PLANNING
BUILDING
HERITAGE
URBAN DESIGN

CITY PLAN SERVICES

11 December 2009

The General Manager
Manly Council
PO Box 82
MANLY NSW 1655

Dear Sir/Madam,

162-182 WOODLAND STREET, BALGOWLAH
DEVELOPMENT APPLICATION NO: 424/06
CONSTRUCTION CERTIFICATE NO: 28326

City Plan Services have 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. CC 28326
- Copy of application for Construction Certificate.
- Documentation used to determine the application for the Construction Certificate as detailed in Schedule 1 of the certificate.
- Notice of Appointment of Principal Certifying Authority.
- 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 Project Building Surveyor Chris Michaels on 8270-3500.

Yours faithfully

Chris Michaels
Director

Encl

$130.00
CW 662480 sent on 18/12/09.
18/12/09.

TELEPHONE 8270 3500
FACSIMILE 8270 3501
LEVEL 1, 364 KENT STREET
SYDNEY NSW 2000
WWW.CITYPLAN.COM.AU
ABN 30 075 223 353

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CITY PLAN SERVICES

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)

PROPOSAL

Address of land on which the work is to be carried out:	**162-182 Woodland Street, Balgowlah**
Description of building works covered by this Notice:	**Construction of Sylvan Avenue, through site link and associated landscape works**

APPLICANT

Name of person having benefit of the development consent:	**Stockland Development Pty Ltd**
Address:	**Level 25, 133 Castlereagh St, Sydney 2000**
Contact Details:	**Phone: (02) 9035 2764 Fax: (02) 8988 2764**

The applicant has appointed Chris Michaels as the Principal Certifying Authority as stated in the Construction Certificate Application lodged with City Plan Services for the building works identified in this Notice.

RELEVANT CONSENTS

Development Consent No:	**424/06**
Date of Development Consent:	**08/01/08**

PRINCIPAL CERTIFYING AUTHORITY	**Chris Michaels** for and on behalf of **City Plan Services Pty Ltd**
ACCREDITATION NUMBER	**BPB 0268**

That I, Chris Michaels, of City Plan Services located at Level 1, 364 Kent Street, Sydney 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 THIS **11th** **day** **of** **December** **2009**

Chris Michaels
Director

TELEPHONE 8270 3500 LEVEL 1 364 KENT STREET WWW.CITYPLAN.COM.AU
FACSIMILE 8270 3501 SYDNEY NSW 2000 ABN 30 075 223 353

PLANNING
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CITY PLAN SERVICES

CONSTRUCTION CERTIFICATE NO. 28326

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

APPLICANT	
Name of person having benefit of the development consent:	**Stockland Development Pty Ltd**
Address of applicant:	**L25, 133 Castlereagh Street, Sydney 2000**
Contact Details:	**Phone: (02) 9035 2764 Fax: (02) 8988 2764**
OWNER	
Name:	**Stockland Development**
Address:	**L25, 133 Castlereagh Street, Sydney 2000**
Contact Details:	**Phone: (02) 9035 2764 Fax: (02) 8988 2764**
DEVELOPMENT CONSENT	
Consent Authority/Local Government Area:	**Manly Council**
Development Consent No:	**424/06**
Date of Development Consent:	**08/01/08**
PROPOSAL	
Address of Development:	**162-182 Woodland Street, Balgowlah**
Building Classification:	**Class 10b**
Type of Construction:	**Type N/A**
Scope of building works covered by this Notice:	**Construction of Sylvan Avenue, through site link and associated landscape works**
Value of Construction Certificate (Incl GST):	**$770,000.00**
Plans and Specifications approved:	**Schedule 1**
Fire Safety Schedule:	**N/A**
Critical Stage Inspections:	**See attached Notice**
Exclusions:	**Nil**
Conditions (Clause 187 or 188 of the Environmental Planning & Assessment Regulation 2000):	**Nil**
PROJECT REGULATIONS CONSULTANT	Please contact **Chris Michaels** for any inquiries
CERTIFYING AUTHORITY	**Chris Michaels** for and on behalf of **City Plan Services Pty Ltd**
ACCREDITATION NUMBER	**BPB 0268**

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

DATED THIS **11th** **day** **of** **December** **2009**

Chris Michaels
Director

NB: Prior to the commencement of work S81A(2)(b)(i) and (ii) and (b2)(i) and (ii) and (iii) and (c) of the Environment Planning and Assessment Act 1979 must be satisfied.

TELEPHONE 8270 3500 LEVEL 1, 364 KENT STREET WWW.CITYPLAN.COM.AU
FACSIMILE 8270 3501 SYDNEY NSW 2000 ABN 30 075 223 353

PLANNING BUILDING HERITAGE LANDSCAPE URBAN DESIGN CITY PLAN SERVICES

SCHEDULE 1
APPROVED PLANS AND SPECIFICATIONS

1. Endorsed Civil plans prepared by BG&E Consulting Engineers P/L

Plan Title	Drawing No	Revision	Date
Earthworks and Grading	C-SK-21	3	14.10.09
Stormwater Plan	C-SK-22	6	14.10.09
Pavement Plan	C-SK-23	3	14.10.09
Setout Plan	C-SK-24	3	14.10.09
Details	C-SK-25	3	14.10.09
Erosion & Sediment control	C-SK-26	3	14.10.09
Road Reserve Works	C-SK-27	2	25.09.09

2. Endorsed Landscape plans prepared by Oculus

Plan Title	Drawing No	Revision	Date
Landscape surface finishes + setout plan	L_001	G	15.10.09
Landscape surface finishes + setout plan	L_002	E	01.10.09
Planting plan	L_003	F	01.10.09
Planting plan	L_004	F	01.10.09
Planting and pavement details	L_101	F	01.10.09
Bollard, raised platform and pavement details	L_102	F	01.10.09

3. Other documents relied upon

Title	Prepared By	Reference	Date
Construction Certificate Application	Stockland Development	-	03.11.09
Levy payment receipt	Long Service Payments Corporation	576746115	23.10.09
Residential Builders' Warranty Insurance	QBE	Policy No. 18-0010978-BWI-1 & 18-0010978-BWI-2	10.12.09
Email correspondence re: DA Conditions ANS03, ANS012	Abigroup Contractors	-	27.10.09
Correspondence re: Security Bond (DA Condition 016) & receipt.	Abigroup Contractors, Manly Council	Receipt # 00645842:001	22.10.09
Email correspondence re: DA Condition 089 & 090	Stockland Development	Section 88B Instrument & Strata Plan DP1134518	08.10.09
Survey Plan	Anthony Guy Mitchell	DP1134518	18.10.08
Site Waste Management Plan Data Sheet	WARD Civil Engineering	-	-
Design certification – Stormwater	BG&E Consulting Engineers P/L	-	29.07.09
Technical Specification – Building Structure	BG&E Consulting Engineers P/L	Rev. 01	03.12.07
Technical Specification – Civil works	BG&E Consulting Engineers P/L	Rev. 01	03.12.07
Technical Specification – Landscape	Oculus	Rev A	02.06.09

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CITY PLAN SERVICES

NOTICE TO APPLICANT OF CRITICAL STAGE INSPECTIONS

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

PROPOSAL

Address of land on which the work is to be carried out:	**162-182 Woodland Street, Balgowlah**
Description of building works covered by this Notice:	**Construction of Sylvan Avenue, through site link and associated landscape works**

APPLICANT

Name of person having benefit of the development consent:	**Stockland Development Pty Ltd**
Address:	**Level 25, 133 Castlereagh St, Sydney 2000**
Contact Details:	**Phone: (02) 9035 2764 Fax: (02) 8988 2764**

RELEVANT CONSENTS

Development Consent No:	**424/06**
Date of Development Consent:	**08/01/08**

INSPECTION BOOKING PROCESS

Please telephone the following number to book a critical stage inspection: Ph: **8270 3500**
A minimum period of 48 hours is to be provided

PRINCIPAL CERTIFYING AUTHORITY — **Chris Michaels** for and on behalf of **City Plan Services Pty Ltd**

ACCREDITATION NUMBER — **BPB 0268**

MANDATORY CRITICAL STAGE INSPECTIONS

That I, Chris Michaels, of City Plan Services located at Level 1, 364 Kent Street, Sydney acting as the principal certifying authority hereby give notice in accordance with Section 81A(2)(b1)(ii) of the Environmental Planning and Assessment Act 1979 to the person having the benefit of the development consent that the mandatory critical stage inspections identified in Schedule 1 & Schedule 2 are to be carried out in respect of the building work.

