE TWO WEEKS AFTER LAYING FERTILISE A.B.S

'TOP DRESS' THE TURF WHEN IT IS ESTABLISHED TO A DEPTH OF 10MM WITH COARSE WASHED RIVER SAND. RUB THE DRESSING WELL INTO THE JOINTS AND CORRECT ANY UNEVENNESS IN THE TURF SURFACES.

LANDSCAPE MAINTENANCE PROGRAM

MAINTENANCE SHALL MEAN THE CARE AND MAINTENANCE OF THE LANDSCAPE WORKS BY ACCEPTED HORTICULTURAL PRACTICE AS RECTIFYING ANY DEFECTS THAT BECOME APPARENT IN THE LANDSCAPE WORKS UNDER NORMAL USE. THIS SHALL INCLUDE, BUT SHALL NOT BE LIMITED TO, WATERING, MOWING, FERTILISING, RESEEDING, RETURFING, WEEDING, PEST AND DISEASE CONTROL, STAKING AND TYING, REPLANTING, CULTIVATION, PRUNING, AERATING, RENOVATING, TOP DRESSING, MAINTAINING THE SITE IN A NEAT AND TIDY CONDITION AS FOLLOWS:-

GENERAL
THE LANDSCAPE CONTRACTOR SHALL MAINTAIN THE LANDSCAPE WORKS FOR THE TERM OF THE MAINTENANCE (OR PLANT ESTABLISHMENT) PERIOD TO THE SATISFACTION OF THE COUNCIL. THE LANDSCAPE CONTRACTOR SHALL ATTEND TO THE SITE ON A WEEKLY BASIS. THE MAINTENANCE PERIOD SHALL COMMENCE AT PRACTICAL COMPLETION AND CONTINUE FOR A PERIOD OF TWENTY SIX (26) WEEKS.

WATERING
GRASS, TREES AND GARDEN AREAS SHALL BE WATERED REGULARLY SO AS TO ENSURE CONTINUOUS HEALTHY GROWTH.

RUBBISH REMOVAL
DURING THE TERM OF THE MAINTENANCE PERIOD THE LANDSCAPE CONTRACTOR SHALL REMOVE RUBBISH THAT MAY OCCUR AND RECYCLE THROUGHOUT THE MAINTENANCE PERIOD. THIS WORK SHALL BE CARRIED OUT REGULARLY SO THAT AT WEEKLY INTERVALS THE AREA MAY BE OBSERVED IN A COMPLETELY CLEAN AND TIDY CONDITION.

REPLACEMENTS
THE LANDSCAPE CONTRACTOR SHALL REPLACE ALL PLANTS THAT ARE MISSING, UNHEALTHY OR DEAD AT THE LANDSCAPE CONTRACTOR'S COST. REPLACEMENTS SHALL BE OF THE SAME SIZE, QUALITY AND SPECIES AS THE PLANT THAT HAS FAILED UNLESS OTHERWISE DIRECTED BY THE LANDSCAPE ARCHITECT. REPLACEMENTS SHALL BE MADE ON A CONTINUING BASIS NOT EXCEEDING TWO (2) WEEKS AFTER THE PLANT HAS DIED OR IS SEEN TO BE MISSING.

STAKES AND TIES
THE LANDSCAPE CONTRACTOR SHALL REPLACE OR ADJUST PLANT STAKES, AND TREE GUARDS AS NECESSARY OR AS DIRECTED BY THE LANDSCAPE ARCHITECT. REMOVE STAKES AND TIES AT THE END OF THE MAINTENANCE PERIOD IF SO DIRECTED.

PRUNING
TREES AND SHRUBS SHALL BE PRUNED AS DIRECTED BY THE LANDSCAPE ARCHITECT. PRUNING WILL BE DIRECTED AT THE MAINTENANCE OF THE DENSE FOLIAGE OR MISCELLANEOUS PRUNING AND BENEFICIAL TO THE CONDITION OF THE PLANTS. ANY DAMAGED GROWTH SHALL BE PRUNED. ALL PRUNED MATERIAL SHALL BE REMOVED FROM THE SITE.

MULCHED SURFACES
ALL MULCHED SURFACES SHALL BE MAINTAINED IN A CLEAN AND TIDY CONDITION AND BE REINSTATED IF NECESSARY TO ENSURE THAT A DEPTH OF 75MM IS MAINTAINED. ENSURE MULCH IS KEPT CLEAR OF PLANT STEMS AT ALL TIMES.

PEST AND DISEASED CONTROL
THE LANDSCAPE CONTRACTOR SHALL SPRAY AGAINST INSECT AND FUNGUS INFESTATION WITH ALL SPRAYING TO BE CARRIED OUT IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS. REPORT ALL INSTANCES OF PESTS AND DISEASES (IMMEDIATELY THAT THEY ARE DETECTED) TO THE LANDSCAPE ARCHITECT.

GRASS AND TURF AREAS
THE LANDSCAPE CONTRACTOR SHALL MAINTAIN ALL GRASS AND TURF AREAS BY WATERING, WEEDING, DRESSING, ROLLING, MOWING, TRIMMING OR OTHER OPERATIONS AS NECESSARY. SEED AND TURF SPECIES SHALL BE THE SAME AS THE ORIGINAL SPECIFIED MIXTURE. GRASS AND TURF AREAS SHALL BE SPRAYED WITH APPROVED SELECTIVE HERBICIDE AGAINST BROAD LEAFED WEEDS AS REQUIRED BY THE LANDSCAPE ARCHITECT AND IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS. GRASS AND TURF AREAS SHALL BE FERTILISED ONCE A YEAR IN AUTUMN WITH 'DYNAMIC LIFTER' FOR LAWNS AT A RATE OF 20KG PER 100M2. FERTILISER SHALL BE WATERED IN IMMEDIATELY AFTER APPLICATION. IRREGULARITIES IN THE GRASS AND TURF SHALL BE WATERED IN IMMEDIATELY AFTER APPLICATION. GRASS AND TURF AREAS SHALL BE KEPT MOWN TO MAINTAIN A HEALTHY AND VIGOROUS SWARD. MOWING HEIGHT: 30-50MM.

WEED ERADICATION
ERADICATE WEEDS BY ENVIRONMENTALLY ACCEPTABLE METHODS USING A NON-RESIDUAL GLYPHOSATE HERBICIDE (EG. 'ROUNDUP') IN ANY OF ITS REGISTERED FORMULAE, AT THE RECOMMENDED MAXIMUM RATE. REGULARLY REMOVE BY HAND, WEED GROWTH THAT MAY OCCUR OR RECUR THROUGHOUT GRASSED, PLANTED AND MULCHED AREAS. REMOVE WEED GROWTH FROM AN AREA 750MM DIAMETER AROUND THE BASE OF TREES IN GRASSED AREAS. CONTINUE ERADICATION THROUGHOUT THE COURSE OF THE WORKS AND DURING THE MAINTENANCE PERIOD.

SOIL SUBSIDENCE
ANY SOIL SUBSIDENCE OR EROSION WHICH MAY OCCUR AFTER THE SOIL FILLING AND PREPARATION OPERATIONS SHALL BE MADE GOOD BY THE LANDSCAPE CONTRACTOR AT NO COST TO THE CLIENT.

13-148 LIVISTONA LANE PLANT SCHEDULE

CODE	BOTANIC NAME	COMMON NAME	MATURE SIZE (h x w) (m)	PROPOSED POT SIZE	QUANTITY
	TREES & PALMS				
Dd	*Dracaena draco*	Dragon Tree	7 x 4	400L	2
Eh	*Eucalyptus haemastoma*	Scribbly Gum	15 x 10	200L	6
	SHRUBS & ACCENTS				
Aa	*Agave attenuata*	Century Plant	1 x 1	300mm	37
As	*Acmena smithii 'Goodbye Neighbours'*	Lilly Pilly	8 x 3	45L	69
Dr	*Dianella revoluta 'Prestige'*	Flax Lily	0.5 x 0.5	200mm	39
Gr	*Grevillea 'Robyn Gordon'*	Robyn Gordon Grevillea	1.5 x 1.5	300mm	16
Lh	*Lomandra hystrix 'Tropic Cascade'*	Tropic Cascade	0.6 x 0.6	200mm	40
Lt	*Lomandra 'Tanika'*	Tanika	0.5 x 0.5	200mm	40
Mt	*Melaleuca thymifolia*	Thyme Honey Myrtle	1 x 1	300mm	9
Ps	*Patersonia sericea*	Silky Purple Flag	0.5 x 0.5	200mm	22
Ts	*Telopea speciosissima*	Waratah	3 x 2	45L	15
Wb	*Westringia 'Blue Gem'*	Blue Gem	1 x 1	300mm	20
Wf	*Westringia fruticosa 'Jervis Gem'*	Jervis Gem	1.5 x 1.5	300mm	10
	FERNS				
Ae	*Aspidistra elatior*	Cast Iron Plant	1 x 1	200mm	68
Ad	*Adiantum aethiopicum*	Maidenhair Fern	0.5 x 0.5	150mm	192
An	*Asplenium nidus*	Birds Nest Fern	1.5 x 1.5	200mm	47
Br	*Bromeliad Species*	Bromeliad	1 x 1	200mm	39
	GROUNDCOVERS				
Cg	*Carpobrotus glaucescens 'Aussie Rambler'*	Aussie Rambler	0.25 x spreading	150mm	50
Da	*Dichondra argentea 'Silver Falls'*	Silver Falls	0.2 x spreading	150mm	80
Sa	*Scaevola aemula 'Mauve Clusters'*	Fan Flower	0.25 x 1	150mm	42
	L2 PLANTER				
Aa	*Agave attenuata*	Century Plant	1 x 1	150mm	12
Da	*Dichondra argentea 'Silver Falls'*	Silver Falls	0.2 x spreading	150mm	30
Sse	*Senecio serpens*	Dwarf Chalk Sticks	0.2 x spreading	150mm	30

CONSTRUCTION CERTIFICATE
No. 14/216
These plans form part of the above Construction Certificate as issued by
Greg Hough of
Get Certified Building Services Pty Ltd
Accreditation No: BPB0186

Issue	Revision Description	Drawn	Check	Date
1	ISSUE FOR CONSTRUCTION CERTIFICATE	AM	AL	09.10.2014
2	REVISED ISSUE FOR CC	AM	AL	30.10.2014
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Notes:

Use only figured dimensions. Any other required dimensions are to be referred to and supplied by the landscape architect.
All discrepancies to be referred to the project manager and Arcadia Landscape Architecture Pty Ltd prior to construction.
Ensure compliance with the Building Code of Australia and all relevant Australian Standards and Authority Requirements.

Client:
SALTER FAMILY

Landscape Architect:
Arcadia
LANDSCAPE ARCHITECTURE
lower deck jones bay wharf suite 68 / 26-32 pirrama rd
pyrmont 2009 nsw p 61 2 9571 6259 f 61 2 9571 7930

Project:
SALTER RESIDENCE
2A LIVISTONA LANE PALM BEACH

Stage of works:
CONSTRUCTION CERTIFICATE

Drawing Name:
LANDSCAPE DETAILS

Scale: AS SHOWN @A1

Job Number:	Drawing Number:	Issue:
13-148	502	2

A1 100 200 300 400 500 600 700

AAA TRAFFIC CONTROL PTY LTD

- Traffic Control Plans
- Traffic Mangement Plans
- Vehicle Management Plans
- Pedestrian Management Plans
- Construction Traffic Management Plans
- Permit Application & Authority Liaison
- RMS Accredited Traffic Controllers
- Emergency Response Teams
- Traffic Control Equipment Hire
- Variable Message Board Hire

Construction Traffic Management Plan

2a LIVISTONA LN, PALM BEACH

RESIDENTIAL DWELLING

Prepared for: **Pacific Plus Constructions Pty Ltd**
Prepared By: **Daniel Metcalfe**
RTA Design & Inspect Traffic Control Plans
Certificate #: **2253014374** Exp: **30/06/2016**
Date: **Wednesday, 22nd October 2014**
Document Number: **CTMP026AI21**

Table of Contents

1 Project Details

1.1 Project Summary

Project:	***Multi Storey Residential Dwelling***	
Location:	**2a Livistona Ln, Palm Beach**	
Hours of Operation:	***Monday – Friday***	***0700 – 1700***
	Saturday	***0700 - 1300***
	Sunday & Public Holidays	**No Work**

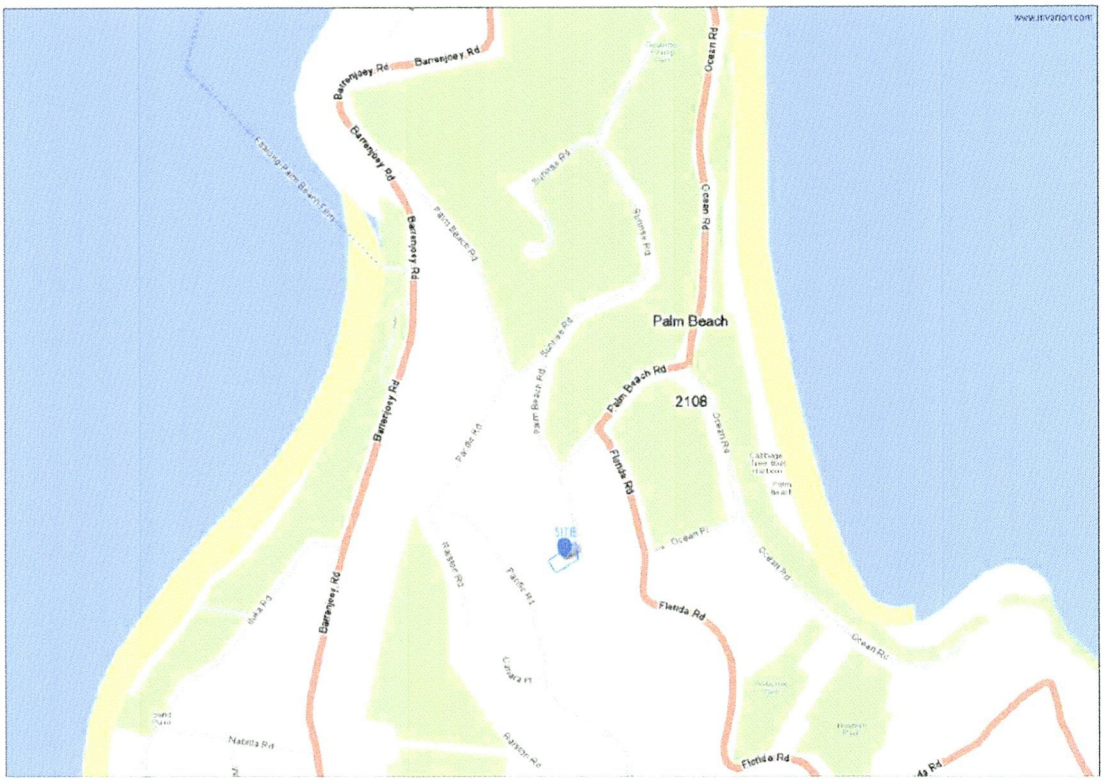
Scope of Works: Construction of a 4 storey building, with ground floor garage.

This Traffic Management Plan has been prepared to satisfy condition D20 in the Development Application No. N0108/14.

1.2 Revisions

Rev	Date	Description
0	25/10/2014	Initial Submission
1	06/11/2014	Revision 1
2		

1.3 Map



1.4 Development Process

This traffic management plan covers the stage(s) listed below, subsequent stages (if any) may require amendments and additional plans to be prepared.

Included Stages / Phases:

Stage / Phase	Duration (Approx.)
Excavation	7 Weeks
Construction	50 Weeks
Fit Out	25 Weeks

1.5 Excavation Phase

Quantity of material to be removed is 2300 m^3

Largest Truck Size: Bogie (tare up to 12 tonne)
Peak Average Daily Vehicle Movements: Up to 20 (5 trucks to make 4 round trips each per day)

Site establishment and Demolition will be the initial phase of the project; the site boundary fencing is to be installed. A new vehicular crossover on Livistona Ln will be used for both vehicular entry and exit.

1.6 Construction Phase

Largest Truck Size: Rigid (tare up to 23 tonne)
Peak Average Daily Vehicle Movements: Up to 8

Vehicle movements will not be required every day during this stage.

1.7 Fit out Phase

Largest Truck Size: Rigid (tare up to 23 tonne) Average Daily Movements: 5 - 10
Vehicle movements will not be required on all days and will mainly consist of Trade Utes and Vans.

2 Proposed Traffic Management

2.1 General

A. Site Vehicles

•Site vehicles will reverse along Livistona Ln with a traffic controller as a spotter and exit the street in a forward facing direction. Traffic controller to be used if required to facilitate reversing in or out of site.

• All drivers will be made aware of the approved routes prior to commencing work at the site as part of the site induction.

• Vehicles will be scheduled in such a manner as to not require queuing on the road network surrounding the site.

B. Road Occupancy

• Approval from RMS is not required.

• All Traffic Control Plans (TCPs) associated with this CTMP will comply with relevant Australian Standards and RMS Traffic Control at Worksites Manual.

C. Parking for Site Workers

• Throughout the project site workers will park within the site boundaries where possible or alternatively using existing on-street parking with existing parking restrictions.

D. Public Transport

•Surrounding public transport access unaffected during this project.

E. Surrounding Roads

• Site vehicles are to use approved routes only for access to and from the site.

• Construction traffic to be scheduled where possible outside of peak times such as school zone hours to minimise impact to existing traffic increases.

• Truck queuing on surrounding streets is not permitted or required during this project.

2.2 Excavation

A. Site Entry & Exit Routes

• Entry – From ***Mona Vale Rd and or Pittwater Rd (North Bound)***

1) Turn Right from **Mona Vale Rd** onto **Pittwater Rd** (or Continue Along **Pittwater Rd**)
2) Continue onto **Barrenjoey Rd**
3) Turn Right onto **Palm Beach Rd**
4) Reverse into **Livistona Ln**
5) Reverse down to **Site**

• Exit – Exit **Site for South or West Bound**

1) Continue along **Livistona Ln**
2) Turn Right onto **Palm Beach Rd**
3) Turn Left onto **Barrenjoey Rd**
4) Continue onto **Pittwater Rd**
5) Turn Right for **West Bound** onto **Mona Vale Rd** OR Continue along **Pittwater Rd** for **South Bound**

B. Vehicle Movements within Site

- Traffic controllers will be used to assist vehicles needing to reverse to and or from site.

C. Loading / Unloading Vehicles

- All vehicles loading / unloading to be contained within site boundaries.

D. Road Occupancy

i. Standing Plant – Not required.
ii. Works Zone – Not required.
iii. Parking for Site Workers – All site workers will park within site boundaries or see 2.1/C

E. Storage for Equipment, Materials and Waste.

- All located within site boundaries to the rear near the site compound.

F. Removal of Excavated Materials from Site

All site vehicles to be loaded within site boundaries and will be checked and cleaned prior to exit to ensure surrounding roadways are not contaminated with spoil.

G. Pedestrian Management

- Boundary fence to limit pedestrian access to site, hoarding not required as work is set back from footpath. Pedestrian access maintained throughout this stage.

2.3 Construction

A. Site Entry & Exit Routes – Same as previous stage.

B. Vehicle Movements Within Site – Same as previous stages with basement level to be used when construction is complete.

C. Loading/Unloading Vehicles – Same as previous stages

D. Road Occupancy

i. Standing Plant – Same as previous stage
ii. Works Zone – Same as previous stage
iii. Parking for Site Workers – Same as previous stage
iv. Footpath Works / Traffic Controllers – An approved permit from council to be sought prior to commencements of works requiring road occupancy.

E. Storage for Equipment, Materials and Waste – Same as previous stage.

F. Pedestrian Management – Same as previous stage.

2.4 Fit Out

A. Site Entry & Exit Routes – Same as previous stages.

B. **Vehicle Movements Within Site** – Same as previous stage.

C. **Loading / Unpacking Vehicles** – Same as previous stage.

D. **Road Occupancy**
   i. Standing Plant – Not Required
   ii. Works Zone – Not Required
   iii. Parking for Site Workers – Same as previous stage

E. **Storage for Equipment, Material and Waste** – Same as previous stage.

F. **Pedestrian Management** – Pedestrian access along footpath maintained throughout this stage.

3 Project Impact

3.1 Residents / Surrounding Property Owners

Existing residential driveways and access points will be maintained throughout the project under traffic control supervision.

3.2 Pedestrians & Cyclists

Existing pedestrian and cyclist's access along Livistona Ln maintained throughout the project. Pedestrian access to be maintained during footpath work via the traffic controller's onsite to manage activity as required. Site vehicles are to wait for a suitable gap in both pedestrian and vehicular traffic before proceeding to minimise impact to existing traffic flow.

3.3 Emergency Services

Access along Livistona Ln will be maintained throughout the project. Priority is given to emergency vehicles as per normal procedure.

3.4 Local Traffic

Access along Livistona Ln will remain as per normal conditions except for when deliveries are taking place along Livistona Ln. Construction vehicles are to make way for residents of 97 Florida Rd and 3 Livistona Ln as required due to the width of the road being to narrow to allow vehicles to pass while construction vehicles are being loaded or unloaded. Site vehicles are to exit using normally occurring gaps in traffic to reduce impact to traffic flows. Construction traffic to be scheduled where possible, outside of peak times such as school zone hours to minimise impact to existing traffic increases.

3.5 Public Transport

N/A.

3.6 Impact on Community & Businesses

Impact to the community will be minimal due to approach and departure routes close to the Barrenjoey Rd.

Appendix A - Traffic Control Plans

AI23 (a) – VEHICLE ROUTES – SITE ACCESS ALL STAGES
AI23 (b) – SITE ACCESS – EXCAVATION / CONSTRUCTION / FIT OUT STAGES

PLAN: SITE OVERVIEW
STAGE: ALL STAGES

AAA TRAFFIC CONTROL PTY LTD
PH: 02 9675 7731 F: 02 9675 7744
Unit 11/105 Kurrajong Ave
Mount Druitt NSW 2770
www.aaatrafficcontrol.com.au
info@aaatrafficcontrol.com.au
A.B.N. 78 105 021 869

NOTES:
1. All Traffic Control works; signs and devices to comply with Australian Standard AS 1742.3.
2. Adjustments to TCP may be only made by persons holding an RTA "Select and Modify" ticket or higher.
3. All traffic control devices may only be set out by persons holding an RTA "Apply Traffic Control Plans" ticket or higher.
4. Traffic control personel must hold an RTA "Traffic Controller" ticket or higher.
5. Signs to be erected so they are visible to motorists and not a hazard to pedestrians.
6. Traffic controllers to escort pedestrians past the work area.
7. Traffic Controllers who are on constant Stop-Go, must be relieved for a minimum period of 15 minutes every two hours. As per the Australian Standards and the WH&S Act.
8. Site ganger is to conduct a 'tool box talk' and complete the adequate paperwork to support the discussion.
9. A 'risk assessment' to be conducted on site, prior setup to determine the queue length and site distance to the active TCP.
10. If an incident occurs on site, an 'incident report form' MUST be completed immediately. Upon completion of the incident report form, site Ganger is to notify AAA head office.

This TCP has been prepared as a guide for Traffic Management purposes only and is not to scale.
The positions of the signs, traffic controllers and equipment are only suggested locations. Amendments to the locations may be required on site.
AAA Traffic Control Pty Ltd excepts no liability for the implementation or execution of this TCP unless undertaken by authorized AAA Traffic Control personnel.

CLIENT:	**PACIFIC PLUS CONSTRUCTIONS PTY LTD**
CONTACT:	LEWIS JOYNER PH: 9939 8103
PROJECT:	RESIDENTIAL DWELLING CONSTRUCTION
LOCATION:	2a LIVISTONA LN, PALM BEACH
UBD:	**98/Q,2**
PO:	**N/A**

MANAGEMENT
- O STOP / SLOW
- O LANE MERGE
- O CONTRA FLOW
- O DETOUR
- O ROAD CLOSURE
- ● SITE ENTRY
- O PEDESTRIAN MGMT.
- O INTERMITTENT

ROAD CLASSIFICATION
- O STATE (RTA/RMS)
- O REGIONAL (COUNCIL & RTA/RMS)
- ● LOCAL (COUNCIL)

JOB NO.	**28**
O TCP	
O TMP	
O CTMP	
REV	2
DATE	06.11.14
SCALE	N.T.S
PLAN NO:	**A123 (a)**
AUTHOR:	SEYED IMAM
CERT:	2472051687
DATE:	26/10/2014
SIGN:	

RECOMMENDED MAXIMUM SPACING OF CONES AND BOLLARDS

PURPOSE OF USAGE	APPROCH SPEED (km/h)	MAX SPACING (m)
All purposes on residential or commercial streets	< = 50	4
Center-line on approach to Traffic Controller position	*All cases*	4
Outer edge of traffic line - i.e. working on shoulder	51-70 / >70	18 / 24
Separating opposing traffic on 2 lane 2 way road	51-70 / >70	12 / 18
Separating opposing traffic on multilane undivided road	51-70 / >70	12 / 18
Adjacent to a closed lane on a multilane road	51-70 / >70	16 / 24
Merge tapers	51-70 / >70	9 / 12
Lateral shift tapers	51-70 / >70	12 / 18
Protecting freshly painted lines	51-70 / >70	24 / 60

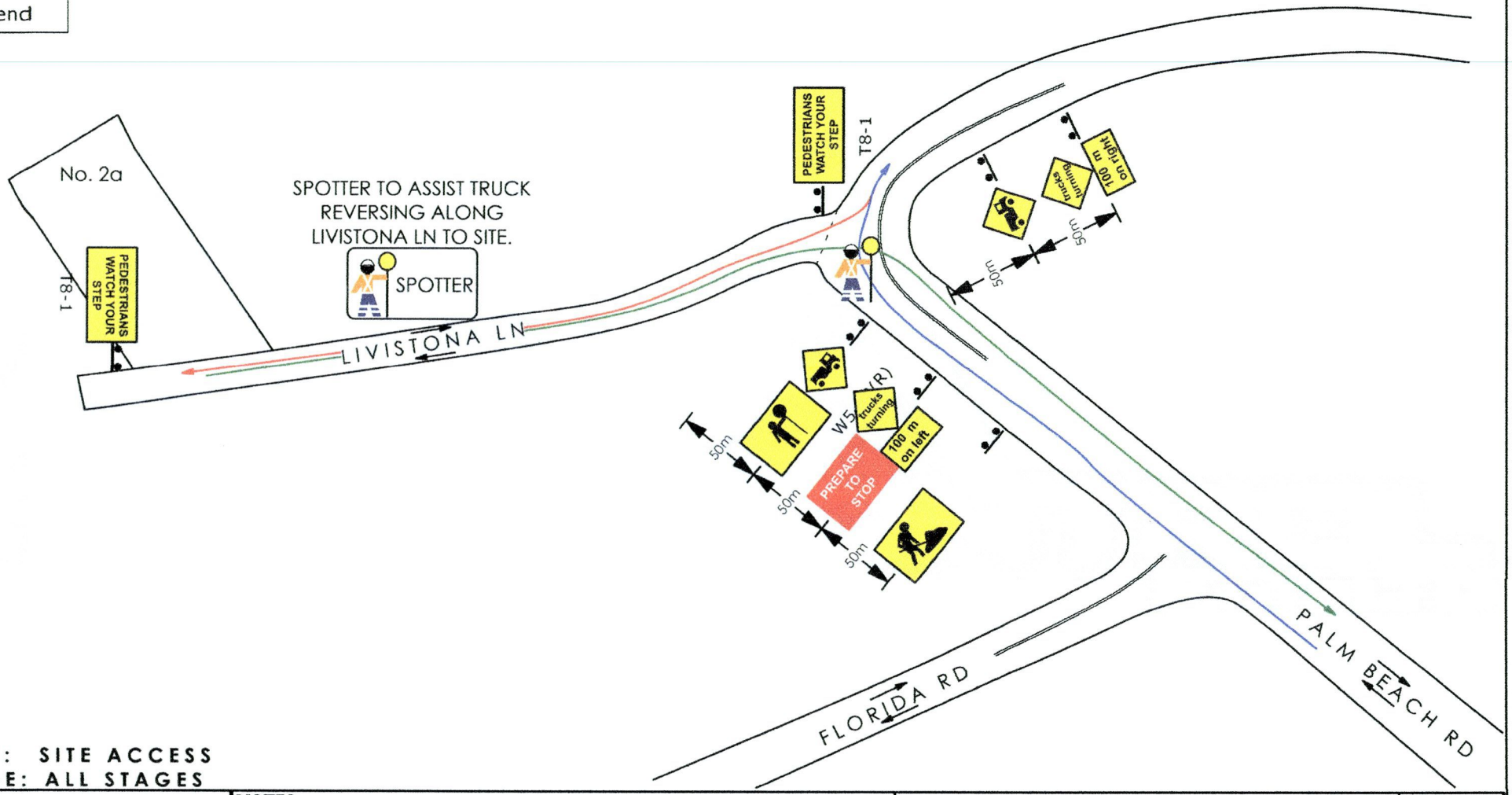
FIGURES EXTRACTED FROM RTA TCWS MANUAL v4.0 (TABLES 5.1 & 5.2). REFER TO MANUAL FOR FURTHER INFO.

RECOMMENDED TAPER LENGTHS

APPROACH SPEED(km/h)	TRAFFIC CONTROL AT START	LATERAL SHIFT TAPER	MERGE TAPER
< 45	15	0	15
46 - 55	15	15	30
56 - 65	30	30	60
66 - 75	N/A	70	115
76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
> 105	N/A	110	180

www.invarion.com

Legend



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O TCP	
O TMP	
O CTMP	
REV	2
DATE	06.11.14
SCALE	N.T.S
PLAN NO:	**AI23 (b)**
AUTHOR:	SEYED IMAM
CERT:	2472051687
DATE:	26/10/2014
SIGN:	

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76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
> 105	N/A	110	180

Head Office

Mount Druitt

Unit 11 / 105 Kurrajong Avenue,

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CONSTRUCTION MANAGEMENT PLAN

NEW RESIDENCE

At

2A LIVISTONA LANE, PALM BEACH NSW

For

Mr. Philip Salter

PACIFIC PLUS CONSTRUCTIONS

A DEVELOPMENT AND CONSTRUCTION DETAILS

A.1 Description of Proposed Development

This Construction Management Plan is prepared in response to DA Consent NO108/14 and Condition C, Annexure 3, for construction of new residential dwelling including ground floor garage and site works, swimming pool and landscaping.

A.2 Excavation staging and timing

Excavation activity is planned to be staged as follows:

Week 1 5th – 12th Nov 2014	• Day 1 – Entry pad establishment to get machine off road. Excavator should be off the road by 9am. At this point truck will also be in the street for this period to remove material as there will be no stock piling area. • Remainder of week – Establishment of main excavation area and stock pile area. Stock pile area will be determined after initial entry to site. • Tree removal
Week 2 – 6 12th Nov– 17th Dec 2014	• Excavation of high side of property • Boundary separation • Bulk material removal
Week 7 17th – 24th Dec 2014	• Site clean up and finishing works

The timing above is subject to any inclement weather delays and changes based on latent conditions

A.3 Excavation Traffic Management Plan

Action	Specific	Traffic Management
Excavator and Site Entry	• Machinery to be dropped off as close to site as possible and tracked up to site. • Bogie will enter after float has left to remove material from entry excavation	• 2 Lollipop persons to allow float truck to back up into Livistona Lane from Palm Beach Road • Lollipop people to remain whilst excavator is on the street, removing material to gain access onto site. • Property at the end of street will need to be notified they will not be able to gain access until excavator has crawled off the street.
Material Removal Trucks	• Bogie Tippers in week 1-2 will be loaded on the street until garage level is excavators enough to back truck into site. • Trucks to enter Livistona Lane for no more than 10 minutes at a time • No more than 2 trucks will be on rotation. Trucks will spend a maximum total of 1.5 hours in the Lane a day • Trucks to be scheduled in a manner as to not require queuing on the road network surrounding the site	• Trucks entering and exiting sign should be placed at the start of the street. • Lollipop labourers can manage traffic whilst trucks are backing up Livistona Lane from Palm Beach Road. A truck turning sign on Palm Beach Road could also act as a warning for people travelling up Palm Beach Road from Ocean Drive • Blue card certified labourers will guide trucks up the street • All trucks will turn right out of Livistona Lane

B. PREVAILING SITE CONDITIONS

B.1 Existing traffic and pedestrian conditions

The site is located on the western side of Livistona Lane with its section defined. Refer to Map 1.

Livistona Lane leading to the site is a non through road with light traffic movement made up resident vehicles only. It has easy access from Palm Beach Road. There is provision for on street parking with existing parking restrictions on Palm Beach Road at the intersection with Livistona Lane.

The construction route that is proposed has taken into consideration all surrounding neighbourhood conditions affected by the traffic movement.

Given the volume of traffic no major disruptions to traffic are anticipated. However, should any traffic control measures be required, all such actions shall be controlled by trained and certified traffic controllers and properly signed posted for controlled pedestrian and traffic use.

C. IDENTIFICATION OF AFFECTED PUBLIC DOMAIN AREAS

C.1 Number and Tonnage of Construction Vehicles

The site establishment and excavation phases of the construction works are the times most likely to involve heavy vehicles. Given the nature of the works we anticipate bulk of the delivery and removal with 10 tonne bogie tipper trucks with a tare weight of 10 tonnes and a laden weight of approximately 22 tonnes (fully loaded).

It is anticipated that a cycle of two to three tippers will be able to remove materials from the site efficiently.

C.2 Vehicular Access Points during Construction

Refer to Map 1 for vehicular access points to and from the site during construction.

C.3 Access routes between site and a major arterial road

Truck access and egress to and from site shall be as indicated in Map 1.

a. Trucks arriving to the site shall travel along Barrenjoey Road, Whale Beach Road, Florida Road, Palm Beach Road, and into Livistona Lane.

b. Trucks departing the site shall travel along Livistona Lane, Palm Beach Road, Florida Road, Whale Beach Road, and onto Barrenjoey Road.

C.4 Queuing locations

Truck queuing on surrounding streets should not be required during this project.

C.6 Oversized vehicles

There shall be no oversized vehicles used on this site apart from the site establishment, demolition and excavation phases. These vehicles may transport the excavator and the like. They will travel the access and departure routes from the site.
All activities shall be controlled by certified and trained traffic controllers and be adequately signposted.
All affected neighbours will be given adequate notice of these types of activities as required.

C.7 Arrival times for Construction Vehicles

Construction vehicles shall arrive at the site between the hours of 7am and 4.30pm.
All effort will be made via programming of works and site co-ordination to minimize the impact of vehicle movement on the neighbouring roadways.

C.8 Loading and unloading of vehicles

For all trades, loading and unloading of vehicles will take place kerbside directly in front of the site. Construction vehicles are to make way for residents of 97 Florida Rd and 3 Livistona Lane as required due to the width of the road being too narrow to allow vehicles to pass while construction vehicles are being loaded or unloaded.
All activities shall be under the control of certified traffic controllers and adequately sign posted. Council permits where necessary will be attained prior to these activities.

Delivery of oversized plant or vehicles shall remain on the transport vehicle until 7am.
On completion these vehicles shall be loaded onto transport vehicles after 4pm.

D. MEASURES TO MINIMIZE THE IMPACT OF THE PROPOSED WORKS

D.1 Detour Routes

Detour routing will not be required for this project.

D.2 Traffic management

Traffic controllers and sufficient signage will be implemented to control traffic and minimise traffic disruptions in the vicinity of the site in Livistona Lane during the construction period in accordance with AS1742.3. Signs will be posted at visible and vital locations to notify pedestrians and vehicles of any temporary inconvenience.
Construction traffic to be scheduled where possible outside of peak times such as school zone hours to minimise impact to existing traffic increases

E. PUBLIC TRANSPORT SERVICES

E.1 Interruption to Bus Services

No current bus service passes the site and therefore no interruptions are anticipated.

F. EMERGENCY VEHICLE ACCESS

F.1 Ambulance fire fighting and police services

Access along Livistona Lane will be maintained throughout the project.
Priority is given to emergency vehicles as per normal procedure.

G. PEDESTRIAN ACCESS

G.1 Pedestrians and Cyclists

Pedestrian and cyclists access is to be maintained at all times in Livistona Lane. Site vehicles are to wait for a suitable gap in both pedestrian and vehicular traffic before proceeding to minimise impact to existing traffic flow .

H. ADJOINING COUNCIL AREAS

H.1 Council Boundaries

The development is not on the boundary of two councils

I. PUBLIC CONSULATION PROCESS

I.1 Contact details of Site manager

Contact point in relation to the CMP is;
Phil Strudwick
Pacific Plus Constructions
Phone (02) 9939 8103
Fax (02) 9939 8106

Map 1: Access and egress routes

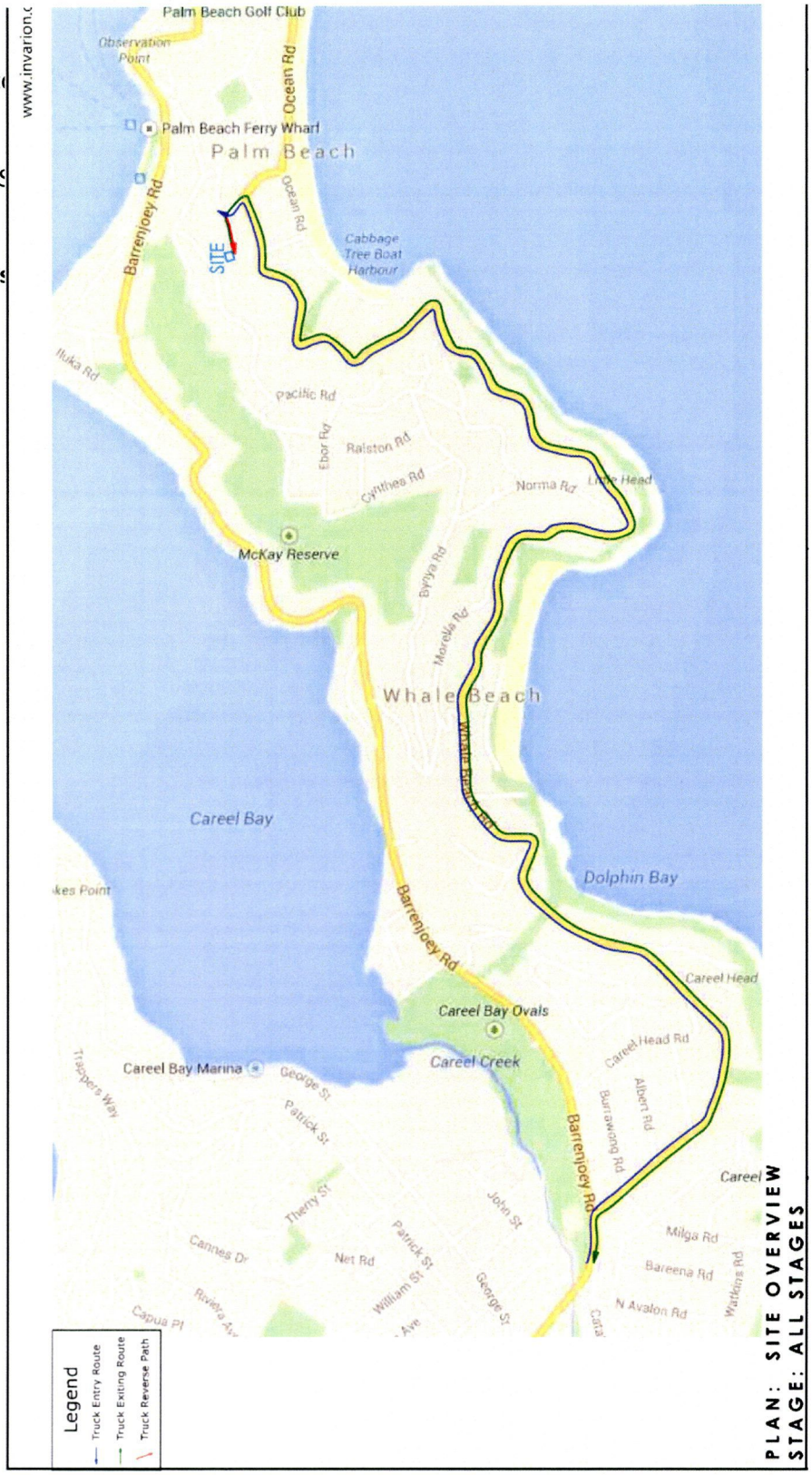
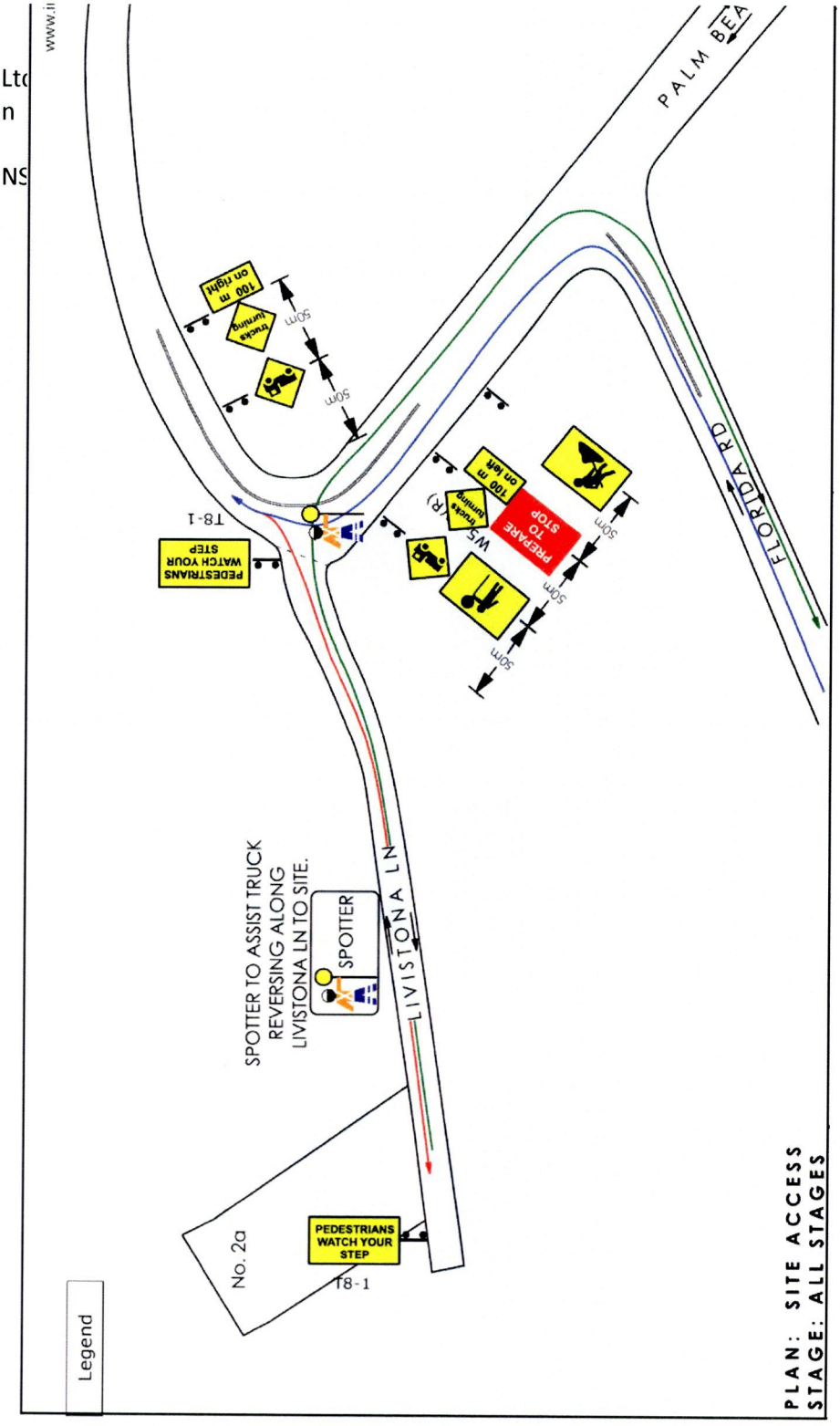


Image 1: Traffic signage plan


PALM BEA
FLORIDA RD
LIVISTONA LN
No. 2a
SPOTTER
SPOTTER TO ASSIST TRUCK REVERSING ALONG LIVISTONA LN TO SITE.
PEDESTRIANS WATCH YOUR STEP
T8-1
PREPARE TO STOP
Trucks turning
100 m on left
100 m on right
50m
Legend
PLAN: SITE ACCESS
STAGE: ALL STAGES

PITTWATER COUNCIL

ABN61340837871
Telephone 02 9970 1111
Facsimile 02 9970 1200
Postal Address
PO Box 882
Mona Vale NSW 1660
DX 9018, Mona Vale

Ross McWhirter, Project Leader – Road Reserve Management
8am to 4:30pm Mon - Fri
Phone 9970 1207 Mobile 0419 629 007

20 November 2014

Vimiera Pty Ltd
2 The Point Road
WOOLWICH NSW 2110

Dear Sir / Madam,

Re: SECTION 139 CONSENT *(Roads Act 1993)* – 2A Livistona Lane, Palm Beach

Council grants the applicant(s), Vimiera Pty Ltd, consent to construct a driveway crossing and associated retaining walls in the public road reserve at 2A Livistona Lane, Palm Beach.

The following drawings are referenced in relation to this Section 139 consent: -

- Structural Drawings dated September 2014 by Istruct Consulting Engineers – Project Number 140806, Drawing Number S02.

This Section 139 Consent is granted subject to the following conditions: -

1. The Applicant(s) shall, at all times, keep indemnified Council from and against all actions, suits, proceedings, losses, costs, damages, changes, claims and demands in any way arising out of or by reason of anything done or omitted to be done by the Applicant(s) in respect of the work in question.

2. The Applicant(s), at all times for the duration of this Consent, will not interrupt or otherwise disturb the traffic flow on the road without first obtaining the consent of Council.

3. Adequate support of the road reserve shall be provided at all times during the course of the works.

4. In the event that the driveway or wall construction requires the use of a mobile concrete pump in the road reserve, separate approval must be obtained from Council for that activity. Form No UEA313 (*Application to Stand Construction Plant on a Public Road Reserve*) must be lodged with the applicable fees.

5. The Applicant(s) shall be responsible for the cost of all service and utility adjustments associated with the construction of the driveway and retaining walls. Contact Dial Before You Dig (1100) at least two working days before the works are due to start for information on the location of underground pipes and cables.

6. Compliance with conditions of Development Consent N0108/14 which relate to the road reserve and hours of construction.

7. Compliance with the recommendations and instructions of the geotechnical engineer relating to any works that impact on the road reserve.

8. Owner(s) who wish to have a coloured driveway in lieu of a standard concrete driveway are required to complete a "Deed of Agreement for Coloured Driveway" (Form No. UEA303) and pay the appropriate fee. For owner(s) who wish to have a driveway constructed with bricks, pavers, patterned, stamped, sealed or stencilled in lieu of a standard concrete driveway, a "Deed of Agreement for Cosmetic Driveway" (Form No. UEA304) is required to be completed and the appropriate fee paid. These Deeds cover the section of the driveway between the property boundary and the kerb and gutter.

9. The Applicant(s) shall make good any damage caused to the property of any person or any property of Council by reason of the carrying out of any work by the Applicant(s) under the Conditions of this Consent.

10. Should the Applicant(s) fail to comply with any of these conditions or any requirement of Council as provided then this Consent shall permanently lapse and any part of the work remaining within the road at that time shall be deemed to be an obstruction or encroachment under *Section 107* of the *Roads Act 1993*.

11. This Consent receipt must be held on the job and produced to any officer of Council when called upon.

12. The Applicant(s) shall accept all responsibility for public safety during the construction of the works.

13. The structural works shall be supervised and certified by a qualified structural / geotechnical engineer. The certification shall address structural adequacy and fitness for purpose. A copy of this certification shall be submitted to Council for its records.

14. COUNCIL IS TO BE ADVISED WHEN THE WORKS HAVE BEEN COMPLETED. Upon receipt of this advice, Council will inspect the works to determine if they are satisfactory. Any works deemed by Council to be unsatisfactory are to be rectified to Council's reasonable satisfaction.