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

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

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

DATED THIS **11th** day of **December** **2009**

Chris Michaels
Director

TELEPHONE 8270 3500 LEVEL 1, 364 KENT STREET WWW.CITYPLAN.COM.AU
FACSIMILE 8270 3501 SYDNEY NSW 2000 ABN 30 075 223 353

PLANNING BUILDING HERITAGE LANDSCAPE URBAN DESIGN

CITY PLAN SERVICES

SCHEDULE 1
MANDATORY CRITICAL STAGE INSPECTIONS

NO.	CRITICAL STAGE INSPECTION	INSPECTOR
1.	After Excavation for, and prior to the placement of any footings	Certifying Authority
2.	Prior to pouring any in-situ reinforced concrete building element	Certifying Authority
3.	Prior to covering any stormwater drainage connections	Certifying Authority
4.	After the building work has been completed & prior to any occupation certificate being issued in relation to the building	Principal Certifying Authority

SCHEDULE 2
OTHER MANDATORY INSPECTION SPECIFIED BY THE PRINCIPAL CERTIFYING AUTHORITY

NO.	OTHER CRITICAL STAGE INSPECTIONS	INSPECTOR
	None have been specified in this instance	N/A

CONSTRUCTION CERTIFICATE APPLICATION

Made under the *Environmental Planning and Assessment Act 1979* Sections 81A(2), 109C(1)(b)

IDENTIFICATION OF BUILDING

Address 162-182 Woodland Street,

Lot, DP/MPS etc PT1 DP 1134156.

Suburb or town Balgowlah Post Code 2093

DESCRIPTION OF DEVELOPMENT

Detailed Description: Construction of Sylvan Avenue, through site link and associated landscape works

APPLICANT

Name of person having benefit of the development consent:

Name Tim Beattie Company Stockland

Address L25, 133 Castlereagh St

Suburb or town Sydney Post Code 2000

Phone B/H 90352764 Fax No 89882764

Mobile 0434602791 Email tim.beattie@stockland.com.au

As the applicant, I/we hereby submit this Construction Certificate Application under the Environmental Planning & Assessment Act 1979, with City Plan Services Pty Ltd.

Signature of applicant: X Sign _____ Date 3.11.09

CONSENT TO ALL OWNER(S)

Name Tim Beattie for Company Stockland

Address As above

Suburb or town _____ Post Code _____

Phone B/H _____ Fax No _____

Mobile _____ Email _____

As the owner of the above property:

1. *I/we consent to this application; and*
2. *I/we appoint* ☐*Brendan Bennett/* ☑*Chris Michaels/* ☐*Adam DeLooze/* ☐*Tony Truong of City Plan Services Pty Ltd as the Principal Certifying Authority for the building work identified in this application.*

Signature of Owner X Sign _____ Date 3.11.09

Schedule 1 information to be
Collected for ABS Particulars of the proposal

DESCRIPTION

What is the area of the land (m^2) 852 m^2

Gross floor area of existing building (m^2) –

What are the current uses of all or parts of the building(s)/land?

(If vacant state vacant) Vacant

Location	Use

Does the site contain a dual occupancy? No

What is the gross floor area of the proposed addition or new building (m^2) –

What are the proposed uses of all parts of the building(s)/land?

Location	Use
All	Road / Footpath

Number of pre-existing dwellings –

Number of dwellings to be demolished –

How many dwellings are proposed? –

How many storeys will the building consist of? –

MATERIALS TO BE USED

NA.

Walls	Code		Roof	Code	
Brick veneer	12		Aluminium	70	
Full brick	11		Concrete	20	
Single brick	11		Concrete tile	10	
Concrete block	11		Fibrous cement	30	
Concrete/ masonary	20		fibreglass	80	
Concrete	20		Masonry/terracott a shingle tiles	10	
Steel	60		Slate	20	
Fibrous cement	30		Steel	60	
Hardiplank	30		Terracotta tile	10	
Timber/weatherboard	40		Other	80	
Cladding aluminium	70		Unknown	90	
Curtain glass	50				
Other					
Unknown	90				

Floor	Code		Frame	Code	
Concrete	20		Timber	40	
Timber	10		Steel	60	
Other	80		Other	80	
Unknown	90		Unknown	90	

Part 2 of 2

Item No.	Proposed New Measure	Is this measure Installed in the Building? Yes or No	If yes, enter the current standard of performance (eg: BCA Clause E1.5 & AS2118.1-1999)
1	Access Panels, doors and hoppers to fire resisting shaft		
2	Automatic fail safe devices		
3	Automatic fire detection and alarm system		
4	Automatic fire suppression system (sprinkler)		
5	Automatic fire suppression system (others – specify)		
6	Emergency lighting		
7	Emergency lifts		
8	Emergency warning and intercommunication system		
9	Exit signs		
10	Fire control centres and rooms		
11	Fire dampers		
12	Fire doors		
13	Fire hydrant systems		
14	Fire seals (protecting openings in fire resisting components of the building)		NA
15	Fire shutters		
16	Fire windows		
17	Hose reel system		
18	Light weight construction		
19	Mechanical air handling systems		
20	Paths of travel stairways passageways or ramps		
21	Perimeter vehicle access for emergency vehicles		
22	Portable fire extinguishers		
23	Pressurising system		
24	Required (automatic) exit doors		
25	Safety curtains in proscenium openings		
26	Smoke and Heat Vents		
27	Smoke Control System		
28	Smoke dampers		
29	Smoke detectors and heat detectors		
30	Smoke doors		
31	Solid-Core doors		
32	Stand-By Power Systems		
33	Wall wetting sprinkler and drencher systems		
34	Warning and operational signs		
35	OTHERS - Specify		

This is an accurate statement of all proposed Fire Safety Measures to be installed/ modified in the whole building.

Signed ..... (Owner/ Agent) Name ..... Date .....

NOTES
For Completing Construction Certificate Application

Note 1

LONG SERVICE
BUILDING & CONSTRUCTION

16 December 2009

Building and Construction Industry
Long Service Payments Corporation
Level 1
19-21 Watt Street
Gosford NSW 2250
Locked Bag 3000
Central Coast MC NSW 2252
Tel: 13 14 41
Fax: (02) 9287 5685
Email: info@lspc.nsw.gov.au
www.lspc.nsw.gov.au
ABN 93 646 090 808

ABIGROUP CONTRACTORS PTY LTD
402 SYDNEY ROAD
BALGOWLAH NSW 2093

As per your request for a copy of your receipt no. 00074738 dated 23 October 2009, the following information is provided:

Received from: (Name of person or organisation paying for levy)	the amount of
ABIGROUP CONTRACTORS PTY LTD	**$2,450.00**

Payment details:

Online 00576746115 $2,450.00

being payment for Long Service Levy as detailed below

Levy Payment Form number	5002086
Council/Department/Authority	MANLY COUNCIL
D.A. Number	424/06
Work address	162-182 WOODLAND STREET BALGOWLAH NSW 2093
Estimated value of work	$700,000.00
Levy payable (No exemption)	**$2,450.00**
Total levy paid	**$2,450.00**

Signed:

Date 16/12/09

83846

Residential Builders' Warranty Insurance

Policy Schedule - Builder
Policy Number: 18-0010978-BWI-1
Date Issued: 10/12/2009

LEVEL 3, 85
HARRINGTON ST
SYDNEY
NSW 2000
Phone: PHONE:8275 9999
Fax: 02 8275 9330
ABN: 78 003 191 035
AFS License No: 239545

QBE

Name of Intermediary
MILLER & ASSOCIATES INSURANCE BROKING PTY LTD
LEVEL 16, 383 KENT STREET SYDNEY
NSW 2000

Account Number
18-0000294

Policy Schedule Details

Builder	ABIGROUP CONTRACTORS PTY LTD
ABN/ACN	40 000 201 516
Business Address	924 PACIFIC HIGHWAY GORDON 2072
Licence Registration Number	U:28320
Category of Work	RESIDENTIAL BUILDING WARRANTY
Period of Eligibility	10/12/2009 - 10/12/2010
Maximum Eligible Insured Total Value of Residential Construction	$1,000,000.00
Approved State of Risk	NSW

Maximum Contract Value of Any One Residential Job

SINGLE DWELLING - ALL	$1,000,000.00
ALTERATIONS AND ADDITIONS STRUCTURAL	$1,000,000.00
ALTERATIONS AND ADDITIONS NON STRUCTURAL	$100,000.00

Please note the following important conditions of eligibility:-

1. This Certificate of Eligibility cannot be used as a Certificate of Insurance as required under the individual state statute.
2. The only evidence of insurance is a separate and original Certificate of Insurance issued by QBE.
3. This Certificate of Eligibility can be cancelled at any time at the absolute discretion of QBE in the event of not meeting QBE's financial and building performance underwriting criteria as assessed from time to time.
4. Any request for insurance in excess of the above listed maximum contract values will not be accepted and the builder will have to submit a Builders Warranty Insurance Change Application for approval.
5. If eligibility is revoked, QBE is obliged to advise the relevant state authority accordingly.
6. If Registration is not issued or renewed by the relevant state authority, this Eligibility does not apply.
7. If the Builder purchases Home Warranty Insurance elsewhere this Eligibility is cancelled immediately.

Premium and Charges

Admin Fee	GST	Total Fee
$0.00	$0.00	$0.00

Residential Builders' Warranty Insurance

Certificate of Insurance
Policy Number: 18-0010978-BWI-2
Date Issued: 10/12/2009

LEVEL 3, 85
HARRINGTON ST
SYDNEY
NSW 2000
Phone: PHONE:8275 9999
Fax: 02 8275 9330
ABN: 78 003 191 035
AFS License No: 239545

QBE

	Name of Intermediary	**Account Number**
STOCKLAND DEVELOPEMNT PTY LTD LEVEL 25 133 CASTLEREAGH STREET SYDNEY NSW 2000	MILLER & ASSOCIATES INSURANCE	18-0000294

Policy Schedule Details

Certificate in Respect of Insurance

Residential Building Work by Contractors

A contract of insurance complying with Sections 92 and 96 of the Home Building Act 1989 has been issued by QBE Insurance (Australia) Limited ABN 78 003 191 035, in respect of Residential Building Work as described in the Schedule herein.

In Respect of	ALTERATIONS AND ADDITIONS STRUCTURAL
At	162 - 182 WOODLAND STREET BALGOWLAH NSW 2093
Carried Out By	BUILDER ABIGROUP CONTRACTORS PTY LTD ABN: 40 000 201 516
Declared Contract Price	$700,000.00
Contract Date	30/09/2009
Builders Registration No.	U:28320
Building Owner / Beneficiary	STOCKLAND DEVELOPEMNT PTY LTD

Subject to the Act and the Home Building Regulation 2004 and the conditions of the insurance contract, cover will be provided to the Building Owner/Beneficiary named in the domestic building contract and to the successors in title to the Building Owner/Beneficiary or the immediate successor in title to the contractor or developer who did the work and subsequent successors in title.

For and behalf of

QBE Insurance (Australia) Limited

IMPORTANT NOTICE:
This Certificate must be read in conjunction with the Policy Wording and kept in a safe place.
These documents are very important and must be retained by you and any successive owners of the property for the duration of the statutory period of cover.

Chris Michaels

From: Nicholas Kordas [Nicholas.Kordas@Abigroup.com.au]
Sent: Tuesday, 27 October 2009 1:09 PM
To: Brendan Bennett
Cc: Chris Michaels; Huw Evans
Subject: FW: DA 424/06 ANS 03 AND ANS 12 / 162 -182 woodland street Balgowlah

Importance: High

Brendan / Chris

For the purposes of the stage 1 construction certificate for Sylvan Avenue, please note below confirmation email from Council in reference to ANS 03 and ANS 12.

If you require further assistance please do not hesitate to contact me.

Regards
Nick Kordas
Design Manager
Abigroup

From: Rob Michael [mailto:Rob.Michael@manly.nsw.gov.au]
Sent: Tuesday, October 27, 2009 12:05 PM
To: Nicholas Kordas
Cc: Bill Adamopoulos; Tony Goninon; Maran Muthiah
Subject: RE: DA 424/06 ANS 03 AND ANS 12 / 162 -182 woodland street Balgowlah

Dear Nick,

In accordance with our meeting Council has no objection to the proposed stage 1 Road Reserve works as per DA condition ANS 03 and ANS 12 of obtaining the Construction certificate.

As advised, please contact Council for formwork inspections prior to construction of the stage 1 works.

Further inspections will be required for the stage 2 works set out by Council as per our site meeting to obtain the final stage Occupational certificate.

Please obtain all relevant drainage details for Maran..

Thank you,

Regards,
Rob Michael
Engineer -Infrastructure and Services
Manly Council
9976-1621

From: Nicholas Kordas [mailto:Nicholas.Kordas@Abigroup.com.au]
Sent: Wednesday, 21 October 2009 1:18 PM
To: Rob Michael
Cc: Maran Muthiah
Subject: FW: DA 424/06 ANS 03 AND ANS 12 / 162 -182 woodland street Balgowlah
Importance: High

Rob / Maran,

In accordance with our on site meeting on Tuesday 13 October 09 at 2.15pm we hereby confirm the following;

Identified at the meeting we proposed the design to the stage 1 road reserve works consisting of the main entry driveway as a concrete finish, as well as modifications to the existing and proposed stormwater pits (as per drawing CSK-27 Rev 2 attached and presented at the site meeting) as required for the DA 424/06 DA Condition ANS 03 and ANS 12 for the purposes of obtaining the construction certificate.

Please also note the drawing CSK-27 Rev 2 (attached) does include the additional requirement's identified by Council regarding the concrete encasement of the proposed pipe across the driveway , the 1200x100 opening through kerb as well as the requested long section and cross sections.

It was also explained by Council that after receiving the construction certificate but prior to proceeding with works on site, the contractor is required to contact Council for an inspection.

Trusting this serves to confirm and as requested on site I await Council confirmation reply email confirming Council is satisfied with the design to the road reserve.

Thankyou

Regards
Nick Kordas
Design Manager
Abigroup

From: Nicholas Kordas
Sent: Friday, October 09, 2009 1:06 PM
To: 'maran.muthiah@manly.nsw.gov.au'
Subject: FW: DA 424/06 ANS 03 / 162 -182 woodland street Balgowlah

Maran
Thankyou for your recent discussion.