Yours sincerely

R. McWhirter

Ross McWhirter
PROJECT LEADER – ROAD RESERVE MANAGEMENT

Enclosures: - *List of Council Authorised & Accredited Concrete Contractors for Vehicle Footpath Crossings and Associated Works.*

PITTWATER COUNCIL

LIST OF COUNCIL AUTHORISED & ACCREDITED

CONCRETE CONTRACTORS

FOR VEHICLE FOOTPATH CROSSINGS & ASSOCIATED WORKS

as at 14th November 2014

- The following Contractors are authorised to carry out the above construction within the road reserve in the Pittwater Council area. No other persons are permitted to carry out excavation or any other part of this work.
- Please note that the Contractors are specifically authorised as vehicle footpath crossing Contractors only and in some instances the Contractors may not hold a Builder's Licence or a Restricted Builder's Licence.

Company Name	Address	Address	Phone	Mobile
Action Concreting & Construction Pty Ltd	PO Box 521	Collaroy 2097	9982 2135	0414 355 772
Anton Constructions Pty Ltd	730 Ourimbah Creek Rd	Palm Grove 2258	0243 629 605	0418 236 651
Barrie Bree Contracting	29 Seaview Ave	Newport 2106	9997 8840	0415 183 146
C-Side Formwork Pty Ltd	29 Elanora Rd	Elanora 2101	9913 1653	0404 872 111
Freshwater Environmental Constructions	17 Binalong Ave	Allambie Heights 2100	9905 3770	0414 543 957
GC Concrete	50 Dryden Ave	Carlingford 2118	9872 3892	0418 651 431
Kelpie Concreting	15 Crummock St	Wheeler Heights 2097		0410 514 024
Kookaburra Concrete Pty Ltd	79 Rednal St	Mona Vale 2103		0404 336 708
L&MC Constructions (T/A Marty & Co)	B17/148 Old Pittwater Rd	Brookvale 2100	99390772	0411 416 777
Lamrock Builders Pty Ltd	PO Box 76	Avalon Beach 2107	9918 7037	0418 406 221
Masterform Services Pty Ltd	150 Alfred St	Narraweena 2099	997 16309	0438 227 887
NBE Concreting	45 Brinawa St	Mona Vale 2103		0418 244 793
Northern Beaches Concreting	14 Ethic Rd	Beacon Hill 2100		0417 640 546
Northside Concreting Services Pty Ltd.	PO Box 168	Mona Vale 1660	9997 6363	0411 529 004
Paton Concrete	PO Box 1149	Newport 2106	9979 2791	0407 011 907
Pavecrete	PO Box 710	Avalon Beach 2107	9918 7948	0418 772 799
Performance Concrete Pty Ltd	104 Stella St	Collaroy Plateau 2097	9982 8451	0414 182 553
RFE Earthmoving Pty Ltd	6/9 Ponderosa Pde	Warriewood 2102	9999 6816	0414 413 877
S&E Cavalieri Pty Ltd	4/7-9 Quirk Rd	Manly Vale 2093		0411 610 715
Statewide Civil	36 Abbott Rd	Seven Hills 2147	9674 9997	
Universal Concrete Construction Pty Ltd	PO Box 410	Dee Why 2099	9939 4644	0418 394 395
Wayne Duffy Building Services Pty Ltd	PO Box 1757	Warriewood 2102	9979 5521	0419 273 260
Youdell Constructions	B/22-24 Boronia St	Dee Why 2099		0414 998 949

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

Development Application for VIMIERA PTY LTD
Name of Applicant

Address of site 2a UVISTONA LANE, PALM BEACH

PART A: Declaration made by Structural or Civil Engineer in relation to the incorporation of the Geotechnical Issues into the project design

I, DAMIAN IENCO (insert name) **on behalf of** ISTRUCT CONSULTING ENGINEERS (trading or company name)

on this the 17/11/2014. (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: EXCAVATION METHODOLOGY FOR PROPOSED NEW
~~Report Date~~: HOUSE AT 2a UVISTONA LANE PALM BEACH
Author: TONY CROZIER DATED 24TH SEPT. 2014.
Author's Company/Organisation: CROZIER GEOTECHNICAL CONSULTANTS

Structural Documents list:

S01-S09

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 ..... DAMIAN IENCO .....

Chartered Professional Status..... MIEAUST CPENG NPER

Membership No. ..... 2644651 .....

Company..... ISTRUCT CONSULTING ENGINEERS.

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, Peter Crozier (insert name) on behalf of Crozier Geotechnical Consultants (trading or company name)

on this the 13th November 2014 (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 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: Investigation & Risk Assessment for Proposed New House
Report Date: 14/05/14 #2014-011
Author: T. Crozier – Crozier Geotechnical

Documentation which relates to or is relied upon in report preparation:

Excavation Methodology report, Crozier Geotechnical, Ref. 2014-011.2, 13th Nov 2014
Structural Design (part) : Istruct, Project No. 140806, Dwg No. S01 to S09
Dated: September 2014, Revision: 4

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 .....

Chartered Professional Status.....

Membership No. .....

Company.....

Registered Professional Engineer 691550
Mr Peter Crozier
MIEAust CPEng (Civil / Geotechnical)
NPER
Signature..... Date. 13/11/14
Registered on the NPER in the area of practice of
Civil / Geotechnical
National Professional Engineers Register

DIRECTORS
Stewart McGeady Rick Wray Brad Seghers

Stormwater Design Certificate

Date:	24th November 2014	Job No.	140143
Client:	Phil Slater	Engineer:	CH

Site: 2A Livistona Lane, Palm Beach

Northern Beaches Consulting Engineers P/L has designed a Stormwater Management System for the above project (Job No: 140143, Dwg No's: D01-D05).

The design is in general compliance with B5.7 of Pittwater 21 DCP, 3.2.1 Drainage of the Building Code of Australia Housing Provision and AS 3500.3 – Stormwater Drainage.

We trust that this certificate meets with your requirements. Please contact the author if further clarification is required.

NORTHERN BEACHES CONSULTING ENGINEERS P/L

Stewart McGeady
BE MIEAust Director

X:\ENG NBC\2014\140143\SC001.docx

CROZIER - *Geotechnical Consultants*
Engineering Geologists & Geotechnical Engineers

REPORT ON GEOTECHNICAL SITE INVESTIGATION
AND
RISK ASSESSMENT

for

PROPOSED NEW HOUSE

at

2A LIVISTONA LANE, PALM BEACH

Prepared For

MR. PHIL SALTER

Project No: 2014-011.3
November, 2014

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 1 – To be submitted with Development Application

Development Application for _____
Name of Applicant
Address of site 2a Livistona Lane Palm Beach

Declaration made by geotechnical engineer or engineering geologist or coastal engineer (where applicable) as part of a geotechnical report

I, Peter Crozier *on behalf of* Crozier Geotechnical Consultants

on this the 14/11/14 certify that I am a geotechnical engineer or engineering geologist or coastal engineer as defined by the Geotechnical Risk Management Policy for Pittwater - 2009 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:

Please mark appropriate box

☐ have prepared the detailed Geotechnical Report referenced below in accordance with the Australia Geomechanics Society's Landslide Risk Management Guidelines (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009

☑ am 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 (AGS 2007) and the Geotechnical Risk Management Policy for Pittwater - 2009

☐ have examined the site and the proposed development in detail and have carried out a risk assessment in accordance with Section 6.0 of the Geotechnical Risk Management Policy for Pittwater - 2009. I confirm that the results of the risk assessment for the proposed development are in compliance with the Geotechnical Risk Management Policy for Pittwater - 2009 and further detailed geotechnical reporting is not required for the subject site.

☐ have examined the site and the proposed development/alteration in detail and I am of the opinion that the Development Application only involves Minor Development/Alteration that does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

☐ have examined the site and the proposed development/alteration is separate from and is not affected by a Geotechnical Hazard and does not require a Geotechnical Report or Risk Assessment and hence my Report is in accordance with the Geotechnical Risk Management Policy for Pittwater - 2009 requirements.

☐ have provided the coastal process and coastal forces analysis for inclusion in the Geotechnical Report

Geotechnical Report Details:

Report Title: Geotechnical Investigation & Risk Assessment for Proposed New House
Report Date: 14th November 2014 #2014-011-3
Author: T. Crozier
Author's Company/Organisation: Crozier Geotechnical Consultants

Documentation which relate to or are relied upon in report preparation:

Survey: PJ Baker & Assoc. Ref: 021013, 17/10/13
Design: BKH Architects, Dwg. No. A01 → A.06 (see report)

I am 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 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.

Registered Professional Engineer 691550
Mr Peter Crozier
MIEAust CPEng (Civil / Geotechnical)
N P E R
Signature..... Date 14/11/14
Registered on the NPER in the area of practice of
Civil / Geotechnical
National Professional Engineers Register

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 _____
Name of Applicant
Address of site 2a Livistona Lane, Palm Beach

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 & Risk Assessment for Proposed New House
Report Date: 14th November 2014 # 2014-011.3
Author: T. Crozier
Author's Company/Organisation: Crozier Geotechnical Consultants

Please mark appropriate box

- ☑ Comprehensive site mapping conducted 11-3-14 & 28-11-14 (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 .....
  - ☑ Yes Date conducted 23-10-14
- ☑ 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.
- ☑ 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.

I am aware that Pittwater Council will rely on the Geotechnical Report, to which this checklist applies, as the basis for 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.

Signature .....
Name .....
Chartered Professional Status.....
Membership No. .....
Company.....

Registered Professional Engineer 691550
Mr Peter Crozier
MIEAust CPEng (Civil / Geotechnical)
N P E R
Signature ..... Date 19/11/14
Registered on the NPER in the area of practice of
Civil / Geotechnical
National Professional Engineers Register

TABLE OF CONTENTS

CROZIER - *Geotechnical Consultants*
Engineering Geologists & Geotechnical Engineers

Crozier Geotechnical Consultants *ABN: 96 113 453 624*
Unit 12/42-46 Wattle Road *Phone: (02) 9939 1882*
Brookvale NSW 2100 *Fax:(02) 9939 1883*
Crozier Geotechnical Consultants is a division of PJC Geo-Engineering Pty Ltd

Date: 14th November 2014
No. Pages: 1 of 18
Project No.: 2014-011.3

REPORT ON GEOTECHNICAL INVESTIGATION AND RISK ASSESSMENT FOR PROPOSED NEW HOUSE AT 2A LIVISTONA LANE, PALM BEACH, NSW.

1. INTRODUCTION:

This report details the results of a geotechnical investigation and risk assessment carried out for the proposed construction of a new house at 2A Livistona Lane, Palm Beach, NSW. The investigation was undertaken by Crozier Geotechnical Consultants at the request of BKH Architects on behalf of the client Mr. Phil Salter. The report has been updated to meet the requirements of Pittwater Councils Development Consent Conditions.

The site (2A Livistona Lane) is currently undeveloped/vacant land and contains a steep to very steep slope with outcropping sandstone bedrock near the roadway and at the rear of the block. Elsewhere within the site are soil slopes with boulders of various sizes and small trees and vegetation.

It is understood that the proposed works involve construction of a new three and four storey house with a lower level garage basement. The house will involve excavation across the site up to approximately 11m depth below current ground levels at its western edge. It is expected that most of the excavation will extend through bedrock of the Narrabeen Group containing interbedded shale/mudstones and sandstone.

The investigation was carried out to provide information for Development Application purposes and design of site works. The site has been classified under the Pittwater Council Geotechnical Risk Management Policy 2009 as being within the H1 landslip hazard zone therefore the site requires a Geotechnical Landslip Risk Assessment to be conducted. The site is also classified as Acid Sulfate Soils Map – Class 5 under the Council LEP 2013 which requires an assessment for Acid Sulfate Soils. The investigation comprised:

a) A detailed geotechnical inspection and mapping of the site and adjacent land by a Geotechnical Engineer and Principal Engineering Geologist.
b) Review of Ortho Photomaps and Aerial Photography of the site.
c) Drilling of test boreholes to investigate subsurface geology and depth to bedrock. The investigation was limited to hand equipment due to site access limitations.

Details of the fieldwork are given in the report, together with comments relating to design and construction practice. The following plans and diagrams were supplied for this work;

- Site Survey Plan by P.J. Baker & Associates, Survey Reference: 021013, Dated: 17/10/2013.
- Architectural Design Plans by BKH Architects, Plans for Concept Presentation:

A.01 – A	Dated:	12/11/2013
A.02 – A		12/11/2013
A.03 – C		20/12/2013
A.04 – C		20/12/2013
A.05 – C		20/12/2013
A.06 – B		05/12/2013

2. SITE FEATURES:

2.1. Description:

Livistona Lane is a narrow laneway that extends to the south from Palm Beach Road, near the intersection with Florida Road, Palm Beach, NSW. The site is situated at mid-slope level on the eastern face of a high, steep sided, north-west striking ridge line that passes through the suburb of Palm Beach. The site is located on the high, western side of the laneway, close to its upper southern end, where it terminates. Adjacent to the laneway is a low (<1.5m) sandstone bedrock cliff outcrop before the site slopes up steeply to the west. The rear of the site contains several large sandstone cliff outcrops with some landscaped terraces above before another sandstone bedrock outcrop marks the rear upper western boundary. The site is devoid of development and has minimal vegetation.

2.2. Geology:

Reference to the Sydney 1: 100,000 Geological Series sheet (9130) indicates that the site is near the boundary between Newport Formation (Rnn) of the Upper Narrabeen Group and Hawkesbury Sandstone (Rh)

Newport Formation (Upper Narrabeen Group) is of middle Triassic Age and typically comprises interbedded laminite, shale and quartz to lithic quartz sandstones and pink clay pellet sandstones. This unit underlies the Hawkesbury Sandstone. Hawkesbury Sandstone is of Triassic Age and the rock unit typically comprises medium to coarse grained quartz sandstone with minor lenses of shale and laminite and forms a capping to the ridges in this area. The upper site boundary outcrops are considered to be related to the Newport Formation.

3. FIELD WORK

3.1 Methods:

The field investigation comprised a walk over inspection of the site and adjacent properties on the 23rd January 2014 and 11th March 2014 by a Geotechnical Engineer and on the 18th February 2014 and 28th October 2014 by a Principal Engineering Geologist. It involved a photographic record of site conditions as well as detailed geological/geomorphological mapping of the site and adjacent land with examination of soil slopes, rock outcrops, vegetation and existing structures for stability. It included the drilling of two hand auger boreholes (BH1 – BH2) to investigate sub-surface geology through the centre of the site.

Dynamic Cone Penetrometer testing was carried out adjacent to the boreholes and in numerous locations, in accordance with AS1289.6.3.2 – 1997, "Determination of the penetration resistance of a soil – 9kg dynamic cone penetrometer" to estimate near surface soil conditions and confirm depths to bedrock. Mapping information and test locations are shown on Figure: 1, in Appendix: 2 along with detailed log sheets. Explanatory notes are included in Appendix: 1. A geological section is provided in Figure: 2, Appendix: 2.

3.2. Field Observations:

The site is located on the high, western side of Livistona Lane, which is a narrow bitumen paved road formed with a concrete kerb and gutter along its western edge. The road is formed with a camber to the west with the eastern edge roughly formed over a soil slope before steep slopes extend down the east into neighbouring properties. A sandstone bedrock outcrop is located within the road reserve adjacent to the western concrete gutter. This outcrop is <1.0m in height at the southern edge of the site and shows signs of previous excavation, likely for road construction. As the outcrop strikes north it moves slightly away from the road edge and is natural with a slightly stepped profile. Several detached plate shaped boulders are located adjacent to the crest of the outcrop, with the lower portion of the cliff showing signs of increased weathering. At the northern boundary of the site the cliff is vertical, approximately 1.5m in height and formed along a planar joint defect. There were no signs of significant cracking or deformation in the road pavement whilst the sandstone bedrock outcrops and boulders at the front of the site show no signs of impending movement.

The centre of the site is formed as an essentially planar, steep (18° – 24°) slope with minimal vegetation. The slope consists of slope wash sandy soils with gravel and cobbles with occasional boulders and some potential sandstone bedrock outcrops. Two large (approx. 30t and 15t) plate shaped sandstone boulders are located upon the upper soil slope. A series of basic timber steps wind up through the site to the rear. There were signs of minor surface sheet erosion however no signs of previous or impending instability. All boulders appear to be slowly creeping down slope.

A 4 to 5m high cliff line extends across the site above the soil slope. This cliff line has a vertical to rounded eastern face and contains some undercutting at its basal edge, most notably the southern portion. Inspection of the northern end revealed a separation from the bedrock and therefore this large section of rock is considered to be a boulder, which has toppled and moved slightly down slope from its original position, along a joint defect at its rear. A section of sandstone rock is exposed at the base of this boulder and this section is interpreted to be bedrock, though some open vertical jointing was noted at the southern end suggesting potential minor movement from its insitu position in this location also. A set of soil steps extend past the northern end of the large boulder, supported by a low dry stacked sandstone rock wall, up to a sandstone paved terrace with low sandstone rock garden beds.

At the southern end of the large cliff line/boulder, extending across into the neighbouring property to the south (No. 3), are three additional large boulders. The lower two of these boulders have separated from the southern end of the large cliff line/boulder whilst the third boulder is perched on top of the southern boulder. The two lower boulders are partially rounded with the southern boulder, which extends across the sites southern boundary, sitting upon a gently sloping outcrop of the interpreted sandstone bedrock. The base of this boulder appears relatively flat when viewed from its southern side. The upper perched boulder is plate shaped and sitting upon the upper sloping surface of the lower boulder resulting in a mushroom shaped outcrop, see Photo: 1. It is evident that some grouting of the contact surface between the two boulders has occurred in the past however no other stabilizing measures are confirmed.

Photo: 1 – Upper plate shaped boulder upon lower boulder, viewed from northern side.

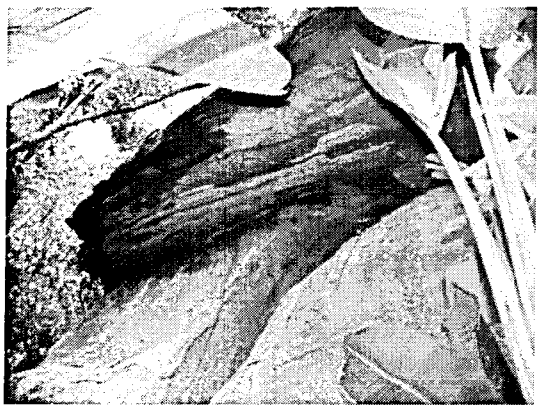


Photo: 2 – Upper and lower boulder when viewed from below on eastern side.

The rear 8m of the site consists of numerous irregular, low dry stacked and cemented sandstone rock walls which support garden beds and a narrow gently sloping lawn terrace. The rear boundary is marked by a large rounded sandstone bedrock outcrop which forms a low (<3.0m) cliff that extends up into the neighbouring property (No. 145 Pacific Road). This bedrock outcrop appears to be related to the Hawkesbury Sandstone unit.

The neighbouring property to the north (No. 2) contains a two storey brick and weatherboard house on the centre of the block, estimated at 30 to 40 years of age, however it appears to have been recently renovated. The southern house walls extend to within 1.0m of the common boundary with the site. To the rear of this property is a steep natural slope containing numerous sandstone bedrock outcrops and sandstone boulders. One large (220 tonne) boulder is of irregular shape and shows signs of previous grouting at its base, however it is partially supported off another boulder and its shape would suggest high potential for dislodgement due to external factors (i.e. earthquake/tree impact), see Photo: 3. The probability of this boulder impacting the site if it is dislodged is low however it is a serious hazard to the neighbouring house.

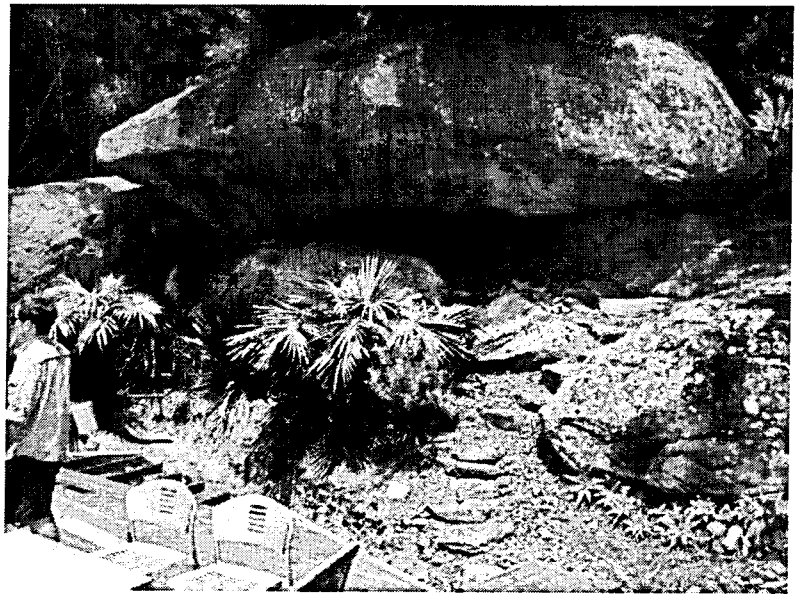


Photo: 3 – Large irregular shaped boulder within neighbouring property, sitting atop two small boulders and of very poor shape and position for long term stability.

The neighbouring property to the south (No. 3) contains a one and two storey rendered brick house on the centre of the block with a large tiled/paved terrace extending from the northern side. The house is located >4.0m from the common boundary with the site however the terrace extends to within 1.0m of the boundary. The front of this site contains a dry stacked sandstone block retaining wall up to 2.5m in height.

The neighbouring property to the west (No. 145 Pacific Road) contains a residential house structure located upslope approximately 20m from the common boundary with the site. The rear of this property contains gardens and outcropping sandstone bedrock.

A limited visual inspection of the external aspects of these neighbouring properties and buildings, carried out from within the site and road reserve, did not identify any significant signs of large scale slope instability other than the boulders described. The site and neighbouring properties are situated across steep slopes and there were loose boulders and slopewash soil across the slope and cliff line which can be subject to movement and which could create landslip hazards to the site and neighbouring properties.

3.3. Field Testing:

Borehole 1 (BH1) was drilled near the southern boundary down slope of the thin flat boulder resting on the hill slope. This borehole intersected silty sand topsoil from the ground surface. At 0.30m depth the hand auger refused on a suspected boulder and the borehole was discontinued. The borehole was attempted at several adjacent locations although all refused at shallow depth due to the boulders within the soils. Four dynamic penetrometer tests (DCP1, DCP1A, DCP1B & DCP1C) were all carried out near the borehole. DCP1A and DCP1B refused at shallow depth although DCP1 extended to refusal at 0.50m depth and DCP1C slightly upslope to 0.70m depth. It is interpreted that the refusal of these tests between 0.50m and 0.70m depth is refusal on the interpreted weathered bedrock surface.

Borehole 2 (BH2) was drilled near the northern site boundary down slope of the other, northern, flat boulder resting on the slope. This borehole intersected silty sand topsoil from the ground surface with sandstone gravel. At 0.20m depth the hand auger refused on a suspected boulder and the borehole was discontinued. The borehole was attempted at several adjacent locations although all refused at shallow depth due to the boulders within the soils. Two dynamic penetrometer tests (DCP2 & DCP2A) were carried out next to the borehole. The test results indicate loose slope wash soils to 0.75m depth where the density increased significantly in what appears to be a residual soil/weathered bedrock profile. DCP2 refused at 1.05m depth and DCP2A at 0.80m depth on the interpreted sandstone bedrock surface.

Additional dynamic penetrometer tests were carried out at two other locations. DCP3 and DCP3A were carried out towards the eastern site boundary up slope from the outcropping sandstone near the front boundary. DCP3 refused at shallow depth whilst DCP3A was able to extend to 0.70m depth which is interpreted as the sandstone bedrock surface.

DCP4 was carried out at the base of the large boulders and sandstone cliff at the rear of the site. It was carried out between the base of the cliff/boulders and the two plate shaped boulders resting on the slope. The test indicates medium dense slope wash soils to 1.05m depth where the test refused on interpreted sandstone bedrock.

There were no signs of a freestanding ground water table in any of the boreholes at the site.

4. COMMENTS:

4.1. Geotechnical Assessment:

The site investigation identified sandstone bedrock outcropping through the front of the site and at relatively shallow depth through the remainder. Several large boulders are located upon the upper soil slope however these will be removed by the proposed excavation. These boulders are plate shaped and sitting upon a steep soil slope therefore during their removal care will be required to ensure sections are not dislodged and allowed to roll down slope. Of more concern are the large plate shaped boulder perched upon the boulder outcrop on the southern boundary (No. 3) and the irregular shaped boulder within the neighbouring property to the north (No. 2). Both of these boulders have orientations that will be highly susceptible to rotation of their centre of gravity which would result in their subsequent sudden failure down slope. These boulders appear to have had some grouting stabilization occur at a previous time, which it is expected was undertaken to increase the basal friction and reduce the potential for sliding. No further detail on these stabilizing works has been identified/procured.

An assessment on the factor of safety (FOS) against sliding of the upper boulder from on the southern boundary with No. 3 was undertaken using the methods of Hoek and Bray (1981). This assessment identified a probable FOS $\geq$ 2.8 at present, suggesting the boulder is stable in its current configuration, however numerous unknown factors exist. Of concern is rotational movement down slope should the boulders be dislodged by external impacts (i.e. earthquake/tree fall) or through natural erosion/weathering changing their centre of gravity. This boulder appears to have been rock bolted, however the details of this are unconfirmed.

The boulder within the northern neighbouring property (No. 2) is considered to have a low probability of impacting the site, however it is considered to present a significant risk to the neighbouring property and potentially properties further down slope. Therefore this boulder should be stabilized prior to any bulk excavation activity on site.

The proposed excavation for the new house will step down the site from the rear with the cut for Level 3 being approximately 3.0m in height and extending to within 1.5m of the northern boundary and 1.7m of the southern boundary. The Level 2 and Level 1 cut will be up to 8m in height and extend to within 1.5m of the northern boundary and 1.5m of the southern boundary. However across the southern half of the site the excavation for Level 1 and 2 will extend down to the garage level and be up to 11.0m in depth at its rear western edge. This excavation will extend to within 1.0m of the southern boundary and 6.5m from the northern boundary. The depth of excavation will reduce to nil at the front boundary due to the slope of the land.

Based on the results of the site investigation it is expected that the excavation will extend through <1.0m of soil and weathered bedrock before intersecting low to medium strength bedrock with potential high strength bedrock in the lower 3 to 5m of the garage cut.

Due to the separation distance of the neighbouring house to the south (No. 3) the excavation should have minimal impact however suitable support measures will still be required to prevent landslip instability within the shallow surface soils or bedrock cut from extending across the boundary. The excavation will extend close (<3.0m) to the neighbouring house to the north therefore extreme care and suitable excavation and construction methods are also required to protect this structure.

Overlying the bedrock is slope wash soils with sandstone cobbles to large boulders. It is expected that the bedrock surface will be controlled on a smaller scale by variations in the type and weathering of the bedrock, which is expected to consist of numerous sandstone horizons and occasional thin siltstone/shale beds that will form a stepped profile down the slope towards the east. Detached sections/boulders will directly overlie the bedrock and also be entrained within the colluvium. These will be susceptible to movement down slope due to the excavation, especially around the upper western edges of the cut.

Due to the site location, observed geology and geomorphology there is no likelihood of intersecting Acid Sulfate Soils below the site. It is also not expected that the groundwater table will be lowered on any adjacent sites or within nearby Acid Sulphate zones, therefore no further assessment into these soils is required as part of this proposal.

Detail on the stabilization of the boulders and excavation support measures and recommended procedures is provided in the supplementary report - Excavation Methodology for Proposed New House. Job No.: 2014-011.2, Dated: 13th November 2014, Appendix: 7.

The recommendations and conclusions in this report are based on an investigation utilising only surface observations and hand drilling tools due to access limitations. This test equipment provides small isolated test points across the entire site with limited penetration into bedrock; therefore some minor variation to the interpreted sub-surface conditions is possible, especially between test locations.

4.2. Slope Stability & Risk Assessment:

Based on our site mapping we have identified the following geological/geotechnical landslip hazards which need to be considered in relation to the existing site:

A. Boulder slide/roll (85 tonne) of upper boulder on mushroom shaped outcrop on southern boundary
B. Boulder roll (150 tonne) of lower rounded boulder from mushroom outcrop on southern boundary.
C. Boulder slide/roll (220 tonne) of boulder at rear of neighbouring property to north (No. 2).
D. Earth slide (<10m³) of surficial soils around crest of excavation.
E. Rock slide/topple (<10m³) from defect defined sections of rock within excavation

The site has been assessed in accordance with the methods of the Australian Geomechanics Society (Landslide Risk Management, AGS Subcommittee, May 2002 and March 2007) and Pittwater Council's Geotechnical Risk Management Policy for Pittwater – July 2009, see Tables:1 and 1a. The Australian Geomechanics Society Qualitative Risk Analysis Matrix is enclosed in Appendix: 3 along with relevant AGS notes and figures. The frequency of failure was interpreted based on the methods of MacGregor et.al. (AGS 2007), due to a lack of evidence of previous instability within the site.

The risk assessment identified that Hazards A and B achieve a Risk to Life of $\leq 1.31 \times 10^{-6}$ and Risk to Property of $\leq$ 'Low', which is considered 'Acceptable'. Hazard D and E both achieve Risk to Life of $\leq 2.15 \times 10^{-5}$ and Risk to Property of 'Low', which is considered 'Tolerable'. However Hazard C presents a Risk to Life of up to 3.04×10^{-4} and Risk to Property of 'Very High'.

It is recommended that the boulder upon the southern boundary (Hazard A) be stabilized via rock bolts due to the significant consequence should failure occur. The risk from Hazard C is far more significant and this section of rock should be stabilized prior to bulk excavation within the site. Hazards D and E may be reduced through implementation of suitable soil batters or retaining wall systems and through close geotechnical supervision of the excavation. All long term landslip hazards may be managed through proper implementation of surface stormwater control and sensible hill side construction and maintenance into the future, see Appendix: 4.

4.3. Design & Construction Recommendations:

4.3.1. New Footings:

The results of the subsurface investigation suggest that the site is underlain by thin slope wash soils overlying weathered bedrock near surface. The slope wash soils contain cobbles and boulders of varying sizes. The weathering within the bedrock is generally expected to result in a thin layer of residual soils and extremely weathered bedrock however this will vary across the site due to the expected variability in the underlying geological units. Some units of the bedrock may weather to significant depths.

The majority of the proposed development will be located within excavations into the hill slope which is expected to expose a minimum of low strength bedrock. However the north-east portion of the new development along with the upper western edge of Level 4 will be located at or above existing ground surface levels. Therefore to prevent differential settlement and cracking within the structure it is recommended that all portions of the development are founded off a minimum of low strength bedrock.

It is considered that strip and pad footings will be suitable within the base of the bedrock excavations whilst pad or shallow pier footings may be required external to the excavations. The stability of any footing located within 3 to 4m of the crest of the excavation is dependent on the stability of the excavation itself.

Piers should ideally be socketed at least 0.50m into insitu low strength weathered bedrock to give the piers lateral support in the event of an earthquake and resist lateral soil pressures. Footings founded on highly weathered, low strength rock should be designed for a maximum allowable bearing pressure of 1000kPa whilst 2000kPa can be used for medium strength rock.

Due to the potential for boulders and detached sections of rock upon the slope all footings will require inspections by an experienced geotechnical professional prior to placement of steel or concrete. This may require footings to be extended through boulders or the boulders to be stabilized in place. These inspections are mandatory to allow them to be 'certified' at the end of the project (Pittwater Councils Form: 3).

For classification purposes, where the footings are located within the base of a bedrock excavation the site may be considered Class 'A' as per the Australian Standard for Residential Slabs and Footings AS2870 – 2011. Footings external to the excavation should be based on a Class 'P' site due to the potential for slope instability.

4.3.2. Excavation:

The proposed works will require excavations of between 3.0m and 11.0m depth below existing ground surface levels. The upper 2.0 to 4.0m of the excavations are expected to extend through soils and extremely to very low strength bedrock however the majority of the cuts are expected to intersect low to high strength bedrock.

The excavation of soil and extremely weathered bedrock may be readily achieved using conventional earth moving equipment while a ripping tyne may be required for low strength bedrock or ironstone bands. This method of excavation through soils will not create excessive vibrations provided it is undertaken with medium scale (<20 tonne excavator) excavation equipment in a sensible manner.

Excavation that extends into medium to high strength sandstone bedrock with the possibility of very high strength ironstone bands will require the use of rock excavation equipment (i.e. rock hammer/breaker/saw/grinder). The selection of excavation machinery must take into account the following information: Vibration levels from rock breakers can be excessive (peak particle velocities greater than 50mm per second) and cause damage to adjacent structures, particularly if high to very high strength iron cemented sandstone bands or major north-east to south-west sub-vertical joints are encountered.

The Australian Standard (AS2187.2) makes reference to several standards used by British and United States authorities to assess damage as a result of ground vibrations from explosions, which produce transient vibration events. From these standards it can be seen that the values to create cosmetic damage, which is defined as hairline cracks (<0.1mm width) in AS2870-2011, Table: C1, are significantly higher than those at which humans find ground vibrations disturbing (>5mm/s). However, rock hammering produces intermittent vibrations which are more continuous than transient events, therefore lower damage thresholds would be expected.

Humans perceive ground vibrations at very low levels (0.5mm/s particle velocities) whilst steady state vibrations, as created by continuous uninterrupted rock hammering, can be disturbing to persons above a value of 5mm/s PPV (Wiss 1981).

It is therefore recommended that a **vibration limit (Maximum Peak Particle Velocity, PPV) of 5mm/s** be set at the founding level of the neighbouring house structures on either side for all excavation work on this site. It is expected that continuous PPV values greater than 8mm/s would be required to create significant damage (i.e. Damage Category = Slight or greater – see AS2870, Table C1).

A value of 5mm/s is recommended for the boulder on the southern boundary of the site whilst a lower value should be implemented for the neighbouring (No. 2) boulder to maintain stability. Due to the separation distance to this neighbouring boulder to the excavation, provided the recommended limit is maintained at the neighbouring house (No.2) then this boulder should be subject to vibration levels < 1mm/s, which should be suitable to prevent any reduction in stability.

Based on previous testing of ground vibrations created by various rock excavation equipment within medium strength sandstone bedrock, to achieve the specified low level of vibration at a buffer distance of 3.0m would require the use of a single medium size rock hammer (≤ Krupp 300 or equivalent) whilst a 600kg hammer will require around 6m.

Vibration characteristics are site specific and vibration characterisation tests for any rock breaker/hammer (>200kg dead weight), should be undertaken using vibration monitoring equipment by a qualified specialist prior to bulk rock excavation. The proposed excavation equipment type and size, and the results of calibration testing will determine whether full time vibration monitoring of neighbouring houses, principally the northern neighbouring house, is necessary. Crozier Geotechnical has the ability to conduct this testing and monitoring.

Sawing of the rock excavation perimeter is recommended as it has several advantages. It often negates the need for rock bolting as the cut faces generally remain stable and require a lower level of rock support than hammer cut excavations, ground vibrations from rock saws are minimal and the saw cuts will provide a slight increase in buffer distance for use of rock hammers.

Upper horizons in the bedrock may also be detached along bedding and joint defects. Where these boulders are impacted via rock hammering, the opposite end of some of these boulders, potentially located below neighbouring buildings, will deflect more than expected and create damage. The rock sawing of the upper excavation perimeter prior to rock hammering will significantly reduce the risk of this hazard.

Visual monitoring at the commencement of the excavation should take place via site inspection (Senior Engineering Geologist) to ensure that excavation techniques used by the operator keep vibration levels down to an acceptable level.

It is recommended that dilapidation surveys be undertaken on all neighbouring structures/properties prior to site work to allow assessment of the recommended vibration limit and protect the client against spurious claims of damage. Crozier Geotechnical can undertake the dilapidation surveys.

4.3.3. Excavation Support:

The upper 1.0m to 3.0m of the excavation is expected to extend through soil and extremely weathered bedrock. It is recommended that maximum short term/temporary batter slopes of 1H:1V be adopted for excavation through this material. Permanent soil batter slopes should be designed for a maximum of 2H:1V. Where these batter slopes are located at the crest of a rock excavation then stormwater control will also be required to divert surface run-off and prevent erosion into the excavation below. If suitable measures are not implemented then the stability of the excavations until permanent retaining walls are completed cannot be guaranteed.

Appendix 7 should be consulted for further detail on excavation methodology, supervision and support methods.

Vertical batters can be used where the excavation extends through medium strength sandstone bedrock which will generally remain self supporting, though this will be dependent on weathering, the orientation of joints/defects and bedding. There is the potential for poorly orientated defects in the bedrock which can result in wedges of rock falling into the excavation when unsupported and also for geological horizons of increased weathering to present potential block toppling failures.

Should boulders be identified near the crest of the excavation or detached sections of bedrock within the excavation faces, then these may need to be slightly over excavated, possibly underpinned and rock bolted to ensure that no long term movement occurs that could create rock face instability hazards to workers or damage walls within the completed development. As these sections of rock are more likely near the crest of the excavation it is recommended that further geotechnical investigation via a cored borehole be undertaken prior to excavation and that regular geotechnical inspections occur during excavation. These inspections should occur at 3.0m depth intervals to allow assessment and installation of support measures in a timely and safe manner.

4.3.4. Retaining Structures:

New retaining structures will be required to support the crest of the proposed excavation and are expected through the remainder of the site. All excavations through soil, and any filled areas not constructed at the above mentioned permanent batter slopes, will require "engineer designed" retaining wall systems, designed in accordance with Australian Standard AS 4678-2002 Earth Retaining Structures. This may be achieved by the use of a steel reinforced concrete/concrete block walls or closely spaced pier walls (every second pier spacing, i.e. for 300mm piers at 600mm centres) with vertical drainage cell then shotcrete and steel mesh infill, or other methods suggested by a qualified structural engineer.

Where the excavation extends through medium strength sandstone bedrock it is likely to remain self supporting and may be left exposed. However it may require the installation of rock bolts, shotcrete and mesh to stabilize areas of potential instability whilst ongoing seepage along defects within the bedrock can be expected and could create weathering and erosion of weaker bedrock units resulting in future instability. These may require shotcrete weather protection and drainage. As such a cored borehole should be undertaken prior to excavation whilst geotechnical inspections of the excavation should occur at regular intervals to allow a cost effective design solution to support.

Backfilled retaining walls within the site, away from site boundaries or existing structures, may utilize active earth pressure coefficients (Ka).

Table 1: Retaining Structures Design Parameters

Material	Density Consistency Strength	Unit Weight (kN/m^3)	Long Term (Drained)	Earth Pressure Coefficient Active (Ka)	Passive Earth Coefficient and Pressure *
Topsoil, sandy slope wash/colluvium at 20° slope	Loose	18	$\phi' = 25°$	0.54	
Sandstone Bedrock	ELS	22	$\phi' = 20°$		400 kPa
Sandstone Bedrock	LS	23	$\phi' = 30°$		2000 kPa

* Ultimate design values ELS = Extremely low strength LS = Low strength

Utilizing lightly compacted granular backfill a soil density of $18kN/m^3$ is suitable.

Retaining walls should be designed for free draining granular backfill to support the slope and appropriate surface and subsoil drains to either divert or intercept groundwater flow which otherwise could provide surcharging on the walls. The additional pressures associated with water surcharge may cause damage or failure of the walls.

4.3.5 Rock Bolting

Refer to Appendix: 7 for further detail on rock bolt support measures. It is considered that the installation of two rock bolts through the upper plate shaped boulder on the southern boundary, into the underlying boulder will significantly reduce the likelihood of failure of the boulders and also reduce the probability of them travelling down slope and impacting any structures. It is considered that rock bolting will be very difficult to implement in a suitable system to ensure the stability of the boulder within No. 2, therefore it is recommended that blade underpinning walls be implemented unless an experienced rock bolting contractor can certify the installation of suitable support measures.

All rock bolts should be installed by an experienced contractor who can certify their installation.

The design of any rock bolting within the excavation can only be achieved through close geotechnical supervision. Alternatively a pattern bolting and shotcrete method may be used in the entire excavation. However this pattern support would be expected to be conservative and have a high cost.

4.3.6. Drainage & Groundwater:

Groundwater seepage can be expected through the sandy soils and at the soil rock interface whilst moderate levels of seepage are expected on geological defects within the rock excavation due to the depth of cut and the site location. This seepage has the potential to be at minor artesian pressures due to the water head formed within defects in the rock mass further upslope. Excavation within the site is not expected to intersect a free standing water table.

A stormwater diversion drain should be installed upslope of excavation crests to intercept stormwater runoff and prevent erosion and softening of the excavation faces. An excavation trench should also be installed at the base of excavation cuts to below floor slab levels to reduce the risk of resulting dampness issues.

4.4. Conditions Relating to Design and Construction Monitoring:

To comply with Councils conditions and to enable us to complete Forms: 2 and 3 required as part of construction, building and post-construction certificate requirements of the Councils Geotechnical Risk Management Policy 2009, it will be necessary for Crozier Geotechnical Consultants to;

1. Review and approve the structural drawings for compliance with the recommendations of this report,
2. Inspect the installation of the bolting/support measures for the boulders identified
3. Inspect the excavation works including prior to commencement of rock excavation and at regular intervals during the excavation.
4. Inspect all new footings to confirm compliance to design assumptions with respect to allowable bearing pressure, basal cleanness and the stability prior to the placement of steel or concrete.
5. Inspect the completed works to confirm that no potential instability has been created by the construction activity and that all support measures are installed and stormwater control is connected and functioning.

The client and builder should make themselves familiar with the Councils Geotechnical Policy and the requirements spelled out in this report for inspections during the construction phase. Crozier Geotechnical Consultants can not sign Form: 3 of the Policy if it has not been called to site to undertake the required inspections.

4.5. Design Life of Structure:

We have interpreted the design life requirements specified within Councils Risk Management Policy to refer to structural elements designed to support the house etc, the adjacent slope, control stormwater and maintain the risk of instability within acceptable limits. Specific structures and features that may affect the maintenance and stability of the site in relation to the proposed and existing development are considered to comprise:

- stormwater and subsoil drainage systems,
- retaining walls and soil slope erosion and instability,
- maintenance of trees/vegetation on this and adjacent properties,

Man-made features should be designed and maintained for a design life consistent with surrounding structures (as per AS2870 – 1996 (50 years)). In order to attain a design life of 100 years as required by the Councils Risk Management Policy, it will be necessary for the structural and geotechnical engineers to incorporate appropriate design and inspection procedures during the construction period. Additionally the property owner should adopt and implement a maintenance and inspection program. It should be noted that timber log/sleeper retaining walls will not remain stable for 100 years. It is considered that the existing house will have a design life of 50 years from its upgrade following the proposed works.

If this maintenance and inspection schedule are not maintained the design life of the property cannot be attained. A recommended program is given in Table: 2 and should also include the following guidelines.

- The conditions on the block don't change from those present at the time this report was prepared, except for the changes due to this development.
- There is no change to the property due to an extraordinary event external to this site, and the property is maintained in good order and in accordance with the guidelines set out in;
    a) CSIRO sheet BTF 18
    b) Australian Geomechanics "Landslide Risk Management" Volume 42, March 2007.
    c) AS 2870 – 2011, Australian Standard for Residential Slabs and Footings

Where changes to site conditions are identified during the maintenance and inspection program, reference should be made to relevant professionals (e.g. structural engineer, geotechnical engineer or Council). It is assumed that Pittwater Council will control development on neighbouring properties, carry out regular inspections and maintenance of the road verge, stormwater systems and large trees on public land adjacent to the site so as to ensure that stability conditions do not deteriorate with potential increase in risk level to the site. Also individual Government Departments will maintain public utilities in the form of power lines, water and sewer mains to ensure they don't leak and increase either the local groundwater level or landslide potential.

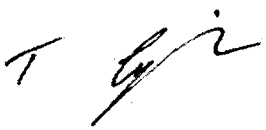
5. CONCLUSION:

The site investigation identified sandstone bedrock outcropping at the front of the site and at the rear boundary, whilst a shallow cover of colluvium including medium to large scale boulders are located across the centre of the site. Several of these boulders, both within the site and adjacent property, are of limited long term stability and some stabilizing measures are recommended.

It is understood that the proposed works involve construction of a new three and four storey house with a lower level garage basement. The house will involve excavation across the site up to approximately 11m depth below current ground levels at its western edge. The proposed excavation is of significant depth, therefore as further geotechnical investigation in the form of a cored boreholes was not possible it will require close geotechnical supervision and implementation of support measures as the excavation progresses.

The large sandstone boulders within the two neighbouring properties are both considered of limited long term stability based on the information available. Of most concern is the boulder within No. 2, which is considered to be of limited stability regardless of the works proposed within the site. As such it is recommended that these boulders be stabilized, further detail on this is provided in the supplementary report within Appendix: 7.

There were no signs of previous or impending large scale slope instability within the site and provided the proposed development is undertaken in a sensible manner and as per the recommendations of this report no new hazards should be created. The entire site and surrounding slopes has been assessed as per the Pittwater Council Geotechnical Risk Management Policy 2009 and the identified existing landslip hazards were assessed as having up to an 'Unacceptable' Risk to Life and Risk to Property level. However all hazards can achieve the 'Acceptable' risk criteria for the design life of the new development, taken as 100 years, provided proper engineering design and construction methods are implemented, including but not limited to the recommendations of this report.



Prepared by:
Troy Crozier
Principal Engineering Geologist

Reviewed By:
Peter Crozier
Principal

6.0. REFERENCES:

1. Walker et. al. May 2002, Titled "Landslide Risk Management Concepts and Guidelines" in the Journal and News of the Australian Geomechanics Society, Volume 37, No 2.
2. Australian Geomechanics Society 2007, "Landslide Risk Assessment and Management", Australian Geomechanics Journal Vol 42, No 1, March 2007.
3. Geotechnical Risk Management Policy for Pittwater, 20th July 2009.
4. Geological Society Engineering Group Working Party 1972, "The preparation of maps and plans in terms of engineering geology" Quarterly Journal Engineering Geology, Volume 5, Pages 295 - 382.
5. E. Hoek & J.W. Bray 1981, "Rock Slope Engineering" By The Institution of Mining and Metallurgy, London.
6. C. W. Fetter 1995, "Applied Hydrology" by Prentice Hall.
7. V. Gardiner & R. Dackombe 1983, "Geomorphological Field Manual" by George Allen & Unwin.
8. Australian Standard *AS 4678 (2002) – Earth Retaining Structures*

Appendix 1

NOTES RELATING TO THIS REPORT

Introduction

These notes have been provided to amplify the geotechnical report in regard to classification methods, specialist field procedures and certain matters relating to the discussion and comments section. Not all, of course, are necessarily relevant to all reports.

Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, Geotechnical Site Investigations Code. In general, descriptions cover the following properties – strength or density, colour, structure, soil or rock and inclusions.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. Sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	Less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Under drained Shear Strength kPa
Very soft	Less the 12
Soft	12-25
Firm	25-50
Stiff	50-100
Very Stiff	100-200
Hard	Greater than 200

None-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300mm)	CPT Cone Value (qc-MPa)
Very Loose	Less than 5	Less than 2
Loose	5-10	2-5
Medium dense	10-30	5-15
Dense	30-50	15-25
Very Dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing with a sample of the soil 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 are given in the report.

Drilling Methods

The following is a brief summary of drilling methods currently adopted by the company and some comments on their use and application.

Test Pits – these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3m for a back hole and up to 6m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) – the hole is advanced by a rotating plate of short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more that 0.5m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable that with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling – the hole is advanced by pushing a 100mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, ect is only marginally affected.

Continuous Spiral Flight Augers – the hole is advanced using 90-115mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling of in-situ testing. This is a relatively economical means of drilling in Clays and in sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed

Samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling – the hole is 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.

Rotary Mud Drilling – similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tend to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. From SPT).

Continuous Core Drilling – a continuous core sample is obtained using a diamond-tipped core barrel, usually 50mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

Standard penetration tests (abbreviated as SPT) are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining 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 6.3.1

The test is carried out in a borehole by driving a 50mm diameter split sample tube 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

  As 4,6,7
  N = 13

- In the case where the rest is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm

  As 15,30/40 mm

- The results of the tests can be related empirically to the engineering properties of the soil.
  Occasionally, the test method is used to obtain samples in 50mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets

Cone and Penetrometer Testing and Interpretation

Cone penetrometer testing (sometimes referred to as Dutch cone – abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in Australian Standard 1289, Test 6.4.1.