Just to confirm our meeting on site for Tuesday 13 October 09 at 2.15pm.

Please find attached information previously issued to Mr Rob Michael.

See you then
Regards
Nick Kordas
Design Manager
Abigroup

From: Nicholas Kordas
Sent: Wednesday, September 23, 2009 3:19 PM
To: 'rob.michael@manly.nsw.gov.au'
Subject: DA 424/06 ANS 03 / 162 -182 woodland street Balgowlah

Rob
Firstly thankyou for your time this morning to discuss the proposed driveway located Woodland Street. You will notice in our submission that our engineers have previously presented the proposed Driveway and stormwater design works with Mr Maran Muthiah of Council.

Once again thankyou for your co operation and I will formally submit to Council this afternoon hard copies which include A1 size drawing of the driveway.

Please fell free any time to contact me if you require further assistance.

Regards

Nick Kordas

Abigroup
Design Manager

The Village, Balgowlah
402 Sydney Road Balgowlah

Mobile: 0406 752 172
Phone: 9430 9900
Fax: 9430 9999
Email: nkordas@abigroup.com.au

Abigroup
Constructing Australia's Future

22 October 2009

Manly Council
1 Belgrave Street,
MANLY NSW 2095

Attention: Mr Ross Fleming

Dear Ross,

Re: Development Application No. 424/06
162-182 Woodland Street Balgowlah NSW 2093
Security (DA Compliance Bonds)

Please find attached security bonds for the following applicable DA Condition relating to the abovementioned development:

- DA Condition DA016 – $30,000 security bond relating to compliance with Conditions of Consent and as security against damage to Council Property during the works on the site.

Should you have any further queries, or require amendments to be made to the submitted documentation, please do not hesitate to contact the undersigned.

Yours faithfully,
ABIGROUP CONTRACTORS PTY LIMITED

STEPHEN SURJAN
Construction Manager

Attach.

Acknowledgement of receipt of Security Bonds by Manly Council

Date: 22/10/09

Name: B WOOD

Signature: Barbara Woods

CUSTOMER SERVICE CENTRE

211635 - 2192

AUSTRALIA AND NEW ZEALAND BANKING GROUP LIMITED
ABN 11 005 357 522

Bank Guarantee No: P743309N

UNCONDITIONAL UNDERTAKING

At the request of **Abigroup Contractors Pty Ltd ABN 40 000 201 516** of 924 Pacific Highway Gordon NSW 2072 (the "Contractor") and in consideration of **Manly Council ABN 43 662 868 065** (the "Principal") accepting this undertaking in respect of the Contract for **security of compliance with the Conditions of Consent, and as security against damage to Council property during work on the site (Sylvan Avenue)** (the "Project"), **Australia and New Zealand Banking Group Limited ABN 11 005 357 522** (the "Financial Institution") unconditionally undertakes to pay on demand any sum or sums which may from time to time be demanded by the Principal to a maximum aggregate sum of **AUD $30,000.00 (Thirty Thousand Australian Dollars and Nil Cents ONLY)** (the "Sum").

The undertaking is to continue until notification has been received from the Principal that the Sum is no longer required by the Principal or until this undertaking is returned to the Financial Institution or until payment to the Principal by the Financial Institution of the whole of the Sum or such part as the Principal may require.

Should the Financial Institution be notified in writing, signed by the Principal that the Principal desires payment to be made of the whole or any part or parts of the Sum, it is unconditionally agreed that the Financial Institution will make the payment or payments to the Principal forthwith without reference to the Contractor and notwithstanding any notice given by the Contractor not to pay same.

Provided always that the Financial Institution may at any time without being required so to do pay to the Principal the sum less any amount or amounts it may previously have paid under this undertaking or such lesser sum as may be required and specified by the Principal and thereupon the liability of the Financial Institution hereunder shall immediately cease.

The Principal may not assign its rights under this undertaking without the written consent of the Financial Institution and the Contractor.

Payment will only be made on the same day as a demand is delivered if that demand is made before 2pm on that day.

This undertaking is governed by the laws of **New South Wales**.

Executed on the **Sixteenth** day of **October, 2009** in **Sydney, New South Wales**.

Executed as a deed poll for and on behalf of)
Australia and New Zealand Banking Group)
Limited ABN 11 005 357 522 under Power of)
Attorney dated 18 November 2002)
registered in New South Wales, Book 4376)
No.410 by **JOSHUA CROSS**)
who certifies that he/she is a Manager and)
that he/she has received no notice of)
revocation of that Power in the presence of)
)
)

.....
Signature of Attorney

AUSTRALIA AND NEW ZEALAND BANKING GROUP LIMITED
Lending Client Services
20 Martin Place
Sydney
A.B.N. 11 005 357 522

JACK MA
Full name of Witness

.....
Signature of Witness

COMMONWEALTH BANK
EFTPOS
MANLY COUNCIL
MANLY NSW

TERMINAL: 12736200
REFERENCE: 000927

CUSTOMER COPY

CARD NO: 4564-9143(I)
PAN SEQ NO: 08
EXPIRY DATE: 10/10
AID: A0000000031010
TVR: 0000088000
TSI: F800
ATC: 00002
TC: 06D6B6433A80B8D7

CREDIT
PURCHASE $110.00
TOTAL AUD $110.00

22 OCT 2009 14:24
Visa Credit
AUTH NO.: 876272

APPROVED 08

TAX INVOICE/RECEIPT
ABN 61436628695
Manly Council
PO Box 82
MANLY NSW 1655
Ph 9976 1500 Fax 9976 1400
Email: records@manly.nsw.gov.au
Website: www.manly.nsw.gov.au

Date 22/10/2009 14:25
Receipt 00/150342:0002 Terminal 14335
M Kordas

Details Amount

Boat Boarding Fee 110.00
GST 10.00
Invoice/Receipt Total: 110.00

Total Taxable: 100.00
Total GST Payable: 10.00

Total Value Tendered 110.00
Credit 110.00
Change 0.00

Thank you for Prompt Payment

Chris Michaels

From: Huw Evans [Huw.Evans@stockland.com.au]
Sent: Friday, 9 October 2009 3:35 PM
To: Chris Michaels
Subject: FW: Sylvan Ave Registered POS
Attachments: DP1134518.pdf; 88B for DP1134518.pdf; Check list 090511.xls; Sylvan Avenue works - DA condition 89, 90 easements

Chris,

Attached is the registered strata plan and 88b indicating the easements required by DA condition DA089 and DA090 for woodland St.

Regards

Huw

-----Original Message-----
From: Nicholas Kordas [mailto:Nicholas.Kordas@Abigroup.com.au]
Sent: Thursday, 8 October 2009 8:33 AM
To: Huw Evans
Subject: FW: Sylvan Ave Registered POS

Hue
Thankyou for that

Can you please issue to CPS for their review as part of the CC process in relation to DA089 and DA 090.

Please refer to the checklist
Regards
Nick

-----Original Message-----
From: Huw Evans [mailto:Huw.Evans@stockland.com.au]
Sent: Wednesday, October 07, 2009 4:33 PM
To: Nicholas Kordas
Subject: FW: Sylvan Ave Registered POS

<DP1134518.pdf>> Hi <<88B for DP1134518.pdf>> Nick,

Attached are the details of the easement registration required for the Sylvan Ave CC

Regards

Huw

-----Original Message-----
From: Lisa Sorrentino
Sent: Wednesday, 7 October 2009 4:24 PM
To: Huw Evans
Subject: Sylvan Ave Registered POS

As discussed, and S88B

Stockland Notice: If this communication has been sent to you by mistake, please delete and notify us. If it has been sent to you by mistake, legal privilege is not waived or lost and you are not entitled to use it in any way. Stockland and its subsidiaries reserve the right to monitor e-mail communication through its networks.

DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 1 of 2 sheet(s)

SIGNATURES, SEALS and STATEMENTS of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919, AS AMENDED IT IS INTENDED TO CREATE:

1. EASEMENT FOR PUBLIC FOOTWAY VARIABLE WIDTH LIMITED IN STRATUM (A)
2. EASEMENT FOR SERVICES VARIABLE WIDTH (B)
3. EASEMENT FOR LIGHT AND AIR AFFECTING THE WHOLE OF THE LOT
4. EASEMENT FOR CONSTRUCTION PURPOSES AFFECTING THE WHOLE OF THE LOT
5. RIGHT OF ACCESS VARIABLE WIDTH LIMITED IN STRATUM (F)
6. RIGHT OF ACCESS VARIABLE WIDTH LIMITED IN STRATUM (M)
7. RIGHT OF CARRIAGEWAY VARIABLE WIDTH LIMITED IN STRATUM (N)
8. EASEMENT FOR PARKING 2.1 WIDE LIMITED IN STRATUM (L)
9. EASEMENT FOR OVERLAND FLOW AFFECTING THE WHOLE OF THE LOT
10. EASEMENT FOR OVERLAND FLOW AFFECTING THE WHOLE OF THE LOT
11. EASEMENT FOR DRAINAGE AND OVERLAND FLOW 2 WIDE (G)
12. EASEMENT FOR DRAINAGE AND OVERLAND FLOW 2 WIDE (H)
13. EASEMENT FOR SUPPORT VARIABLE WIDTH (P)
14. EASEMENT FOR LANDSCAPING AND PEDESTRIAN PATHWAY VARIABLE WIDTH (Q)

SEE ADDITIONAL SHEETS FOR SIGNATURES

Use PLAN FORM 6A for additional certificates, signatures, seals and statements

Crown Lands NSW/Western Lands Office Approval

I.....in approving this plan certify
(Authorised Officer)
that all necessary approvals in regard to the allocation of the land shown herein have been given

Signature:.....
Date:.....
File Number:.....
Office.....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed subdivision set out herein
(insert 'subdivision' or 'new road')

OSlang
.....
* Authorised Person/~~General Manager/Accredited Certifier~~

Consent Authority: Manly Council
Date of Endorsement: 21.8.09
Accreditation no: N/A
Subdivision Certificate no: 4482/5
File no: 4482/5

* Delete whichever is inapplicable.

DP1134518

Registered: 28.09.2009
Title System: TORRENS
Purpose: SUBDIVISION

PLAN OF SUBDIVISION OF LOT A DP382578 AND LOTS A & B DP162462 & EASEMENTS OVER LOT 201 DP1065493, LOT 7 DP9650, LOT 2 DP303359, LOT 25 DP8949 & LOTS A & B DP347250

LGA: MANLY
Suburb/Locality: BALGOWLAH
Parish: MANLY COVE
County: CUMBERLAND

Surveying Regulation, 2006

I, ANTHONY GUY MITCHELL
of STRATASURV PO BOX 305 FIVE DOCK NSW 2046
a surveyor registered under the *Surveying Act, 2002*, certify that the survey represented in this plan is accurate, has been made in accordance with the *Surveying Regulation, 2006* and was completed on: 18-08-2008

The survey relates to LOTS 21 & 22

(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature ..... *Dated:* 03/07/2009
Surveyor registered under the Surveying Act, 2002

Datum Line: "X" - "Y"
Type: Urban/~~Rural~~

Plans used in the preparation of survey/compilation

DP776824	DP1102617	DP347250	DP1065493	DP8949
DP9650	DP499756	DP864555	DP162462	

(if insufficient space use Plan Form 6A annexure sheet)

SURVEYOR'S REFERENCE: 2220DP01i2.dwg

DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 2 of 2 sheet(s)

PLAN OF SUBDIVISION OF LOT A DP382578 AND LOTS A & B DP162462 & EASEMENTS OVER LOT 201 DP1065493, LOT 7 DP9650, LOT 2 DP303359, LOT 25 DP8949 & LOTS A & B DP347250

DP1134518

Registered: 28.09.2009

*OFFICE USE ONLY

Subdivision Certificate No: 4482/5 Date of Endorsement: 21.08.2009

SIGNED by STOCKLAND DEVELOPMENT PTY LIMITED (ACN:000064835) by its Attorney.
under a Power of Attorney dated registered Book oin the presence of:on behalf of Stockland Development Pty Ltd (ACN 000 064 835) by BENJAMIN PHILIP DODWELL under Power of Attorney registration in Book 4541 No. 461 who declares that he has no notice of revocation of the said Power of Attorney:

Benjamin Philip Dodwell

..... Attorney	..... Attorney
..... Print Name	..... Print Name
..... Witness	..... Witness
..... Print Name	TIM BEATTIE Print Name
..... Occupation and address of witness	DEVELOPMENT MANAGER, 16 YARALLA ST, NEWTOWN, NSW 2042. Occupation and address of witness
..... Date	24-08-09. Date

EXECUTION:

SIGNED SEALED AND DELIVERED for and on behalf of EnergyAustralia by KATHERINE MARGARET GUNTON its duly constituted Attorney pursuant to Power of Attorney registered Book 4528 No. 401

Attorney

Witness

SURVEYOR'S REFERENCE: 2220DP01i2.dwg

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000 .

Part 1 (Creation)

Number of item shown in the intention panel on the plan	Identity of easement, profit á prendre, restriction or positive covenant to be created and referred to in the plan	Burdened lot(s) or parcel(s):	Benefited lot(s), road(s), bodies or Prescribed Authorities
1	Easement for Public Footway variable width limited in stratum (A)	21 22 25/8949	Council
2	Easement for Services variable width (B)	22 21 25/8949	21 A/347250 B/347250 201/1065493 25/8949 7/9650 2/303359 22
3	Easement for Light and Air affecting the whole of the lot	22	21 A/347250 B/347250 201/1065493 25/8949 7/9650 2/303359

DSLang

Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

4	Easement for Construction Purposes affecting the whole of the lot	21	22
5	Right of Access variable width limited in stratum (F)	22	21 A/347250 B/347250 201/1065493 25/8949 7/9650 2/303359 200/1065493
6	Right of Access variable width limited in stratum (M)	21 22	Council
7	Right of Carriageway variable width and limited in stratum (N)	22	EnergyAustralia ABN 67 505 337 385
8	Easement for Parking 2.1 wide limited in stratum (L)	22	21 201/1065493 A/347250 B/347250 25/8949 7/9650 2/303359

Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

9	Easement for Overland Flow affecting the whole of the lot	22 21 201/1065493 A/347250 B/347250 25/8949 7/9650 2/303359	21 201/1065493 A/347250 B/347250 25/8949 7/9650 2/303359 22
10	Easement for Overland Flow affecting the whole of the lot	22 21 ~~201/1064593~~ A/347250 B/347250 25/8949 7/9650 2/303359 201/1065493	Council
11	Easement for Drainage and Overland Flow 2 wide (G)	~~201/1064593~~ 201/1065493	21 22 A/347250

OSlang

Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

			B/347250 25/8949 7/9650 2/303359 200/1065493
		21	22 ~~201/1064593~~ A/347250 B/347250 25/8949 7/9650 2/303359 200/1065493 201/1065493
		22	21 ~~201/1064593~~ A/347250 B/347250 25/8949 7/9650 2/303359 200/1065493 201/1065493
		7/9650	21 22 ~~201/1064593~~ A/347250 B/347250

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Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

		2/303359	25/8949 2/303359 200/1065493 201/1065493 21 22 ~~201/1064593~~ A/347250 B/347250 25/8949 7/9650 200/1065493 201/1065493
12	Easement for Drainage and Overland Flow 2 wide (H)	21 22 ~~201/1064593~~ ~~A/347250~~ ~~B/347250~~ ~~25/8949~~ 7/9650 2/303359 201/1065493	Council
13	Easement for Support variable width (P)	21 25/8949	22
14	Easement for Landscaping and Pedestrian Pathway variable width (Q)	21 25/8949	22

DSLang
.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

Part 2 (Terms)

1. Interpretation

1.1 Definitions

In this Instrument, unless the contrary intention appears, the following terms have the following meanings:

Act means the Conveyancing Act 1919.