In the tests, a 35mm diameter rod with a cone-tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with a hydraulic ram system. Measurements are made of the end bearing resistance on the core and the friction resistance on a separate 130mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical 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 plotted on a computer screen and at the end of the test is stored on the computer for later plotting of the results.

The information provided on the plotted results comprises:

- 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 are – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed in percent.

There are two scales available for measurement of cone resistance. The lower scale (0-5 MPa) is used in very soft soils in the graphs as a dotted line. The main scale (0-50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve friction to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% - 2% are commonly encountered in sands and very soft clays rising to 4% - 10 % in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:-

qc (MPa) = (0.4 to 0.6) N (blow per 300mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:-

qc = (12 to 18) cu

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes, etc. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and precise information on soil classification is required, direct drilling and sampling may be preferable.

Hand Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150mm increments of penetration. Normally, there is a depth limitation of 1.2m but this may be extended in certain conditions by the use of extension roads.

Two relatively similar tests are used.

- Perth sand penetrometer – a 16mm diameter flat-ended rod is driven with a 9kg hammer, dropping 600mm (AS 1289, test 6.3.3). This test was developed for testing the desity of sands (originating in Perth) and is mainly used in granular soils and filling.

- Cone penetrometer (sometimes known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS 1289, Test 6.3.2). The test was developed initially for pavement subgrade investigations, and published correlations of the test results with California bearing ration have been published by various road Authorities.

Laboratory Testing

Laboratory testing is 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.

Bore Logs

The bore logs presented herein are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable, or possible to justify on economic grounds. In any case, the boreholes represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes, the frequency of sampling and the possibility of other than straight line variations between the boreholes.

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems.

- In low permeability soils, ground water although present, may enter the hole slowly or perhaps not at all during the time it is left open.
- A localized 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 of recent weather changes. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or 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 a perched water table.

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 condition, 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 depend partly on bore spacing and sampling frequency.
- Changes in policy or interpretation of policy by statutory authorities.
- The action of contractors responding to commercial pressures.

If these occur, the company will be pleased to assist with investigation or advise to resolve the matter.

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 than at some later stage, well after the event.

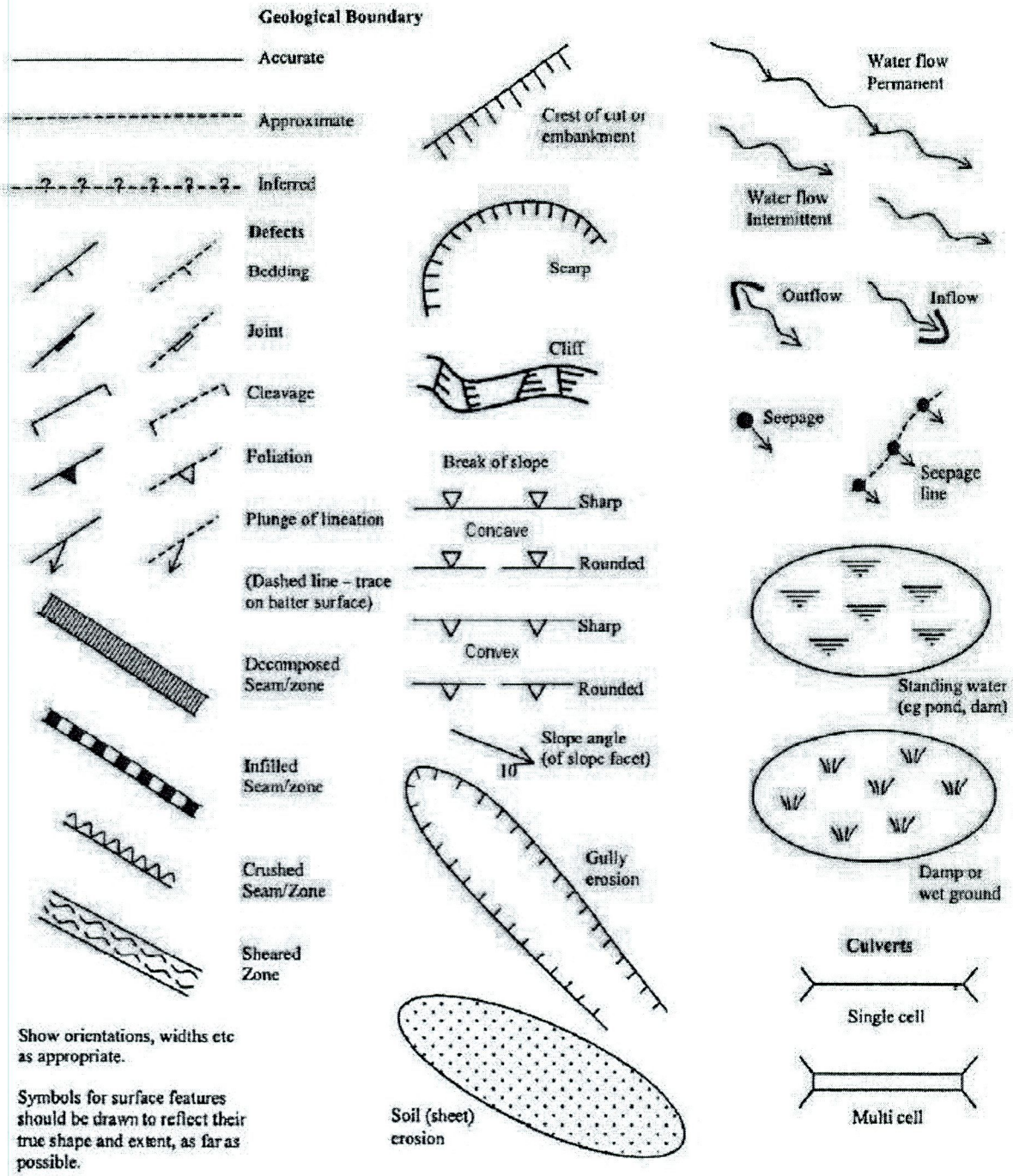
Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guideline 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, 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.

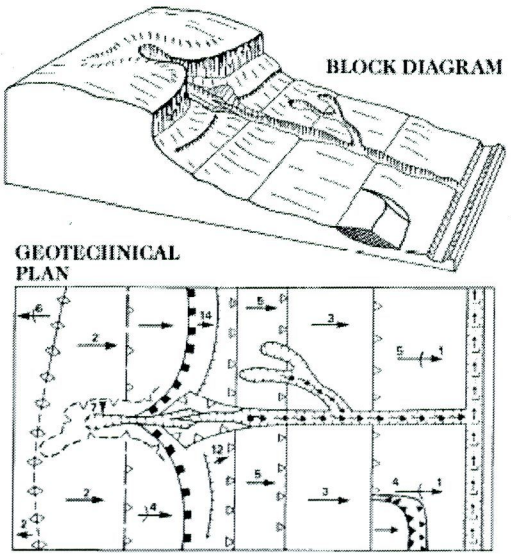
Site Inspection

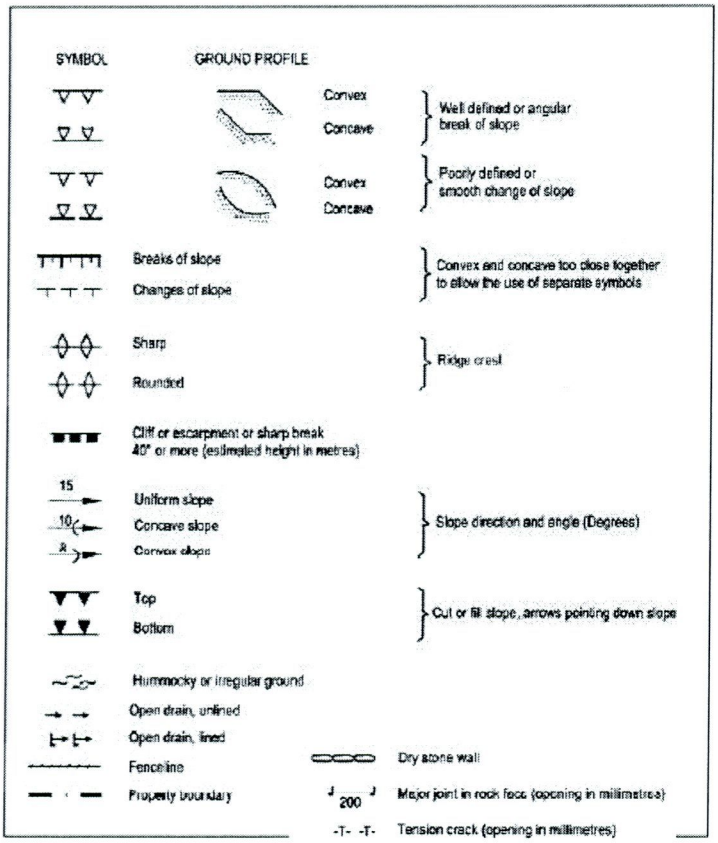
The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

APPENDIX E - GEOLOGICAL AND GEOMORPHOLOGICAL MAPPING SYMBOLS AND TERMINOLOGY



Examples of Mapping Symbols (after Guide to Slope Risk Analysis Version 3.1 November 2001, Roads and Traffic Authority of New South Wales).





Example of Mapping Symbols
(after V Gardiner & R V Dackombe (1983).Geomorphological Field Manual. George Allen & Unwin).

Appendix 2

GEOTECHNICAL MAPPING *FIGURE 1.*

CROZIER - *Geotechnical Consultants*
Geotechnical Engineers & Engineering Geologist

Crozier Geotechnical *ABN:* *96 113 453 624*
Unit 12, 42-46 Wattle Road *Phone:* *(02) 9939 1882*
Brookvale NSW 2100 *Fax:* *(02) 9939 1883*
Crozier Geotechnical is a division of PJC Geo-Engineering Pty Ltd

LEGEND

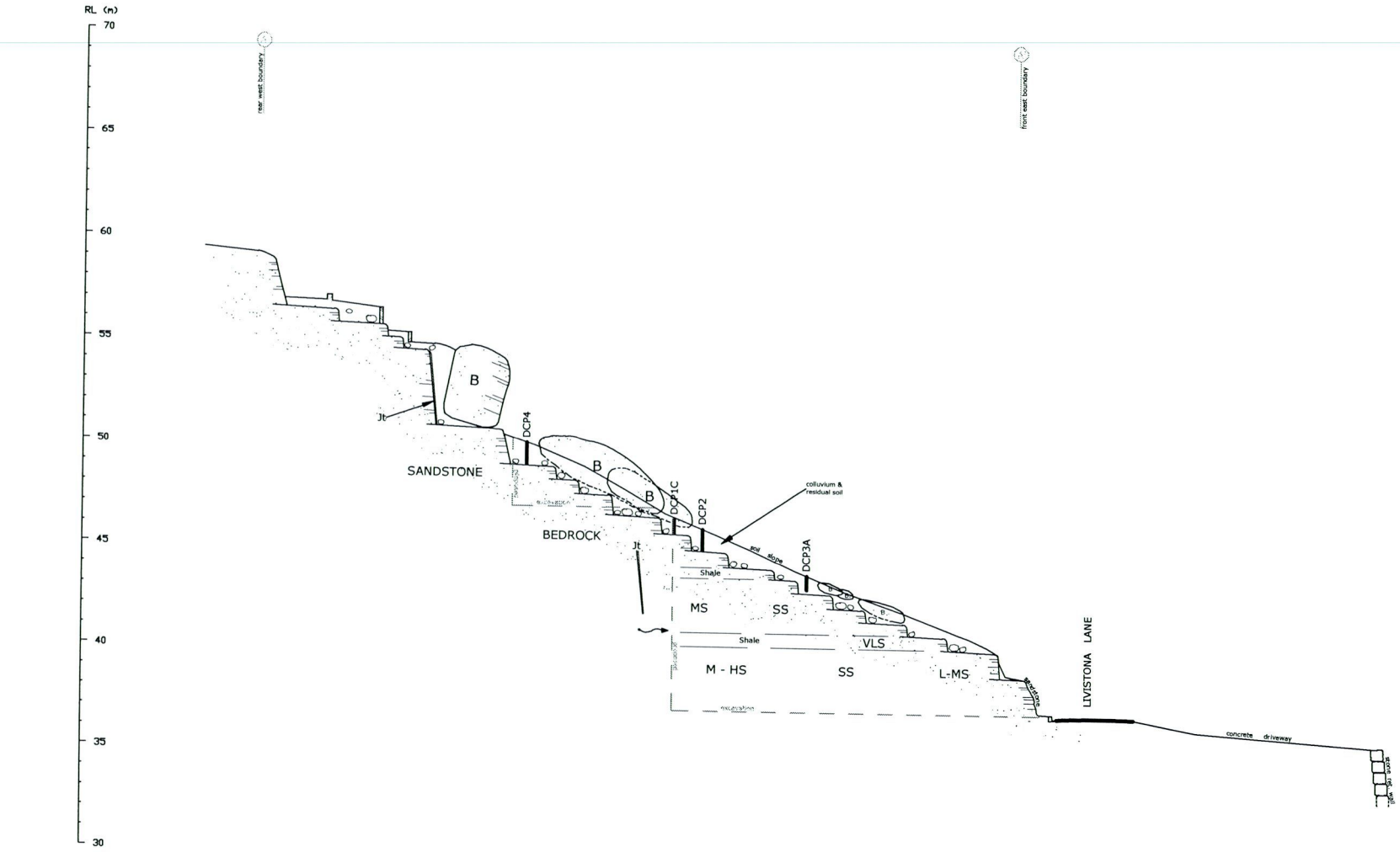
- TOP OF SLOPE
- BASE OF SLOPE
- B ROCK OUTCROP & BURIED BOULDERS
- AUGER LOCATIONS
- DYNAMIC PENETROMETER TEST
- SLOPE ANGLE
- SURFACE WATER FLOW

SCALE: 1:200 @ A3
DRAWING: 2014-011
DRAWN: AW

APPROVED BY:

PREPARED FOR:
Mr. Phil Salter.

PROPOSED NEW HOUSE
ADDRESS: 2A Livistona Lane, Palm Beach.
PROJECT: 2014-011 DATE: 12/03/2014



0 1 2 3 4 5 6 7 8 9 10

SCALE: 1:200

VL - Very Loose	VS - Very Soft	ELS - Extremely Low Strength	EW - Extremely Weathered
L - Loose	S - Soft	VLS - Very Low Strength	HW - Highly Weathered
MD - Medium Dense	F - Firm	LS - Low Strength	MW - Moderately Weathered
D - Dense	St - Stiff	MS - Medium Strength	SW - Slightly Weathered
VD - Very Dense	VSt - Very Stiff	HS - High Strength	FR - Fresh
SS - Sandstone	H - Hard	VHS - Very High Strength	

GEOLOGICAL MODEL *FIGURE 2.*

CROZIER - *Geotechnical Consultants*
Geotechnical Engineers & Engineering Geologist

Crozier Geotechnical ABN: 96 113 453 624
Unit 12, 42-46 Wattle Road Phone: (02) 9939 1882
Brookvale NSW 2100 Fax: (02) 9939 1883
Crozier Geotechnical is a division of PJC Geo-Engineering Pty Ltd

LEGEND

SEEPAGE WATER FLOW
DYNAMIC PENETROMETER TEST
SANDSTONE BEDROCK
WATER TABLE

SCALE: 1:200 @ A3
DRAWING: 2014-011
DRAWN: AW

APPROVED BY:

PREPARED FOR:
Mr. Phil Salter.

PROPOSED NEW HOUSE
ADDRESS: 2A Livistona Lane, Palm Beach.
PROJECT: 2014-011 DATE: 12/03/2014

TEST BORE REPORT

CLIENT: Mr. Phil Salter **DATE:** 11/03/2014 **BORE No.:** 1

PROJECT: Proposed New House **PROJECT No.:** 2014-011 **SHEET:** 1 of 1

LOCATION: 2A Livistona Lane, Palm Beach **SURFACE LEVEL:** RL ≈ 46.70m

Depth (m)	Description of Strata PRIMARY SOIL - strength/density, colour, grainsize/plasticity, moisture, soil type incl. secondary constituents, other remarks	Sampling		In Situ Testing		
		Type	Depth (m)	Type	Results	
0.00	TOPSOIL: Dark brown, fine grained, dry silty sand topsoil					
0.30	HAND AUGER REFUSAL at 0.30m depth on suspected boulder, borehole attempted at adjacent locations all refusing at shallow depth, attempt DCP.					
1.00						
2.00						

RIG: None DRILLER: AW LOGGED: JB

METHOD: Hand Auger

GROUND WATER OBSERVATIONS: No freestanding groundwater table observed.

REMARKS: CHECKED: PJC

TEST BORE REPORT

CLIENT: Mr. Phil Salter **DATE:** 11/03/2014 **BORE No.:** 2

PROJECT: Proposed New House **PROJECT No.:** 2014-011 **SHEET:** 1 of 1

LOCATION: 2A Livistona Lane, Palm Beach **SURFACE LEVEL:** RL ≈ 46.40m

Depth (m)	Description of Strata	Sampling		In Situ Testing		
	PRIMARY SOIL - strength/density, colour, grainsize/plasticity, moisture, soil type incl. secondary constituents, other remarks	Type	Depth (m)	Type	Results	
0.00						
	TOPSOIL: Dark brown, fine grained, moist silty sand topsoil, sandstone gravel, auger grinding					
0.20	HAND AUGER REFUSAL at 0.30m depth on suspected boulder, borehole attempted at adjacent locations all refusing at shallow depth, attempt DCP.					
1.00						
2.00						

RIG: None DRILLER: AW LOGGED: JB

METHOD: Hand Auger

GROUND WATER OBSERVATIONS: No freestanding groundwater table observed.

REMARKS: CHECKED: PJC

DYNAMIC PENETROMETER TEST SHEET

CLIENT: Mr. Phil Salter **DATE:** 11/03/2014

PROJECT: Proposed New House **PROJECT No.:** 2014-011

LOCATION: 2A Livistona Lane, Palm Beach **SHEET:** 1 of 2

	Test Location							
Depth (m)	DCP1	DCP1A	DCP1B	DCP1C	DCP2	DCP2A	DCP3	DCP3A
0.00 - 0.15	2	2	2	2	4	4	6	4
0.15 - 0.30	11	20	(B)	7	5	2	7 / 70mm	5
0.30 - 0.45	9	(B)		7	2	2	(B)	5
0.45 - 0.60	15 / 50mm			22	3	2		6
0.60 - 0.75	(B)			20 / 100mm	3	3		18 / 100mm
0.75 - 0.90				(B)	10	10 / 50mm		(B)
0.90 - 1.05					22	(B)		
1.05 - 1.20					(B)			
1.20 - 1.35								
1.35 - 1.50								
1.50 - 1.65								
1.65 - 1.80								
1.80 - 1.95								
1.95 - 2.10								
2.10 - 2.25								
2.25 - 2.40								
2.40 - 2.55								
2.55 - 2.70								
2.70 - 2.85								
2.85 - 3.00								

TEST METHOD: AS 1289. F3.2, CONE PENETROMETER

REMARKS:

(B) Test hammer bouncing upon refusal on solid object

-- No test undertaken at this level due to prior excavation of soils

DYNAMIC PENETROMETER TEST SHEET

CLIENT: Mr. Phil Salter **DATE:** 11/03/2014

PROJECT: Proposed New House **PROJECT No.:** 2014-011

LOCATION: 2A Livistona Lane, Palm Beach **SHEET:** 2 of 2

	Test Location							
Depth (m)	DCP4							
0.00 - 0.15	4							
0.15 - 0.30	6							
0.30 - 0.45	8							
0.45 - 0.60	4							
0.60 - 0.75	4							
0.75 - 0.90	4							
0.90 - 1.05	5							
1.05 - 1.20	(B)							
1.20 - 1.35								
1.35 - 1.50								
1.50 - 1.65								
1.65 - 1.80								
1.80 - 1.95								
1.95 - 2.10								
2.10 - 2.25								
2.25 - 2.40								
2.40 - 2.55								
2.55 - 2.70								
2.70 - 2.85								
2.85 - 3.00								

TEST METHOD: AS 1289. F3.2, CONE PENETROMETER

REMARKS:

(B) Test hammer bouncing upon refusal on solid object

-- No test undertaken at this level due to prior excavation of soils

Appendix 3

TABLE : 1

Landslide risk assessment for Risk to life

HAZARD	Description	Impacting	Likelihood	Spatial Impact	Occupancy	Evacuation	Vulnerability	Risk to Life
A	Boulder slide (85 tonne) of upper boulder on mushroom shaped outcrop on southern boundary		Boulder apears stabilised in its current condition, earthquake or external. Plate like boulder expected to slide along ground	a) located upslope 4m and across slope slightly b) directly upslope c) located 50m directly down slope	a) Persons within hallways and stairs L4 and L3, 0.5hrs/day, b) persons in garden 0.5hr/week c) person in neighbouring house, bedroom, 9hrs sleep per day	a) Likely to not evacuate b) Possible to not evacuate c) Almost Certain to not evacuate	a) Person in building potential wall collapse b) person in open space crushed c) Person in building potential wall collapse	
			Possible					
		a) south-west corner of site house	0.001	0.1	0.0210	0.75	1.0	**1.58E-06**
		b) soil/garden slopes along southern boundary	0.001	0.9	0.0029	0.5	1.0	**1.31E-06**
		c) neighbouring houses down slope	0.001	0.0001	0.3750	1.0	1.0	**3.75E-08**
	Boulder roll (85 tonne) of upper boulder on mushroom shaped outcrop on southern boundary, as opposed to sliding		Boulder apears stabilised in its current condition, earthquake or external. Plate like boulder expected to slide along ground	a) located upslope 4m and across slope slightly b) directly upslope c) located 50m directly down slope	a) Persons within hallways and stairs L4 and L3, 0.5hrs/day, b) persons in garden 0.5hr/week c) person in neighbouring house, bedroom, 9hrs sleep per day	a) Likely to not evacuate b) Possible to not evacuate c) Almost Certain to not evacuate	a) Person in building potential wall collapse b) person in open space crushed c) Person in building potential wall collapse	
			Unlikely					
		a) south-west corner of house	0.0001	0.1	0.0210	0.75	1.0	**1.58E-07**
		b) soil/garden slopes along southern boundary	0.0001	0.9	0.0029	0.5	1.0	**1.31E-07**
		c) neighbouring houses down slope of road	0.0001	0.1	0.3750	1.0	1.0	**3.75E-06**
B	Boulder roll (150 tonne) of lower portion of mushroom shaped outcrop		Rounded boulder with relatively flat base upon partial bedrock outcrop foundation, some rotational force due to boulder above	a) located upslope 4m and across slope slightly b) directly upslope c) located 50m directly down slope	a) Persons within hallways and stairs L4 and L3, 0.5hrs/day, b) persons in garden 0.5hr/week c) person in neighbouring house, bedroom, 9hrs sleep per day	a) Likely to not evacuate b) Possible to not evacuate c) Almost Certain to not evacuate	a) Person in building potential wall collapse b) person in open space crushed c) Person in building potential wall collapse	
			Unlikely					
		a) south-west corner of house	0.0001	0.2	0.0210	0.75	1.0	**3.15E-07**
		b) soil/garden slopes along southern boundary	0.0001	0.8	0.0029	0.5	1.0	**1.16E-07**
		c) neighbouring houses down slope of road	0.0001	0.01	0.3750	1.0	1.0	**3.75E-07**

C	Boulder slide/roll (220 tonne) of irregular boulder at rear of No. 2	a) north-west corner of sites house	Irregular shaped boulder sitting atop two seperate boulders, minor stabilising completed previously Possible 0.001	Boulder expected to continue predominantly down slope towards neighbours house due to its shape, expected to travel signficant distance upon dislodgement 0.05	a) Level 4 bedroom in NW corner, 9hrs sleep per day, b) Neighbourng house any room 20 hrs per day 0.3750	a) Almost Certain to not evacuate b) Almost Certain to not evacuate 1.0	a and b) Person in house and potential collpase of walls 0.9	**1.69E-05**
		b) neighbouring house (No. 2)	Possible 0.001	0.9	0.3750	1.0	0.9	**3.04E-04**
D	Earth slide <10m³ of surficial soils at crest of excavation Construction	a) excavation	Steep slope, loose soils on bedrock surface Possible 0.001	Expected to impact 1/5 of excavation floor 0.2	Persons within excavation 8hrs/day, 6 days per week 0.286	Likely to not evacuate 0.75	Person in open space and buried 1.0	**4.29E-05**
E	Rock slide/topple(<10m³) of defect defined rock within excavation	a) excavation	Deep excavation expected to intersect some defect defined portions Possible 0.001	Block would be expected to impact 1/10 of excavation floor 0.1	Persons within excavation 8hrs/day, 6 days per week 0.286	Likely to not evacuate 0.75	Person in open space and crushed 1.0	**2.15E-05**

* hazards considered in current condition and/or without suitable remedial/stabilisation measures
* likelihood of occurrence for design life of house (considered 100years)
* considered for person most at risk
* evacuation scale from Almost Certain to not evacuate (1.0), Likely (0.75), Possible (0.5), Unlikely (0.25), Rare to not evacuate (0.01)
* vulnerability assessed using Appendix F - AGS Practice Note Guidelines for Landslide Risk Management 2007
* where layout of neighbouring house unknown, assume bedroom due to higher risk levels based on occupancy and evacuation probability

TABLE : 1a

Landslide risk assessment for Risk to Property

HAZARD	Description	Impacting	Likelihood		Consequences		Risk to Property
A	Boulder slide (85 tonne) of upper boulder on mushroom shaped outcrop on southern boundary	a) south-west corner of site house	Unlikely	The event might occur under very adverse circumstances over the design life.	Medium	Moderate damage to some of structure or significant part of site, requires large stabilising works, MINOR damage to neighbouring property.	Low
		b) soil/garden slopes along southern boundary	Unlikely	The event might occur under very adverse circumstances over the design life.	Minor	Limited Damage to part of structure or site requires some stabilisation, INSIGNIFICANT damage to neighbouring properties.	Low
		c) neighbouring houses down slope	Rare	The event is conceivable but only under exceptional circumstances over the design life.	Major	Extensive damage to most of site/structures with significant stabilising to support site, MEDIUM damage to neighbouring properties.	Low
	Boulder roll (85 tonne) of upper boulder on mushroom shaped outcrop on southern boundary, as opposed to sliding	a) south-west corner of house	Rare	The event is conceivable but only under exceptional circumstances over the design life.	Major	Extensive damage to most of site/structures with significant stabilising to support site, MEDIUM damage to neighbouring properties.	Low
		b) soil/garden slopes along southern boundary	Rare	The event is conceivable but only under exceptional circumstances over the design life.	Minor	Limited Damage to part of structure or site requires some stabilisation, INSIGNIFICANT damage to neighbouring properties.	Very Low
		c) neighbouring houses down slope of road	Rare	The event is conceivable but only under exceptional circumstances over the design life.	Major	Extensive damage to most of site/structures with significant stabilising to support site, MEDIUM damage to neighbouring properties.	Low

B	Boulder roll (150 tonne) of lower portion of mushroom shaped outcrop	a) south-west corner of house	Unlikely	The event might occur under very adverse circumstances over the design life.	Medium	Moderate damage to some of structure or significant part of site, requires large stabilising works, MINOR damage to neighbouring property.	Low
		b) soil/garden slopes along southern boundary	Unlikely	The event might occur under very adverse circumstances over the design life.	Minor	Limited Damage to part of structure or site requires some stabilisation, INSIGNIFICANT damage to neighbouring properties.	Low
		c) neighbouring houses down slope of road	Rare	The event is conceivable but only under exceptional circumstances over the design life.	Major	Extensive damage to most of site/structures with significant stabilising to support site, MEDIUM damage to neighbouring properties.	Low
C	Boulder slide/roll (220 tonne) of irregular boulder at rear of No. 2	a) north-west corner of sites house	Rare	The event is conceivable but only under exceptional circumstances over the design life.	Medium	Moderate damage to some of structure or significant part of site, requires large stabilising works, MINOR damage to neighbouring property.	Low
		b) neighbouring house at No. 2	Likely	Event will probably occur under adverse circumstances over the design life.	Major	Extensive damage to most of site/structures with significant stabilising to support site, MEDIUM damage to neighbouring properties.	Very High
D	Earth slide <10m³ of surficial soils at crest of excavation	a) excavation	Likely	Event will probably occur under adverse circumstances over the design life.	Insignificant	Little Damage, no significant stabilising required, no impact to neighbouring properties.	Low
E	Rock slide/topple(<10m³) of defect defined rock within excavation	a) excavation	Possible	The event could occur under adverse conditions over the design life.	Insignificant	Little Damage, no significant stabilising required, no impact to neighbouring properties.	Very Low

* hazards considered in current condition, without remedial/stabilisation measures and during construction works.
* qualitative expression of likelihood incorporates both frequency analysis estimate and spatial impact probability estimate as per AGS guidelines.
* qualitative measures of consequences to property assessed per Appendix C in AGS Guidelines for Landslide Risk Management.
* Indicative cost of damage expressed as cost of site development with respect to consequence values: Catastrophic : 200%, Major: 60%, Medium: 20%, Minor: 5%, Insignificant: 0.5%.

TABLE: 2

Recommended Maintenance and Inspection Program

Structure	Maintenance/ Inspection Item	Frequency
Stormwater drains.	Owner to inspect to ensure that the drains, and pipes are free of debris & sediment build-up. Clear surface grates and litter.	Every year or following each major rainfall event.
Retaining Walls.	Owner to inspect walls for deveation from as constructed condition. Replace poorly constructed rock walls	Every two years or following major rainfall event. As soon as practicable
Large Trees on or adjacent to site	Arbourist to check condition of trees and remove branches as required.	Every five years
Slope Stability	Hydraulics (stormwater) & Geotechnical Consultants to check on site stability at same time and provide report. Owner to inspect rock bolts in crest of boulder for fretting of rock and or changes to bolt condition	One year after construction is completed. Every 10 years

N.B. Provided the above shedule is maintained the design life of the property should conform with Pittwater Councils Risk Management Policy.

Appendix 4

APPENDIX A

DEFINITION OF TERMS

INTERNATIONAL UNION OF GEOLOGICAL SCIENCES WORKING GROUP ON LANDSLIDES, COMMITTEE ON RISK ASSESSMENT

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.

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.

Elements at Risk – Meaning the population, buildings and engineering works, economic activities, public services utilities, infrastructure and environmental features in the area potentially affected by landslides.

Probability – The likelihood of a specific outcome, measured by the ratio of specific outcomes to the total number of possible outcomes. Probability is expressed as a number between 0 and 1, with 0 indicating an impossible outcome, and 1 indicating that an outcome is certain.

Frequency – A measure of likelihood expressed as the number of occurrences of an event in a given time. See also Likelihood and Probability.

Likelihood – used as a qualitative description of probability or frequency.

Temporal Probability – The probability that the element at risk is in the area affected by the landsliding, at the time of the landslide.

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.

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.

Risk Analysis – The use of available information to estimate the risk to individuals or populations, property, or the environment, from hazards. Risk analyses generally contain the following steps: scope definition, hazard identification, and risk estimation.

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 judgements 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 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 Management – The complete process of risk assessment and risk control (*or risk treatment*).

Individual Risk – 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.

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.

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.

Tolerable Risk – A risk that society is willing to live with so as to secure certain net benefits in the confidence that it is being properly controlled, kept under review and further reduced as and when possible.

In some situations risk may be tolerated because the individuals at risk cannot afford to reduce risk even though they recognise it is not properly controlled.

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, kinetic energy per unit area.

Note: Reference should also be made to Figure 1 which shows the inter-relationship of many of these terms and the relevant portion of Landslide Risk Management.

APPENDIX C: 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

APPENDIX C: – 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}	VH	VH	VH	H	M or L (5)
B - LIKELY	10^{-2}	VH	VH	H	M	L
C - POSSIBLE	10^{-3}	VH	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) For 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)
VH	VERY HIGH RISK	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.

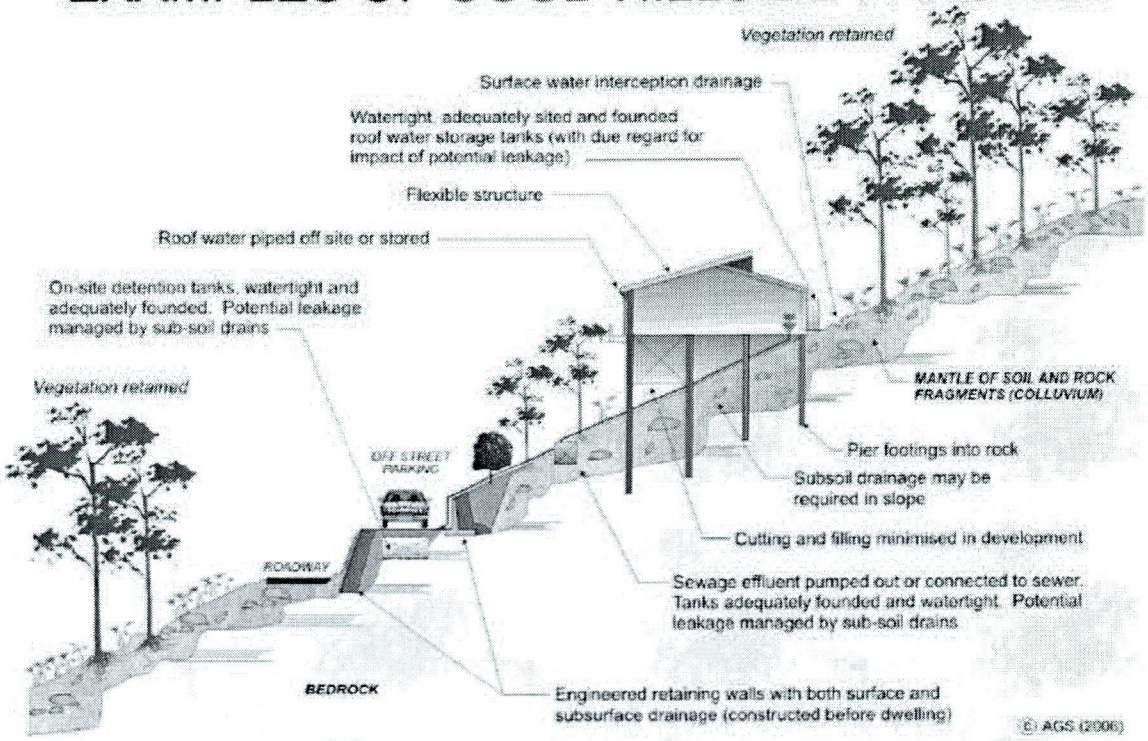
Note: (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.

Appendix 5

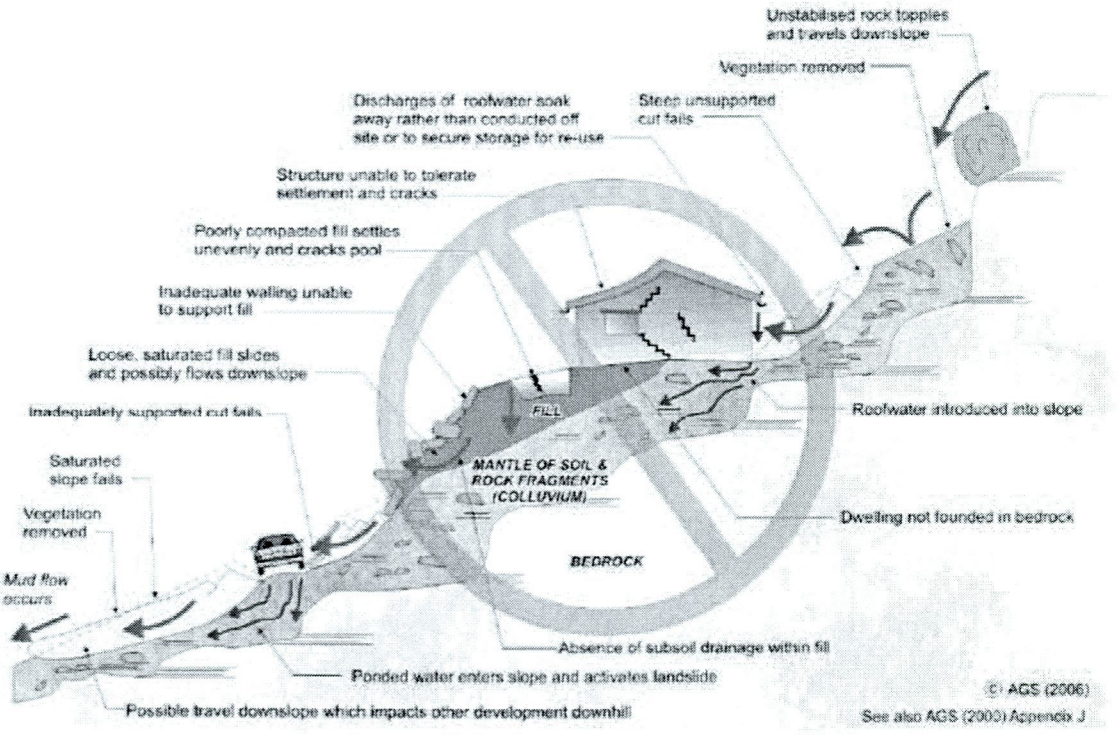
APPENDIX G - SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

ADVICE	*GOOD ENGINEERING PRACTICE*	*POOR ENGINEERING PRACTICE*
GEOTECHNICAL ASSESSMENT	Obtain advice from a qualified, experienced geotechnical practitioner 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.	Indiscriminatory 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 property 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 rock 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 rock 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 general 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 on 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 roof runoff 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 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 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 see advice. If seepage observed, determine causes or seek advice on consequences.	

EXAMPLES OF GOOD HILLSIDE PRACTICE



EXAMPLES OF POOR HILLSIDE PRACTICE



Appendix 6

Foundation Maintenance and Footing Performance:
A Homeowner's Guide

CSIRO

BTF 18
replaces
Information
Sheet 10/91

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870, the Residential Slab and Footing Code.

Causes of Movement

Settlement due to construction

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

Erosion

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

Saturation

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume – particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

Seasonal swelling and shrinkage of soil

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

Shear failure

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.
- In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

GENERAL DEFINITIONS OF SITE CLASSES

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites with only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which can experience moderate ground movement from moisture changes
H	Highly reactive clay sites, which can experience high ground movement from moisture changes
E	Extremely reactive sites, which can experience extreme ground movement from moisture changes
A to P	Filled sites
P	Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise

Tree root growth
Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

Effects of Uneven Soil Movement on Structures

Erosion and saturation
Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

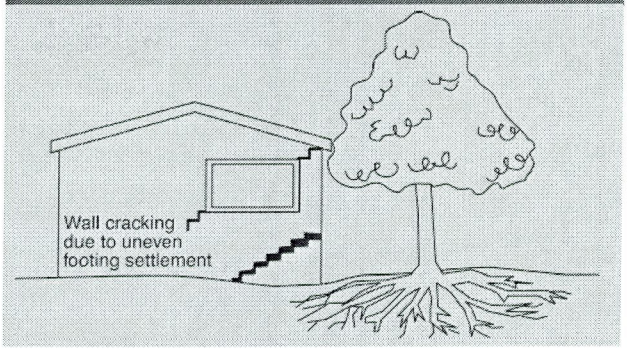
Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

Seasonal swelling/shrinkage in clay
Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

Trees can cause shrinkage and damage



As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

Movement caused by tree roots
In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

Complications caused by the structure itself
Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

Effects on full masonry structures
Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

Effects on framed structures
Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation cause a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

Effects on brick veneer structures
Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem.
Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870.

AS 2870 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

Prevention/Cure

Plumbing
Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage
In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

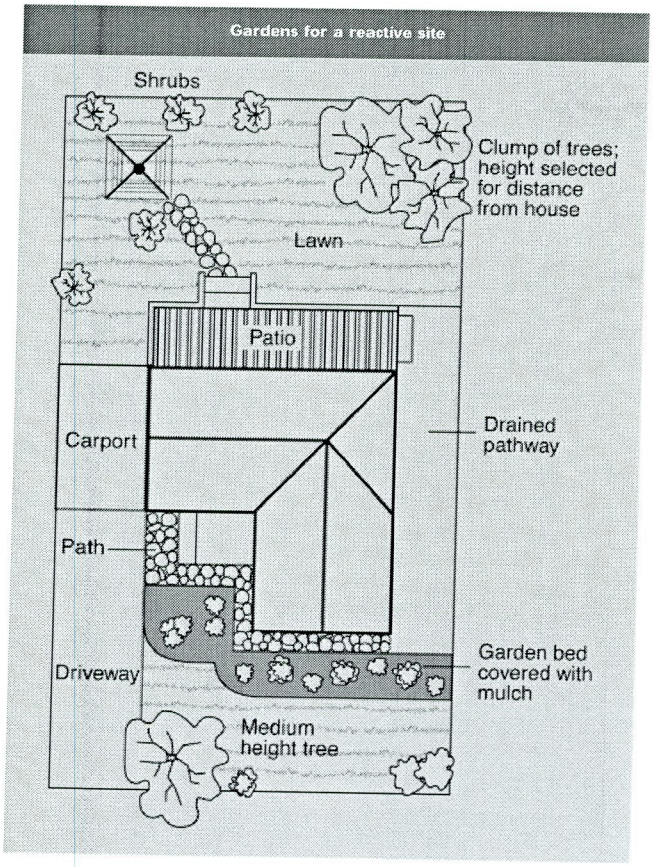
It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

Protection of the building perimeter
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving

CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted	15–25 mm but also depend on number of cracks	4



should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

Warning: Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.

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Appendix 7

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Date: 13th November 2014
No. Pages: 1 of 7
Project No.: 2014-011.2

EXCAVATION METHODOLOGY FOR PROPOSED NEW HOUSE AT 2A LIVISTONA LANE, PALM BEACH, NSW.

1. INTRODUCTION:

This report details a recommended excavation methodology for the proposed construction of a new house at 2A Livistona Lane, Palm Beach, NSW. This report is supplied to outline a recommended method of providing continued support to the excavation, the geology for which is unconfirmed due to access problems preventing further detailed geotechnical testing.

The site (2A Livistona Lane) is currently undeveloped/vacant land and contains a steep to very steep slope with outcropping sandstone bedrock near the roadway and at the rear of the block. Elsewhere within the site are soil slopes with boulders of various sizes and small trees and vegetation.

The new house will involve excavation across the site up to approximately 11m depth below current ground levels. The excavation will be $\leq$ 3.5m depth at the upper western end for Level 3 and will then step down the block with another 3.0m cut for Level 2 before an 8m high cut face for the garage level. The garage excavation will extend to within 1.3m of the southern side boundary, whilst the Level 2 and 3 excavations will extend to within 1.3m of the northern boundary.

This report should be read in conjunction with our updated geotechnical report (2014-011.3, Dated: 14th November 2014) for recommendations on footing design and excavation equipment and monitoring.

2. SITE CONDITIONS

Based on our previous limited investigation it is expected that most of the excavation will extend through bedrock of the Narrabeen Group containing interbedded shale/mudstones and sandstone. These geological units will be expected to form a stepped profile down the slope with the sandstone horizons being more resistant to weathering creating terraces and cliffs whilst shale/siltstone units will form deeper soil and extremely low strength rock profiles. Minor soils with medium strength sandstone boulders are expected for the surface to 1.0 to 1.5m depth, overlying extremely low to very low strength bedrock with medium strength rock expected within 3.0m of the ground surface. Medium strength bedrock is outcropping at the front of the site and may extend closer to surface in various locations.

This geological profile is unconfirmed due to access limitations preventing further detailed geotechnical investigation, therefore some variations to this interpretation should be expected. Low strength shale/siltstone horizons may exist whilst defects within the rock mass could result in significant levels of excavation support being required.

3. GEOTECHNICAL ISSUES.

There are two outcrops in the neighbouring properties which have been identified as being susceptible to movement. Whilst these boulders could remain stable or move due to natural causes, any movement which occurs during excavation or in the period following will be attributed to the works until proven otherwise. The consequence from the movement of these boulders is considered to be 'Very High' therefore they should be secured prior to excavations works.

It is understood from verbal discussion that the boulder near the boundary with No. 3, is supported via two rock bolts and grouting installed at the direction of the previous owner. The specifications and existence of the rock bolt portion has not been confirmed to date.

An assessment of the boulder within the opposite neighbouring property (No. 2) identified that the large boulder above the rear timber deck has a mass of approximately 220tonnes and it is sitting on one confirmed detached boulder and one section of weathered rock which may be bedrock. There has been some form of grout packing at the two small interfaces of the boulder base however there is no indication of further support measures being in place. This section of rock is considered to be potentially unstable regardless of the works being undertaken within the site and therefore should be permanently supported.

The Level 3 excavation will extend to within <1.0m of the existing large sandstone outcrop near the rear of the site. This outcrop is a detached boulder and so will be susceptible to undermining and down slope movement as a result of the excavation. A portion of this boulder is supported off another section of rock which may be bedrock, though this is unconfirmed. The soil depth in this part of the site could present a landslip hazard to the excavation, especially where seepage is encountered.

The two large plate shaped boulders situated on the ground surface near the upper western end of the excavation will be removed. These will require breaking up prior to removal due to their size, however fracturing of these units presents a hazard for boulders/fragments rolling down slope.

The excavation for Level 1 will be up to 4.0m deep where it passes the neighbouring house to the north (No. 2), however it will decrease to the east due to the slope. Based on expected geology this portion of the cut should present a relatively low risk of instability to the neighbouring house based on separation distance to the boundary and expected founding depth, however this is unconfirmed.

The excavation for the garage will be up to 11m deep at its south-west corner, where it will be within 1.5m of the site boundary and within 3m of the neighbouring terrace (No. 3). As such there is a potential for undermining this boundary through instability in both the upper soil horizons and due to defects in the bedrock.

4. RECOMMENDATIONS.

The high excavation faces are expected to expose soils in the upper portions and then weathered bedrock which will not stand unsupported. Whilst harder rock units may be intersected and stand vertically unsupported they will be expected to contain defects, some of which will be of potentially unstable orientations. Groundwater seepage will also be expected at the soil/rock interface and along these defects and will quickly reduce the stability of the slopes if not contained.

The excavation works are not expected to impact the boulders located within the neighbouring properties either side. The boulder within No. 3 appears to have been stabilized, however as certification for this work has not been procured it is recommended that the grout caps on the surface of the boulder be excavated in an attempt to expose a bolt below. It no bolt exists or this inspection/confirmation does not occur then the boulder should be stabilized via new bolts.

The boulder within No. 2 presents a significant risk to the neighbouring property and is apparently un-stabilized. As such it should be stabilized regardless of the proposed site works.

4.1. Methodology

As the time frame from start of excavation to completion of the built structure and retaining walls will be significant, excavation support must be implemented either prior to bulk excavation or in regular intervals as the excavation proceeds down. It is considered that anchored soldier pier support walls, installed prior to bulk excavation, will provide the highest level of support and lowest risk, however these may encounter difficulty in implementation where medium to high strength bedrock or boulders are encountered and where proximity to boundaries is minimal.

Based on the proximity to site boundaries the installation of rock bolts to provide lateral support to any shotcrete or pile support system on either side of the excavation will be expected to extend across into the neighbouring properties, therefore requiring permission from property owners. As such any excavation bolt bolt support should be on a temporary basis with permanent lateral support supplied via retaining walls and the new development. Reinforced shotcrete may be permanently supported laterally via the building floor slabs. Rock bolts drilled towards the west will be entirely within the site, and therefore could be designed as permanent structures if required. Any permanent rock bolt will need to be double corrosion protection or of a certified fiberglass construction to achieve a 100 year design life.

The following procedure is recommended for the excavation support:

- Stabilize the two boulders in the neighbouring properties via rock bolts and blade underpinning walls.
- Initial excavation at front boundary to create access track for excavator into site
- Stabilize and then excavate/remove two plate shaped boulders on upper soil slope
- Investigate via 2 – 3 test pits the upper boulder/cliff outcrop foundation and rear edge of excavation, under geotechnical supervision, and underpin/support boulder as necessary
- A series of test pits/pilot pier holes around perimeter of excavation to determine soil and weathered bedrock depth may be utilized by the excavator, under geotechnical supervision, to confirm the most suitable support option based on identified conditions.
- **(Preferred if possible)** Install solider pier support wall to base of excavation cut levels, with anchored support considered necessary for the deeper cuts.
- (Alternate) Implement soil/extremely low strength rock stabilizing measures for upper portion of excavation, expected to 2.0 to 4.0m depth. This may be achieved via a closely spaced pier support wall or where soil is shallow, excavate as a batter followed by immediate installation of an anchored reinforced shotcrete wall.

  Following support of upper soils, excavation of upper 1.5 to 2.0m of the bedrock followed by immediate geotechnical inspection and installation of a reinforced and anchored shotcrete retaining wall (unless determined otherwise by the geotechnical engineer)

  Excavation of rock at 3.0m deep cut intervals with geotechnical inspection following each cut and installation of anchored, reinforced shotcrete support walls unless determined otherwise (unless determined otherwise by the geotechnical engineer)
- Construct new development with floor slabs utilized as permanent horizontal support to excavation.

4.2. Design Parameters/Recommendations:

It is recommended that maximum short term/temporary batter slopes of 1H:1V be adopted for excavation through soil and extremely weathered rock at the crest of the excavation, expected to < 2m. A temporary batter of 1.0H:1.5V can be used through very low to low strength bedrock. Permanent soil/weathered rock batter slopes should be designed for a maximum of 2H:1V.

Where these batter slopes are located at the crest of a rock excavation then stormwater control will also be required to divert surface run-off and prevent erosion into the excavation below, as well as control groundwater seepage at the base of the embankment, which could result in batter failure. If suitable measures are not implemented then the stability of the excavations until permanent retaining walls are completed cannot be guaranteed.

Vertical batters can be used where the excavation extends through medium strength sandstone bedrock which will generally remain self supporting, though this will be dependent on weathering, the orientation of joints/defects and bedding. There is the potential for poorly orientated defects in the bedrock which can result in wedges of rock falling into the excavation when unsupported and also for geological horizons of increased weathering to present potential block toppling failures. Slow de-stressing and erosion along defects which may not be visible in the short term may result in longer term instability in the bedrock therefore it is recommended that all excavation faces be supported unless determined otherwise by the geotechnical engineer.

Should boulders be identified in the soil slope near the crest of the excavation or detached sections of bedrock within the excavation faces, then these may need to be slightly over excavated, possibly underpinned and rock bolted to ensure that no long term movement occurs that could create rock face instability hazards to workers or damage walls within the completed development. Regular geotechnical inspections are required during excavation. These inspections should occur as per the previous methodology including at ≤ 3.0m depth intervals to allow assessment and installation of support measures in a timely and safe manner.

All excavations through soil, and any filled areas not constructed at the above mentioned permanent batter slopes, will require "engineer designed" retaining wall systems, designed in accordance with Australian Standard AS 4678-2002 Earth Retaining Structures. This may be achieved by the use of a steel reinforced concrete/concrete block walls or closely spaced pier walls (every second pier spacing, i.e. for 300mm piers at 600mm centres) with vertical drainage cell then shotcrete and steel mesh infill, or other methods suggested by a qualified structural engineer.

Backfilled retaining walls within the site, away from site boundaries or existing structures, may utilize active earth pressure coefficients (Ka).

Table 1: Retaining Structures Design Parameters

Material	Density Consistency Strength	Unit Weight (kN/m^3)	Long Term (Drained)	Earth Pressure Coefficient Active (Ka)	Passive Earth Coefficient and Pressure *
Topsoil, sandy slope wash/colluvium at 20° slope	Loose	18	$\phi' = 25°$	0.54	
Sandstone Bedrock	ELS	22	$\phi' = 20°$	0.25	400 kPa
Sandstone Bedrock	LS	23	$\phi' = 30°$	0.15	2000 kPa

* Ultimate design values ELS = Extremely low strength LS = Low strength

Utilizing lightly compacted granular backfill a soil density of $18kN/m^3$ is suitable.

Retaining walls should be designed for free draining granular backfill to support the slope and appropriate surface and subsoil drains to either divert or intercept groundwater flow which otherwise could provide surcharging on the walls. The additional pressures associated with water surcharge may cause damage or failure of the walls.

4.3. Rock Bolting

It is considered that the installation of two rock bolts through the upper plate shaped boulder on the southern boundary (No. 3), extending into the underlying boulder will significantly reduce the likelihood of failure of the boulders and also reduce the probability of them travelling down slope and impacting any structures. It is considered that two 24mm diameter fully grouted rock bolts of approximately 5.0m length will be sufficient for this purpose.

Based on the size of the boulder within No. 2, and the loads potentially requiring support should movement occur, it is estimated that a minimum of 6 bolts or anchors of >24mm would be required, each of a minimum of 7m length (or an approved equivalent design) thus providing approximately 4m of bond length in to the underlying bedrock. An assessment of the conditions suggests that anchoring/bolting of this boulder will not be practical, however discussion with a specialist contractor may determine otherwise. It is considered that even with anchoring that blade underpinning walls would be required to stop rotation of the boulder and lateral dislocation, which could create shock loading on the bolt system.

As such it is considered that it is more suitable to install two blade underpinning walls below the boulder, adjacent to the existing boulders/outcrops below. These walls will need to be of reinforced concrete construction and designed by a structural engineer to support the full load of the boulder and lateral forces in the order of 250kN each. As such these walls may require some anchoring into the bedrock. The concrete walls could be faced for aesthetics upon completion.

The detailed design of any rock bolting and shotcreting within the excavation can only be achieved through close geotechnical mapping and supervision. Any permanent rock bolt will need to be double corrosion protection to achieve a 100 year design life and be installed by an experienced contractor who can certify their installation.

Shotcrete support to rock excavation faces should generally be a minimum of 100mm thick with steel mesh reinforcing (≈ SL82) and vertical strip drains at 1.0 to 1.5m spacing. Rock bolts should have double corrosion protection and will be generally be to approximately 3.0m length at 5 – 10° incline. For pattern bolt/shotcrete support, bolts should be on a diamond pattern at 1.5m spacing. Bolts should be 24mm diameter or approved equivalent, the drilled holes should be at least 45mm diameter and flushed clean and checked for water tightness whilst the bolts should be tensioned to approximately 50kN upon completion. Fully grouted steel dowels to 1.5m length may also be used as anchors or substitute to rock bolts pending inspection/assessment results.

Rock bolt design should utilize the following factored grout/rock bond stresses for this site:

Extremely weathered sandstone	100 kPa	Moderately weathered sandstone	600 kPa
Moderately weathered shale	400 kPa	Fresh/medium strength sandstone	800 kPa

Rock bolting of individual indentified hazards should be determined and designed by the geotechnical engineer.

4.4. Drainage & Groundwater:

Groundwater seepage can be expected through the sandy soils and at the soil rock interface whilst moderate levels of seepage are expected on geological defects within the rock excavation due to the depth of cut and the site location. This seepage has the potential to be at minor artesian pressures due to the water head formed within defects in the rock mass further upslope. Excavation within the site is not expected to intersect a free standing water table.

A stormwater diversion drain should be installed upslope of excavation crests to intercept stormwater runoff and prevent erosion and softening of the excavation faces. An excavation trench should also be installed at the base of excavation cuts to below floor slab levels to reduce the risk of resulting dampness issues.

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Project No: 2014-011A

REPORT ON DILAPIDATION SURVEY OF THE PROPERTY AT 2 LIVISTONA PLACE, PALM BEACH.

1. INTRODUCTION:

This report details the results of a dilapidation survey of the property at No. 2 Livistona Place, Palm Beach undertaken prior to approved development works at the neighbouring site, No. 2a Livistona Place. This assessment was undertaken at the request of the client Mr Andrew Salter as a condition of Council's Development Consent No. (NO108/14)

The survey is based on a walk through inspection and photographic record of the property (No. 2) and associated structures on the 28st October 2014. The inspection extended to accessible areas throughout the property, however it was a non-invasive survey and did not include the removal of fixtures, furniture etc. It is a visual catalogue only and makes no assumptions on the cause or probability of further deterioration.

The dilapidation assessment is incomplete and will be completed upon access approval to the remainder of the house.

2. DESCRIPTION OF BUILDING:

The house (No. 2) consists of a one and two storey structure with brick lower floor and timber upper. The site contains numerous rock retaining walls at the front along with a timber deck. At the rear is a paved terrace and rendered masonry retaining wall. The house walls extend to within 1.5m of the common boundary with the site.

3. DESCRIPTION OF DEFECTS:

For the purpose of this report and where reference is made to "Hairline crack (s)", we note these cracks as being less than 0.10mm in width. All other references to cracks (without specific reference to their width) are assumed to be between 0.10mm and 1.0mm in width.

A basic house outline with identified defects is provided as Figure: 1. The plan is a schematic representation of the house made at the time of the inspection and should not be relied for any further works. Selected photos of individual defects are included with this report. The quality of thee photos is reduced to allow production of the report at a manageable size. The original high definition photos are maintained on file and can be supplied if required. The original high definition photos are maintained on file and can be supplied if required. A summary of the inspection results are outlined below:

Lower Level

Shower Room – Photos on Page 1

Tiled floor with tiled walls and plaster board ceiling.

- Defect No.: 1 – Tile separation at architrave join.

No other obvious defects.

Kitchen Area – Photos on Page 2

Timber floor, with stone walls and plaster board ceiling.

- Defect No.: 2 – Tile and paint separation near sink.

No other obvious defects.

Living Area – Photos on Pages 3-4

Timber floor with stone walls and plaster board ceiling.

- Defect No.: 3/4/6 – Crack/paint separation at join on wooden frame above sliding doors.
- Defect No.: 5 – Previous repaired crack near wooden frame.
- Defect No.: 7 – Deterioration of wall paint.

No other obvious defects.

Front Exterior – Photos on Pages 5-11

North facing wall made of brick and timber with raised deck and stairs leading to house

- Defect No.: 8 – Crack in brick at the lower end near west patio door area, 4mm in width
- Defect No.: 9 – Crack/paint separation to the right of the east patio door, 1mm in width.
- Defect No.: 10 – Crack/separation of timber from brick at the east patio sliding door track.
- Defect No.: 11 – Crack in small stone wall to the west of house near outdoor shower area.
- Defect No.: 12– Crack/split in timber to the right of patio frame towards east side of house.

West Side of house – Photos on Pages 12-13

Brick and timber with stone steps leading to upper level of house with plants to the right.

- Defect No.: 13– Crack in concrete step about mid way up.

No other obvious defects, remedial paint works in progress.

Upper Level Patio Area – Photos on Pages 14-16

Stone pavers and concrete rendered walls

- Defect No.: 14– Horizontal hairline crack in concrete wall
- Defect No.: 15/16– Hairline crack in east corner of rendered retaining wall, crack previously repaired.
- Defect No.: 17– Diagonal crack at top of south face large retaining wall < 1mm in width.

Lower Front Entrance – Photos on Pages 17-18

Sandstone Block retaining walls

- Defect No.: 18– Lower front north facing cemented sandstone block wall, cracking in mortar at eastern side.
- Defect No.: 19– Lower front north facing cemented sandstone block wall, cracking in mortar at eastern side.

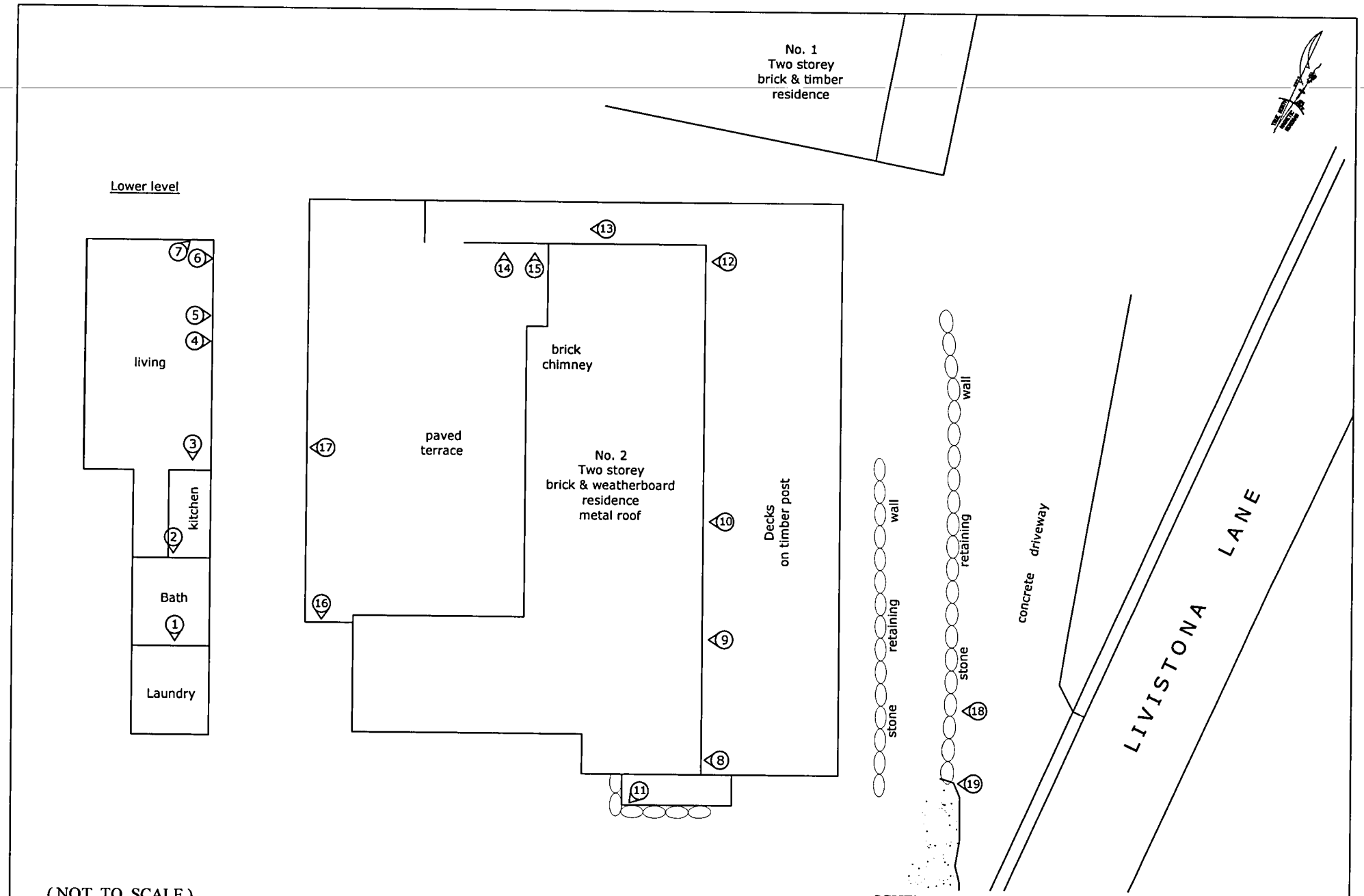
  Some cracking and deterioration of concrete slab.

The timber framed upper portion of the house is awaiting assessment, upon approval of access.

If the owner of the property identifies structurally significant defects within the house or other structures that are not listed in this report then Crozier Geotechnical should be contacted immediately.

Prepared by:
Kelly Scott

Reviewed by:
Troy Crozier
Principal Engineering Geologist



(NOT TO SCALE)

SCHEMATIC PLAN & DEFECT LOCATIONS *FIGURE 1.*

CROZIER - *Geotechnical Consultants*
Geotechnical Engineers & Engineering Geologist

Crozier Geotechnical ABN: 96 113 453 624
Unit 12, 42-46 Wattle Road Phone: (02) 9939 1882
Brookvale NSW 2100 Fax: (02) 9939 1883
Crozier Geotechnical is a division of PJC Geo-Engineering Pty Ltd

LEGEND

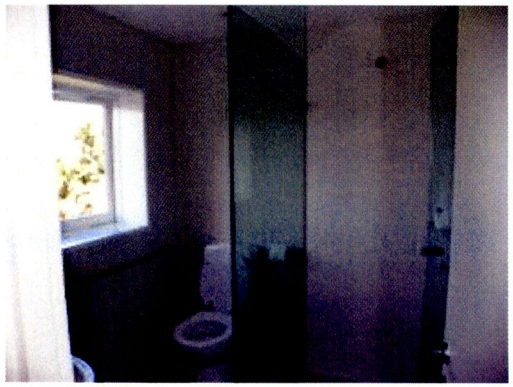
1 DEFECT LOCATIONS

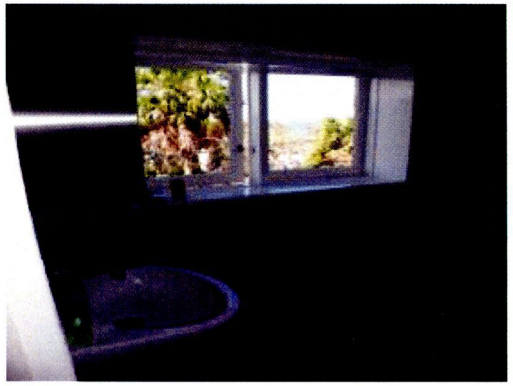
SCALE: 1:200 @ A3
DRAWING: 2014-011.2
DRAWN: AW

APPROVED BY:

PREPARED FOR:
Mr. Phil Salter.

DILAPIDATION SURVEY
ADDRESS: 2 Livistona Lane, Palm Beach.
PROJECT: 2014-011.2 DATE: 10/11/2014



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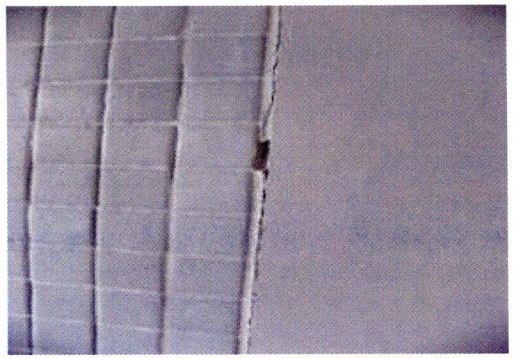

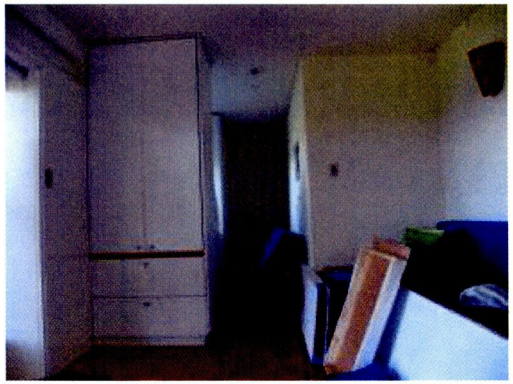


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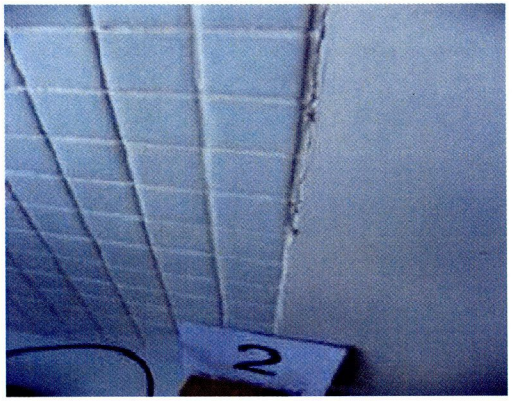
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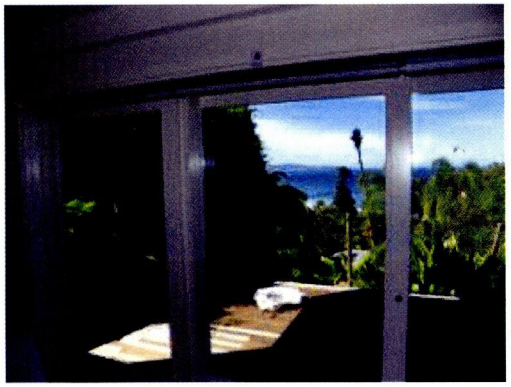


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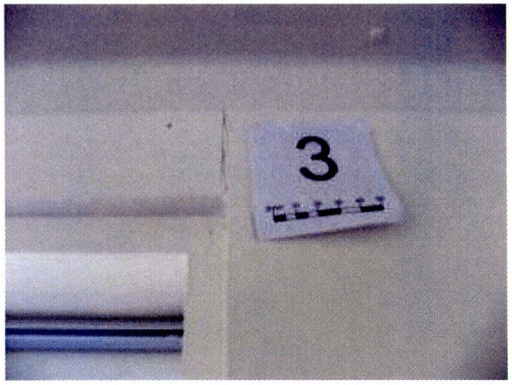
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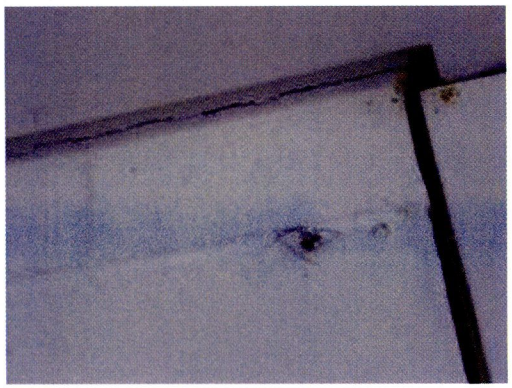

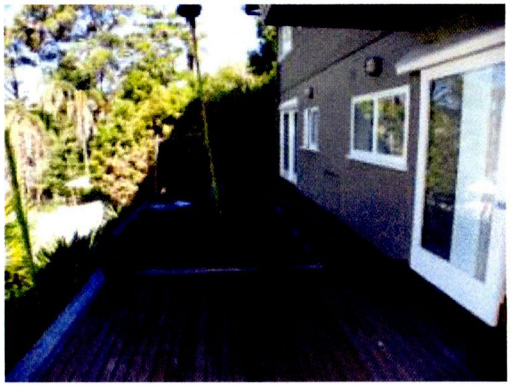


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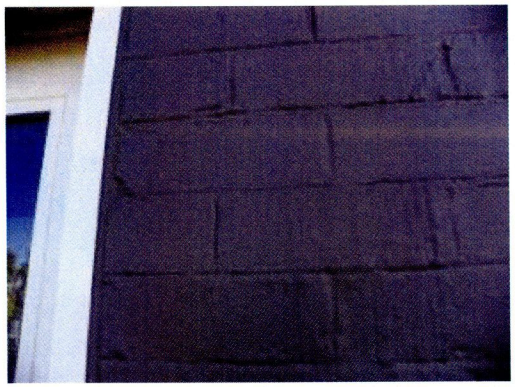

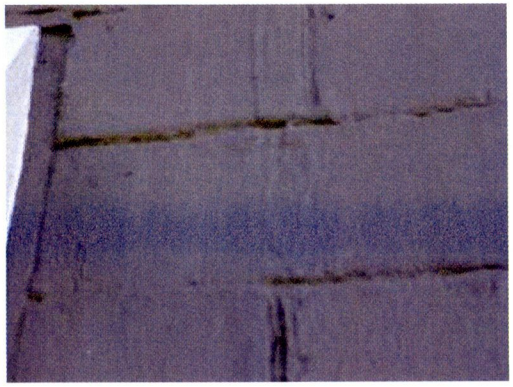

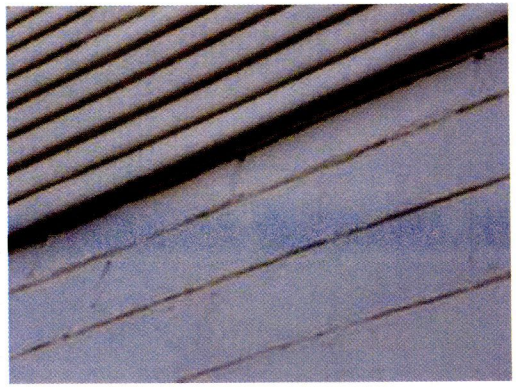

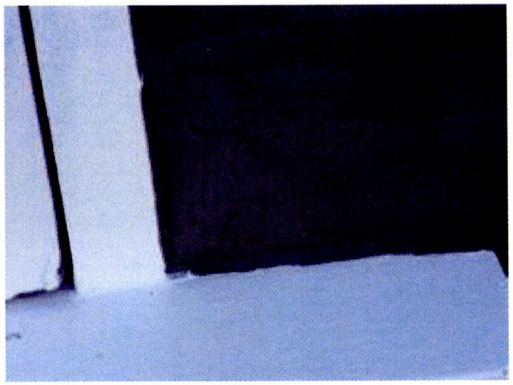

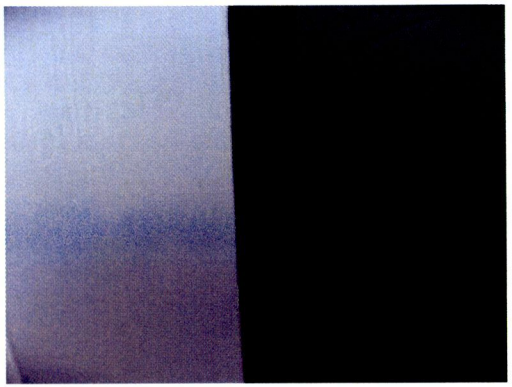

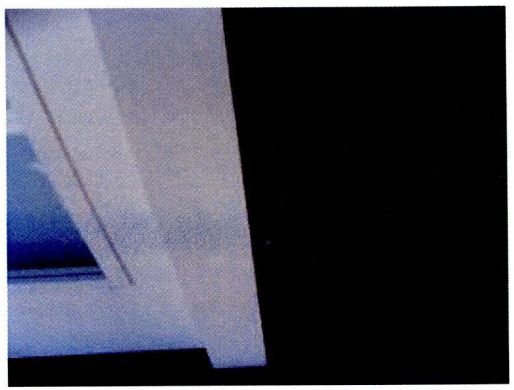


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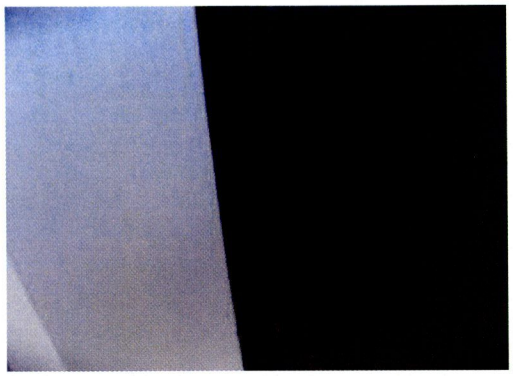

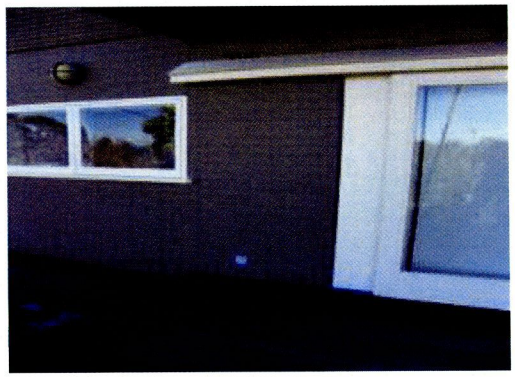


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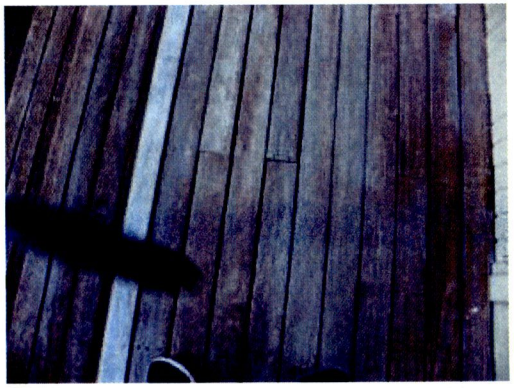

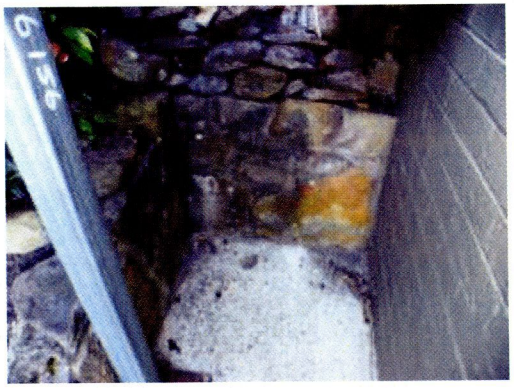


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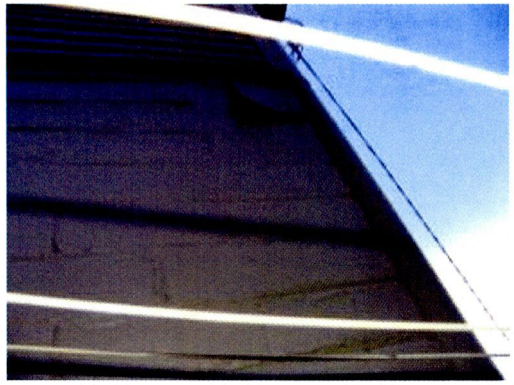

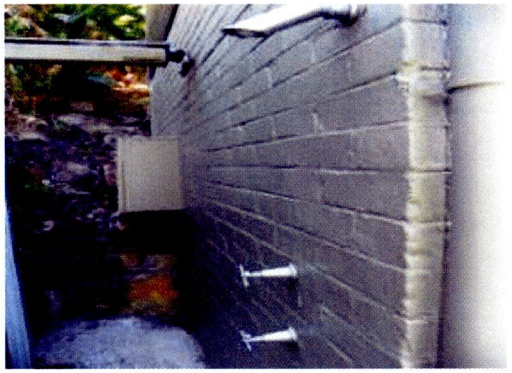


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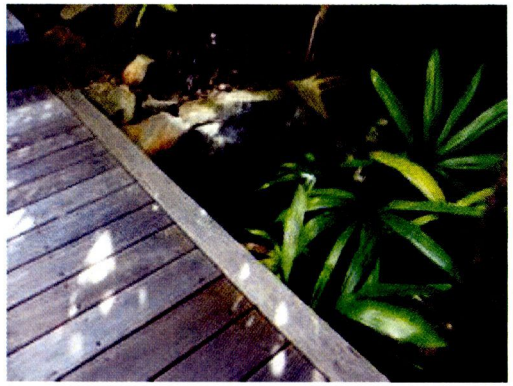

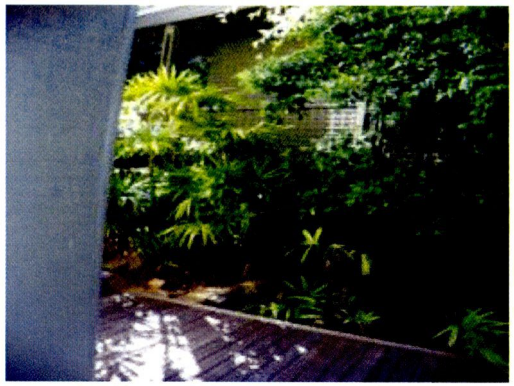

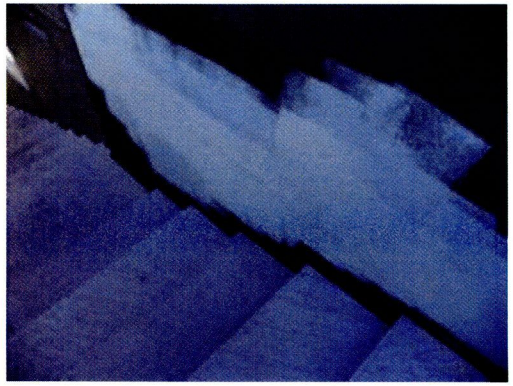


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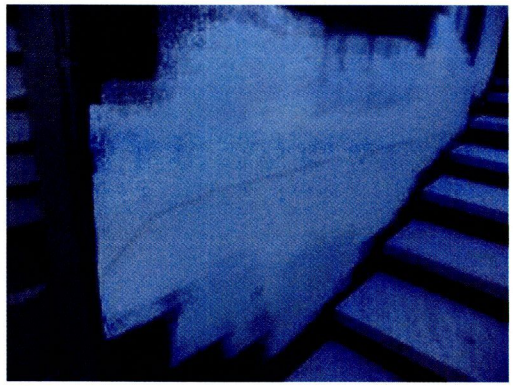

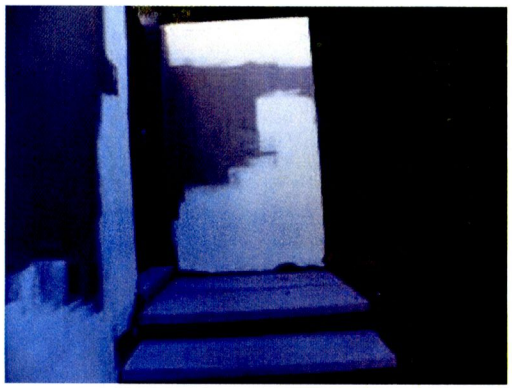

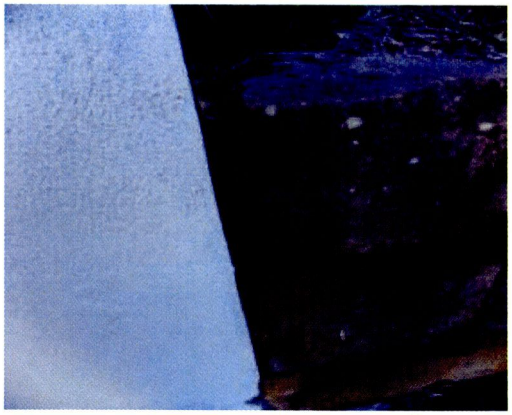

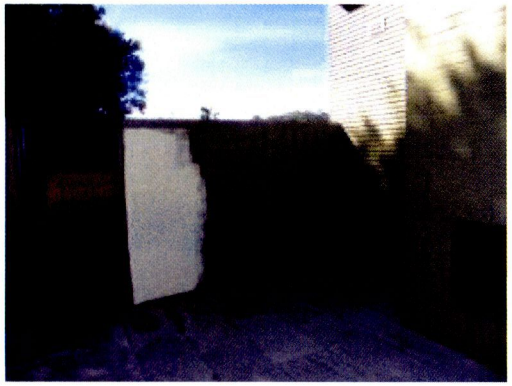

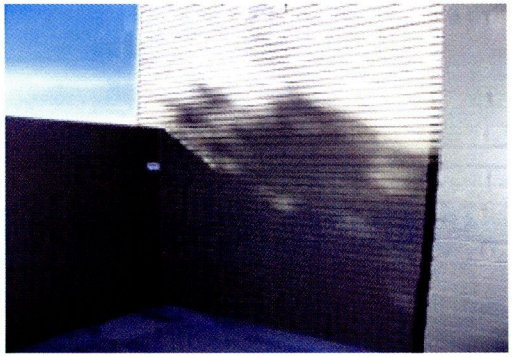


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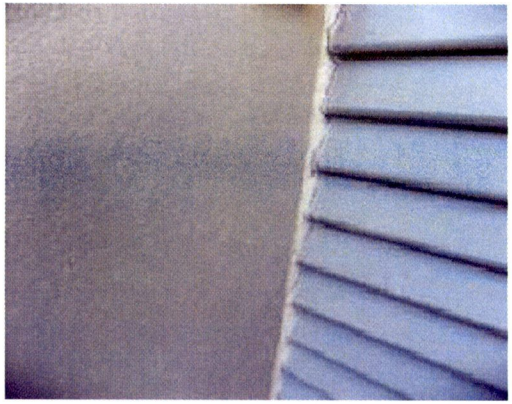

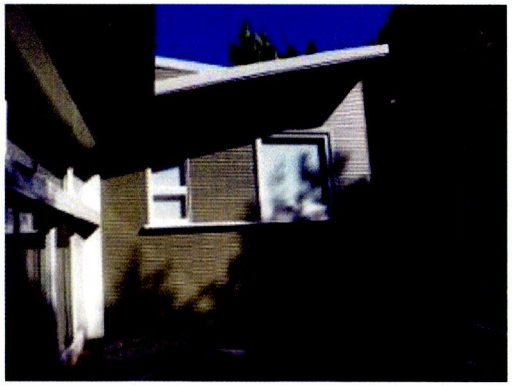

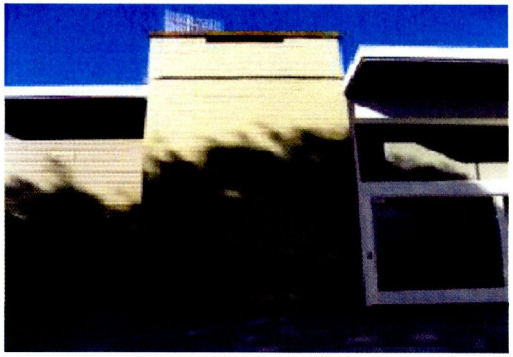

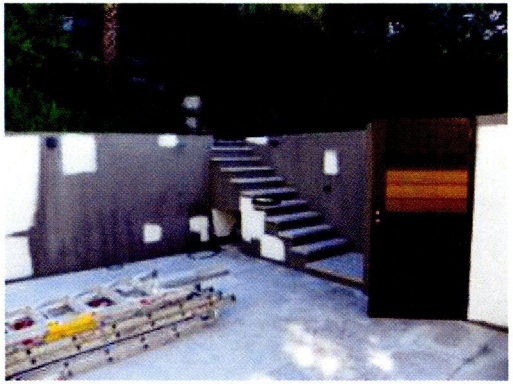


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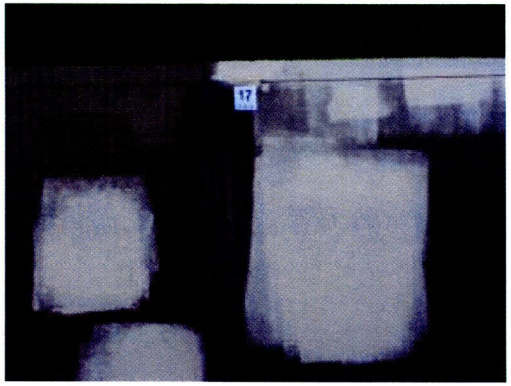
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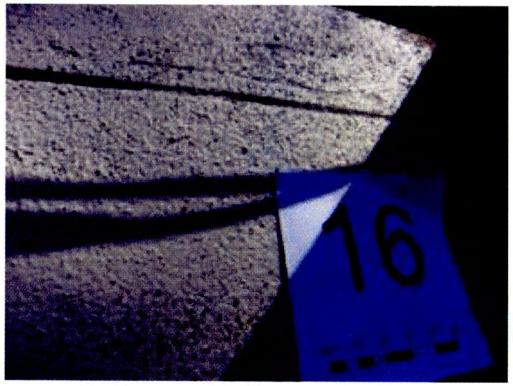
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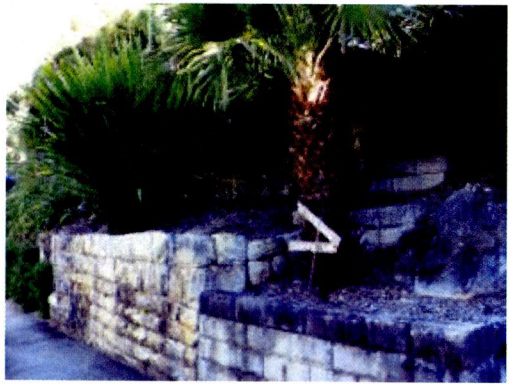

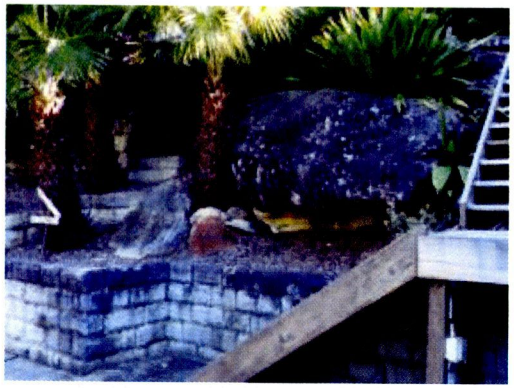

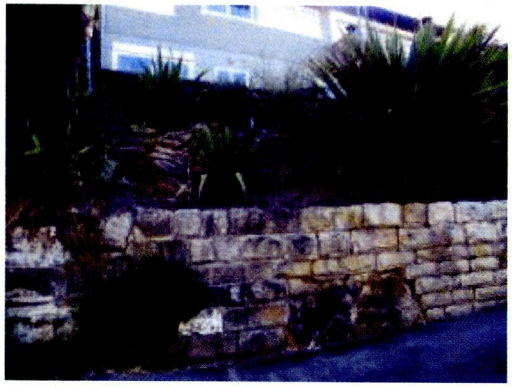


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CROZIER - *Geotechnical Consultants*
Engineering Geologists & Geotechnical Engineers

Crozier Geotechnical Consultants *ABN: 96 113 453 624*
Unit 12/ 42-46 Wattle Road *Phone: (02) 9939 1882*
Brookvale NSW 2100 *Fax: (02) 9939 1883*
Crozier Geotechnical Consultants is a division of PJC Geo-Engineering Pty Ltd

REPORT ON DILAPIDATION SURVEY OF THE PROPERTY AT 3 LIVISTONA PLACE, PALM BEACH.

1. INTRODUCTION:

This report details the results of a dilapidation survey of the property at No. 3 Livistona Place, Palm Beach undertaken prior to approved development works at the neighbouring site, No. 2a Livistona Place. This assessment was undertaken at the request of the client Mr Andrew Salter as a condition of Council's Development Consent No. (N0108/14)

The survey is based on a walk through inspection and photographic record of the property (No. 3) and associated structures on the 31st October 2014. The inspection extended to accessible areas throughout the property, however it was a non-invasive survey and did not include the removal of fixtures, furniture etc. It is a visual catalogue only and makes no assumptions on the cause or probability of further deterioration.

2. DESCRIPTION OF BUILDING:

The house (No. 3) consists of one and two storey masonry and timber structure of at least 30 years of age. The lower floor level extends to within 1.8m of common boundary whilst the upper level tiled terrace extends to within 1.0m and the upper level of the house to within 4.5m of the common building.
The lower floor level of the house and some internal components are masonry and concrete floors however the remainder of the structure is timber and rendered cladding. Several concrete block retaining walls extend around the house, whilst visible house footings were brick piers and slab on ground.

3. DESCRIPTION OF DEFECTS:

For the purpose of this report and where reference is made to "Hairline crack (s)", we note these cracks as being less than 0.10mm in width. All other references to cracks (without specific reference to their width) are assumed to be between 0.10mm and 1.0mm in width.

A basic house outline with identified defects is provided as Figure: 1. The plan is a schematic representation of the house made at the time of the inspection and should not be relied for any further works. Selected photos of individual defects are included with this report. The quality of these photos is reduced to allow production of the report at a manageable size. The original high definition photos are maintained on file and can be supplied if required. A summary of the inspection results are outlined below:

Lower Level

Sunroom and Bedroom – Photos 1-21

Timber floor with wall panelling.

- Defect No.: 1 – 2 Hairline cracks in plasterboard on roof.
- Defect No.: 2 – Vertical crack/separation at paint joint <1mm and deterioration of wood
- Defect No.: 3 – 1mm width horizontal crack at join above window, extends full width of window.
- Defect No.: 4 – Numerous small discontinuous cracks in render around corner, all <1mm in width.
- Defect No.: 5 – Separation of timber roof panel and crack, 1-2mm in width.
- Defect No.: 6 – Vertical separation at join <1mm in width.
- Defect No.: 7 – Horizontal crack at join,<1mm in width for most of the wall length.

  No other obvious defects. Nothing found on roof, timber floor and wall panels/cupboards.

Timber Deck – Photos 22-26

No major defects apart from weather deterioration.

Music Room – Photos 27-39

Tiled floor, rendered brick walls with concrete slab roof.

- Defect No.: 8 – Horizontal irregular crack at top of wall < 1mm in width.
- Defect No.: 9 – Horizontal hairline crack mid level of wall for ¾ width.
- Defect No.: 10 – Irregular hairline cracks at the top of wall.
- Defect No.: 11 – Horizontal hairline crack mid level of wall.

  No other obvious defects.

Store Room – Photos 40-45

Floor with render walls and concrete roof.

- Defect No.: 12 – Vertical crack/paint separation from the roof to near the floor.

  No other obvious defects, however inspection was limited by cupboards and furnishings.

Bathroom – Photos 46-47

Tiled walls and floor with plastered ceiling.

No obvious significant defects

External north wall and porch. – Photos 48-57 and 130-138

Rendered masonry and concrete and rendered timber.

- Defect No.: 22: - Several Diagonal cracks in rendered plasterboard and all <1mm in width.

No obvious defects other than paint deterioration.

Entry and Stairs- Photos 57-66

Rendered masonry walls with timber stairs.

- Defect No.: 13 – Horizontal hairline separation at mid wall near upper floor level, extends to full length of wall.

No other obvious defects

UPPER FLOOR LEVEL

Deck - Photos 67-76

Tiled

No obvious defects apart from minor cracks in tiles in isolated areas.

Dining Room - Photos 77-88

Timber floor with rendered walls and plaster ceiling.

- Defect No.: 14. - Horizontal and diagonal separation at join, <1mm in width.
- Defect No.: 15: - Horizontal separation in roof plaster above the window and <1mm in width.
- Defect No.: 16: - Horizontal separation above the door/bifolds and <1mm in width.

No other obvious defects

Lounge - Photos 89-94

Timber floor with rendered walls and plaster ceiling, rendered masonry fireplace.

- Defect No.: 17: - Horizontal crack at join, <1mm in width.
- Defect No.: 18: - Hairline separation at window join.
- Defect No.: 19: - Vertical seperation at join at corner <1mm

No other obvious defects.

Laundry- Photos 95-99

Rendered masonry walls

No obvious defects apart from some hairline separations at joins.

Kitchen – Photos100-102

Timber floor with masonry walls covered in cupboards.

- Defect No.: 20: - Vertical separation at cupboard/ wall <1mm.

No other obvious defects

Childs Bedroom - Photos 103 to 106

Carpet floor with rendered masonry west wall, other walls timber.

- Defect No.: 21: - Cracked and rendered separation at door.

No other obvious defects

Bathroom and Hallway – Photos 107-115

Tiled floor and walls with timber ceiling.

No other obvious defects

Bedroom (Main) and External Under Cover – Photos 116-129

Carpet floor with rendered walls and timber cupboards with mostly windows.

No obvious defects

External Wall (South) and sandstone block wall (NE Corner) – Photos 139-145

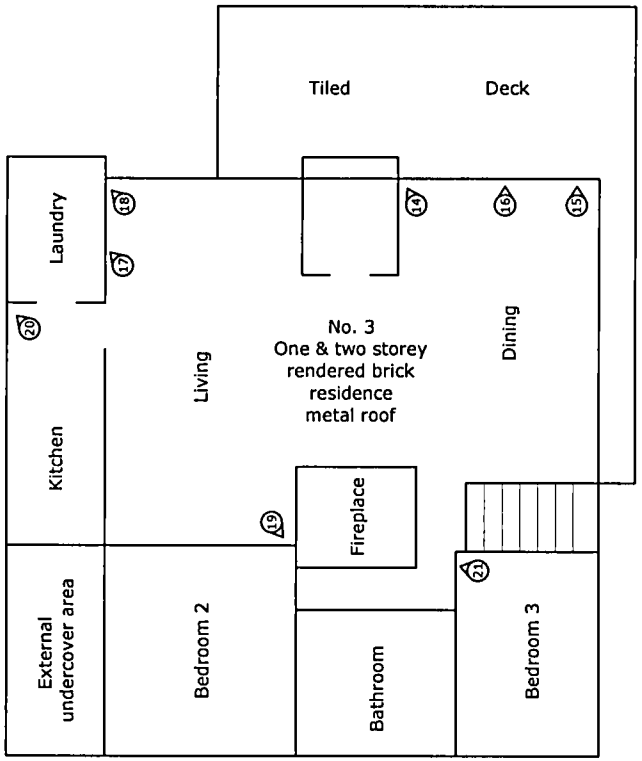
No obvious defects

If the owner of the property identifies structurally significant defects within the house or other structures that are not listed in this report then Crozier Geotechnical should be contacted immediately.