Airspace means the airspace of the Lot Burdened.

Authorised User means any person authorised by the Grantee or a prescribed authority (as the case may be).

Authority Benefited means the Authority having the benefit of an Easement under this Instrument.

Conveyancing Act means the *Conveyancing Act 1919 (NSW)*.

Council means Manly Council.

Council Authorised Users means each and every member of the public without the need for any specific authority of Council.

Easement includes any easement, covenant, positive covenant or restriction on use created in this Instrument.

Easement Site in relation to an Easement, means that site of the Easement identified in the Plan and includes all items within the site of an Easement.

Freehold Act means the *Strata Schemes (Freehold Development) Act* 1973 (NSW).

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

Grantee means:

(a) the registered proprietor of a Lot Benefited; and

(b) if, from time to time, a strata scheme exists in respect of a Lot Benefited, the owners corporation in respect of that strata scheme; and

(c) if, from time to time, a community scheme exists in respect of a Lot Benefited, the community association in respect of that community scheme.

Grantee 1 means:

(a) the registered proprietor of the Grantee 1 Land; and

(b) if, from time to time, a strata scheme exists in respect of the Grantee 1 Land, the owners corporation in respect of that strata scheme; and

(c) if, from time to time, a community scheme exists in respect of the Grantee 1 Land, the community association in respect of that community scheme.

Grantee 1 Land means Lot 21 in the Plan, Lot A in DP347250, Lot B in DP347250, Lot 201 in DP1065493, Lot 25 in DP8949, Lot 7 in DP9650, Lot 2 in DP303359 and if a strata plan or community plan is registered over any of the lots, the strata scheme or the community scheme.

Grantee 2 means:

(a) the registered proprietor of the Grantee 2 Land; and

(b) if, from time to time, a strata scheme exists in respect of the Grantee 2 Land, the owners corporation in respect of that strata scheme; and

(c) if, from time to time, a community scheme exists in respect of the Grantee 2 Land, the community association in respect of that community scheme.

Grantee 2 Land means Lot 200 in deposited plan 1065493.

Oslary
.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

Grantor means:

(a) the registered proprietor of a Lot Burdened; and

(b) if, from time to time, a strata scheme exists in respect of a Lot Burdened, the owners corporation in respect of that strata scheme; and

(c) if, from time to time, a community scheme exists in respect of a Lot Burdened, the community association in respect of that community scheme.

Instrument means this section 88B instrument.

Lot Benefited means the whole or any part of a lot having the benefit of an Easement.

Lot Burdened means the whole or any part of a lot having the burden of an Easement.

Management Act means the Strata Schemes Management Act 1996 (NSW).

Owners Corporation means an owners corporation constituted under the Management Act on registration of a Strata Plan.

Plan means the plan to which this instrument relates.

Strata Management Statement means a strata management statement registered in accordance with the Freehold Act which applies to any of the lots in the Plan.

Strata Plan means a strata plan registered under the Freehold Act.

Strata Scheme means a strata scheme created under the Freehold Act.

Woodland Street Development means Lot 21 in the Plan, Lot A in DP347250, Lot B in DP347250, Lot 201 in DP1065493, Lot 25 in DP8949, Lot 7 in DP9650, Lot 2 in DP303359 and if a strata plan or community plan is registered over any of the lots, the strata scheme or the community scheme.

Woodland Street Development Owner means:

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

(a) the registered proprietor of the Woodland Street Development; and

(b) if, from time to time, a strata scheme exists in respect of the Woodland Street Development, the owners corporation in respect of that strata scheme; and

(c) if, from time to time, a community scheme exists in respect of the Woodland Street Development, the community association in respect of that community scheme.

1.2 Each Easement covenant and restriction contained within this Instrument are covenants and agreements between:

(a) each Grantee for itself, its successors and every person who is entitled to an estate or interest in possession of the Lot Benefited or any part of it with which the right is capable of enjoyment;

(b) each Grantor for itself, its successors and every person who is entitled to an estate or interest in possession of the Lot Burdened or any part of it with which the right is capable of enjoyment

to the extent that the benefit and burden of those covenants and agreements are annexed to and pass with the benefits and burdens of the Easements, covenants and restrictions.

1.3 Each Grantor and Grantee:

(a) is bound by, and must comply with, the terms of each relevant easement, covenant and restriction in this Instrument; and

(b) must use reasonable endeavours to ensure its Authorised User (other than members of the public) complies with the terms of each relevant easement, covenant and restriction.

1.4 The word "includes" in any form is not a word of limitation.

1.5 Headings do not affect the interpretation of this Instrument.

2. Terms of Easement for Public Footway variable width limited in stratum (A) numbered 1 in the plan

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

2.1 The rights granted under this Easement for Public Footway are subject to completion of construction of the public footway and the Grantor must complete construction by 30 June, 2010.

2.2 The Council and Council Authorised Users may pass and repass over that part of the Lot Burdened designed for pedestrian use at all times and for all lawful purposes:

(a) on foot (but not using rollerblades, skateboards, scooters or similar items of equipment); and

(b) with wheelchairs or other disabled access aids; and

(c) without animals (except for guide dogs or hearing dogs for the visually or hearing impaired).

2.3 The Grantor may make rules relating to the use of the Easement Site under the Strata Management Statement but not without the consent of Council hereto, which consent shall not be unreasonably withheld.

2.4 The Council and Council Authorised Users must comply with any rules made under the Strata Management Statement.

2.5 The Grantor, acting reasonably (and having proper regard to the nature of the use of, or activity carried on the Lot Burdened), may remove (or refuse entry to) members of the public, if that member of the public:

(a) is not adequately clothed;

(b) is drunk or under the influence of drugs;

(c) causes excessive noise; or

(d) behaves in a manner reasonably likely to cause harm, offence, embarrassment or inconvenience to persons on the Lot Burdened.

Name of authority empowered to release, vary or modify easement, profit á prendre, restriction, or positive covenant numbered 1 in the plan.

Council

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

3. Terms of Easement for Services variable width (B) numbered 2 in the plan

3.1 In this Easement:

(a) "**Development Consent**" means consent DA 424/06 as amended by any section 96 modification and as may be further amended or varied from time to time and including any other development consent in relation to the land the subject of the Plan;

(b) "**Future Services**" means any services approved in any construction certificate attached to the Development Consent;

(c) "**Roadway**" means the roadway known as "Thomas Street" which is to be constructed on part of the Lot Burdened in accordance with the terms of the Development Consent; and

(d) "**Services**" has the meaning given to it in Part 11 Schedule 8 of the Conveyancing Act 1919 and also includes:

(i) Future Services; and

(ii) oil, garbage, conditioned air, radio impulses or signals service, drainage, sewage and stormwater and any other prescribed service.