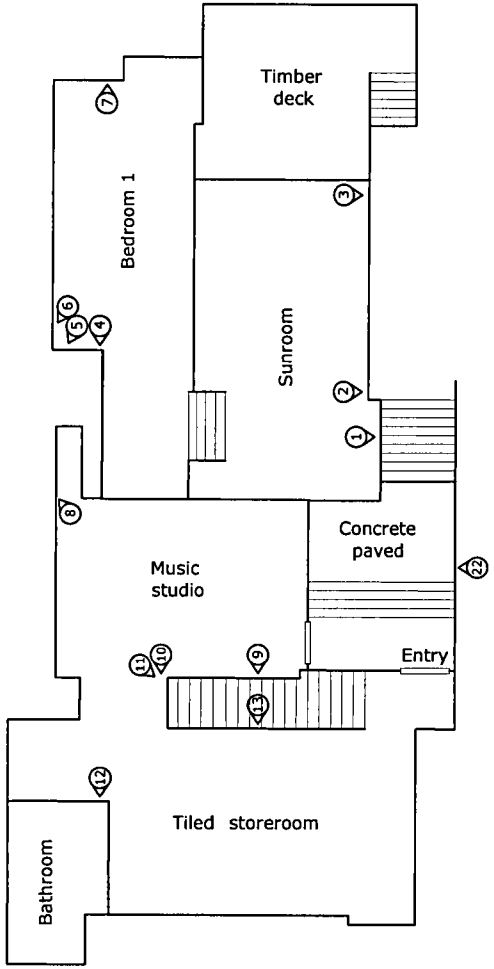
Prepared by:
Kelly Scott

Reviewed by:
Troy Crozier
Principal Engineering Geologist

Upper level



Lower level



LIVISTONA LANE

(NOT TO SCALE)

SCHEMATIC PLAN & DEFECT LOCATIONS *FIGURE 1.*

CROZIER - *Geotechnical Consultants*
Geotechnical Engineers & Engineering Geologist

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Unit 12, 42-46 Wattle Road Phone: (02) 9939 1882
Brookvale NSW 2100 Fax: (02) 9939 1883
Crozier Geotechnical is a division of PJC Geo-Engineering Pty Ltd

LEGEND

(1) DEFECT LOCATIONS

SCALE: 1:200 @ A3
DRAWING: 2014-011.2
DRAWN: AW

APPROVED BY:

PREPARED FOR:
Mr. Phil Salter.

DILAPIDATION SURVEY
ADDRESS: 3 Livistona Lane, Palm Beach.
PROJECT: 2014-011.2 DATE: 10/11/2014

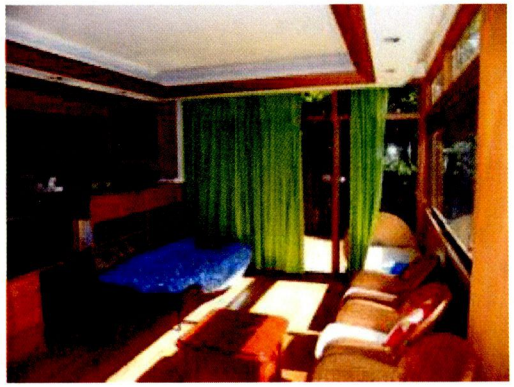
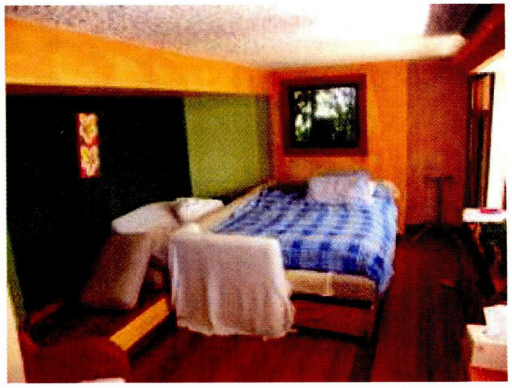


Photo: 1



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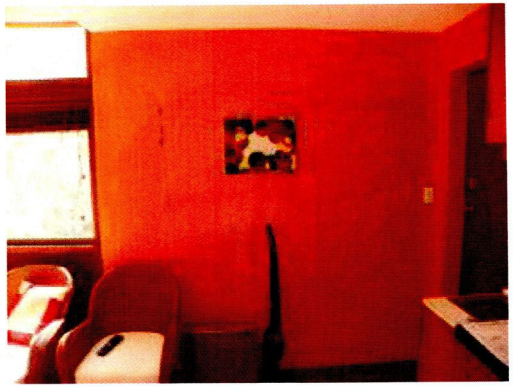

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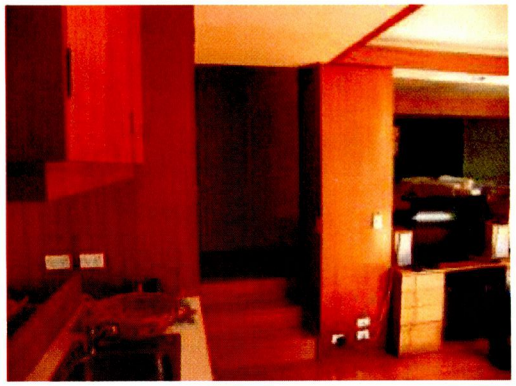


Photo: 2

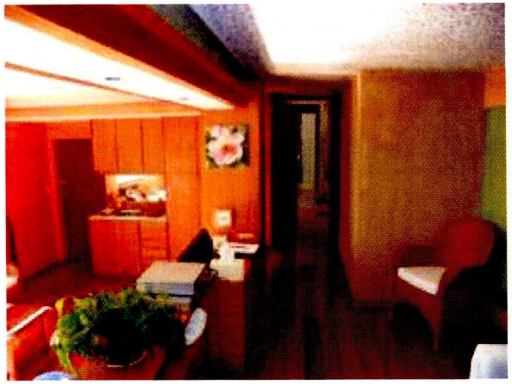


Photo: 4

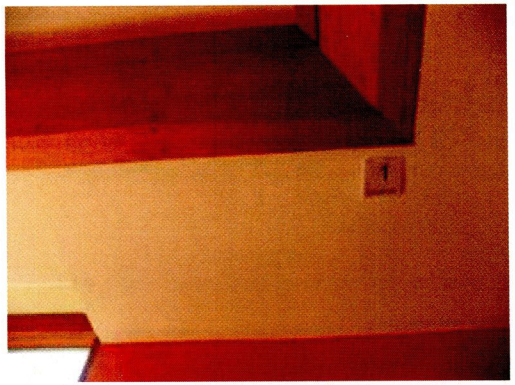


Photo: 6

Photo: 7

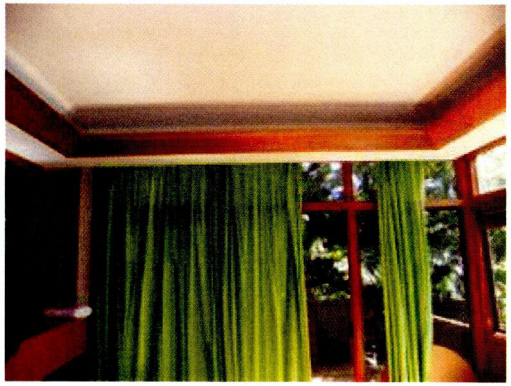


Photo: 9

Photo: 11

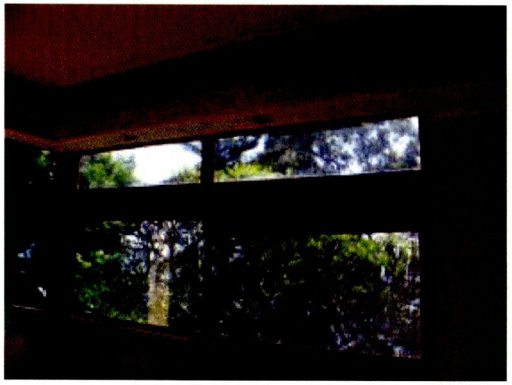


Photo: 8

Photo: 10

Photo: 12

Photo: 13

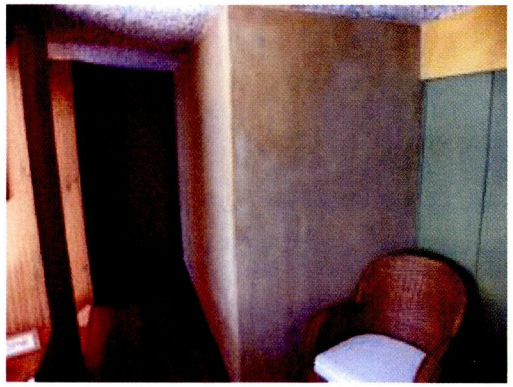


Photo: 15

Photo: 17

Photo: 14

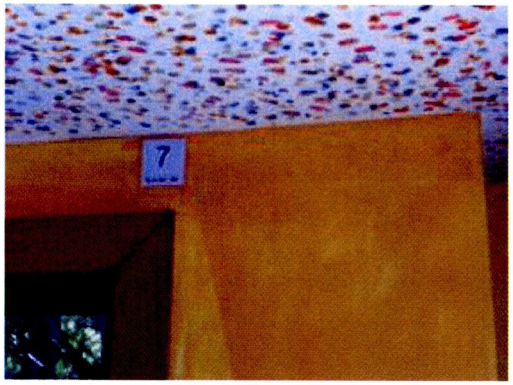
Photo: 16

Photo: 18

Photo: 19

Photo: 21

Photo: 23



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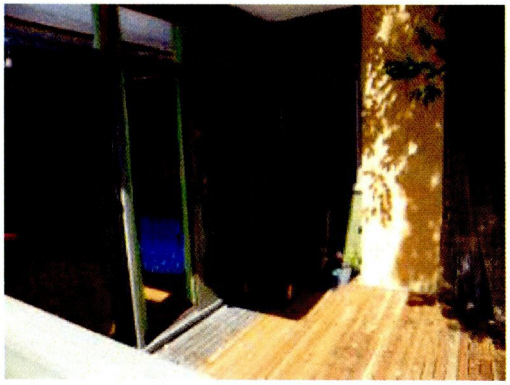

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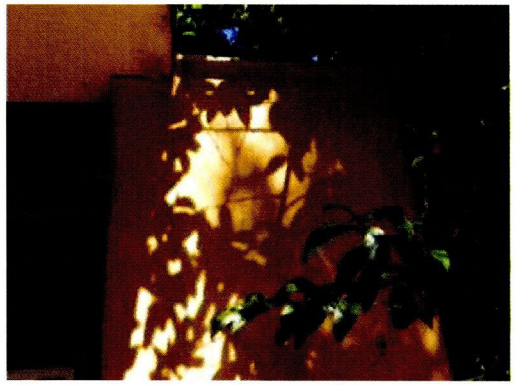
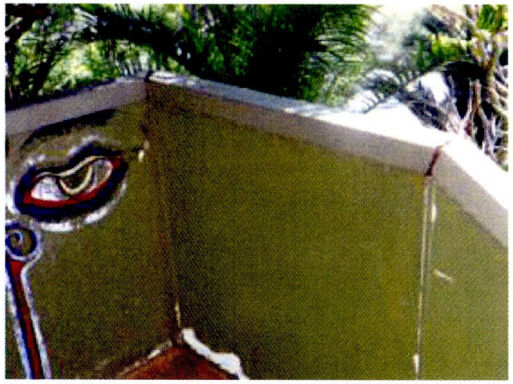


Photo: 24

Photo: 25

Photo: 27

Photo: 29



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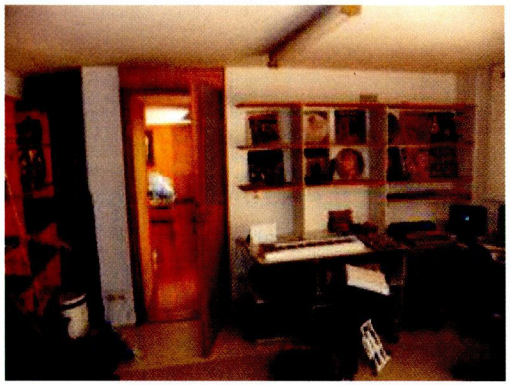

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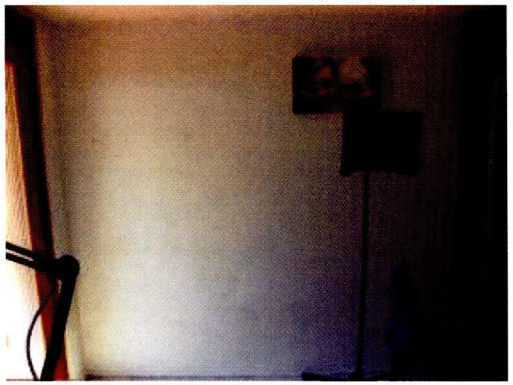

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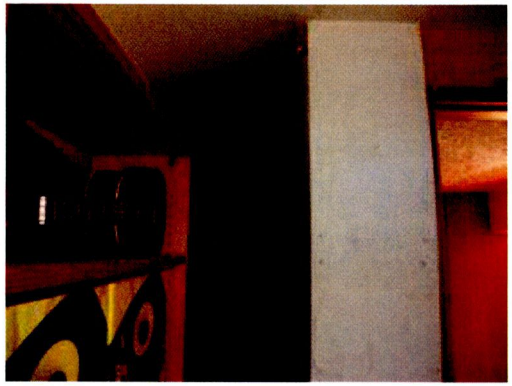

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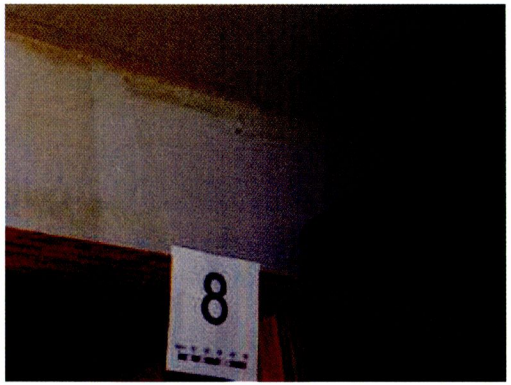

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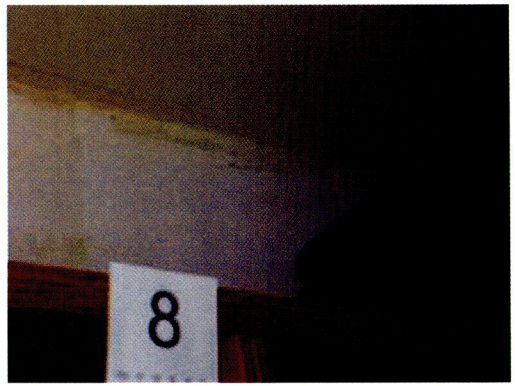

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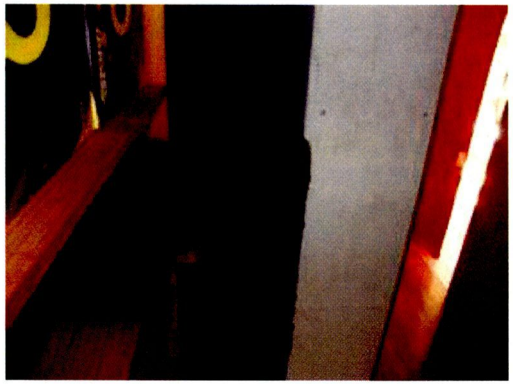

Photo: 32

Photo: 34 (Defect 8 Zoomed in)

Photo: 36

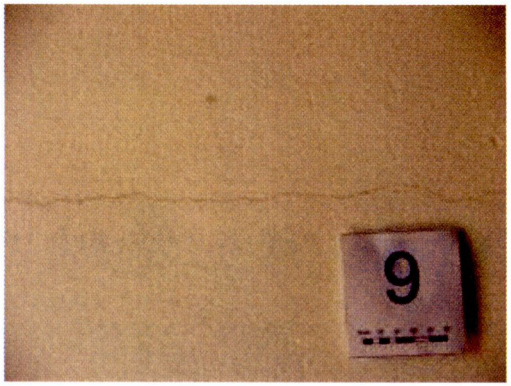

Photo: 37

Photo: 39

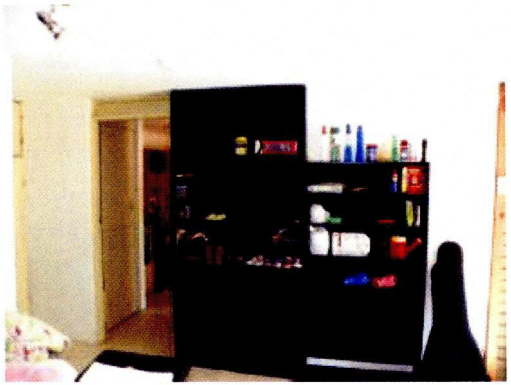

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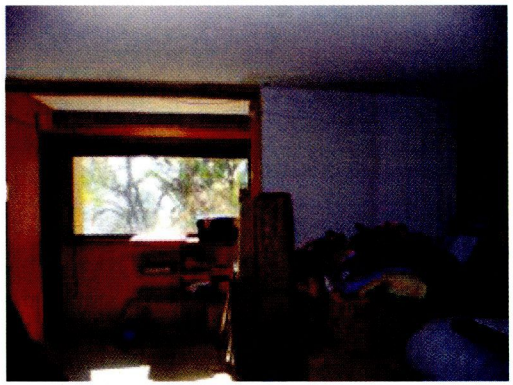
Photo: 38

Photo: 40



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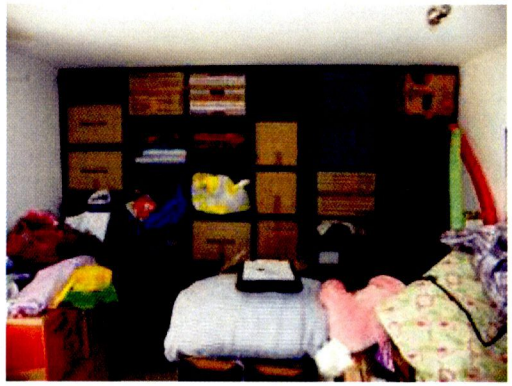

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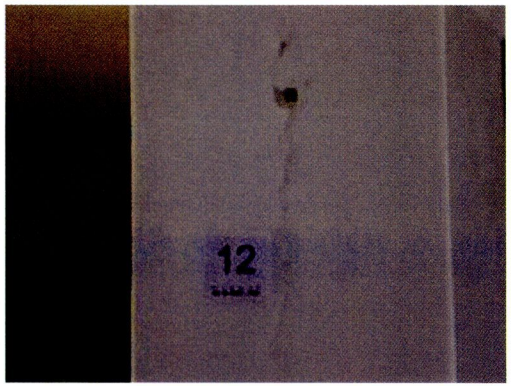

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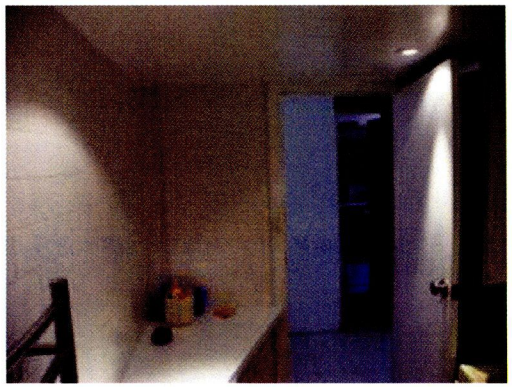

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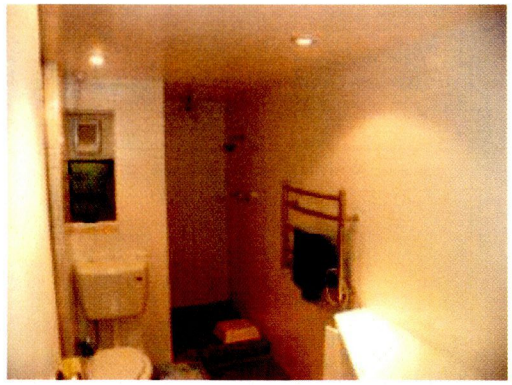
Photo: 44



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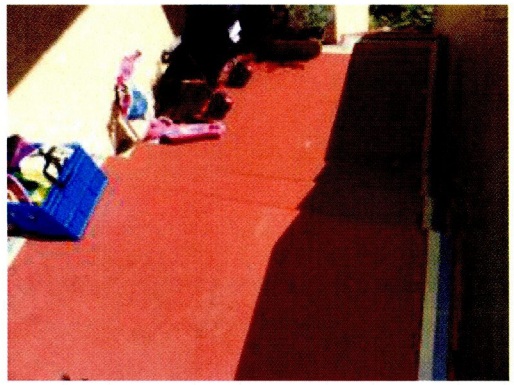

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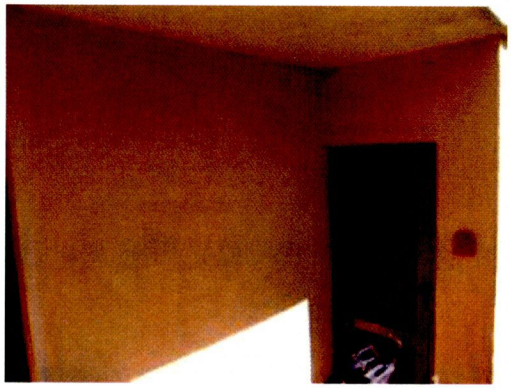


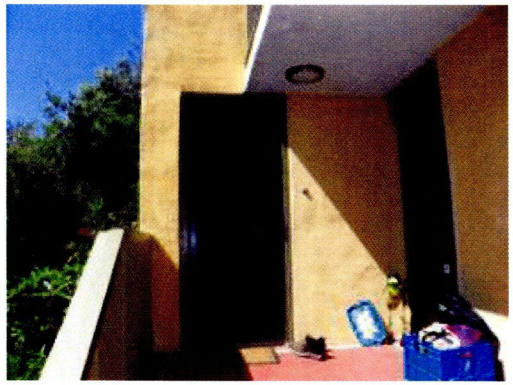
Photo: 49

Photo: 51

Photo: 53

Photo: 50

Photo: 52



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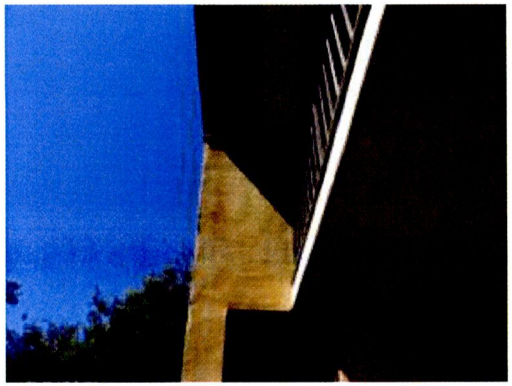
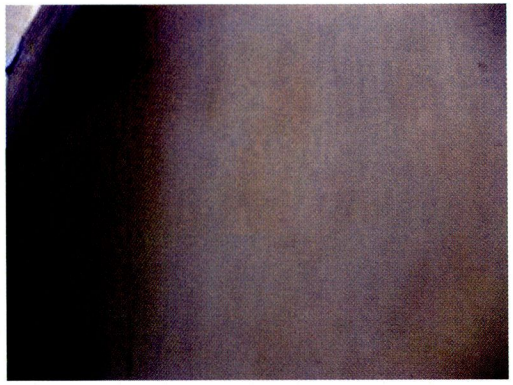


Photo: 55

Photo: 57

Photo: 59

Photo: 56



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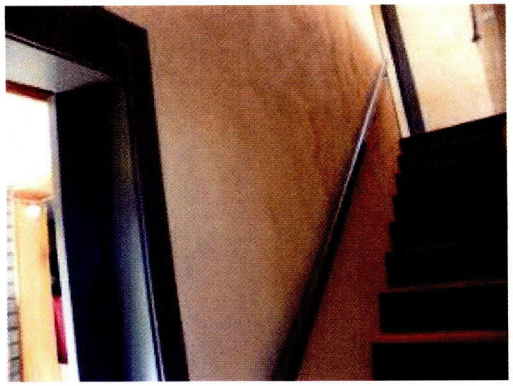

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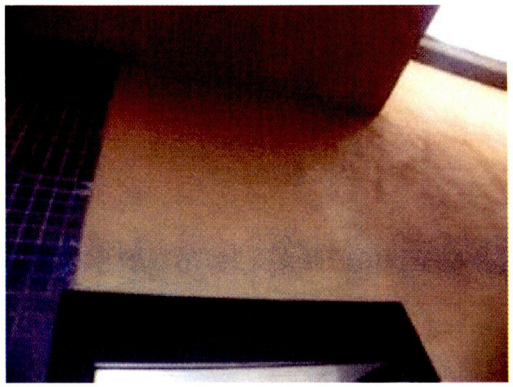

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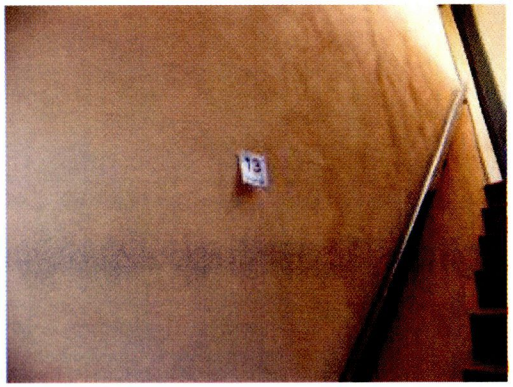

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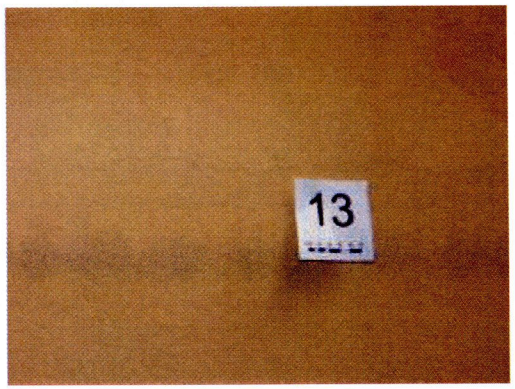

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Photo: 62

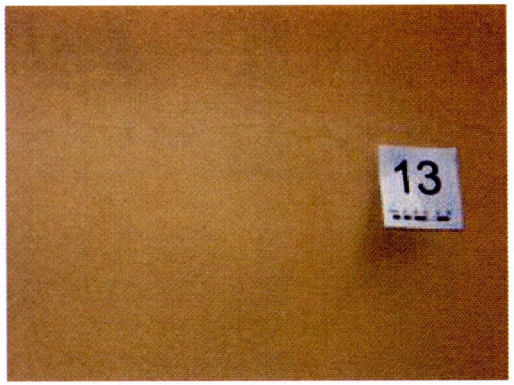

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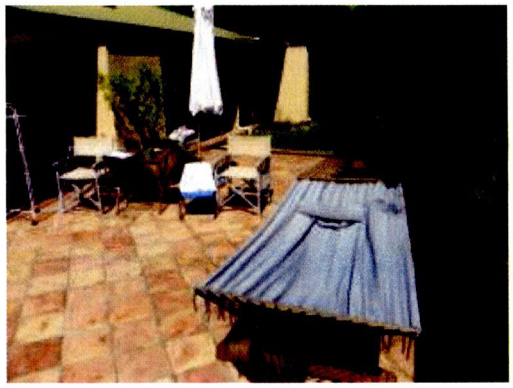
Photo: 66



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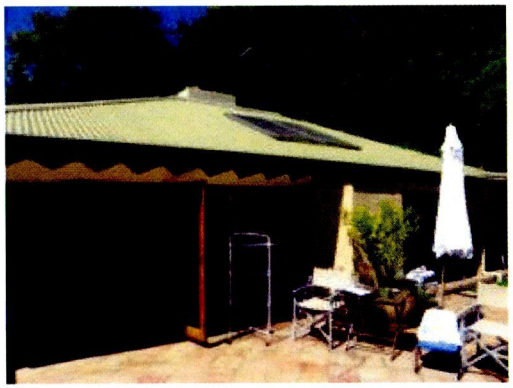

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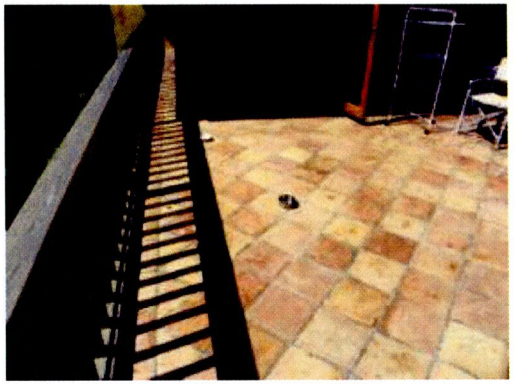
Photo: 71



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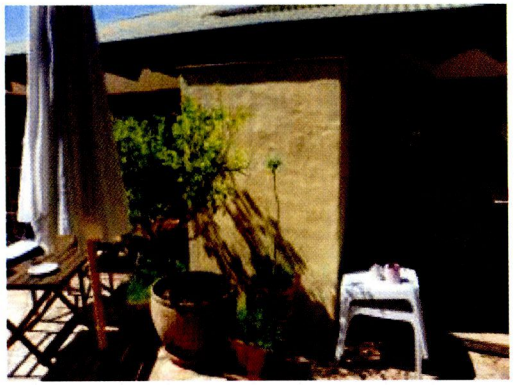

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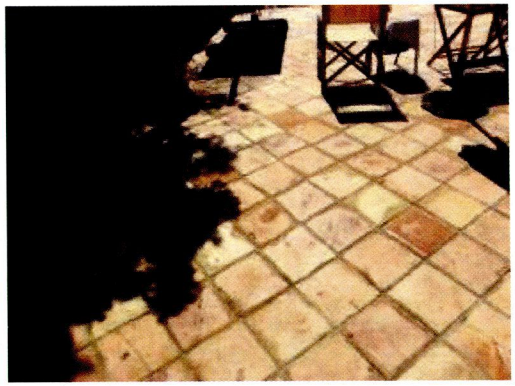

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Photo: 73

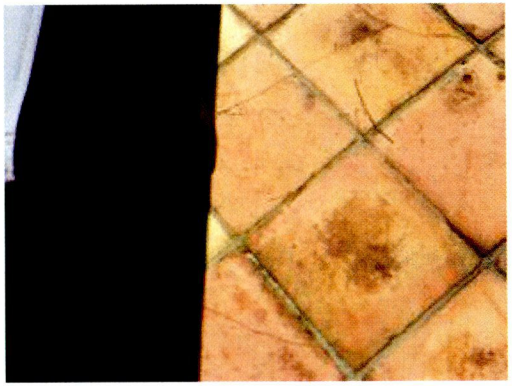

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Photo: 77

Photo: 74

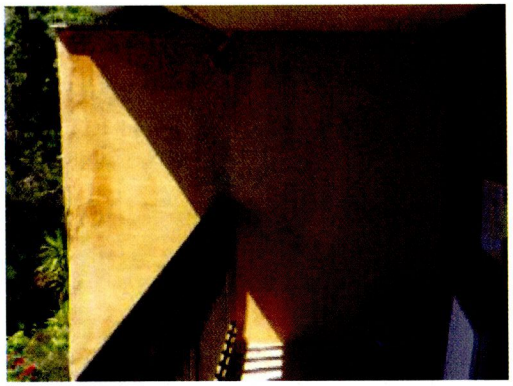

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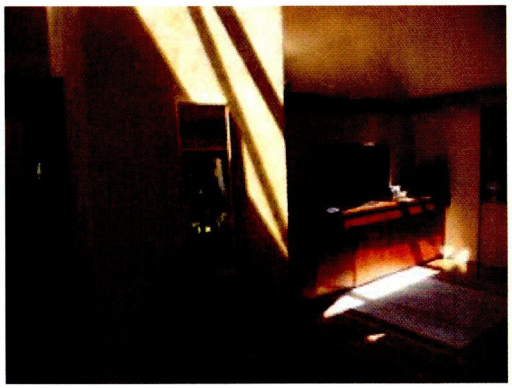
Photo: 78

Photo: 79



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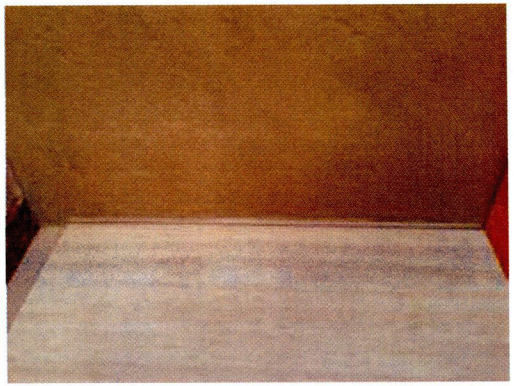

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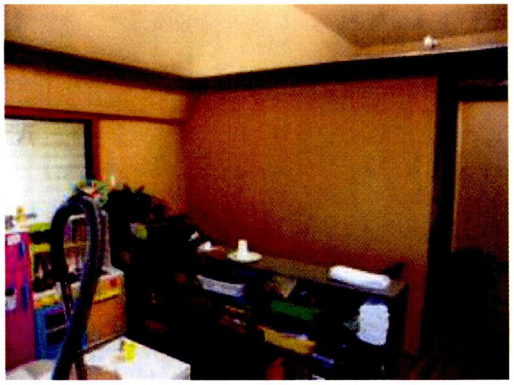

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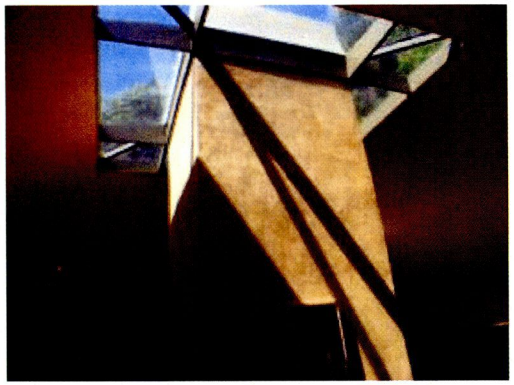


Photo: 82

Photo: 84

Photo: 85

Photo: 87

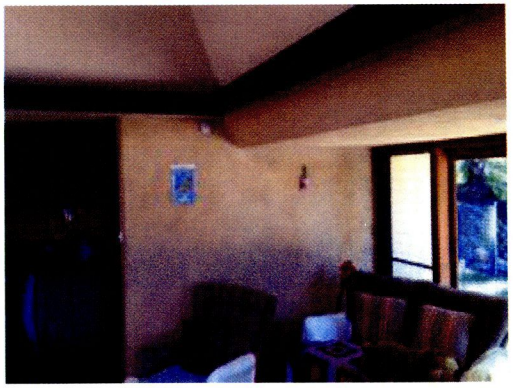


Photo: 89

Photo: 86

Photo: 88

Photo: 90

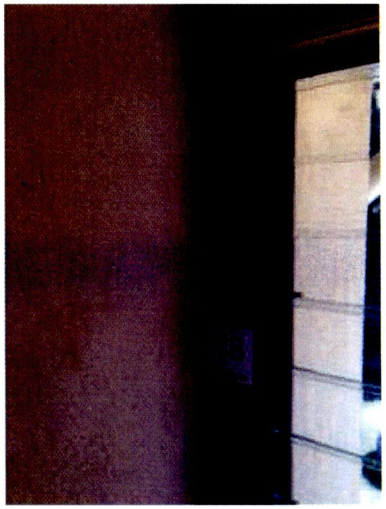


Photo: 91

Photo: 92

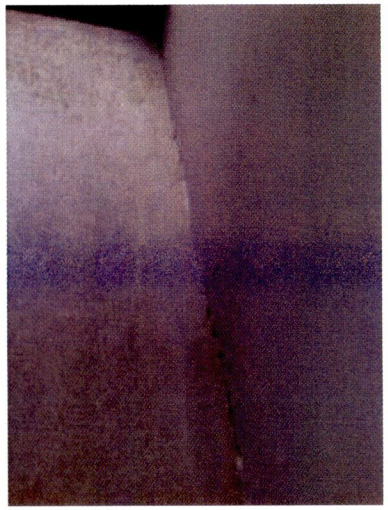
Photo: 93

Photo: 94

Photo: 95

Photo: 96

Photo: 97



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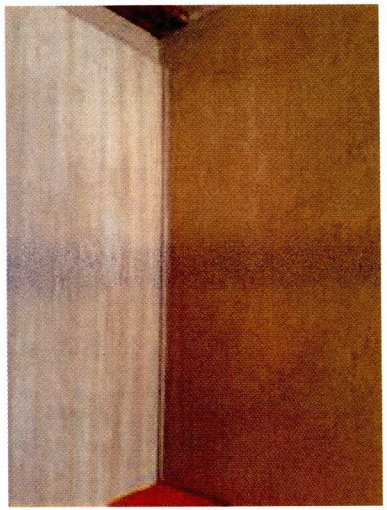


Photo: 101

Photo: 98

Photo: 100

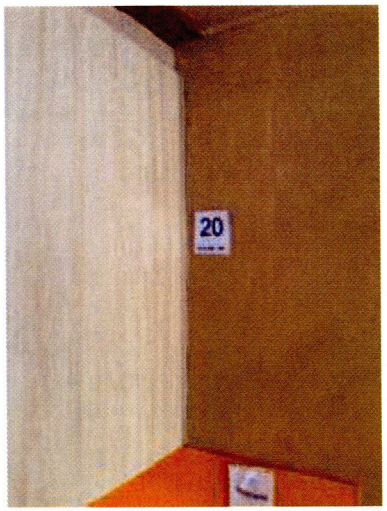


Photo: 102

Photo: 103

Photo: 105

Photo: 107

Photo: 104

Photo: 106

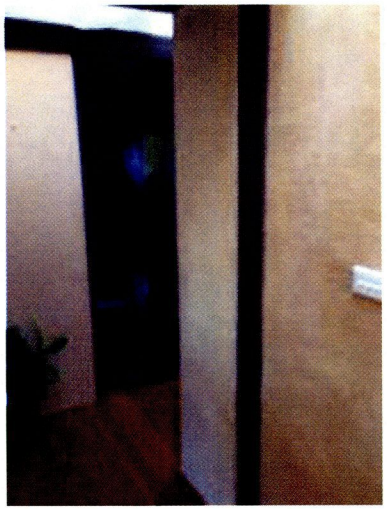


Photo: 108

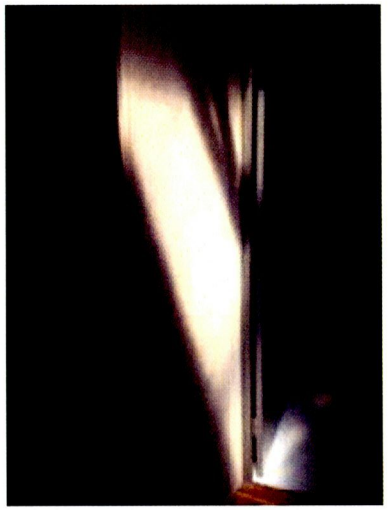


Photo: 109

Photo: 111

Photo: 112

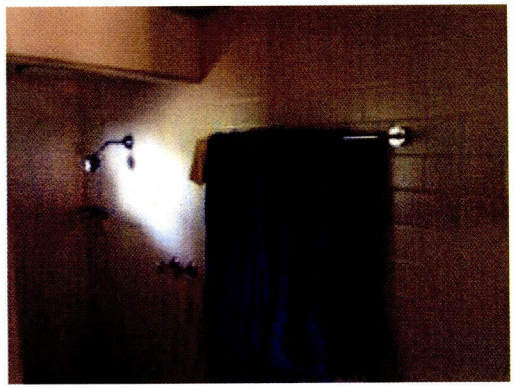
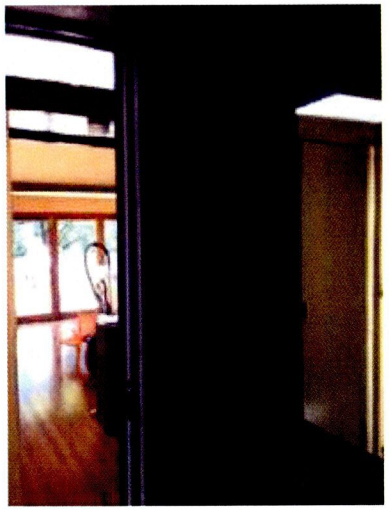


Photo: 113

Photo: 110



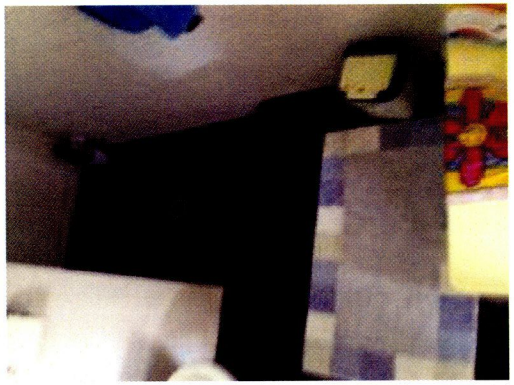


Photo: 114

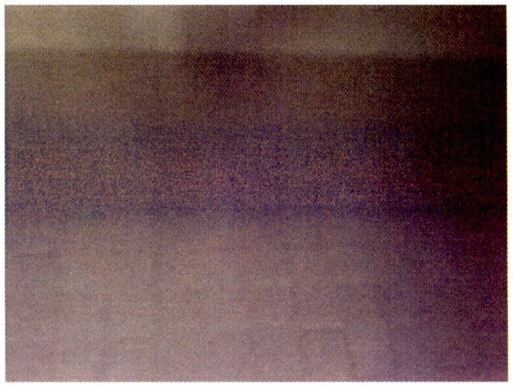


Photo: 115

Photo: 117

Photo: 119

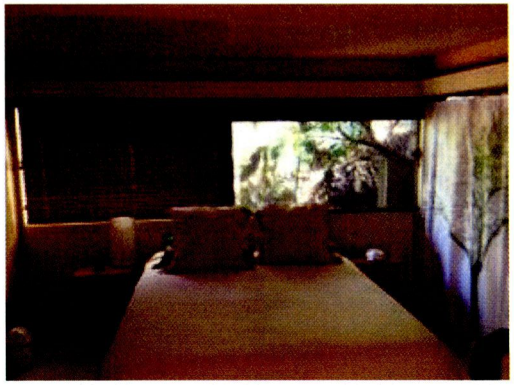


Photo: 116

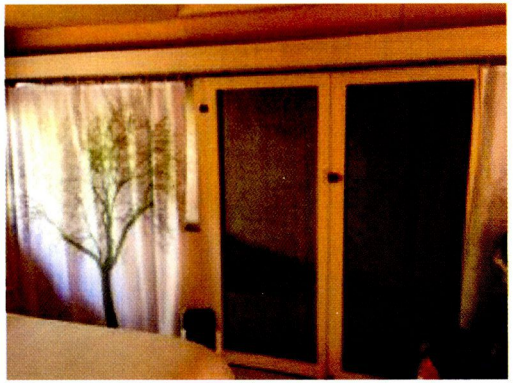
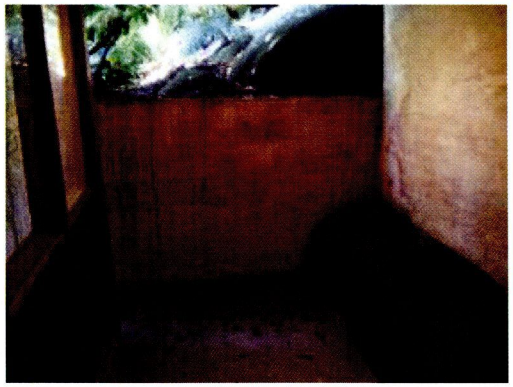


Photo: 118

Photo: 120

Photo: 121

Photo: 123



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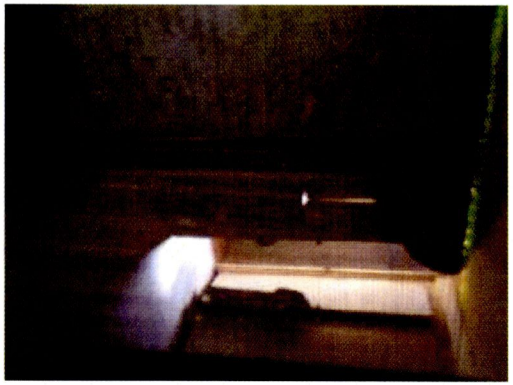

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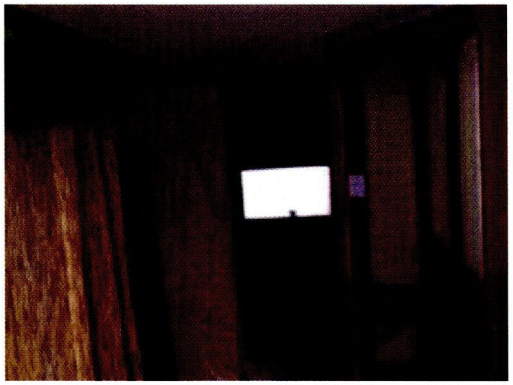

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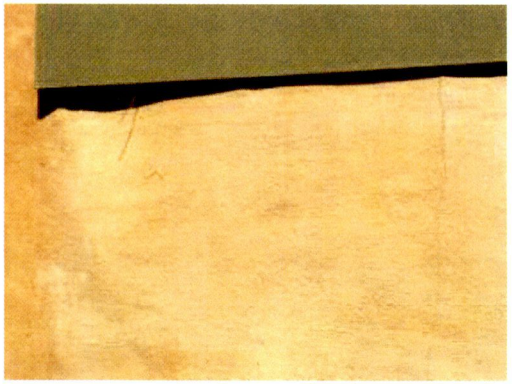

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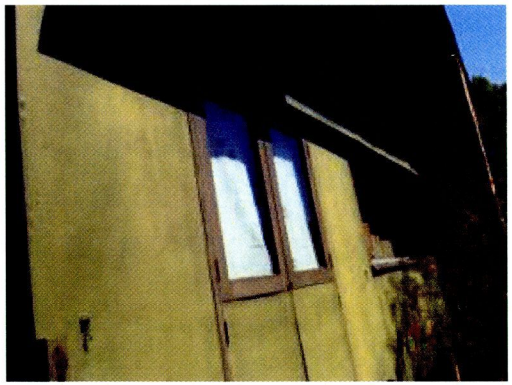

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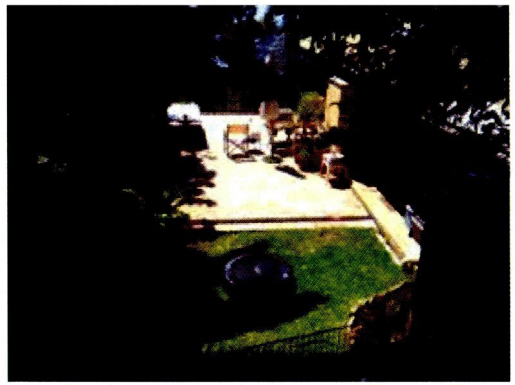
Photo: 143

Photo: 140

Photo: 142



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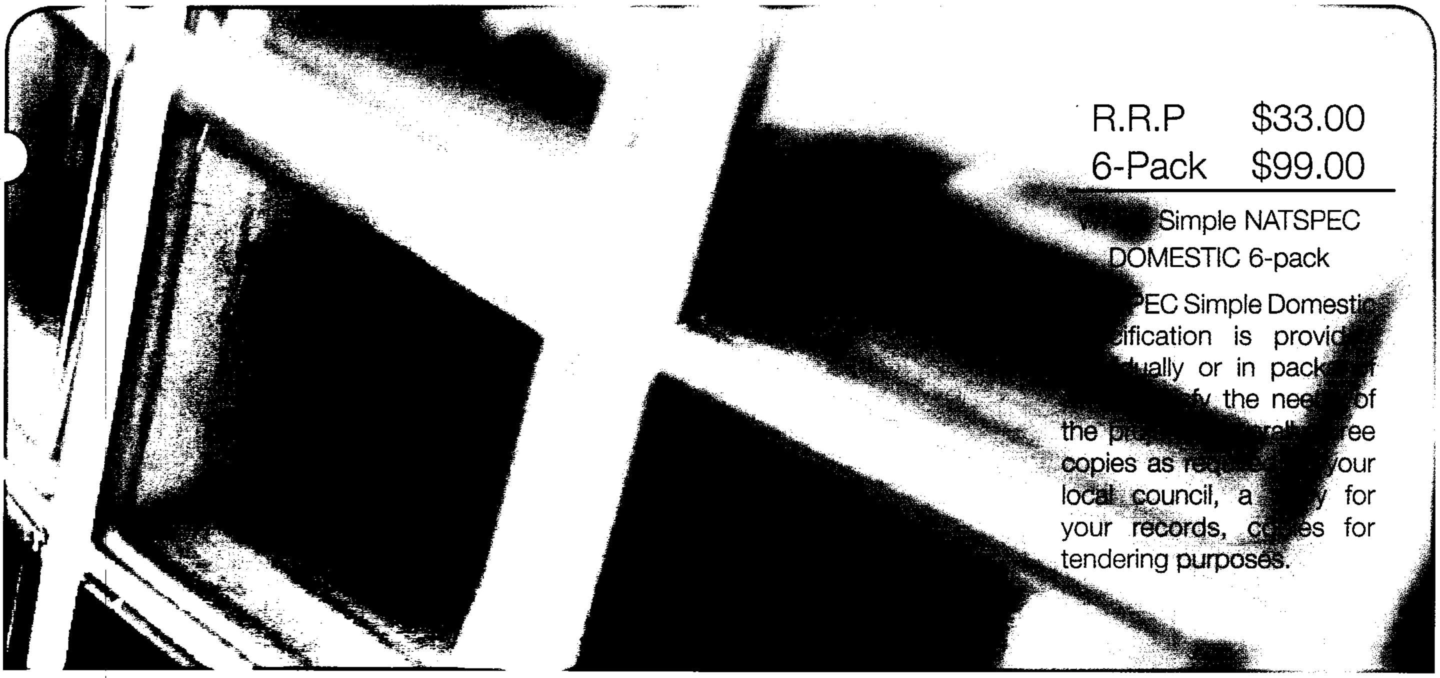


SIMPLE DOMESTIC SPECIFICATION

NCC 2014 COMPLIANT

CONSTRUCTION CERTIFICATE
No: 14/

These plans form part of the above Construction Certificate as issued by
Greg Hough of
Get Certified Building Services Pty Ltd
Accreditation No: BPB0186

In Australia, there is no law requiring contractors to build your project to Australian Standards, if it is not specified or required under the National Construction Code Series. A specification reduces the number of variations, or extras, by enabling a clear understanding of the acceptable level of quality for the project. Without a specification, such as SIMPLE DOMESTIC SPECIFICATION, you may find a number of small extra items resulting in unexpected, substantial additional cost, and you may not receive the quality you would like. For a specification to be enforceable, it needs to be included or referenced in the contractual agreement between you and your contractor.

SIMPLE DOMESTIC SPECIFICATION is suitable for owner builders undertaking new domestic building work or alterations and additions, using conventional construction practice under normal conditions covered by Class 1a and Class 10 of the Building Code of Australia.

SIMPLE DOMESTIC SPECIFICATION is a reference specification. It provides a quality statement which defines the minimum level of acceptable materials and workmanship for the building works. It should be included, along with drawings and schedules, as a condition of contract between the owner and the builder.

SIMPLE DOMESTIC SPECIFICATION relies on the organiser, only owner, taking responsibility for complying with statutory, local government and other mandatory requirements. A comprehensive checklist of project specific information which may require additional documentation, such as drawings or schedules, is included to assist the owner. For work involving extensive structural design, customised airconditioning, prestige finishes or unusual features, facilities or conditions (e.g. snow, high winds, earthquake, bushfire zoning and/or marine exposure), the owner is recommended to engage professional consultants to prepare a customised specification.

Professional consultants should use the NATSPEC national building specification system for architects, building designers, landscape architects, structural engineers and services engineers.

NATSPEC//ConstructionInformation

CONSTRUCTION CERTIFICATE
No: 14/216

These plans form part of the above Construction Certificate as issued by
Greg Hough of
Get Certified Building Services Pty Ltd
Accreditation No: BPB0186

Endorsed by

Australian Institute of Architects

AIBS
Australian Institute of Building Surveyors

AIQS

NATSPEC SIMPLE DOMESTIC SPECIFICATION is a reference specification and does not require editing or amendment. It is intended for inclusion, along with other documents such as drawings and schedules, as a condition of contract for the building works. It assumes all project specific design information is shown on the drawings or in schedules, including the requirements of the consent authority. The *Preliminaries* worksection provides for the requirements of the drawings and schedules to override conflicting requirements of this reference specification.

National Construction Code
The National Construction Code (NCC), including state and territory variations, is enforced by local authorities and controls domestic construction in Australia, along with the requirements of statutory authorities (e.g. electricity and water supply). This specification has been aligned with NCC 2014 Volume 2 but any local requirements must take precedence. NATSPEC recommends that the users of this document have ready access to NCC Volume 2 – Building Code of Australia (BCA) Class 1 and Class 10 Buildings (e.g. local library).

Work Health and Safety (WHS)
Everyone at a workplace is responsible for complying with stringent Occupational Health and Safety legislation. However, the accountable person has primary control over the workplace and therefore the greatest WHS responsibility. A builder engaged to manage a project and organise the relevant sub-contractors is the accountable person and must make sure that they, their employees and sub-contractors work in a safe manner. An owner builder, engaging independent tradespeople as required, is the accountable person responsible for ensuring the tradespeople comply with safety standards. WHS legislation in some States and Territories also includes statutory obligations on designers in relation to WHS issues arising out of their designs during and after construction. It is important to note that WHS obligations differ in each State and Territory.

Standards and tolerances
Check that the building work conforms to requirements of the drawings, schedules and this specification. *Guide to Standards and Tolerances* is a reference document of best construction practice which can be referred to during and after construction. It is available at:
www.buildingcommission.com.au
www.fairtrading.nsw.gov.au
www.wst.tas.gov.au/building and
www.actpla.act.gov.au.

Dispute resolution
Many building contracts include dispute resolution provisions and in most states there are dispute resolution services provided and/or mandated under State legislation.

0271 Pavement base and subbase

- Base course material and thickness.

0274 Concrete pavement

Concrete pavements, except footpaths should be specified by a professional engineer. The requirements for in situ concrete may be varied if it is unreinforced. AS 3727 can then be used for design purposes.

- Site preparation.
- Mix, thickness, grading, location of control joints and finish.
- Concrete strength.
- Reinforcement.
- Type: Select concrete colour, broom finish or stamped finish.
- Curing.

0276 Segmental pavers – sand bed

- Preparation and bedding sand/mortar edge restraint.
- Thickness, grading and laying.
- Cutting.
- Type: Select from clay brick pavers or concrete.
- Pattern: Select from rectangular or interlocking.

0310 Concrete

- Construction notes/specification on structural engineer's drawings.
- Because ground conditions vary so much within Australia, concrete ground slabs or footings are usually designed by a professional engineer, but this is not always necessary. AS 2870 has 'deemed-to-comply' provisions. The BCA 3.2.4 contains a table of site classifications that are the basis for requirements for footing design. The site classification should be determined by the local council engineer or a geotechnical engineer. SAA HB 28 and SAA HB 109 are also useful design guides.
- Formwork: Stripping times and repair. The design of the formwork is the contractor's responsibility. This applies to all formwork types, including conventional, proprietary or purpose-made formwork.
- Ground slab vapour barrier: Note type. Provision of a vapour barrier for external slabs on ground prevents water loss to the subgrade and has the potential to reduce slab curling at edges and corners.
- Concrete strength.
- Reinforcement: Location, cover to reinforcement and splicing.
- Joints.
- Surface finish class: To AS 3610.1 (Class 1 – 5)
  - Class 2 – high.
  - Class 3 – good.
- Surface finish type: Select from:
  - Machine float: Under dry floor finishes.
  - Steel trowel: Under resilient finishes, garage floors.
  - Wood float: External
  - Broomed/patterned/coloured: External.
  - Rough scored: Under tiles in a mortar bed.
  - Specify others.
- Slip resistance, if required.
- Curing.

0331 Brick and block construction

For buildings not conforming to the scope of the AS 4773 series use AS 3700.

Consult the local approval authority to determine where walls over a certain height require design by a professional engineer.

Energy efficiency requirements at BCA 2.6 set out minimum insulation performance requirements for walls, roofs, floor slabs and external glazing depending on climate zone and orientation.

- Masonry units: Brick or block.
- Reinforced blockwork.
- Masonry unit description: Type/size, colour, texture, supplier. Check durability if soil is aggressive or heavily fertilized.
- Mortar type: M3 applies generally, except that M4 applies for interior elements subjected to saline wetting and drying, elements below the damp-proof course or in contact with ground that are in aggressive soils, elements in severe marine environments as defined by AS 4773.1 clause 4.3.1, elements in saline or contaminated water including tidal and splash zones and elements in especially aggressive environments.
- Mortar colour.
- Damp proof courses.
- Cavity width: Note increased width if wall insulation is required to BCA 3.12.1.4.
- Wall ties: Type and location.
- Flashing details.
- Mortar joint types: Select tooled, weatherstruck or raked. Mortar joints which are not completely filled and tooled may not provide adequate weatherproofing. A flush joint which is cut with the trowel without compacting the mortar should not be used externally unless agreed.
- Brick rods.
- Bond patterns.
- Joints.
- Lintels.
- Chasing locations.
- Air vent location: For subfloor ventilation, BCA 3.4.1 and BCA Table 3.4.1.2 provides minimum requirements for various climates.
- Weep holes.
- Weephole guards: Insect only or insect and bushfire ember protection.
- Control joints: Clay bricks grow after they have been fired and concrete slabs shrink after they have been poured. The provision for control joints is based on a minimum age of bricks and supporting concrete. If these ages cannot be complied with, additional joints may be necessary. Refer to AS 4773.2 Section 7 for joint detail.

0342 Light steel framing

The NASH-1 (National Association of Steel-framed Housing) is cited in the BCA. It sets out the design criteria to comply with the performance requirements of the BCA for steel framing of low-rise housing as well as commercial buildings. Design of structural steelwork, and cold-formed steel framing except domestic, should be by a professional engineer. The local authority may have requirements for permanent earthing of the frame. Refer to AS/NZS 3000 Section 5 for earthing arrangements and earthing conductors.

- Framing to NASH 1.
- Cyclonic area as classified in BCA figure 3.10.1.4.
- Steel roof truss: Type and supplier.

0382 Light timber framing

Detailed requirements for timber framing in areas with design gust wind speeds up to 33 m/s are set out in AS 1684.4 but other codes designed for local conditions may be acceptable or mandatory. For cyclonic areas refer to AS 1684.3.

Design of timber framing to AS 1720.1 should be by a professional engineer.

- Cyclonic area as classified in BCA figure 3.10.1.4.
- Framing to AS 1684.
- Bracing.

- Finish: wood float (sandy finish), steel trowel (polished) and sponge (smooth textured).
- Cornices.
- Cornice cement.

0621 Waterproofing – wet areas

- Extent. To BCA 3.8.1.2.
- Membrane: Manufacturer and type.
- Shower tray: PVC, copper, stainless steel.

0631 Ceramic tiles

- Location.
- Internal tile selection: Floors, skirtings, walls, dado.
- External tile selection: Slip resistance to AS/NZS 4586.
- Grout: Type and colour.

0651 Resilient finishes

- Location.
- Product and manufacturer.

0652 Carpets

- Location.
- Product and manufacturer.
- Underlay.
- Edge strip: Type, material and colour.
- Fixing method: Select from covers gripper, direct-stick, or double-bond systems.

0654 Engineered panel floors

- Location.
- Product and manufacturer.

0655 Timber flooring

- Location.
- Species and manufacturer.
- Profile, width.
- Recycled timber flooring: If stained nail holes are unacceptable, specify remedial work such as coring and plugging with matching timber.

0656 Floor sanding and finishing

- Location.
- Product and manufacturer.

Guidance on the properties of coating systems is given in AS 4786.2 Appendix C. Advice on the properties include edge bonding, fume nuisance, darkening with age, flammability, wear resistance and gloss levels. Coating systems can be selected from the following groups: Oil based finishes, solvent based polyurethane finishes or water based finishes.

0671 Painting

Select your paint and supplier.

- External: Final coat paint type, finish (full, semi, low gloss or flat) and colour for fascias and barges, rainwater goods, eaves, cladding, shutters, balustrades and handrails, posts and beams and masonry.
- Windows and external doors: Final coat paint type, finish (full, semi, low gloss or flat) for internal, external and mouldings. Front and garage door panels and frames and windows.
- Internal: Final coat paint type, finish (full, semi, low gloss or flat) and colour: Room by room schedule for walls, ceilings, doors and frames and joinery.

0702 Mechanical design and install

So that the air conditioning systems can be adequately designed, the drawings should show:

- Preferences for heating and cooling systems (e.g. ducted, non-ducted split etc.) otherwise leave to the contractor's choice.
- The extent and performance (R-values) of insulation for the walls roof and floor.
- The type, location and performance of windows.
- External shading of windows and intended type of internal shading (e.g. blinds, curtains).
- The preferred location of plant, otherwise leave to the contractor's choice.
- Any provisions for ducts (e.g. duct risers, roof spaces).
- Rooms requiring mechanical ventilation. The BCA requires that where its requirements for natural ventilation are not satisfied, mechanical ventilation must be provided. Identify areas requiring mechanical ventilation on the drawings. If local exhaust fans are required (e.g. for a bathroom), include the fans in *Electrical design and install.*
- The type of supply, return and exhaust grilles if there is a preference, otherwise leave to the contractor's choice.

It is recommended that the following be provided by tenderers for review before the mechanical tender is accepted:

- Outside design conditions, corresponding geographic location and source of data.
- Calculated total and sensible cooling capacities and heating capacity.
- Name of calculation method used.
- Makes and model numbers of proposed equipment.
- Compliance of proposed equipment with Minimum Energy Preformance Standard (MEPS).
- Details and locations of controls.
- Total and sensible cooling capacities and heating capacity of the proposed equipment, adjusted for the specified outdoor and indoor conditions and any effects of the proposed plant configuration.
- Any assumptions on which the calculations are based (e.g. that the curtains will be closed at all times).
- Details of any departures from this specification.
- A drawing of the proposed duct, pipe and equipment layout showing proposed zoning.
- An explanation of why the proposed zoning has been chosen.
- Licence numbers and type of licences held by persons responsible for the installation.

Other matters:

- The *AIRAH Residential Air Conditioning Best Practice Guideline* for each State and Territory (available free from www.airah.org.au) sets out industry best practice guidelines for the selection, installation and maintenance of residential air conditioning units. The guideline addresses issues such as energy efficiency and air conditioner noise in a clear and concise manner.
- The plant should have at least 12 months defects liability and maintenance period to make sure it operates through the full range of cooling and heating seasons.

0802 Hydraulic design and install

The drawings should show:

- Cold water pipe material, otherwise leave to the contractor's choice. In bushfire prone areas, above - ground gas and water pipes, and pipes < 300 mm below ground are to be metal, not plastic.
- Heated water pipe material, otherwise leave to the contractor's choice.
- Mixing valves if required.
- Water heater location and details e.g. gas instantaneous, electric, and solar or heat pump. Include manufacturer, model/capacity and temperature control for thermostatic mixing valves and special taps.
- Cold and heated water: For insulation of heated water pipes see AS/NZS 3500.4 Sections 8 or AS/NZS 3500.5 clause 3.3.8 which require insulation

Make sure all subcontractors are aware of the requirements within 0180 *Common requirements*.

0131 PRELIMINARIES

1 GENERAL

1.1 THE SITE

Occupied premises
General: For the parts of the site which are occupied premises:

- Allow 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 for their safety.
- Protect occupants against weather, dust, dirt, water or other nuisance, by such means as temporary screens.

Protection of persons and property
Temporary works: Provide and maintain required barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting, watching and traffic flagging.

Accessways and services: 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.

Property: Do not interfere with or damage property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

Rectification
Accessways and services: Rectify immediately any obstruction or damage to roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Provide temporary services whilst repairs are carried out.

Property: Rectify immediately any interference or damage to property which is to remain on or adjacent to the site, including adjoining property encroaching onto the site, and trees.

Existing services
General: Attend to existing services as follows:

- If the service is to be continued, repair, divert or relocate. Submit proposals.
- If the service crosses the line of a required trench, or will lose support when the trench is excavated, provide permanent support for the existing service. Submit proposals.
- If the service is to be abandoned, submit proposals, remove redundant parts and make safe.

Signs
General: Provide a signboard displaying the lot number, the builder's name, address and licence number, and the BCA accreditation authority, address and contact details, if required.

1.2 BUILDING THE WORKS

Order of precedence of documents
Precedence: Requirements of the schedules and drawings override conflicting requirements in this reference specification.

Survey marks
Definition: A survey peg, bench mark, reference mark, signal, alignment, level mark or any other mark used for the purpose of setting out, checking or measuring the work.

Care: Preserve and maintain the survey marks in their true positions.

Rectification: If survey marks are disturbed or obliterated, immediately rectify.

Items supplied by owner
General: Documented materials and other items supplied free of charge to the contractor for installation in the execution of the works. Unload and take delivery of them, inspect them for defects and then take care of them. If defects are found, advise. Return unused items to the owner.

1.3 MISCELLANEOUS

Contractor and owner to observe confidentiality
Publicity: Do not issue information concerning the project for publication in the media without prior written approval of the owner.

0180 COMMON REQUIREMENTS

1 GENERAL

1.1 APPLICABILITY

General
Requirement: Conform to *Common requirements,* as appropriate, in all worksections.

1.2 STANDARDS

Current editions
General: Use referenced Australian or other standards (including amendments), and the BCA including State and Territory variations which are current three months before the date of the contract except where other editions or amendments are required by statutory authorities. Any local authority requirements take precedence.

1.3 INTERPRETATION

Definitions:
General: For the purposes of this document the definitions given below apply:

- BCA: Building Code of Australia Class 1 and Class 10 Buildings Volume Two of the National Construction Code
- Contractor: Means the same as builder.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy via a continuous hot-dip process.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 after fabrication.
- Professional engineer: As defined by the BCA.
- Proprietary: Proprietary means identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.
- Required: Means required by the contract documents, the local council or statutory authorities.
- Supply: Supply, furnish and similar expressions mean supply only.

1.4 BUSHFIRE PROTECTION

General
Conformance: In areas designated as bushfire prone, comply with statutory and local authority requirements.

Standard: To AS 3959 in conjunction with SAA HB 330.

2.5 FASTENERS

Self drilling screws

Corrosion resistance: To AS 3566.2 Table 1 and the **Corrosion resistance table**.

Corrosion resistance table

Atmospheric corrosivity category to AS/NZS 2312	Corrosion resistance class	
	Internal	External
A and B (Low)	1	3
C (Medium)	2	4
D and F (High)	3	Stainless steel 316

2.6 VAPOUR BARRIER

General

Vapour barrier: To AS 2870 clause 5.3.3.

Type: Medium impact resistant polyethylene film, minimum 0.2 mm thick which has been pigmented and branded by the manufacturer.

2.7 DAMP-PROOF MEMBRANES

General

Damp-proof membrane: To AS 2870 clause 5.3.3.

Type: High impact resistant polyethylene film, minimum 0.2 mm thick which has been pigmented and branded by the manufacturer.

3 EXECUTION

3.1 WALL CHASING

Holes and chases

General: Make holes and chases required in masonry walls so that the structural integrity of the wall is maintained. Do not chase walls nominated as fire or acoustic rated.

Parallel chases or recesses on opposite faces of a wall: Not closer than 600 mm to each other.

Chasing of blockwork: Only in core-filled hollow blocks or in solid blocks which are not designated as structural and to the **Concrete blockwork chasing table**.

Concrete blockwork chasing table

Block thickness (mm)	Depth of chase (maximum mm)
190	35
140	25
90	20

3.2 MOISTURE CONTENT

Flooring

General: Do not commence installation of floor finishes unless:

- Concrete substrate: The moisture content of the concrete has been tested to AS 1884 Appendix A and values in clause A3.1.2 and A3.1.3 have been obtained.
- Plywood and timber: The moisture content of battens/joists or plywood background has been tested to AS/NZS 1080.1 for timber and AS/NZS 2098.1 for plywood and values obtained as follows:
- Air conditioned buildings: 8 to 10%.
- Intermittently heated buildings: 10 to 12.5%.
- Unheated buildings: 12 to 15%.

3.3 FIXING

General

Suitability: If equipment is not suitable for fixing to non-structural building elements, fix directly to structure and trim around penetrations in non-structural elements.

Fasteners

Sufficiency: Use proprietary fasteners capable of transmitting the loads imposed, and sufficient to for the rigidity of the assembly.

3.4 FOOTPATH CROSSING

General

Requirement: Provide a footpath and kerb crossing to local authority requirements.

3.5 COMPLETION

General

Removal of temporary work, services and plant: Remove temporary work services and construction plant within 10 working days after occupation of the works.

Rectification: Clean and repair damage caused by the installation or use of temporary work and services and restore existing facilities used during construction to original condition.

Final cleaning: Remove rubbish and surplus material from the site and clean the works throughout including interior and exterior surfaces exposed to view. Vacuum clean carpeted and soft surfaces. Clean debris from the site, roofs, gutters, downpipes and drainage systems.

Samples: Remove non-incorporated samples, sample panels and prototypes.

Warranties: Register with manufacturers, as necessary, and obtain copies of manufacturers' warranties.

Instruction manuals: Provide the manufacturers' instruction manuals.

Operation: Make sure moving parts operate safely and smoothly.

Surveyor's certificate: Provide a certificate which confirms that the work, including boundary fences, has been correctly located.

Services layout: Provide a plan which shows the location of underground services.

Authorities' approvals: Provide evidence of approval of the local authority or principal accredited certifier and statutory authorities whose requirements apply to the work.

Keys: Provide two keys for each set of locks keyed alike and two keys for each lock keyed to differ.

0184 TERMITE MANAGEMENT

1 GENERAL

1.1 STANDARD

General

Standard: To AS 3660.1.

0201 DEMOLITION

1 GENERAL

1.1 STANDARD

General

Demolition: To AS 2601.

2.2 EXCAVATION

Extent

Site surface: Excavate over the site to give correct levels and profiles required as the basis for structures, paving and landscaping. Make allowance for compaction or settlement or heaving.

Rock: Do not use explosives.

Footings: Excavate for footings to the required sizes and depths. Confirm that the foundation conditions meet the design bearing capacity.

Crawl space: Provide a clear space under timber or steel bearers:

- Minimum clearance: 400 mm generally and to BCA 3.4.1.

Bearing surfaces

General: Provide even plane bearing surfaces for loadbearing elements including footings. Step to accommodate level changes.

Existing footings

Requirement: If excavation is required within the zone of influence of an existing footing, use methods including (temporary) shoring and underpinning which maintain the support of the footing and make sure that the structure and finishes supported by the footing are not damaged.

Existing services

Utility services: Contact DIAL BEFORE YOU DIG to identify location of underground utility services pipes and cables. See www.1100.com.au.

Grading

External areas: Grade to give falls away from buildings, minimum 1:100.

Subfloor areas: Grade the ground surface under suspended floors to drain ground or surface water away from buildings without ponding.

2.3 PREPARATION FOR FILLING

Preparation

Stripping: Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements to AS 3798 clause 6.1.5. Remove materials which will inhibit or prevent satisfactory placement of fill layers, loose material, debris and organic matter.

2.4 PLACING FILL

Placing fill

Placement: To BCA 3.2.2.

Layers: Place fill in near-horizontal layers of uniform thickness no greater than 150 mm after compaction, deposited systematically across the fill area.

Moisture content: Adjust the moisture content of fill during compaction in order to achieve the required density.

Base preparation under ground slab vapour barrier or damp-proof membrane: Blind the surface with sufficient sand to cover any hard projections. Dampen the sand just before placing the vapour barrier.

0223 SERVICE TRENCHING

1 PRODUCTS

1.1 FILL MATERIALS

General

Backfill material: Excavated spoil or well graded inorganic material free from stones larger than 100 mm maximum dimension and as follows:

- Next to services: Do not place any particles greater in size than 25 mm within 150 mm of services.
- Under paved areas and within 4 m of structures: Coarse sand, controlled low strength material or fine crushed rock.
- In reactive clay: In sites classified M, M-D, H1, H1-D, H2, H2-D, E or E-D to AS 2870, re-use excavated site material at a moisture content within ± 1% of that of the adjoining in situ clay.

2 EXECUTION

2.1 EXCAVATING

Excavation

General: Excavate for underground services in conformance with the following:

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.

2.2 TRENCH BACKFILL

General

Timing: Backfill service trenches as soon as possible after laying and bedding the service, if possible on the same working day.

Layers: Compact all material in layers not exceeding 150 mm compacted thickness. Compact each layer to the relative compaction specified before the next layer is commenced.

2.3 SURFACE RESTORATION

General

Reinstatement: Reinstate existing surfaces removed or disturbed by trench excavation to match existing and adjacent work.

0242 LANDSCAPE – FENCES AND BARRIERS

1 PRODUCTS

1.1 TIMBER

Posts and rails

Hardwood: To AS 2082.

Softwood: To AS 2858, stress grade F5.

Pickets and palings

Hardwood: To AS 2796.1, Section 8.

- Grade to AS 2796.2: Select.

Softwood: To AS 4785.1, Section 7.

Seasoned cypress pine: To AS 1810, Section 5.

Preservative treatment

Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

1.2 STEEL

Steel tube

Posts, rails, stays and pickets: To AS/NZS 1163.

- Grade: C350L0.

1.3 COMPONENTS

Steel panel fencing

Steel framing: Zinc-coated or aluminium/zinc alloy coated steel to AS 1397.

2.3 TOLERANCES

Surface level
General: Provide a finished surface which is free draining and evenly graded between level points.

2.4 SUBBASE AND BASE COMPACTION

General
Construction operation: Compact each layer of fill to the required depth and density, as a systematic construction operation and to conform to the **Minimum relative compaction table**.

Minimum relative compaction table

Item description	Minimum dry density ratio (modified compaction) to AS 1289.5.2.1
Subbase	95%
Base	98%

Compaction requirements
General: Apply uniform compactive effort, over the whole area to be compacted, until the required density is achieved or until failure is acknowledged.

Equipment: Use rollers appropriate to the materials and compaction requirements documented.

0274 CONCRETE PAVEMENT

1 GENERAL

1.1 STANDARDS

General
Specification and supply: To AS 1379.

Materials and construction: To AS 3600.

Guide to residential pavements: To AS 3727.

Vapour barrier or damp-proof membrane.
Requirement: Conform to *Common requirements.*

0276 SEGMENTAL PAVERS – SAND BED

1 PRODUCTS

1.1 MATERIALS

Sand
Bedding and joint filling: Well-graded and free of deleterious materials such as soluble salts which may cause efflorescence.

Mortar edge restraint
Mix proportions (cement:sand): 1:3.

2 EXECUTION

2.1 GENERAL

Preparation
General: Trim the subgrade to the required profile and to suit the thickness of pavers and sand bed. Compact to a firm, even surface.

Base course
General: Conform to the *Pavement base and subbase* worksection.

Edge restraint
Perimeter: If not provided by other structures, provide edge restraints to bedding and units.

Type: Bed units in mortar at least 40 mm thick.

Bedding course
Bedding sand: Screed uncompacted sand over prepared base uniformly to achieve a 30 mm thick layer. Maintain sand at a uniform loose density and moisture content.

Grading
General: Grade paving to even falls to drain away from buildings to drainage outlets without ponding. Minimum fall for drainage: 1:100.

Laying
General: Lay paving units on the screeded sand bedding to the nominated pattern shown on the drawings.

Joints: 2 to 5 mm gap.

Compaction: Compact the sand bedding after laying paving units using a vibrating plate compactor and appropriate hand methods, and continue until lipping between adjoining units is eliminated.

Joint filling: Spread dry sand over the paving units and fill the joints by brooming. Carry out one or more passes with the vibrating plate compactor and refill the joints with sand. Repeat the process until the joints are completely filled.

0310 CONCRETE

1 GENERAL

1.1 STANDARDS

General
Formwork design and construction, formed surfaces: To AS 3600 and AS 3610.1.

Profiled steel sheeting including shear connectors: To AS 2327.1.

Specification and supply of concrete: To AS 1379.

Reinforced concrete construction: To AS 3600.

Residential ground slabs and footings: To AS 2870.

Design
Requirement: As documented by a professional engineer.

Vapour barrier or damp-proof membrane.
Requirement: Conform to *Common requirements.*

0331 BRICK AND BLOCK CONSTRUCTION

1 GENERAL

1.1 STANDARD

General
Materials and construction: To AS 4773.1 and AS 4773.2.

2 PRODUCTS

2.1 DURABILITY

General
Exposure locations: To AS 4773.1 clause 4.3.

2.2 MATERIALS

Bricks and blocks
Standard: To AS/NZS 4455.1 and AS/NZS 4455.3.

Residential and low-rise steel framing: To NASH.1.

2 EXECUTION

2.1 GENERAL

Fabrication
Length: Cut members accurately to length so that they fit firmly against abutting members.

Service holes: Form holes by drilling or punching.

Bushes: Provide plastic bushes or grommets to site cut holes.

Swarf: Immediately remove swarf and other debris from cold-formed steel framing.

Site work: On-site welded connections are not permitted.

Prefabricated wall frames and trusses
Assembly: Factory assemble wall frames and trusses.

Bracing: Provide details of bracing.

Certification: Obtain certification from a professional engineer for the erected frames.

Protection: Protect from damage or distortion during storage, transport and erection. Provide temporary protection for members until permanent covering is in place

Metal separation
General: Install lagging to separate non-ferrous service pipes and accessories from the framing.

Unseasoned or CCA treated timber
General: Do not fix in contact with framing without fully painting the timber and/or the steel.

Earthing
Permanent earthing: Required.

Protection
General: Restore coatings which have been damaged by welding or other causes. Thoroughly clean affected areas to base metal and coat with zinc rich organic primer.

Grommets: Provide grommets to isolate piping and wiring from cold-formed steel framing.

Vermin barriers
Brick veneer barrier: Close nail 10 mm galvanized steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Anti-ponding boards
Standard: To AS/NZS 4200.2.

Fascia, valley gutter and barge boards
Requirement: Supply and fix fascia, valley gutter and barge boards in conformance with the manufacturer's requirements.

0382 LIGHT TIMBER FRAMING

1 GENERAL

1.1 STANDARDS

General
Residential timber framed construction: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

2 EXECUTION

2.1 GENERAL

Fabrication
Length: Cut members accurately to length so that they fit firmly against abutting members.

Service holes: Form holes by drilling.

Prefabricated wall frames and trusses
Assembly: Factory assemble wall frames and trusses.

Bracing: Provide details of bracing.

Certification: Obtain certification from a professional engineer for the erected frames.

Protection: Protect from damage or distortion during storage, transport and erection. Provide temporary protection for members until permanent covering is in place

Timber fasteners
Metal washers: Provide washers to the heads and nuts of all bolts and coach screws.

Connectors: Press connector plates fully into the frame members. Knots not permitted in plate area.

Joints
General: No gaps greater than 2 mm.

Priming
Steel: Before fixing, prime steel which is not galvanized or metallic-coated.

Vermin barriers
Brick veneer barrier: Close nail 10 mm galvanized steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Anti-ponding boards
Standard: To AS/NZS 4200.2.

Fascia, valley gutter and barge boards
Requirement: Supply and fix fascia, valley gutter and barge boards in conformance with the manufacturer's requirements.

0383 SHEET FLOORING AND DECKING

1 GENERAL

1.1 STANDARD

General
Flooring and decking: To AS 1684.2, AS 1684.3 or AS 1684.4, as appropriate.

2 PRODUCTS

2.1 DECKING

New timber decking
Standard:

- Treated softwood to AS 4785.1 Section 4.
- Hardwood to AS 2796.1 Section 4.

2.2 SHEET FLOORING

Plywood
Standard: To AS/NZS 2269.0.

Grade: Bond type A.

High-fronted gutters: Provide overflows to prevent back flow into roof or building structure.

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.

Downpipe support: Provide supports and fixings for downpipes.

0431 CLADDING

1 GENERAL

1.1 CROSS REFERENCES

Associated worksections
Conform to the following:

- *Thermal insulation and pliable membranes* for wall sarking requirements.

2 PRODUCTS

2.1 MATERIALS

Hardboard planks
Wet-processed fibreboard (including hardboard):

Standard: To AS/NZS 1859.4.

Plank cladding: A proprietary system of hardboard planks:

- Plank thickness: 9.5 mm.
- Joints and edges: PVC-U extrusions.
- External corners: Preformed metal joining pieces.
- Internal corners: Scribe.

Fibre cement planks
Standard: To AS/NZS 2908.2.

Plank cladding: A proprietary system of single-faced fibre cement planks:

- Plank thickness: 7.5 mm.
- Joints and edges: PVC-U extrusions.
- Corners: Preformed metal joining pieces.

Sheet metal cladding
Standard: To AS 1562.1.

Fibre cement cladding
Standard: To AS/NZS 2908.2.

Cladding, eaves and soffit linings: Type A Category 3.

Compressed cladding: Type A Category 5.

Sheet cladding: Provide a proprietary system of single faced fibre cement sheets:

- Arrangement: Set out in even panels with joints coinciding with framing.
- Sheet thickness: 6 mm.
- Joints, corners and edges: PVC-U extrusion.

Eaves lining: Single faced fibre cement:

- Sheet thickness: 4.5 mm.
- Joints: PVC-U extrusion.

Plastic cladding
Unplasticised polyvinyl chloride (PVC-U) sheet: To AS 4256.4.

Glass fibre reinforced polyester (GRP) sheet: To AS 4256.3.

Polycarbonate: To AS 4256.5.

2.2 COMPONENTS

Flashing material
Standard: To AS/NZS 2904.

3 EXECUTION

3.1 GENERAL

Cladding
Installation: To the manufacturer's recommendations.

0451 WINDOWS AND GLAZED DOORS

1 GENERAL

1.1 STANDARD

General
Selection and installation: To AS 2047.

Glazing
Selection and installation: To AS 1288.

2 PRODUCTS

2.1 GENERAL

Standards
Flashings: To AS/NZS 2904.

Aluminium extrusions: To AS/NZS 1866.

Safety glasses: To AS/NZS 2208.

Aluminium frame finishes
Powder coating: To AS 3715:

- Grade: Architectural coating.

Anodising: To AS 1231:

- Thickness: ≥ 15 microns to 20 microns.

2.2 COMPONENTS

Insect screens
Aluminium framed insect 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.

Bushfire screens and seals
Protection: Protect glazed windows and doors from the ingress of embers.

Standard: To AS 3959.

Security
Security grilles: To AS 5039.

Security screen doors: To AS 5040.

2.3 HARDWARE

Hardware documented generically
General: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined.

0454 OVERHEAD DOORS

1 GENERAL

1.1 STANDARD

General

Garage doors: To AS/NZS 4505.

Bushfire screens and seals: To AS 3959.

0455 DOOR HARDWARE

1 PRODUCTS

1.1 COMPONENTS

Hinges

Requirement: Provide 3 hinges for external doors and door leafs over 2040 mm in height and 600 mm in width. Conform to the **Hinges table**.

Hinges table

Size of door (mm x mm)	Number of hinges (per door leaf)	Size of hinges (steel)
2040 x 920	3	100 x 75 x 3 mm
2040/2400 x 1020	4	100 x 100 x 3.5 mm

Locksets

External doors: Push-button key and knob set and a double-cylinder dead bolt to each door.

Internal doors:

- Generally: Passage sets.
- Bathrooms, showers and toilets: Privacy sets.
- Sliding patio doors and windows: Key-lockable surface mounted bolts.

Keying

Requirement: Key doors (excluding garage doors) alike and key windows alike.

2 EXECUTION

2.1 INSTALLATION

Supply

Delivery: Deliver door hardware items, in individual complete sets for each door.

Mounting height

Door lockset mounting heights: 1000 mm above finished floor to centreline of spindle.

Locks

Cylinders: Fix vertically and with consistent key alignment.

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.

0467 GLASS COMPONENTS

1 GENERAL

1.1 SUBMISSIONS

Balustrade design

Certification: Provide a professional engineers' certificate confirming conformance with AS/NZS 1170.1 clause 3.6.

Sealant compatibility

Compatibility statements: Submit statements from all parties to the installation that certify the compatibility of sealants and glazing systems to all substrates.

2 PRODUCTS

2.1 MIRRORS

Reflective surface

Type: Silver layer deposited on the glass or glazing plastic.

Protective coatings: Electrolytic copper coating at least 5 µm thick and 2 coats of mirror backing and edge sealing paint having a total dry film thickness of at least 50 microns.

Safety mirror

Type: Vinyl backed Grade A safety mirror.

Safety compliance: To AS/NZS 2208.

2.2 SHOWER SCREENS

Type

Proprietary system comprising frames of extruded aluminium, stainless steel, or PVC, assembled around safety glass to form fixed panels and sliding, hinged or pivoted doors.

2.3 GLASS BALUSTRADES

General

Glass: Grade A safety glass to AS 1288 Section 7.

0471 THERMAL INSULATION AND PLIABLE MEMBRANES

1 GENERAL

1.1 INTERPRETATION

Definition

General: For the purposes of this worksection the definition given below applies:

- Pliable building membrane: To AS/NZS 4200.1 and equivalent to sarking-type material as defined in the BCA.

1.2 ENERGY EFFICIENCY

Commitment to energy efficiency required by authorities

General: Provide details as required by state and local authorities.

2 PRODUCTS

2.1 MATERIALS

Insulation

Cellulosic fibre (loose fill): To AS/NZS 4859.1 Section 5.

Mineral wool blankets and cut pieces: To AS/NZS 4859.1, Section 8.

Joints in tiled areas: Do not apply a topping coat after bedding perforated paper tape in bedding compound.

0551 JOINERY

1 PRODUCTS

1.1 MATERIALS

Joinery timber

Hardwood for trim: To AS 2796.1.

Hardwood for furniture: To AS 2796.3.

Seasoned cypress pine: To AS 1810.

Softwood for trim: To AS 4785.1.

Softwood for furniture: To AS 4785.3.

Finished sizes for milled timber: Not less than the documented dimension unless qualified by a term such as nominal, out of or ex to which industry standards for finished sizes apply.

Plywood

Interior use generally: To AS/NZS 2270.

Interior use, exposed to moisture: To AS/NZS 2271.

Non-structural glued laminated timber

Standard: AS 5067.

Wet processed fibreboard (Including hardboard)

Standard: To AS/NZS 1859.4.

Particleboard

Standard: To AS/NZS 1859.1.

Dry processed fibreboard (Including medium density fibreboard)

Standard: To AS/NZS 1859.2.

Decorative overlaid wood panels

Standard: To AS/NZS 1859.3.

Certification

General: Brand panels under the authority of a recognised certification program applicable to the product. Locate the brand on faces or edges which will be concealed in the works.

Plywood certified formaldehyde emission level to AS/NZS 2270: E1.

Wood panel certified formaldehyde emission level to AS/NZS 1859.2: E1.

High-pressure decorative laminate sheets

Standard: To AS/NZS 2924.1.

High-pressure decorative laminate sheet application table

Classes: Provide classes as follows:

Class to AS/NZS 2924.1	Application
HGS or HGP	Kitchen work-tops
VGS or VGP	Kitchen front panels
VLS	Other vertical locations

Thickness (minimum):

- For horizontal surfaces fixed to a continuous substrate: 1.2 mm.
- For vertical surfaces fixed to a continuous substrate: 0.8 mm.
- For post formed laminate fixed to a continuous substrate: 0.8 mm.
- For vertical surfaces fixed intermittently (e.g. to studs): 3.0 mm.
- For edge strips: 0.4 mm.

1.2 DOMESTIC KITCHEN ASSEMBLIES

Standard

General: To AS/NZS 4386.1.

1.3 WARDROBE, CUPBOARD AND DRAWER UNITS

Plinths, carcasses, drawer fronts, shelves and doors

Material: Select from the following:

- Overlaid high moisture resistant particleboard.
- Overlaid high moisture resistant medium density fibreboard.

Thickness: 16 mm.

Adjustable shelves: Support on proprietary pins in holes bored at equal spacing of 32 mm centres vertically.

Fasteners: Conceal with finish.

Drawer fronts: Rout for drawer bottoms.

Drawer and door hardware

Hinge types: Concealed metal hinges with the following features:

- Adjustable for height, side and depth location of door.
- Self-closing action.
- Hold-open function.
- Nickel plated.

Slides: Metal runners or drawer systems with the following features:

- 30 kg loading capacity.
- Closure retention.
- White thermoset powder coating or nickel plated.

Hardware

Requirement: Provide details of handles and locks.

1.4 WORKING SURFACES

Material: High moisture-resistant particleboard or medium density fibreboard.

Finish: High pressure decorative laminate sheet.

Exposed edges: Extend laminate over shaped nosing, finishing more than 50 mm back on underside. Splay outside corners at 45°.

Minimum thickness: 32 mm.

Balance underside: Extend laminate to the undersides of benchtops if subject to excessive moisture from equipment such as dishwashers.

Stone or engineered stone benchtops

General: Provide stone or engineered stone slabs within the visual range of approved samples. In natural stone, repair mud veins or lines of separation that are integral to the selected pattern with resin fillers and back lining.

Splashbacks

Glass: 6 mm toughened colourback glass ***.

- Standard: To AS/NZS 2208.

Stainless steel: Grade 304, fine linished finish.

2 EXECUTION

2.1 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.

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.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of plaster and junctions with other materials or plaster systems.

Material:

- Internal location: Metallic-coated sheet AZ 150.
- External location: Stainless steel or PVC-U.

Bonding treatment

General: If bonding treatment is required, throw a wet mix onto the background of 1 part cement to 2 parts sand.

Curing: Keep continuously moist for 5 days or more and allow to dry before applying plaster coats.

Embedded items

General: If there are water pipes and other embedded items, sheath them to permit thermal movement.

Lath

Location: Provide lath as follows:

- Chases: If chases or recesses are 50 mm wide or greater, fix metal lath extending 75 mm or more beyond each side of the chase or recess.
- Metal and other non-porous backgrounds: Fix metal lath to provide a key.

Weepholes

Requirements: Keep opening free of plaster. Maintain consistent opening size.

2.2 APPLICATION

Control joints

General: Provide joints in the finish to coincide with control joints in the substrate. Make sure that the joint in the substrate is not bridged during plastering.

Plaster thickness

General: Conform to the **Plaster thickness table**.

Plaster thickness table

Substrate	Cement render, total thickness of single or multi-coat work (mm)
Brickwork and blockwork	12 min
Lightweight concrete and blocks	12 min
Metal lath measured from the face of the lath.	18 min

Tolerances

General: Finish plane surfaces within a tolerance of 6 mm in 2400 mm, determined using a 2400 mm straightedge placed anywhere in any direction. Finish corners, angles, edges and curved surfaces within equivalent tolerances.

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.

0621 WATERPROOFING – WET AREAS

1 GENERAL

1.1 STANDARDS

Wet areas

Waterproofing: To AS 3740.

2 PRODUCTS

2.1 PRODUCTS

Membranes

Standard: To AS/NZS 4858.

Membrane systems

Requirement: Provide a proprietary membrane system certified as suitable for the intended external waterproofing.

Certificate: A current BRANZ Appraisal Certificate.

Shower tray

General: Purpose-made waterproof jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob masonry on the inside of the tray hob upstands.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Provide substrates as follows:

- Clean and free of any deposit or finish which may impair adhesion of membranes.
- If walls or floors are framed or discontinuous, support members in full lengths without splicing.
- If floors are solid or continuous remove excessive projections and fill voids, hollows and cracks.

Moisture content

Concrete substrates: Cure for at least 21 days.

Change of finish: Maintain finished floor level across changes of floor finish including carpet.

Sealant joints
General: Provide sealant joints filled with silicone sealant and finish flush with the tile surface where tiling joins sanitary fixtures and at internal corners of walls.

0651 RESILIENT FINISHES

1 GENERAL

1.1 STANDARDS

General
Installation: To AS 1884.

2 PRODUCTS

2.1 MATERIALS

Wet processed fibreboard (hardboard) underlay
Standard: To AS/NZS 1859.4.

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

3 EXECUTION

3.1 PREPARATION

Substrates
General: To AS 1884 Section 3.

Concrete substrates

Surface treatments: Mechanically remove the following surface treatments:

- Sealers and hardeners.
- Curing compounds.
- Waterproofing additives.
- Surface coatings and contamination.

Concrete substrate correction: Remove projections and fill voids and hollows with a levelling compound compatible with the adhesive. Allow filling or levelling compound to dry to manufacturer's recommendations.

Cleaning: Remove loose materials or dust.

Timber and plywood substrates
Timber substrate correction: Remove projections. If conformance to a planeness tolerance of 4 mm in 2 m determined using a 2 m straightedge cannot be achieved, provide an underlay in brick pattern with joints avoiding substrate joints.

Cleaning Remove oil, grease, traces of applied finishes and loose materials or dust.

3.2 SHEET AND TILE INSTALLATION

General
Fixtures: Remove door stops and other fixtures, and refix in positions undamaged on completion of the installation.

Sheet set-out
General: Set out sheets to give the minimum number of joints. Position joints away from areas of high stress. Run sheet joints parallel with the long sides of floor areas, vertically on non-horizontal surfaces.

Tile set-out
General: Set out tiles from centre of room. If possible cut tiles at margins only, to give a cut dimension of at least 100 mm x full tile width. Match edges and align patterns. Arrange the cut tiles so that any variation in appearance is minimised.

Joints
Non-welded: Butt edges together to form tight neat joints showing no visible open seam.

Chemical 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.

Junctions
General: Scribe neatly up to returns, edges, fixtures and fittings. Finish flush with adjoining surfaces.

3.3 COMPLETION

Protection of sheet materials
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
Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Cleaning
General: Clean the finished surface. Buff and polish. Before the date for practical completion, mop and leave the finished surface clean and undamaged on completion.

0652 CARPETS

1 PRODUCTS

1.1 MATERIALS

Carpet
Minimum class: Residential Medium use under the Australian Carpet Classification Scheme.

Total VOC limit:

- Generally: 0.5 mg/m^2.
- Compliance: To the Environmental Classification Scheme operated by the Carpet Institute of Australia.

Wet processed fibreboard (hardboard) underlay
Standard: To AS/NZS 1859.4.

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

Soft underlay alternatives
Standard: To AS 4288.

Hot-melt adhesive tape
General: 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.

Preformed gripper strips
General: Domestic grade plywood carpet gripper strip with 3 rows of rust-resistant angled pins of length appropriate to the carpet type.

Edge strip
Location: At exposed edges of the carpet and at junctions with different floor finishes or finishes of different

3.2 FLOOR FIXING

Adhesive

General: Use a urethane elastomer adhesive in addition to nails.

Nailing

General: Make sure the boards are in contact with the subfloor at the time of nailing, particularly where boards are machine nailed. Skew nail in a uniform pattern. If nails are to be less than 12 mm from ends of sheets or boards, pre-drill nail holes 0 to 1 mm undersize.

Secret nailing: Do not use boards of more than 85 mm cover width, and use one nail or staple skewed at 45°. Do not cramp more than one board at a time.

Sinking: Punch nails 3 mm below finished surfaces and fill the sinking flush with a material tinted to match the flooring which is compatible with the floor finish.

Top nailing: For boards more than 65 mm cover width, use two nails skewed 10 degrees in opposite directions. Do not cramp more than 800 mm width of boards at one time.

Control joints

Perimeters: Provide 12 mm wide joints against vertical building elements.

Floors less than 6 x 6 m: Partially cramp strip flooring to allow a 1 mm gap every 600 mm or 1.5 mm every metre.

Floors over 6 x 6 m: Additionally, divide floors into maximum dimensions of 6 m with joints 4 mm wide filled with a flexible sealant compatible with the applied finish.

Strip flooring

Installation: Lay in straight and parallel lines with each board firmly butted to the next and firmly in contact with the subfloor. Cramp sufficient only to bring the boards together and no more than 800 mm of flooring at any one time.

Fixing to softwood joists, battens or underlay: Apply adhesive in addition to nailing.