3.2 An Easement for Services in the terms of Part 11 Schedule 8 of the Conveyancing Act, 1919 is created.

3.3 The Grantee, when exercising rights to carry out works within the Easement Site, must:

(a) give the Grantor not less than 7 days' notice (other than in case of an emergency) of proposed works;

(b) obtain the approval of the Grantor prior to the commencement of any works, which approval will not be unreasonably withheld provided the use and enjoyment of the Lot Burdened by the Grantor and Authorised Users will not be affected; and

(c) at all times (other than in case of an emergency) ensure that access to the Lot Burdened is not impeded other than with the prior arrangement of the Grantor.

Oslary

.....

Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

3.4 The rights granted under this Easement are subject to the rights of the Woodland Street Development Owner to carry out all works necessary to construct the Roadway and resurface any part of the Lot Burdened for the purposes of the Roadway.

4. Terms of Easement for Light and Air affecting the whole of the lot numbered 3 in the plan

4.1 This Easement is for the free and uninterrupted access of light and air crossing through the airspace vertically above the Lot Burdened to and from the windows, doors and apertures on any building erected or to be erected on the Lot Benefited

5. Terms of Easement for Construction Purposes affecting the whole of the lot numbered 4 in the plan

5.1 In this Easement, "**Development Consent**" means consent DA 424/06 as amended by any section 96 modification and as may be further amended or varied from time to time and including any other development consent in relation to the land the subject of the Plan.

5.2 The Grantee and its Authorised Users may:

(a) Use the Airspace and the Lot Burdened to facilitate the construction of improvements on the Lot Benefited; and

(b) Do anything reasonably necessary for that purpose including:

(i) entering the Lot Burdened and encroaching on the Airspace;

(ii) taking anything on to the Lot Burdened;

(iii) carrying out work including installing, keeping and using any scaffolding, fencing, plant, equipment, signage and machinery on the Lot Burdened; and

(iv) temporarily closing parts of the Easement Site.

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

5.3 In exercising those powers, the owner of the Lot Benefited and its Authorised Users must:

(a) ensure all work is done properly; and

(b) cause as little inconvenience as is practicable to the Lot Burdened and any occupier of the Lot Burdened; and

(c) cause as little damage as is practicable to the Lot Burdened and any improvements on the Lot Burdened; and

(d) restore the Lot Burdened as nearly as is practicable to its former condition; and;

(e) make good any collateral damage.

5.4 The rights under this Easement terminate on the date of completion of the construction of improvements on the Lot Benefited in accordance with the Development Consent and on and from that date this Easement is extinguished without further assurance.

6. Terms of Right of Access variable width limited in stratum (F) numbered 5 in the plan

6.1 The rights granted under this Right of Access are subject to completion of construction of the driveway within the Easement Site.

6.2 The Grantee may:

(a) by any reasonable means pass across each Lot Burdened, but only within the Easement Site, to get to and from the Lot Benefited; and

(b) do anything reasonably necessary for that purpose, including:

(i) entering into the Lot Burdened;

(ii) taking anything on to the Lot Burdened; and

(iii) carrying out work within the Easement Site, such as repairing or maintaining the Easement Site.

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

(Sheet 14 of 24 sheets)

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

6.3 In exercising those powers, the Grantee must:

(a) ensure all work is done properly;

(b) cause as little inconvenience as is practicable to the owner and any occupier of the Lot Burdened;

(c) cause as little damage as is practicable to the Lot Burdened and any improvement on it;

(d) restore the Lot Burdened as nearly as practicable to its former condition;

(e) make good any collateral damage which they cause, at their expense; and

(f) not park any motor vehicles on the Easement Site or the Lot Burdened.

6.4 Subject to the conditions in this Easement, the Grantor must keep the Easement Site in good repair.

6.5 Subject to clause 6.6, all reasonable costs incurred by the Grantor under clause 6.2 are to be shared equally between the Grantor and Grantee 1 only.

6.6 Grantee 2 is not required to contribute to the cost of maintenance of the Easement Site unless the Grantee 2 Land is further subdivided in which case all reasonable costs incurred by the Grantor under clause 6.2 are to be shared equally between the Grantor, Grantee 1 and Grantee 2.

6.7 The costs under clauses 6.5 and 6.6 are to be payable to the Grantor on demand.

6.8 If the Grantor does not keep the Easement Site in good repair, the Grantee may serve a written notice on the Grantor requiring the Grantor to repair the Easement Site within 21 days of receipt of that notice.

6.9 If the Grantor fails to repair the Easement Site within the prescribed time set out in the notice served under clause 6.7, the Grantee who served the notice in clause 6.7 may enter the Easement Site with all necessary equipment and repair the Easement Site.

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

6.10 All reasonable costs incurred by the Grantee under clause 6.8 are to be shared in accordance with clauses 6.4 and 6.5. These costs are to be payable to the Grantee who repaired the Easement Site under clause 6.8 on demand.

6.11 The Grantee, when exercising rights to carry out works within the Easement Site, must:

(a) give the Grantor not less than 7 days' notice (other than in case of an emergency) of proposed works;

(b) obtain the approval of the Grantor prior to the commencement of any works, which approval will not be unreasonably withheld provided the use and enjoyment of the Lot Burdened by the Grantor and Authorised Users will not be affected; and

(c) at all times (other than in case of an emergency) ensure that access to the Lot Burdened is not impeded other than with the prior arrangement of the Grantor.

7. Terms of Right of Access variable width limited in stratum (M) numbered 6 in the plan

7.1 In this Easement

(a) "**Development Consent**" means consent DA 424/06 as amended by any section 96 modification and as may be further amended or varied from time to time and including any other development consent in relation to the land the subject of the Plan; and

(b) "**Roadway**" means the roadway known as "Thomas Street" which is to be constructed on part of the Lot Burdened in accordance with the terms of the Development Consent.

7.2 The rights granted under this Right of Access are subject to completion of construction of the driveway within the Easement Site and the Grantor must complete construction of the driveway by 30 June, 2010.

7.3 The Council and Council's Authorised Users may pass, repass and cross at all times within the Easement Site.

7.4 In exercising those powers, Council and Council's Authorised Users must not park any motor vehicles on the Easement Site or the Lot Burdened.

.....

Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

7.5 The rights granted under this Easement are subject to the right of the Woodland Street Development Owner to carry out all works necessary to construct the Roadway and resurface any part of the Lot Burdened for the purposes of the Roadway.

8. Terms of Right of Carriageway variable width limited in stratum (N) numbered 7 in the plan

8.1 The rights granted under this Right of Carriageway are subject to completion of construction of the driveway within the Easement Site.

8.2 A Right of Carriageway set out in Part 1 of Schedule 4A of the Conveyancing Act 1919 (as amended) is created.

Name of authority empowered to release, vary or modify easement, profit á prendre, restriction, or positive covenant numbered 4 in the plan.

EnergyAustralia

9. Terms of Easement for Parking 2.1 limited in stratum (L) numbered 8 in the plan.

9.1 The rights granted under this Easement for Parking are subject to completion of construction of the visitor car parking lots within the Easement Site.

9.2 Subject to the terms of this Easement, the Grantee and its Authorised Users may, only for the purposes of visitor parking, park motor vehicles within the Easement Site.

9.3 The Grantee and its Authorised Users, when exercising rights under this Easement, must:

(a) ensure the Easement Site is kept clean;

(b) exercise the right consistently with the rights from each person who has the same or similar rights; and

(c) not carry out any mechanical repairs or engine degreasing to or wash any vehicle.