3.3 COMPLETION

Protection

General: Provide protection as follows:

- Floors: With hardboard taped at all butt joints. Do not cover with sheet plastic.
- Stair treads: Full timber or plywood casing.

0656 FLOOR SANDING AND FINISHING

1 GENERAL

1.1 STANDARD

Floor sanding and finishing

General: To AS 4786.2.

1.2 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.

Minor cracks: Fill and stop punched nails with a putty knife.

Deeper holes: Fill in layers greater than 6 mm allowing each fill to dry. Make sure 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 – general

General: Provide a clear finished surface free of scratch marks when observed under normal lighting conditions when standing.

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: Sand with a final grade of paper of minimum F220 screen back.

0671 PAINTING

1 GENERAL

1.1 STANDARD

Painting

General: To the recommendations of those parts of AS/NZS 2311 which are referenced in this worksection.

2 PRODUCTS

2.1 PAINTING MATERIAL

Low VOC emitting paints

VOC limits for low odour/low environmental impact paint types:

- Primers and undercoats: < 65 g/litre.
- Low gloss white or light coloured latex paints for wall areas: < 16 g/litre.
- Coloured low gloss latex paints: < 16 g/litre.
- Gloss latex paints for timber doors and trims: < 75 g/litre.

Combinations

General: Do not combine paints from different manufacturers in a paint system.

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the top coats.

Delivery

General: Deliver paints to the site in the manufacturer's labelled and unopened containers.

Putty and fillers

Material: To the recommendation of the paint system manufacturer as suitable for the substrate and compatible with the primer.

Tinting

General: Provide only products which are colour tinted by the manufacturer or supplier.

Final coat	Applicable Australian Standard
Flat latex	AS 3730.7
Low gloss latex	AS 3730.8
Gloss latex	AS 3730.10
Stain, lightly pigmented	AS 3730.28
Latex stain, opaque	AS 3730.16
Semi gloss latex	AS 3730.9
Paving	
Paving paint, semi gloss	AS 3730.29
Paving paint, gloss	AS 3730.29

0702 MECHANICAL DESIGN AND INSTALL

1 GENERAL

1.1 AIR CONDITIONING DESIGN

Design basis

Outside design conditions: Use outdoor design conditions listed in AIRAH DA09, Table 1 or Table 1A for the following:

- Location geographically closest to the site.
- Comfort (or non-critical process) conditions.

Inside design conditions:

- Summer: 24°C dry bulb, 50% relative humidity.
- Winter: 21°C dry bulb.

Temperature variation: Limit the temperature difference in air conditioned spaces served by the same zone or system to 2°C as follows:

- Between any 2 points in the space from floor level to 1500 mm above floor level.
- More than 2000 mm from cooking equipment and more than 1000 mm from any other appliance.
- When outside conditions are in the range specified above.
- After the plant has been operating for one hour.
- With the temperatures measured in the same 5 minute period.

Zoning: Divide the systems into temperature controlled zones to meet the specified permissible temperature variation and the system divisions documented.

Fresh air: Supply fresh air to spaces with air conditioning systems via the air handling system.

Heating: Reverse cycle.

Windows, walls, floors and roofs: Refer to the drawings for construction, insulation, window details, external and internal shading.

Ambient noise emitted: Lower than the level that can be heard within a habitable room in any neighbouring residential premises regardless of whether any door or window to that room is open.

2 PRODUCTS

2.1 COMPONENTS

Standards

Ducted air conditioners: To AS/NZS 3823.1.2.

Non-ducted air conditioners: To AS/NZS 3823.1.1.

Controls

General: Provide the following functions:

- Temperature control for each zone located to accurately sense zone temperature.
- Fan speed selection for multi and variable speed fans.
- Day/night zone changeover if scheduled.
- Time switch for each system with ≥ 6 temperature programs per day, separate programs for each day of the week, manual set point over ride and 'Vacation' temperature set back.

0802 HYDRAULIC DESIGN AND INSTALL

1 GENERAL

1.1 STANDARDS

General

Plumbing and drainage: To AS/NZS 3500.1, AS/NZS 3500.2, AS/NZS 3500.3, AS/NZS 3500.4, AS/NZS 3500.5.

2 EXECUTION

2.1 INSTALLATION

Connections to Network Utility Operator mains

General: Excavate to locate and expose the connection points and connect to the Network Utility Operator mains. On completion, backfill and compact the excavation and reinstate surfaces and elements which have been disturbed such as roads, pavements, kerbs, footpaths and nature strips.

Piping

Embedded pipes: Do not embed pipes that operate under pressure in concrete or surfacing material.

Concealment: If practicable, conceal piping and fittings requiring maintenance or servicing so that they are accessible within non-habitable enclosed spaces such as roof spaces, subfloor spaces and ducts. Keep pipelines in subfloor spaces at least 150 mm above ground and make sure access can be provided throughout for inspection.

Cover plates: If exposed piping emerges from wall, floor or ceiling finishes, provide cover plates of non-ferrous metal, finished to match the piping, or of stainless steel.

Pipe support materials: The same as the piping, or galvanized or non-ferrous metals, with bonded PVC-U or glass fibre woven tape sleeves where needed to separate dissimilar metals.

2.2 FINISHES

General

General: Finish exposed piping, including fittings and supports as follows:

- Internal locations such as toilet and kitchen areas: Bright chrome plate.
- Externally and steel piping or worn fittings internally: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for required identification marking. Prime steel piping and iron fittings.
- Valves: Finish valves to match connected piping.

2.3 COLD AND HEATED WATER

Water heaters

Location: Locate water heaters where they can be maintained or replaced without damaging adjacent structures, fixtures or finishes.

Tariff: Install so that the heating system qualifies for the tariff concession or subsidy offered by the statutory authority.

Installation: Do not penetrate damp-proof courses. Arrange wiring such that it does not bridge the cavity in external masonry.

Minimum conduit diameter: 20 mm.

Conduits for future use: Provide a non-metallic drawstring having a breaking strain > 100 kg.

Luminaires

Standard: to AS/NZS 60598.1.

Non-specified luminaires: Provide a bayonet cap batten holder and lamp at each lighting point location where no luminaire is documented.

Minimum energy performance standards:

- General: To AS/NZS 4783.2 and AS/NZS 4782.2.
- Self ballasted lamps: To AS/NZS 4847.2.
- Incandescent lamps: To AS 4934.2.

Appliances

General: Provide final subcircuits and terminate at fixed appliances, hot water units, packaged air conditioning and other plant and equipment.

Isolation switch: Provide isolating switch adjacent to equipment.

Telecommunications

General: Liaise with the telecommunication services carrier.

Installations requiring telephony only: To AS/CA S009.

Small office/home office installations: Category 6, to AS/CA S009 and AS/NZS ISO/IEC 15018 and in accordance with the recommendations of SAA HB 29.

Television systems

General: Provide an analogue and digital television distribution system to AS/NZS 1367 and conforming to the recommendations of Digital Broadcasting Australia.

Antennas: Provide and locate antennas to receive all locally available free-to-air television stations.

Network systems: Provide a coaxial cabling system suitable for satellite and cable network operators' services.

Intruder alarm system

Standard: To AS 2201.1.

Smoke detection

General: Provide smoke detectors to the requirements of the Building Code of Australia. Connect smoke detectors to mains power.

Labelling

General: Provide labels.

Telecommunications cables: Label telecommunications cables, cross connects and outlets in accordance with the requirements of AS/NZS 3080, and SAA HB 29.

2.2 COMPLETION

Testing and certification

Electrical installations: Test to AS/NZS 3017. Provide a certificate showing test results and certifying compliance with AS/NZS 3000.

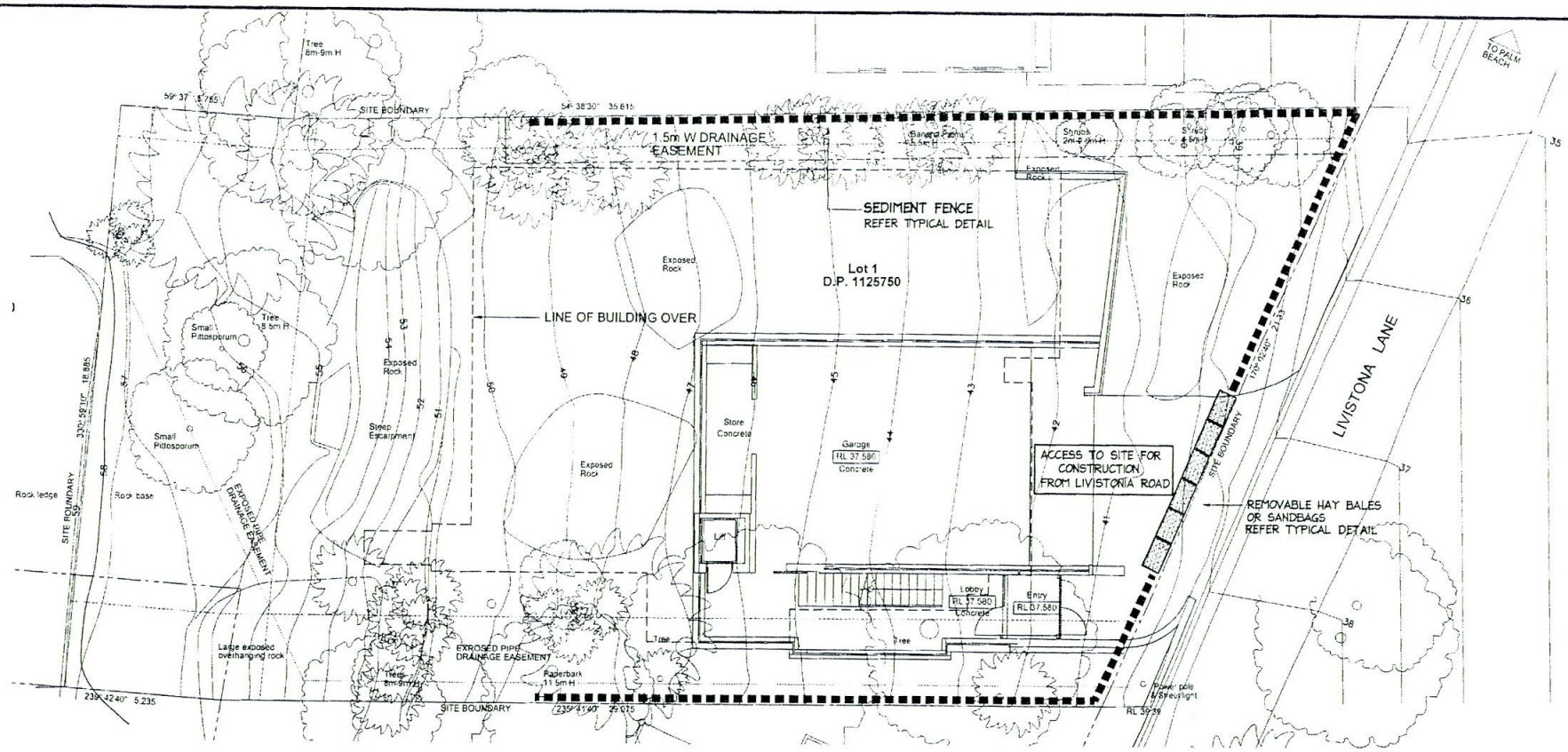
Telecommunications cabling: To the recommendations of SAA HB 29. Provide a certificate showing test results and certifying compliance with AS/NZS ISO/IEC 15018.

Submission: Provide Telecommunications Cabling Advice (TCA1).

Television and audio systems: To AS/NZS 1367. Test the complete television and audio system. Provide a certificate showing test results and certifying compliance.

AS/NZS 2589	2007	Gypsum linings - Application and finishing
AS 2601	2001	The demolition of structures
AS 2665	2001	Smoke/heat venting systems- Design, installation and commissioning
AS/NZS 2699		Built in components for masonry construction
AS/NZS 2699.1	2000	Wall ties
AS/NZS 2699.3	2002	Lintels and shelf angles (durability requirements)
AS/NZS 2712	2007	Solar and heat pump water heaters - Design and construction
AS/NZS 2728	2013	Prefinished/prepainted sheet metal products for interior/exterior building applications – Performance requirements
AS 2796		Timber – Hardwood – Sawn and milled products
AS 2796.1	1999	Product Spec
AS 2796.2	2006	Grade description
AS 2796.3	1999	Timber for furniture components
AS 2820	1993	Gate units for private swimming pools
AS 2858	2008	Timber - Softwood - Visually graded for structural purposes
AS 2870	2011	Residential slabs and footings
AS/NZS 2904	1995	Damp-proof courses and flashings
AS/NZS 2908		Cellulose-cement products
AS/NZS 2908.2	2000	Flat sheets
AS/NZS 2924		High pressure decorative laminates – Sheets made from thermosetting resins
AS/NZS 2924.1	1998	Classification and specifications
AS/NZS 3000	2007	Wiring rules
AS/NZS 3008		Electrical installations – Selection of cables
AS/NZS 3008.1.1	2009	Cables for alternating voltages up to and including 0.6/1 kV – Typical Australian installation conditions
AS/NZS 3017	2007	Electrical installations – Testing and inspection guidelines
AS/NZS 3018	2001	Electrical installations – Domestic installations
AS/NZS 3080	2013	Telecommunications installations - Generic cabling for commercial premises (ISO/IEC 11801:2002, MOD)
AS/NZS 3439		Low-voltage switchgear and controlgear
AS/NZS 3439.3	2002	Particular requirements for low-voltage switchgear and controlgear assemblies intended to be installed in places where unskilled persons have access for their use – Distribution
AS/NZS 3500		Plumbing and Drainage
AS/NZS 3500.1	2003	Water services
AS/NZS 3500.2	2003	Sanitary plumbing and drainage
AS/NZS 3500.3	2003	Stormwater drainage
AS/NZS 3500.4	2003	Heated water services
AS/NZS 3500.5	2012	Domestic installations
AS 3566		Self-drilling screws for the building and construction industries
AS 3566.2	2002	Corrosion resistance requirements
AS 3600	2009	Concrete structures
AS 3610	1995	Formwork for concrete
AS 3610.1	2010	Documentation and surface finish
AS 3660		Termite management
AS 3660.1	2000	New buildings
AS 3700	2011	Masonry structures
AS 3715	2002	Metal finishing – Thermoset powder coatings for architectural applications of aluminium and aluminium alloys
AS 3727	1993	Guide to residential pavements
AS 3730		Guide to the properties of paints for buildings
AS 3730.1	2006	Latex - Interior - Flat
AS 3730.2	2006	Latex - Interior - Semi-gloss
AS 3730.3	2006	Latex - Interior - Low-gloss
AS 3730.6	2006	Solvent-borne - Exterior - Full gloss enamel
AS 3730.7	2006	Latex - Exterior - Flat
AS 3730.8	2006	Latex - Exterior - Low-gloss
AS 3730.9	2006	Latex - Exterior - Semi-gloss
AS 3730.10	2006	Latex - Exterior – Gloss
AS 3730.12	2006	Latex - Interior - Gloss
AS 3730.16	2006	Latex - Timber finish - Exterior
AS 3730.27	2006	Floor varnish - Two pack - Isocyanate cured
AS 3730.28	2006	Wood stain - Solvent-borne - Exterior
AS 3730.29	2006	Solvent-borne - Exterior/interior - Paving paint
AS 3740	2010	Waterproofing of domestic wet areas
AS 3798	2007	Guidelines on earthworks for commercial and residential developments
AS/NZS 3823		Performance of electrical appliances - Airconditioners and heat pumps
AS/NZS 3823.1.1	2012	Non-ducted airconditioners and heat pumps - Testing and rating for performance
AS/NZS 3823.1.2	2012	Test Methods - Ducted airconditioners and air-to-air heat pumps - Testing and rating for performance
AS 3958		Ceramic tiles
AS 3958.1	2007	Guide to the installation of ceramic tiles
AS 3959	2009	Construction of buildings in bushfire prone areas
AS 3972	2010	General purpose and blended cements
AS 3999	1992	Thermal insulation of dwellings – Bulk insulation – Installation requirements
AS 4145		Locksets

BCA 3.9.1		Acceptable construction - Safe movement and access - Stair construction - General requirements
BCA 3.9.2		Acceptable construction – Safe movement and access – Balustrades
BCA Fig 3.10.1.4		Acceptable construction – Additional construction requirements – High wind areas – Cyclonic areas
BCA 3.12		Acceptable construction - Energy efficiency
BCA 3.12.1.3		Acceptable construction – Energy efficiency – Building fabric – Roof lights
BCA 3.12.1.4		Acceptable construction – Energy efficiency – Building fabric –
BCA 3.12.2		Acceptable construction – Energy efficiency – External glazing
BCA 3.12.3		3.9.1Acceptable construction – Energy efficiency – Building sealing
NASH 1	2005	Residential and low-rise steel framing
Safe Work Australia	2011	How to safely remove asbestos – Code of Practice



SEDIMENT & EROSION CONTROL PLAN

SCALE = 1 : 100

www.dialbeforeyoudig.com.au
DIAL 1100 BEFORE YOU DIG

NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE.

DEVELOPERS & EXCAVATORS MAY BE HELD FINANCIALLY RESPONSIBLE BY THE ASSET OWNER SHOULD THEY DAMAGE UNDERGROUND NETWORKS.

CARELESS DIGGING CAN
- CAUSE DEATH OR SERIOUS INJURY TO WORKERS AND THE GENERAL PUBLIC
- INCONVENIENCE USERS OF ELECTRICITY, GAS, WATER AND COMMUNICATIONS
- LEAD TO CRIMINAL PROSECUTION AND DAMAGES CLAIMS
- CAUSE EXPENSIVE FINANCIAL LOSSES TO BUSINESS
- CUT OFF EMERGENCY SERVICES
- DELAY PROJECT COMPLETION TIMES WHILE THE DAMAGE IS REPAIRED

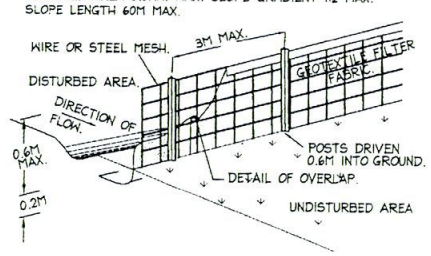
MINIMISE YOUR RISK AND DIAL BEFORE YOU DIG.
TEL. 1100

GENERAL NOTES :

1. CONSTRUCTION VEHICLES ARE TO LEAVE AND ENTER THE SITE OVER AN ALL WEATHER SURFACE CONSISTING OF COURSE CRUSHED STONE OR BLUE METAL CONSTRUCTED WITHIN THE FRONT SETBACK AREA OPPOSITE THE EXISTING FOOTPATH CROSSING UNLESS NOTED OTHERWISE.
2. EXCAVATION MACHINERY ARE TO BE UNLOADED AND LOADED UPON THIS ALL WEATHER SURFACE. CONCRETE PUMPS AND TRUCKS WILL ALSO UTILISE THE ALL WEATHER SURFACE FOR THEIR OPERATIONS.
3. MATERIALS WILL BE UNLOADED UPON THE ALL WEATHER SURFACE WITHIN THE FRONT SETBACK AREA BY MEANS OF CRANES MOUNTED ON THE BACK OF DELIVERY TRUCKS OR UNLOADED BY HAND. IT IS NOT ENVISAGED THAT A MOBILE CRANE WILL BE REQUIRED DURING THE CONSTRUCTION PROCESS.
4. SOME STOCKPILING OF TOPSOIL REMOVED FROM THE BUILDING AREA MAY BE STORED ON THE SITE DURING THE CONSTRUCTION WITHIN THE PROPERTY IN AN AREA ENCLOSED WITHIN THE SEDIMENT CONTROL FENCING.
5. ALL EXCAVATED & CONSTRUCTION MATERIALS, SHED, SKIP BINS, TEMPORARY WATER CLOSETS, SPOIL AND EQUIPMENT, ETC SHALL BE KEPT WITHIN THE PROPERTY. NO VEHICLES OR MACHINES SHALL BE KEPT WITHIN THE PROPERTY. NO VEHICLES OR MACHINES SHALL STAND ON COUNCIL FOOTPATHS FOR LARGE LENGTHS OF TIME.
6. ALL RUBBISH & RECYCLABLE MATERIAL SHALL BE STOCKPILED IN WASTE BINS IN THE AREA NOMINATED ON THE SITE PLAN WITHIN THE SITE BOUNDARY. PUBLIC PROPERTY SHALL BE KEPT FREE OF RUBBISH AND RECYCLABLES AT ALL TIMES. ANY WASTE MATERIALS SHALL BE REGULARLY COLLECTED FROM THE SITE AND DISPOSED OF IN AN APPROPRIATE FASHION.
7. ANY BUILDING / DEMOLITION WORKS INVOLVING ASBESTOS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RELAVANT STANDARDS.
8. VEHICLES LEAVING THE SITE WILL DO SO VIA THE ALL WEATHER BALLAST DRIVEWAY MADE OF COURSE AGGREGATE OR SIMILAR LOCATED WITHIN THE FRONT SETBACK AREA OF THE DEVELOPMENT. ANY DIRT OR MATERIAL DEPOSITED ON THE ROAD RESERVE OR ROADWAY IS TO BE PROMPTLY CLEANED.
9. ANY EXCAVATED AREA REQUIRED SUPPORT WILL BE UNDERTAKEN BY THE OWNER USING STRUCTURALLY APPROVED RETAINING STRUCTURES.
10. ADEQUATE SAFETY SIGNAGE MUST BE ERECTED IN A PROMINENT POSITION ON THE WORK SITE, WARNING OF UNAUTHORISED ENTRY TO WORK SITE AND INTENDING DANGERS.
11. SAFETY FENCES SHALL BE PROVIDED AROUND ALL BOUNDARIES UNLESS A CONTINUOUS STRUCTURALLY ADEQUATE FENCE PRESENTLY EXISTS. THE FENCING SHALL BE ADEQUATE TO RESTRICT PUBLIC ACCESS TO THE SITE WHEN BUILDING WORK IS NOT IN PROGRESS OR THE SITE IS UNOCCUPIED.
12. NOISE LEVELS SHALL NOT EXCEED COUNCIL REGULATION LEVELS. BUILDING AND DEMOLITION WORKS SHALL ONLY BE CARRIED OUT BETWEEN HOURS AND DAYS SPECIFIED BY COUNCIL.
13. GEOTEXTILE FABRIC SHALL BE PLACED ON THE INSIDE OF THE SITE FENCING PRIOR TO SITE DISTURBANCE TO PREVENT SEDIMENT WASHING FROM CLEARED AND DISTURBED AREAS OF THE SITE INTO THE STORMWATER SYSTEM. DURING CONSTRUCTION UNCONTAMINATED RUNOFF FROM CLEARED OR DISTURBED AREAS IS TO BE DIRECTED TO A TEMPORARY SIL' ARRESTOR PIT THAT SHALL BE PROVIDED WITHIN THE SITE AT THE STREET BOUNDARY PROCESSING SITE STORMWATER BEFORE IT IS DISCHARGED TO THE STREET DRAINAGE SYSTEM OR WATERCOURSE.
14. ALL TOP SOIL STRIPPED & STOCKPILED ON SITE IS TO BE BE PLACED IN NOMINATED AREAS ON PLAN. ALL DISTURBED AREAS ARE TO BE STABILISED UPON THE COMPLETION OF BUILDING WORKS.
15. ALL SEDIMENT CONTROL STRUCTURES ARE TO BE CONTINUALLY MAINTAINED DURING CONSTRUCTION AND INSPECTED FOR STRUCTURAL DAMAGE AFTER EACH RAINFALL EVENT, WITH TRAPPED SEDIMENT BEING REMOVED TO THE TOPSOIL STOCKPILE.
16. WHERE THERE IS THE POTENTIAL OF SITE EROSION TO PRODUCE EXCESSIVE SEDIMENT RUNOFF SUITABLE GEOTEXTILE BARRIERS SHALL BE PLACED TO ALLEVIATE THE RISK ACCORDINGLY. BARE SURFACES SHALL BE KEPT MOIST TO REDUCE DUST LEVELS. GEOTEXTILE FABRIC LOCATED ON THE INSIDE OF FENCES SHALL ALSO BE UTILISED FOR DUST CONTROL WHERE NECESSARY.

CONSTRUCTION CERTIFICATE
No. 14/266
These plans form part of the above Construction Certificate as issued by
Greg Hough of
Get Certified Building Services Pty Ltd
Accreditation No: BPB0186

DRAINAGE AREA 0.6HA. MAX. SLOPE GRADIENT 1:2 MAX.
SLOPE LENGTH 60M MAX.



SEDIMENT FENCE

CONSTRUCTION NOTES:

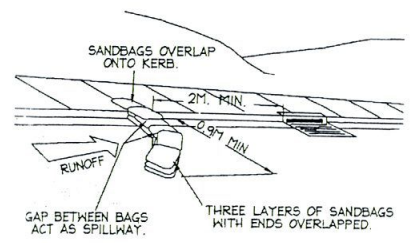
1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
2. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND, 3 METRES APART.
3. DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
4. BACKFILL TRENCH OVER BASE OF FABRIC.
5. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES or AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.
6. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.

SCHEDULE OF WORKS:

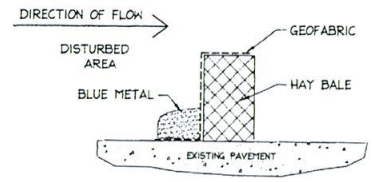
1. SILT FENCE AND ASSOCIATED WORKS INCLUDING INTERCEPTOR DRAIN IS TO BE INSTALLED BEFORE THE COMMENCEMENT OF ANY EXCAVATION.
2. CUTS TO BE EXECUTED TO THE REQUIRED LEVEL USING CONVENTIONAL EXCAVATION MACHINERY. INITIALLY THE DEPTH OF FILL/CLAY IS TO BE ESTABLISHED TO ENSURE NEIGHBOURING PROPERTIES ARE NOT ADVERSELY AFFECTED. EARTH BATTERS TO BE A MAXIMUM SLOPE OF 1.0 m VERT. TO 1.7 m HORIZ. (AS PER GEOTECHNICAL REPORT). ANY BATTERS GREATER THAN 1.0 m VERT. TO 1.7 m HORIZ. ARE TO BE ADEQUATELY SHORED IN ACCORDANCE WITH THE ENGINEERS DETAILS AND INSTRUCTIONS.
3. ANY PERMANENT RETAINING STRUCTURE IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE ENGINEERS DETAILS AND INSTRUCTIONS.
4. ALL PERMANENT RETAINING STRUCTURES ARE TO BE COMPLETED WITH MINIMUM DELAY FOLLOWING EXCAVATION.

NOTES:

1. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED AND MAINTAINED DAILY BY SITE MANAGER.
2. MINIMISE DISTURBED AREAS'
3. ALL STOCKPILES TO BE CLEAR FROM DRAINS, GUTTERS AND FOOTPATHS.
4. DRAINAGE IS TO BE CONNECTED TO STORMWATER SYSTEM AS SOON AS POSSIBLE.
5. ROADS AND FOOTPATH TO BE SWEPT DAILY.

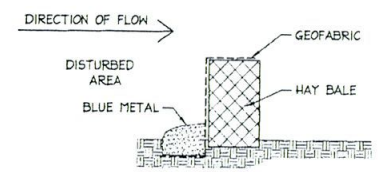


SANDBAG KERB INLET SEDIMENT TRAP



REMOVABLE HAY BALE DETAIL

SCALE = N.T.S.



REMOVABLE HAY BALE DETAIL

SCALE = N.T.S.

ISSUED FOR CONSTRUCTION CERTIFICATE SUBMISSION ONLY

IF IN DOUBT ASK

Northern Beaches Consulting Engineers Pty Ltd.

A1

Date	Rev.	Amendment	By
10-11-2014	A	ISSUE FOR CC	MC

DOCUMENT CERTIFICATION
Date : 10/11/14
Stewart McGeady .....
B.E.(Civil), MIEAust, P.Eng
(Director Northern Beaches Consulting Engineers)

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Architect	BKH ARCHITECTS
Client	PHIL SLATER
Project	NEW RESIDENCE 2a LIVISTONA LANE PALM BEACH
Drawing Title	SEDIMENT & EROSION CONTROL PLAN & DETAILS
Date	NOV. 2014
Design	CH/MW
Drawn	MC
Checked	
Job No	140143
Drawing No	D05
Rev	A

GENERAL

1. These drawings shall be read in conjunction with all architectural drawings and other consultants' drawings and specifications.
   All discrepancies shall be referred to the architect and/or engineer prior to proceeding with any work.
2. Dimensions shall not be obtained by scaling these drawings. All dimensions shown on these drawings are in millimetres unless noted otherwise.
   All levels shown are in metres.
3. All workmanship and materials shall be in accordance with the current SAA codes and by-laws, ordinances or other requirements of the relevant building authorities.
4. Unless noted otherwise, waterproofing of all elements is the responsibility of the architect and to be in accordance with the architect's and manufacturer's specification.
5. During the course of construction the contractor shall be responsible for maintaining the structure in a stable condition and for ensuring that no part of the structure is over-stressed.
6. Temporary bracing and shoring shall be provided by the contractor to ensure that the structure and excavations are stable at all times. For all temporary excavation batters, the contractor is to obtain geotechnical advice.
7. No penetrations, holes or chases shall be made through the structural elements without the written approval from the engineer.
8. Design live loads in accordance with AS 1170.1 as follows:

Area Type	Live Load kPa
General	1.5
Balconies/Decks/Terraces	2
Parking Areas	2.5

9. The following abbreviations denote:
   ARCH- Architect
   BEL - Bulk Excavation Level
   BL - Boundary Line
   CL - Centre Line
   COS - Confirm on Site
   DPM - Damp Proof Membrane
   EF - Each Face
   EW - Each Way
   EX - Existing
   FGL - Finished Ground Level
   FSL - Finished Surface Level
   INV - Invert
   NGL - Natural Ground Level
   SW - Stormwater
   TBA - To Be Advised
   U.N.O.- Unless Noted Otherwise
   WPM - Water Proof Membrane
10. Council and/or PCA Approval for all Works contained in the following drawings is to be obtained prior to commencement of construction.

FOOTINGS

1. The footings have been designed for a maximum allowable bearing capacity of 1000kPa to rock. Assumed Class A in accordance with AS2870. The soil conditions and bearing capacity of the foundations are to be confirmed by a geotechnical engineer prior to works commencing on site.
2. Refer to Geotechnical Engineer's report by Crozier Geotechnical Consultants project reference 2014-011 dated 14th March 2014.
3. All loose material, debris and water shall be removed from the base of the footing prior to the casting of concrete.
4. In all locations where excavated surfaces become softened by exposure to the weather or by ground water seepage, the footing shall be further excavated to reach a bearing capacity as specified in 1 and as approved by the geotechnical engineer.
5. All top soil and soil containing organic matter shall be removed from the area of proposed slab on ground and a minimum 30mm layer of compacted sand is to be provided under a waterproof membrane.

CONCRETE

1. All materials and workmanship is to be in accordance with AS 3600.
2. Concrete quality shall be as shown below unless otherwise noted on the drawings:

Element	Max. Slump (mm)	Aggregate Size (mm)	Concrete Grade (MPa)
Footings	80	20	40
Blockwork Core Fill	230	10	32
Ground Floor Slab	80	20	40
Level 1 Slab	80	20	40
Level 2 Slab	80	20	40
Level 3 Slab	80	20	40
Level 4 Slab	80	20	40

3. Clear concrete cover to reinforcement shall be as follows, unless noted otherwise:

Element	Interior	Exterior	Cast against ground
Strip Footing	N/A	N/A	50
Pad Footing	N/A	N/A	50
Pier	N/A	N/A	50
Column	40	45	N/A
Wall	25	45	N/A
Beam	25	45	N/A
Slab	25	45	50

4. The concrete shall be tested for compliance in accordance with AS 3600. Test results are to be submitted to the engineer for review and approval.
5. The sizes of concrete elements do not include the thickness of finishes.
6. Construction joints other than those specified on the drawings shall not be made without approval from the engineer.
7. Beam depths are written first and include the slab thickness, if any.
8. Cover to all reinforcement, as specified in 3 or otherwise shown on the drawings, shall be provided and maintained during the concrete pour by the use of bar chairs. The bar chairs are to be at a maximum of 750mm centres in both directions. Bar chairs are to be either plastic or plastic tipped steel chairs.
9. Curing of the concrete shall be carried out by keeping surfaces continuously wet for a period of 7 days. The use of a plastic sheeting and/or hessian placed over the concrete surface and held down firmly is recommended for aid in curing concrete surfaces where no floor finishes are proposed.
10. All conduits in slabs shall not be placed within the zone of the clear concrete cover to the steel reinforcement. Conduits shall be placed above the bottom reinforcement and below the top reinforcement. Any conduits larger than 25 mm in diameter shall not be placed in the concrete element without the prior approval from the engineer.
11. Stripping of formwork and back propping of soffits shall not take place until concrete has reached 75% of the specified 28 day characteristic compressive strength.
12. 'N' denotes deformed bars, grade D500N
    'S' denotes deformed bars, grade 250S
    'R' denotes round bars, grade 250R
    'SL' denotes square mesh, grade 500L
13. All reinforcement shall be in accordance with AS 4671.
14. N12-200 (SPACING (mm) / BAR SIZE (mm) / REINFORCEMENT GRADE) 4N24 (BAR SIZE (mm) / REINFORCEMENT GRADE / NUMBER OF BARS)
15. Reinforcement shown on the drawings is represented diagrammatically, and is not necessarily shown in its true projection.
16. Welding of reinforcement shall not be permitted unless shown on the drawings.
17. Splices in the reinforcement shall only be made in locations as shown on the drawings.
18. All cogs to be standard cogs unless noted otherwise.
19. All reinforcement laps to be as follows unless noted otherwise:

Reinforcement Bar	N12	N16	N20	N24	N28	N32	N36
Lap Length (mm)	500	650	800	1000	1150	1300	1450

20. Fabric reinforcement is to be lapped 300mm at ends and sides unless noted otherwise.

STRUCTURAL STEEL

1. All structural steel work is to be in accordance with AS 4100.
2. All welding is to be in accordance with AS/NZS 1554
3. All hot rolled structural steel sections are to be grade 300PLUS and in accordance with AS/NZS 3679.
4. All rectangular hollow sections (RHS) are to be grade C350L0 in accordance with AS 1163.
5. All square hollow sections (SHS) are to be grade C350L0 in accordance with AS 1163.
6. All circular hollow sections (CHS) are to grade C250L0 and grade C350L0 as applicable to their size in accordance with AS1163.
7. All bolts shall be high strength structural bolts, grade 8.8 unless noted otherwise.
8. All bolts are to be M16 and a minimum of two (2) bolts per connection unless noted otherwise.
9. All bolt holes are to have a minimum of 2mm clearance unless noted otherwise.
10. All bolts, nuts and washers are to be hot dip galvanised in accordance with AS/NZS 4680 unless noted otherwise.
11. The ends of all hollow steel members are to be sealed with 5mm thick end plates welded all around unless noted otherwise.
12. All gusset, fin and end plates are to be 10mm thick welded all around unless noted otherwise.
13. Fillet welds shall be full length continuous welds, denoted CFW on the drawings. The size of the fillet weld refers to the leg size of the weld. All fillet welds are to be 6mm unless noted otherwise.
14. Butt welds shall be complete penetration full length continuous welds denoted CPBW on the drawings.
15. Prior to the fabrication of structural steel work, two (2) copies of shop drawings shall be submitted to the engineer for review and approval. Fabrication shall not commence without written approval from the engineer.
16. All structural steel work to be encased in concrete is to be hot dip galvanised in accordance with AS/NZS 4680 unless noted otherwise.
17. Protective coatings and surface treatments shall be as follows:

Element location	Surface Preparation in accordance with AS 1627	Protective Coating or Treatment
Internal	Hand or power tool cleaned to minimum Class 2	Two coats (2) of inorganic zinc silicate primer DFT 70 microns
External - not requiring painting and more than 3km from sea water	Blast clean to minimum Class 2.5	Hot dip galvanised in accordance with AS/NZS 4680
External - requiring painting and/or less than 3km from sea water	-	Refer to architect and paint manufacturer for specifications.

18. All paint specifications listed in 17 are to be applied in strict accordance with the manufacturers' recommendations and specifications.
19. Hot dip galvanised steel work that is site welded or sustains any other type of damage is to be prepared to a Class 3 standard and painted with two (2) coats of zinc rich paint.

MASONRY

1. All masonry work is to be in accordance with AS 3700.
2. All bricks to have a minimum compressive strength of 20MPa.
3. All concrete blocks to have a minimum compressive strength of 15MPa.
4. Masonry shall not be constructed on suspended concrete slabs and beams until all formwork and back propping is removed.
5. Vertical expansion and/or articulation joints shall be provided in all brickwork and block work walls in accordance with AS 3700.
6. Non load bearing walls are to be kept 20mm clear of the soffit of the slab and beams. The 20mm gap is to be filled with approved compressible filler and sealant. The filler and sealant are to provide the appropriate fire rating if required.
7. The tops of non load bearing masonry walls are to be supported by appropriate ties which allow vertical movement but do not allow lateral movement. The ties shall be placed at a maximum of 800mm centres.
8. Masonry wall ties shall be provided in accordance with AS 3700.
9. Dry pressed masonry only to be used for retaining walls, not extruded.
10. Two layers of approved graphite greased metal based slip joint material is to be provided between load bearing brick walls and the underside of concrete slabs and beams. The slip joint is to be placed on smooth brickwork or a smooth trowelled mortar finish.
11. The cores of all concrete block work are to be filled with 32MPa concrete U.N.O., of 10mm aggregate and 230mm slump. The concrete is to be compacted and mechanically vibrated during placement.
12. Clean out holes are to be provided at the base of all cores. Care shall be taken to ensure that the internal cores and clean out holes are clean and free from any mortar prior to grouting.
13. The vertical reinforcement is to be accurately placed and tied to the starter bars at the clean out holes. The vertical reinforcement is to be placed and tied off to the horizontal reinforcement as courses are laid to ensure that the location of the vertical reinforcement is maintained during grouting.
14. The minimum cover to all reinforcement from the internal face of the concrete block shall be 20mm unless noted otherwise.
15. The maximum pour height for unrestrained block work is to be 2000mm.
16. All concrete blocks used are to be of the Double U type.
17. Waterproofing and drainage to the back of retaining walls is to be provided in accordance with the architect and other consultants' specifications.
18. Reinforced concrete block work retaining walls shall not be backfilled until 14 days after the wall has been grouted, or if applicable, until after the slab over the retaining wall has been poured and cured for 7 days.

TIMBER

1. All workmanship and materials are to be in accordance with AS 1684, AS 1720 and AS 3959.
2. All members are to be H2 or T2 treated unless noted otherwise.
3. All external above ground members are to be H3 treated unless noted otherwise.
4. All external and in ground member are to be H5 treated unless noted otherwise.
5. All holes for bolts to be a snug fit. Washers are to be provided under all bolts and nuts and to be a minimum of 2.5 times the diameter of the bolt unless noted otherwise.
6. All bolted connections to be 2M16 bolts unless noted otherwise.
7. All bolts, nails, clouts and screws are to be hot dip galvanised in accordance with AS 4680.
8. All cut ends of members are to be treated to achieve the required hazard protection level.
9. All hold downs to roof, wall and floor framing to be in accordance with AS 1684.

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DRAWING SCHEDULE

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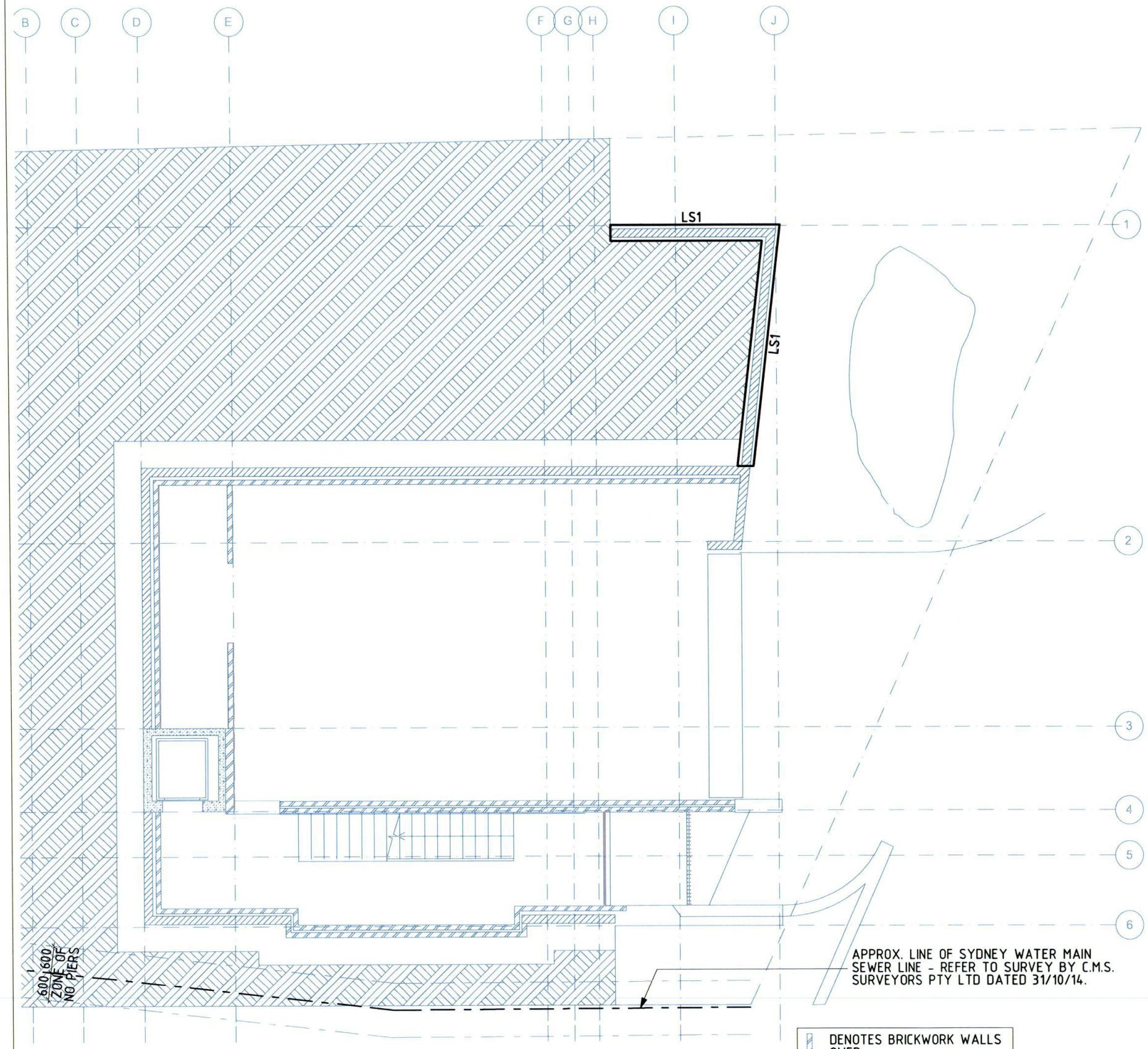
REV.	DATE	REVISION DESCRIPTION	BY
1	12.11.14	ISSUE FOR CC SUBMISSION ONLY	DI

ARCHITECT: BKH
CLIENT: VIMIERA PTY LTD

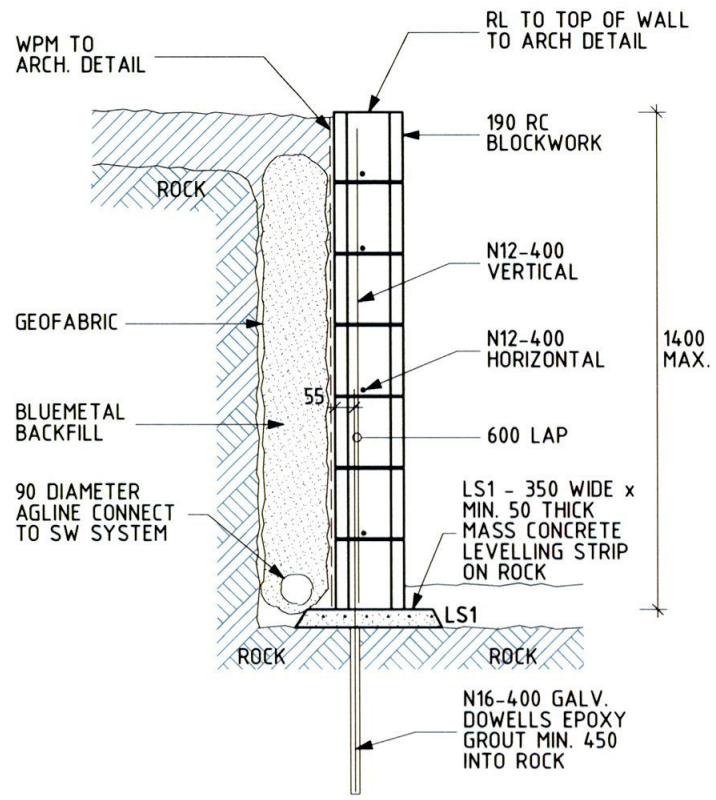
STATUS: ISSUE FOR REVIEW & CC SUBMISSION ONLY
DATE: SEPT 2014
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DESIGNED: DI
SCALE: N/A
DRAWN: AI
PAGE SIZE: A3
CHECKED: DI
REVISION: 1
PROJECT NUMBER: 140806
DRAWING: GENERAL NOTES
DRAWING NUMBER: S01



FOOTING PLAN
1:100

LS1	MIN 50 THICK x 350 WIDE LEVELLING STRIP ON ROCK.

	DENOTES BRICKWORK WALLS OVER
	DENOTES BLOCKWORK WALLS OVER
	DENOTES CONCRETE WALLS OVER



LS1 DETAIL
1:20

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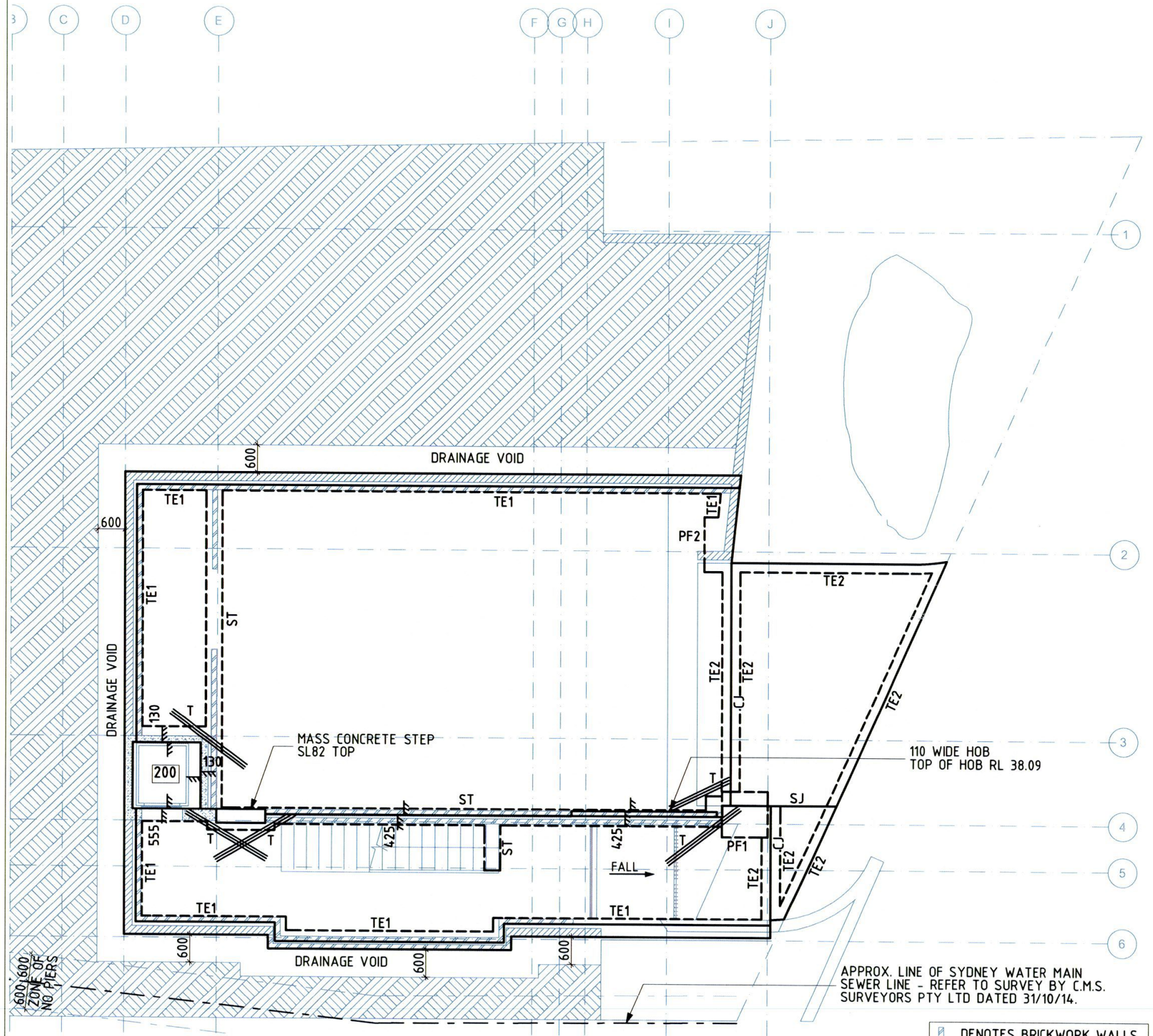
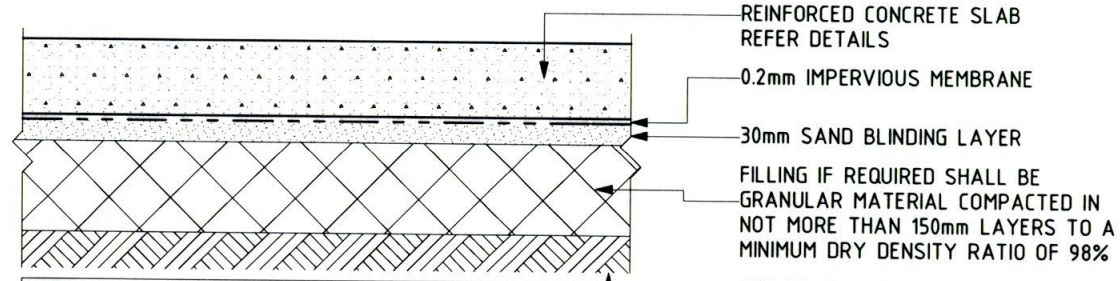
2	17.10.14	ISSUE FOR REVIEW & CC SUBMISSION ONLY	DI
1	16.09.14	ISSUE FOR REVIEW ONLY	DI

ARCHITECT	BKH
CLIENT	VIMIERA PTY LTD
STATUS	ISSUE FOR REVIEW & CC SUBMISSION ONLY
DATE	SEPT 2014
PROJECT	2A LIVISTONA LANE, PALM BEACH
DESIGNED	DI
SCALE	REFER DWG
DRAWN	AI
PAGE SIZE	A3
CHECKED	DI
REVISION	4
DRAWING	FOOTING PLAN
PROJECT NUMBER	140806
DRAWING NUMBER	S02

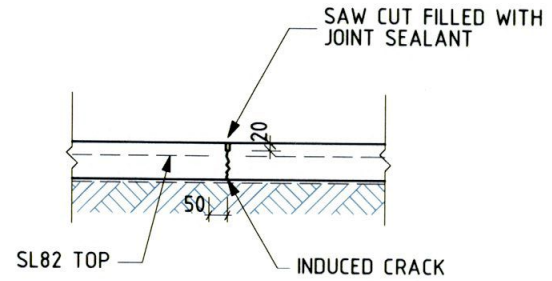


GROUND FLOOR SLAB PLAN
1:100



NOTE:
SAND BLINDING, SUB-BASE, FILLING & SUB GRADE TO BE MECHANICALLY COMPACTED TO A DRY DENSITY RATIO OF NOT LESS THAN 98% STANDARD MAXIMUM DRY DENSITY. ALL AREAS TO BE TESTED BY GEOTECHNICAL ENGINEER AND RESULT FORWARDED TO STRUCTURAL ENGINEER PRIOR TO POURING CONCRETE.

TYPICAL SLAB PREPARATION - SLAB ON GRADE
NTS



NOTE: SAW CUT TO BE MADE WITHIN 12 HOURS OF FINISHING SLAB

TYPICAL 'SJ' DETAIL
1:20

DENOTES BRICKWORK WALLS OVER	
DENOTES BLOCKWORK WALLS OVER	
DENOTES CONCRETE WALLS OVER	

U.N.O.	120 THICK SLAB ON GROUND, SL82 TOP.
200	200 THICK SLAB ON ROCK TO LIFT PIT, SL82 TOP & BOTTOM.
	DENOTES STEP IN SLAB
TE1	MIN 200 DEEP x 400 WIDE THICKENED EDGE ON ROCK.
TE2	MIN 200 DEEP x 200 WIDE THICKENED EDGE ON ROCK.
ST	MIN 200 DEEP x 350 WIDE THICKENING ON ROCK.
PF1	1000x1000x400 DEEP PAD FOOTING. 4N16 'U' BARS E.W. BOTTOM.
PF2	1200x1200x400 DEEP PAD FOOTING. 5N16 'U' BARS E.W. BOTTOM.
SJ	SAW JOINT - REFER DETAIL.
CJ	ABLEFLEX CONSTRUCTION JOINT.
T	3N12, 2000 LONG TRIMMER BARS TIED TO UNDERSIDE OF MESH

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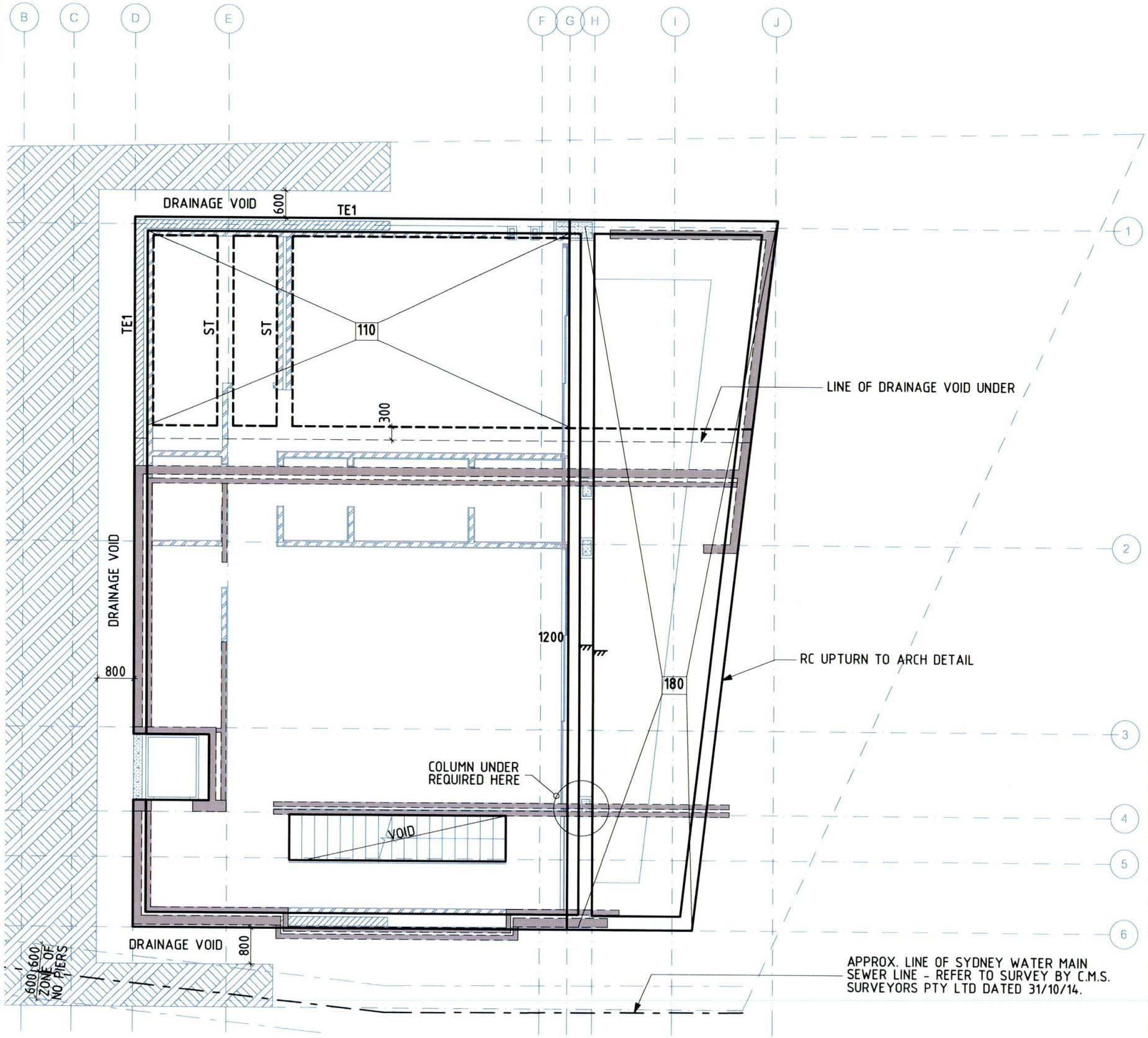
1	16.09.14	ISSUE FOR REVIEW ONLY	DI

ARCHITECT: BKH
CLIENT: VIMIERA PTY LTD

STATUS: ISSUE FOR REVIEW & CC SUBMISSION ONLY
DATE: SEPT 2014
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DESIGNED: DI
SCALE: REFER DWG
DRAWN: AI
PAGE SIZE: A3
CHECKED: DI
REVISION: 4
PROJECT NUMBER: 140806
DRAWING: GROUND FLOOR SLAB PLAN
DRAWING NUMBER: S03



	DENOTES LOAD BEARING WALLS UNDER
	DENOTES BRICKWORK WALLS OVER
	DENOTES BLOCKWORK WALLS OVER
	DENOTES CONCRETE WALLS OVER

U.N.O.	250 THICK SLAB.
180	DENOTES SLAB THICKNESS.
110	DENOTES 110 THICK SLAB ON GROUND, SL82 TOP.
150	DENOTES 150 THICK SUSPENDED SLAB, SL82 TOP & BOTTOM.
	DENOTES STEP IN SLAB
TE1	MIN 200 DEEP x 400 WIDE THICKENED EDGE ON ROCK.
ST	MIN 200 DEEP x 350 WIDE THICKENING ON ROCK.

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LEVEL 1 SLAB PLAN
1:100

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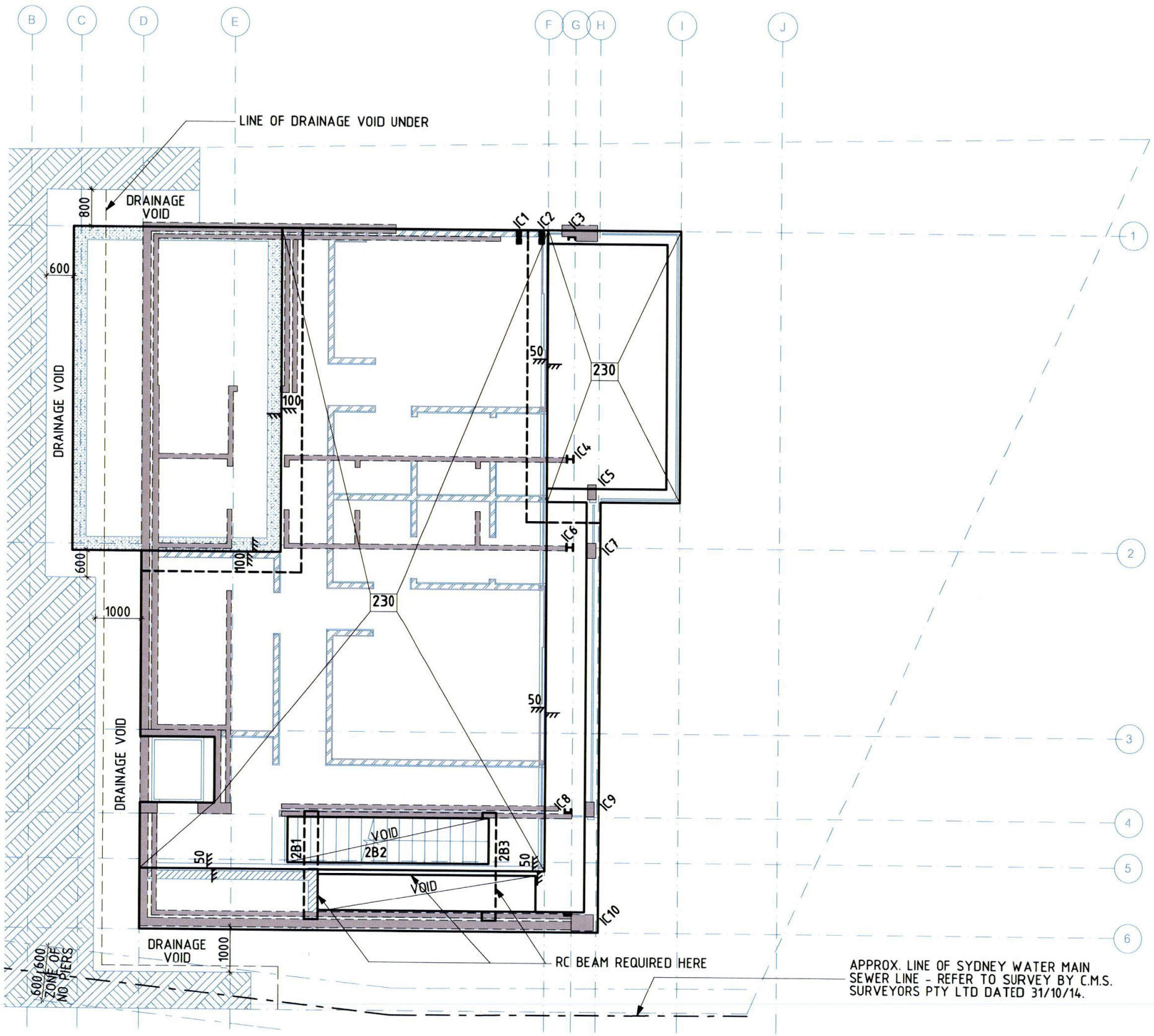
STATUS: ISSUE FOR REVIEW & CC SUBMISSION ONLY
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DRAWING: LEVEL 1 SLAB PLAN
DESIGNED: DI
DRAWN: AI
CHECKED: DI
SCALE: 1:100
PAGE SIZE: A3
REVISION: 4
DATE: SEPT 2014
PROJECT NUMBER: 140806
DRAWING NUMBER: S04



LEVEL 2 SLAB PLAN

1:100

U.N.O.	180 THICK SLAB.
230	DENOTES 230 THICK SUSPENDED SLAB, SL82 TOP.
	DENOTES STEP IN SLAB

DENOTES LOAD BEARING WALLS UNDER
DENOTES BRICKWORK WALLS OVER
DENOTES BLOCKWORK WALLS OVER
DENOTES CONCRETE WALLS OVER

MEMBER SCHEDULE		
MARK	SIZE	TYPE
2B1		BEAM
2B2		BEAM
2B3		BEAM
IC1		COLUMN
IC2		COLUMN
IC3		COLUMN
IC4		COLUMN
IC5		COLUMN
IC6		COLUMN
IC7		COLUMN
IC8		COLUMN
IC9		COLUMN
IC10		COLUMN

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1	16.09.14	ISSUE FOR REVIEW ONLY	DI

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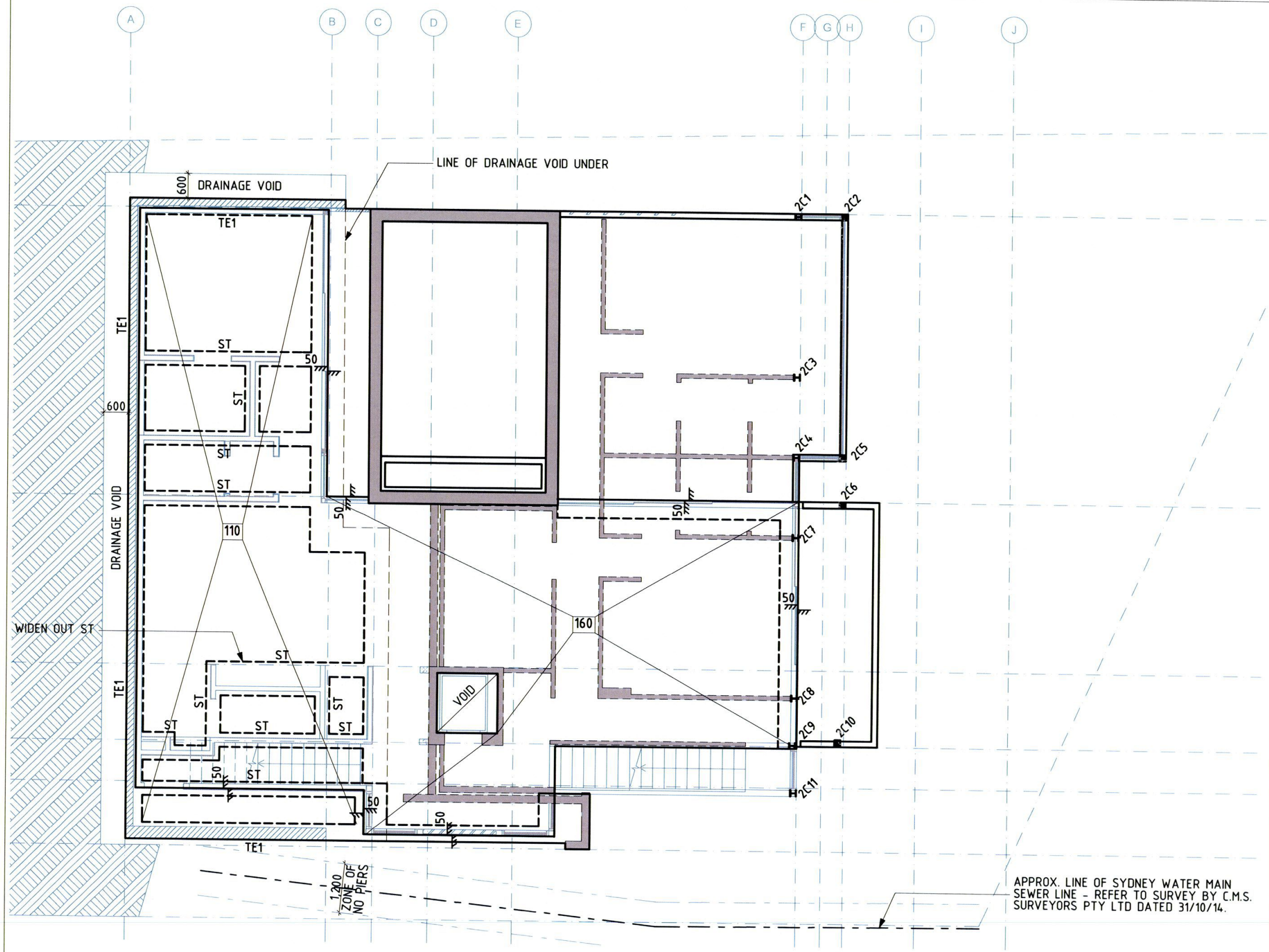
STATUS: ISSUE FOR REVIEW & CC SUBMISSION ONLY
DATE: SEPT 2014
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DESIGNED: DI
SCALE: 1:100
DRAWN: AI
PAGE SIZE: A3
CHECKED: DI
REVISION: 4
PROJECT NUMBER: 140806
DRAWING: LEVEL 2 SLAB PLAN
DRAWING NUMBER: S05



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U.N.O.	180 THICK SLAB.
160	DENOTES SLAB THICKNESS
110	DENOTES 110 THICK SLAB ON GROUND, SL82 TOP.
~~	DENOTES STEP IN SLAB
TE1	MIN 200 DEEP x 400 WIDE THICKENED EDGE ON ROCK.
ST	MIN 200 DEEP x 350 WIDE THICKENING ON ROCK.

MEMBER SCHEDULE		
MARK	SIZE	TYPE
2C1		COLUMN
2C2		COLUMN
2C3		COLUMN
2C4		COLUMN
2C5		COLUMN
2C6		COLUMN
2C7		COLUMN
2C8		COLUMN
2C9		COLUMN
2C10		COLUMN
2C11		COLUMN

	DENOTES LOAD BEARING WALLS UNDER
	DENOTES BRICKWORK WALLS OVER
	DENOTES BLOCKWORK WALLS OVER
	DENOTES CONCRETE WALLS OVER

LEVEL 3 SLAB PLAN
1:100

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1	16.09.14	ISSUE FOR REVIEW ONLY	DI

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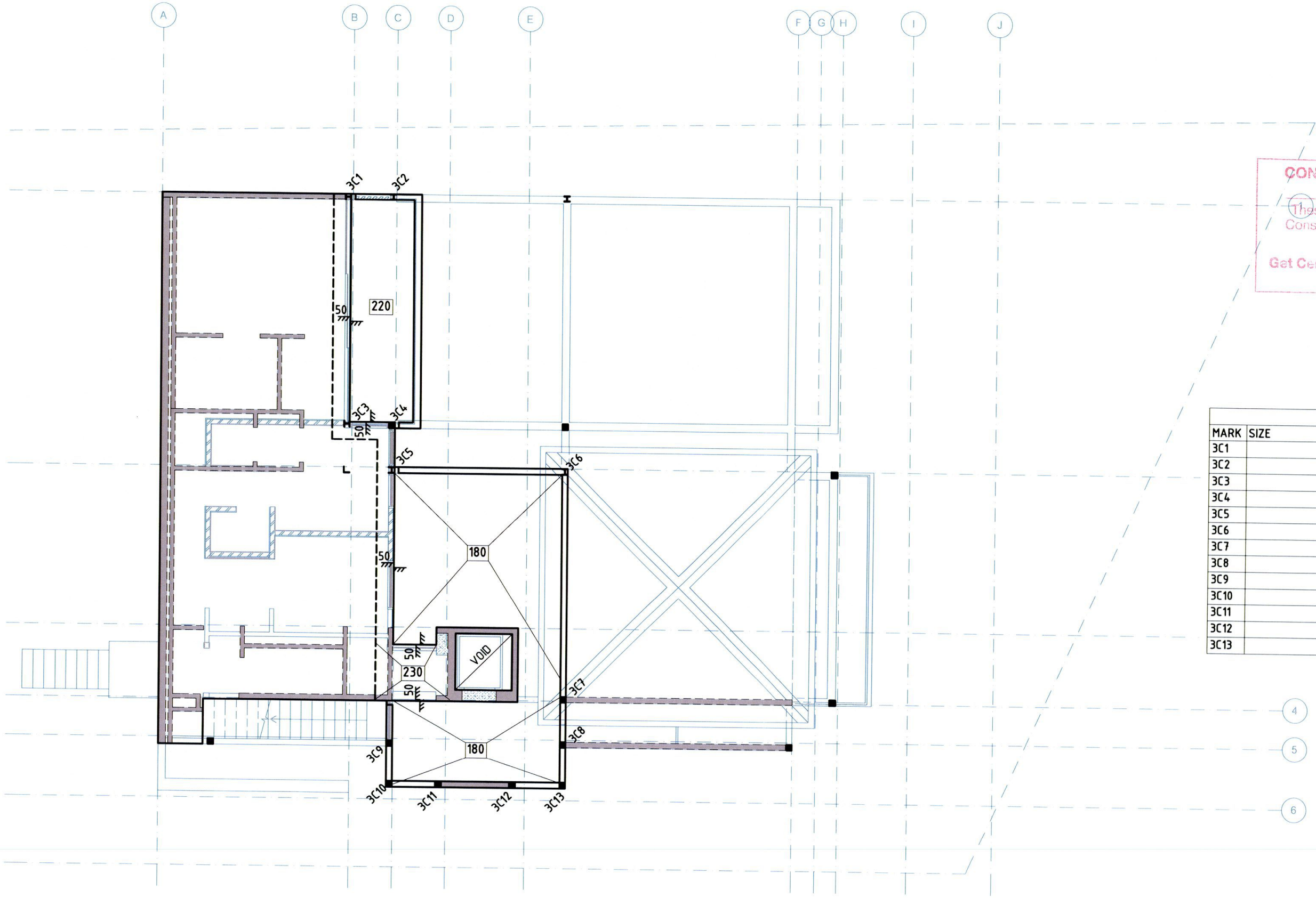
STATUS: ISSUE FOR REVIEW & CC SUBMISSION ONLY
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DRAWING: LEVEL 3 SLAB PLAN

DESIGNED	DI
SCALE	1:100
DRAWN	AI
PAGE SIZE	A3
CHECKED	DI
REVISION	4

DATE: SEPT 2014
PROJECT NUMBER: 140806
DRAWING NUMBER: S06



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U.N.O.	160 THICK SLAB.
180	DENOTES SLAB THICKNESS
	DENOTES STEP IN SLAB

MEMBER SCHEDULE		
MARK	SIZE	TYPE
3C1		COLUMN
3C2		COLUMN
3C3		COLUMN
3C4		COLUMN
3C5		COLUMN
3C6		COLUMN
3C7		COLUMN
3C8		COLUMN
3C9		COLUMN
3C10		COLUMN
3C11		COLUMN
3C12		COLUMN
3C13		COLUMN

	DENOTES LOAD BEARING WALLS UNDER
	DENOTES BRICKWORK WALLS OVER
	DENOTES BLOCKWORK WALLS OVER
	DENOTES CONCRETE WALLS OVER

LEVEL 4 SLAB PLAN

1:100

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1	16.09.14	ISSUE FOR REVIEW ONLY	DI

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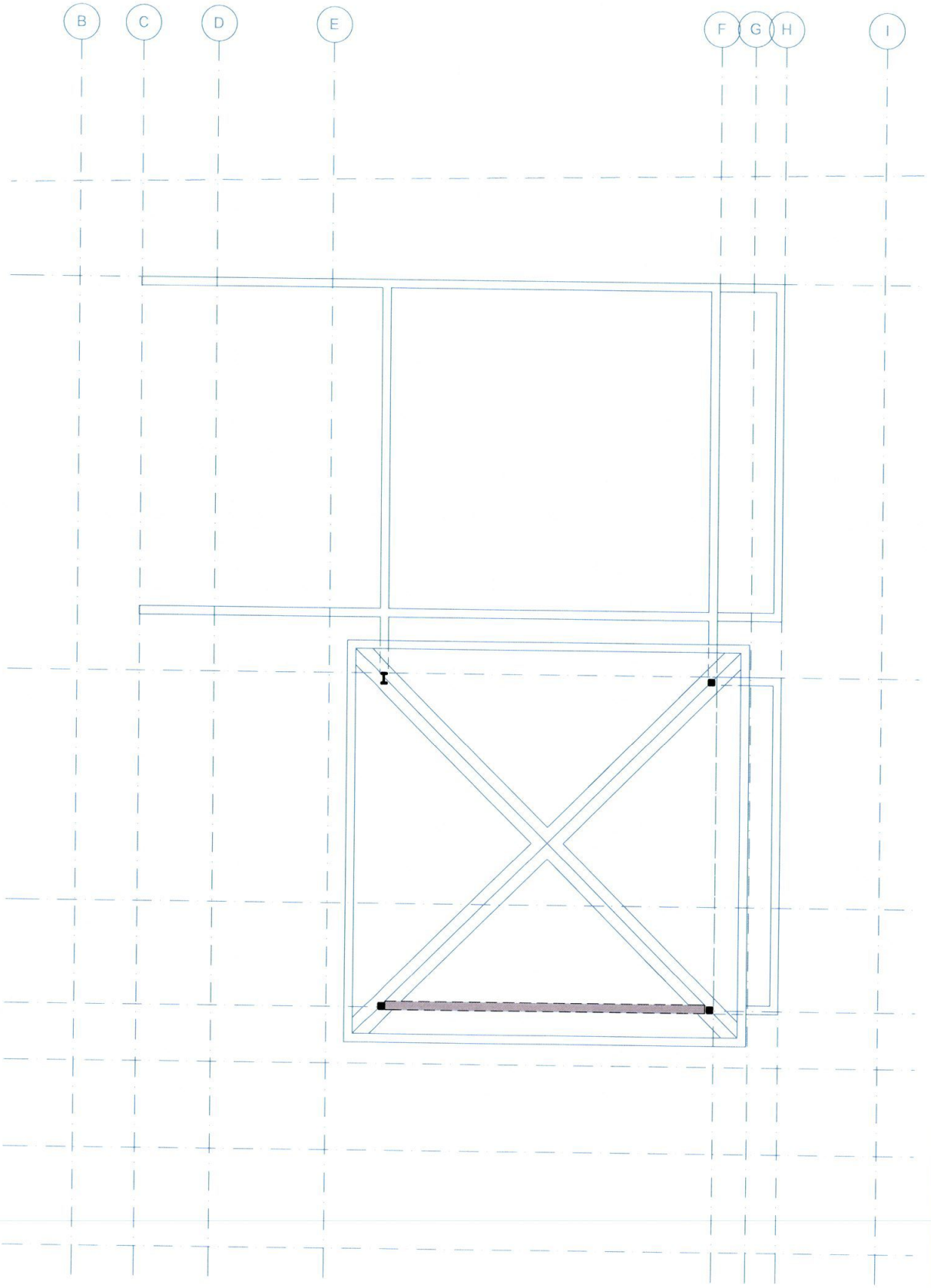
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DRAWING: LEVEL 4 SLAB PLAN
DESIGNED: DI
DRAWN: AI
CHECKED: DI
SCALE: 1:100
PAGE SIZE: A3
REVISION: 4
DATE: SEPT 2014
PROJECT NUMBER: 140806
DRAWING NUMBER: S07



LEVEL 4 ROOF FRAMING PLAN

1:100

DENOTES LOAD BEARING WALLS UNDER

NOTE:

- ALL LINTELS TO BEAR A MINIMUM OF 150 ON BRICKWORK WHERE WALL IS BRICKWORK.
- ALL BEAMS TO BEAR A MINIMUM OF 100 ON BRICKWORK WHERE WALL IS BRICKWORK.
- PROVIDE DOUBLE JOISTS UNDER ALL PARALLEL WALLS U.N.O.
- ALL TIMBER BEAM TO TIMBER BEAM CONNECTIONS TO BE WITH PRYDA SPLIT JOIST HANGERS U.N.O.

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2	17.10.14	ISSUE FOR REVIEW & CC SUBMISSION ONLY	DI
1	16.09.14	ISSUE FOR REVIEW ONLY	DI

ARCHITECT: BKH
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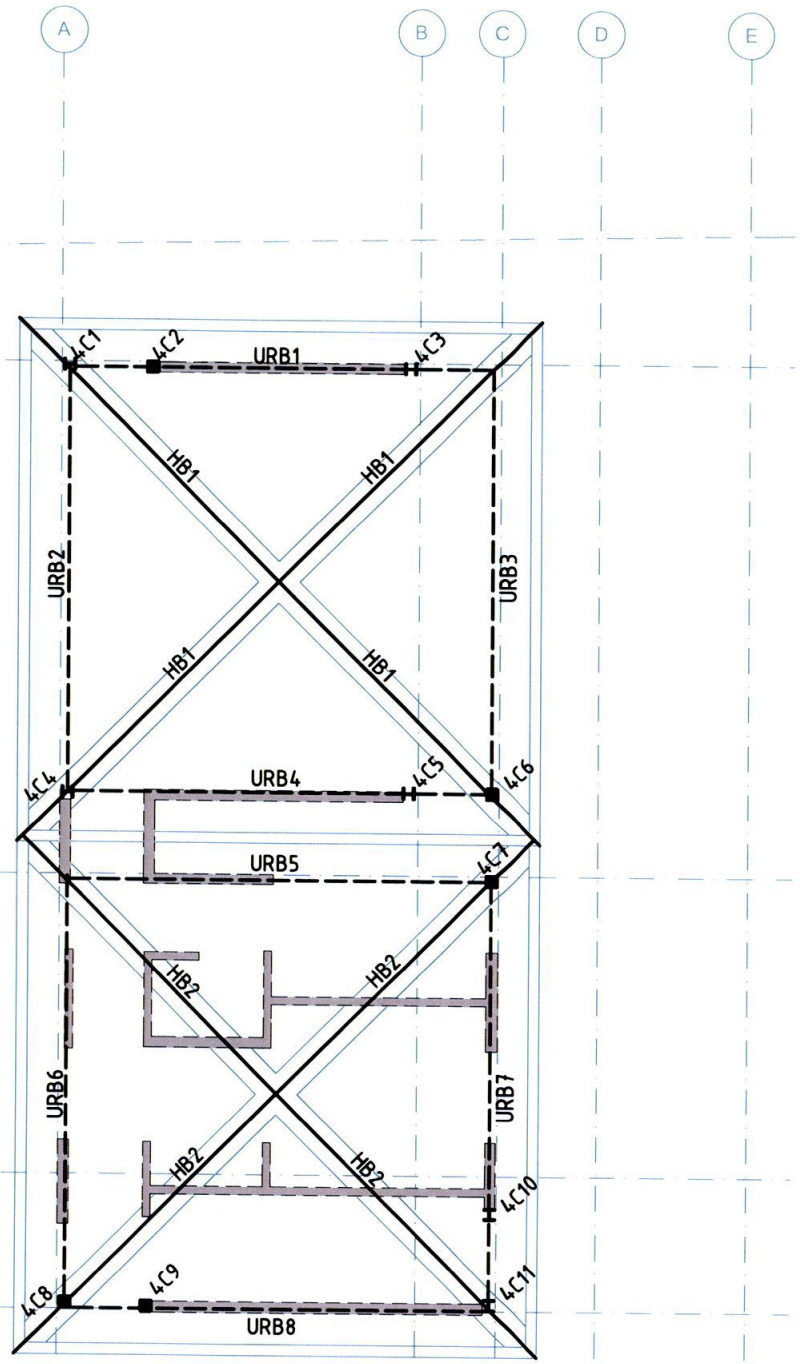
STATUS: ISSUE FOR REVIEW & CC SUBMISSION ONLY
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DRAWING: LEVEL 4 ROOF FRAMING PLAN
DESIGNED: DI
DRAWN: AI
CHECKED: DI
SCALE:
PAGE SIZE: A3
REVISION: 4
DATE: SEPT 2014
PROJECT NUMBER: 140806
DRAWING NUMBER: S08



UPPER ROOF FRAMING PLAN

1:100

DENOTES LOAD BEARING WALLS UNDER

MEMBER SCHEDULE		
MARK	SIZE	TYPE
URB1		ROOF BEAM
URB2		ROOF BEAM
URB3		ROOF BEAM
URB4		ROOF BEAM
URB5		ROOF BEAM
URB6		ROOF BEAM
URB7		ROOF BEAM
URB8		ROOF BEAM
HB1		HIP BEAM
HB2		HIP BEAM
4C1		COLUMN
4C2		COLUMN
4C3		COLUMN
4C4		COLUMN
4C5		COLUMN
4C6		COLUMN
4C7		COLUMN
4C8		COLUMN
4C9		COLUMN
4C10		COLUMN
4C11		COLUMN

NOTE:

- ALL LINTELS TO BEAR A MINIMUM OF 150 ON BRICKWORK WHERE WALL IS BRICKWORK.
- ALL BEAMS TO BEAR A MINIMUM OF 100 ON BRICKWORK WHERE WALL IS BRICKWORK.
- PROVIDE DOUBLE JOISTS UNDER ALL PARALLEL WALLS U.N.O.
- ALL TIMBER BEAM TO TIMBER BEAM CONNECTIONS TO BE WITH PRYDA SPLIT JOIST HANGERS U.N.O.

CONSTRUCTION CERTIFICATE
No. 14/216
These plans form part of the above Construction Certificate as issued by
Greg Mough of
Get Certified Building Services Pty Ltd
Accreditation No. BPB0186

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REV.	DATE	REVISION DESCRIPTION	BY
4	11.11.14	AMENDED TO SUIT REVISED ARCH DWGS	DI
3	21.10.14	GRIDLINES REVISED TO MATCH ARCHITECTURALS - ISSUE FOR REVIEW & CC SUBMISSION ONLY	DI
2	17.10.14	ISSUE FOR REVIEW & CC SUBMISSION ONLY	DI
1	16.09.14	ISSUE FOR REVIEW ONLY	DI

ARCHITECT: BKH
CLIENT: VIMIERA PTY LTD

STATUS: ISSUE FOR REVIEW & CC SUBMISSION ONLY
PROJECT: 2A LIVISTONA LANE, PALM BEACH
DRAWING: UPPER ROOF FRAMING PLAN

DESIGNED	SCALE
DI	1:100
DRAWN	PAGE SIZE
AI	A3
CHECKED	REVISION
DI	4

DATE: SEPT 2014
PROJECT NUMBER: 140806
DRAWING NUMBER: S09

mgp
building & infrastructure services pty limited
ACCREDITED SUPPLIER FOR SYDNEY WATER

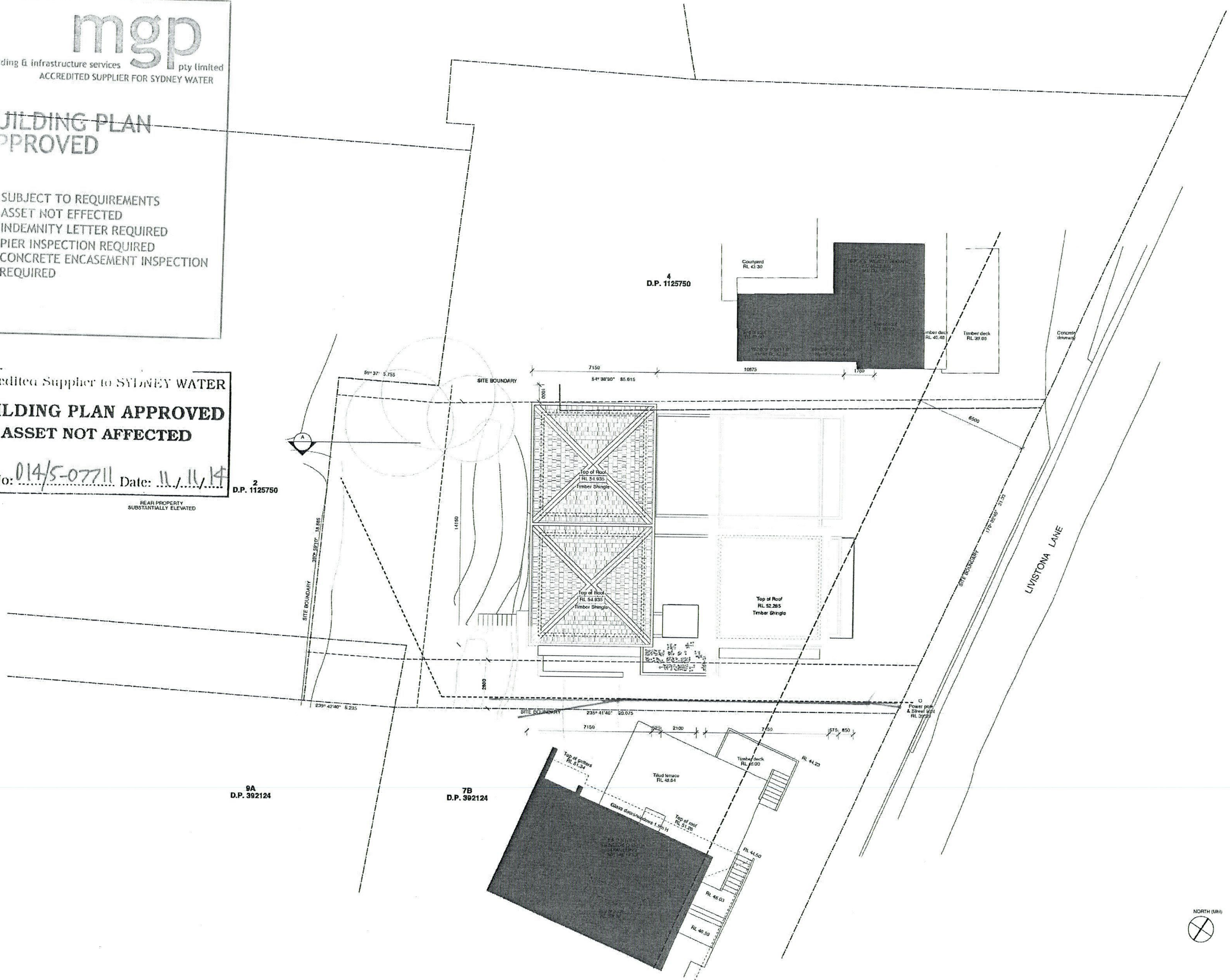
BUILDING PLAN APPROVED

( ) SUBJECT TO REQUIREMENTS
(X) ASSET NOT EFFECTED
( ) INDEMNITY LETTER REQUIRED
( ) PIER INSPECTION REQUIRED
( ) CONCRETE ENCASEMENT INSPECTION REQUIRED

Accredited Supplier to SYDNEY WATER

BUILDING PLAN APPROVED
ASSET NOT AFFECTED

Ref No: 014/5-07711 Date: 11/11/14



DRAWING LEGEND

- Proposed Masonry Structure
- Proposed Concrete Structure
- Proposed Reinforced Concrete Blockwork Structure
- Proposed Steel Structure
- Proposed Lightweight Structure
- Proposed Sandstone Structure
- Existing Soil - soil type unknown
- Proposed Soil

DRAWING NOTES

Refer to BASIX Certificate for thermal performance requirements, water and energy commitments.

All ceiling downlights to have fully sealed covers as per BASIX requirements.

1 CONSTRUCTION CERTIFICATE 22.10.2014

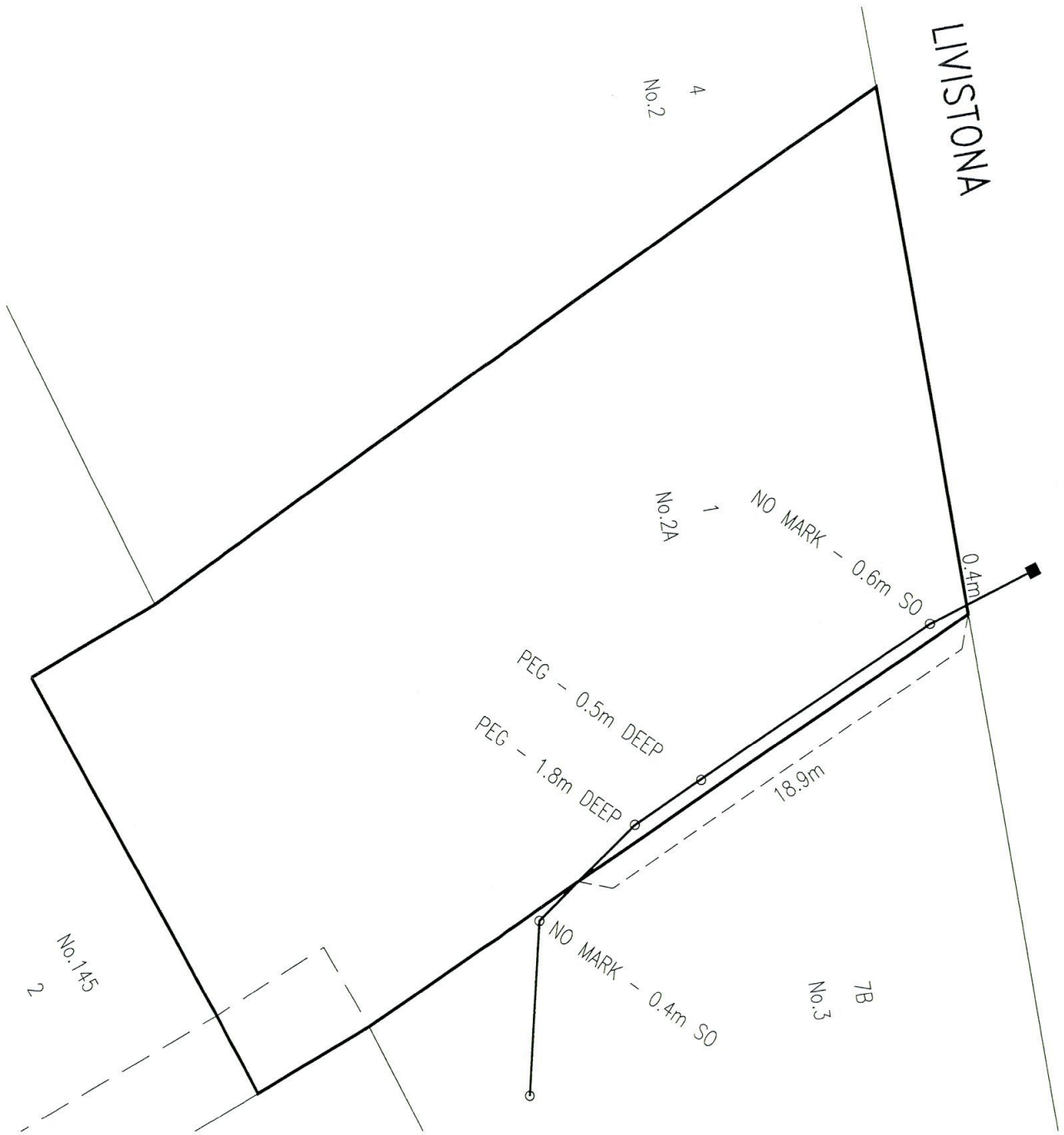
AMENDMENTS

NORTH (MM)

BALTER RESIDENCE
28 Livistona Lane Palm Beach
Lot 1, DP 1125750
CONSTRUCTION CERTIFICATE
DEVELOPMENT APPLICATION NO108/14
GENERAL ARRANGEMENT PLAN
ROOF

1:100 JE 25.09.2014 3316 A.01.06[1]

Sydney Water Stamped Plan



SITE PLAN
SCALE 1:250

LOCATION PLAN
NOT TO SCALE

NOTES:

1. I, Marc Gaudry OF MGP BUILDING & INFRASTRUCTURE SERVICES PTY LTD BEING ACCREDITED TO CARRY OUT A SERVICE PROTECTION REPORT, CERTIFY THAT THE INFORMATION SHOWN ON THIS REPORT HAS BEEN PREPARED IN ACCORDANCE WITH THE RELEVANT INSTRUCTIONS AND ACCEPT FULL RESPONSIBILITY FOR THE ACCURACY OF THE INFORMATION ON THIS REPORT. SIGN:
2. FOR THE PURPOSE OF THIS REPORT, 'BOUNDARY' REFERS TO FIXED STRUCTURES (FENCES, RETAINING WALLS, BUILDINGS ETC) USED TO TIE THE LOCATION OF THE SYDNEY WATER ASSET(S), AND MAY NOT ALWAYS CORRESPOND TO THE ACTUAL PROPERTY BOUNDARY AS IDENTIFIED ON THE PROPERTY REGISTERED SURVEY PLAN.
3. SEWER LOCATIONS MARKS ARE NOT NECESSARILY ON BOUNDARY.
4. DO NOT SCALE FROM THIS PLAN, USE DIMENSIONS ONLY.
5. SYDNEY WATER WAE RECORDS HAVE BEEN USED TO ASSIST IN DETERMINING THE LOCATION & DEPTH OF SEWER.
6. PLEASE NOTE THE ZONE OF INFLUENCE FOR SAND IS 2 IN 1. FOR ALL OTHER MATERIALS, THE ZONE OF INFLUENCE IS 1 IN 1.
7. STRATA: Rock
   PIPE SIZE: 150
   PIPE TYPE CICL

LEGEND:

SEWER MAIN		RODDING POINT	R.P.	JUNCTION (PCP)	
MAINTENANCE HOLE		VENT SHAFT (Induct or Educt)	V.S	CONCRETE ENCASED SECTION	CON.EN
MAINTENANCE SHAFT	MS	VERTICAL RISER	VERT	LAMP HOLE	

Water Servicing Coordinator
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Drawing
SERVICE PROTECTION REPORT
2A LIVISTONA LN
PALM BEACH

Drawn By	VA	Date	31.10.2014
Design By	MG	Scale	1: 250
Approved	MG	Sheet	1 OF 1
Job.No.	2014-0000		
Dwg.No.	SPR 1	Issue	01