9.4 The Grantee must maintain, repair, replaced and renew the Easement Site when necessary.

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

10. Terms of Easement for Overland Flow affecting the whole of the lot numbered 9 in the plan

10.1 The Grantee may:

(a) drain water from any natural source through each Lot Burdened until such time as an overland flow path is designed and constructed as part of the development of each Lot Burdened, at which time the Grantee may drain water from any natural source through that part of each Lot Burdened designed and constructed as an overland flow path; and

(b) do anything reasonably necessary for that purpose including:

(i) entering the Lot Burdened; and

(ii) taking anything onto the Lot Burdened; and

(iii) carrying out work such as constructing, placing, repairing or maintaining channels and ditches;

(c) in exercising those powers the Grantee must:

(i) ensure all work is done properly; and

(ii) cause as little inconvenience as is practicable to the owner and any occupier of the Lot Burdened; and

(iii) cause as little damage as is practicable to the Lot Burdened and any improvement on it; and

(iv) restore the Lot Burdened as nearly as is practicable to its former condition; and

(v) make good any collateral damage.

10.2 The Grantee, when exercising rights to carry out works under this Easement, must:

(a) give the Grantor not less than 7 days' notice (other than in case of an emergency) of proposed works;

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

(b) obtain the approval of the Grantor prior to the commencement of any works, which approval will not be unreasonably withheld provided the use and enjoyment of the Lot Burdened by the Grantor and Authorised Users will not be affected; and

(c) at all times (other than in case of an emergency) ensure that access to the Lot Burdened is not impeded other than with the prior arrangement of the Grantor.

11. Terms of Easement for Overland Flow affecting the whole of the lot numbered 10 in the plan

11.1 The Council may:

(a) drain water from any natural source through each Lot Burdened until such time as an overland flow path is designed and constructed as part of the development of each Lot Burdened, at which time the Grantee may drain water from any natural source through that part of each Lot Burdened designed and constructed as an overland flow path; and

(b) do anything reasonably necessary for that purpose including:

(i) entering the Lot Burdened; and

(ii) taking anything onto the Lot Burdened; and

(iii) carrying out work such as constructing, placing, repairing or maintaining channels and ditches.

11.2 In exercising its powers under this Easement the Council must:

(a) ensure all work is done properly; and

(b) cause as little inconvenience as is practicable to the owner and any occupier of the Lot Burdened; and

(c) cause as little damage as is practicable to the Lot Burdened and any improvement on it; and

(d) restore the Lot Burdened as nearly as is practicable to its former condition; and

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

(e) make good any collateral damage.

Name of authority empowered to release, vary or modify easement, profit á prendre, restriction, or positive covenant numbered 10 in the plan.

Council

12. Terms of Easement for Drainage and Overland Flow 2 wide (G) numbered 11 in the plan

12.1 An easement for drainage of water in the terms of Part 8 Schedule 8 of the Conveyancing Act 1919 is created.

12.2 The Grantee, when exercising rights to carry out works within the Easement Site, must:

(a) give the Grantor not less than 7 days' notice (other than in case of an emergency) of proposed works;

(b) obtain the approval of the Grantor prior to the commencement of any works, which approval will not be unreasonably withheld provided the use and enjoyment of the Lot Burdened by the Grantor and Authorised Users will not be affected; and

(c) at all times (other than in case of an emergency) ensure that access to the Lot Burdened is not impeded other than with the prior arrangement of the Grantor.

13. Terms of Easement for Drainage and Overland Flow 2 wide (H) numbered 12 in the plan

13.1 An easement for drainage in the terms of Part 7 Schedule 4A of the Conveyancing Act 1919 is created.

Name of authority empowered to release, vary or modify easement, profit á prendre, restriction, or positive covenant numbered 12 in the plan.

Council

14. Terms of Easement for Support variable width (P) numbered 13 in the plan

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

14.1 In this Easement, "**Support Structure**" means any embankment, retaining wall or other structure required by the Grantee from time to time to support the Lot Benefited.

14.2 The Grantor grants to the Grantee the right of support over that part of the Lot Burdened capable of affording support.

14.3 The Grantee may:

(a) construct and maintain on the Lot Burdened whatever Support Structure reasonably necessary to support the surface or subsurface of the Lot Benefited or any part of it, or any structure or works on the Lot Benefited; and

(b) do anything reasonably necessary for that purpose, including:

(i) entering the Lot Burdened;

(ii) taking anything on to the Lot Burdened; and

(iii) carrying out work.

14.4 The Grantee, in exercising its rights under this Easement, must:

(a) ensure all work is done properly;

(b) cause as little damage as is practicable to the Lot Burdened and any improvements on it;

(c) restore the Lot Burdened as nearly as is practicable to its former condition; and

(d) make good any collateral damage.

14.5 Except when urgent work is required, the Grantee must:

(a) give the Grantor reasonable notice of intention to enter the Lot Burdened; and

(b) only enter the Lot Burdened during times reasonably agreed with the Grantor.

OSlary

Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

14.6 The Grantor must:

(a) not do anything which will detract from the support of the Lot Benefited; and

(b) allow the Grantee to enter the Lot Burdened and to remain for any reasonable time for the purpose of carrying out any work necessary to ensure the support of the Lot Benefited is maintained.

14.7 If the Grantor does or allows anything to be done which damages the Support Structure or impairs its effectiveness, the Grantee may serve not less than 14 days' notice on the Grantor requiring the damage to be repaired or the impairment removed.

14.8 The Grantor may replace any Support Structure previously constructed on the Lot Burdened by the Grantee (or any third party) with another type of Support Structure so long as that replacement Support Structure adequately supports the Lot Benefited.

14.9 The Grantor, in exercising its rights under this Easement, must:

(a) ensure all work is done properly;

(b) cause as little damage as is practicable to the Lot Benefited and any improvements on it;

(c) restore the Lot Benefited as nearly as is practicable to its former condition; and

(d) make good any collateral damage.

15. Terms of Easement for Landscaping and Pedestrian Pathway variable width (Q) numbered 14 in the plan

15.1 In this Easement:

(a) "**Development Consent**" means consent DA 424/06 as amended by any section 96 modification and as may be further amended or varied from time to time and including any other development consent in relation to the land the subject of the Plan; and

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Plan of Subdivision of Lot A in DP382578 and Lots A & B in DP162462 and Easements over Lot 201 in DP1065493, Lot 7 in DP9650, Lot 2 in DP303359, Lot 25 in DP8949 and Lots A & B in DP347250 covered by Subdivision Certificate No.

Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

(b) "**Landscaping and Pedestrian Pathway**" means the landscaping and pedestrian pathway approved by Development Consent; and

(c) "**Roadway**" means the roadway known as "Thomas Street" which is to be constructed on part of the Lot Burdened in accordance with the terms of the Development Consent.

15.2 The Grantee:

(a) may construct and maintain the Landscaping and Pedestrian Pathway on the Lot Burdened, but only within the Easement Site;

(b) may do anything reasonably necessary for those purposes, including:

(i) entering the Lot Burdened;

(ii) taking anything on to the Lot Burdened; and

(iii) carrying out the work.

15.3 In exercising those powers, the Grantee must:

(a) ensure all work is done properly;

(b) cause as little inconvenience as is practicable to the Grantor;

(c) make good any collateral damage; and

(d) not park any motor vehicles on the Easement Site or the Lot Burdened.

15.4 All reasonable costs incurred by the Grantee to maintain the landscaping the subject of this Easement are to be shared equally between the Grantee and the Grantor.

15.5 The costs under clause 15.4 are to be payable to the Grantee on demand.

15.6 Subject to clause 15.7, the Grantor must not do or allow anything to be done to damage or interfere with the Landscaping and Pedestrian Pathway.

.....
Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

15.7 Subject to clause 15.8, the rights granted under this Easement are subject to the rights of the Woodland Street Development Owner to carry out all works necessary to construct the Roadway and resurface any part of the Lot Burdened for the purposes of the Roadway.

15.8 In carrying out the works under clause 15.7, the Woodland Street Development Owner must at all times ensure that pedestrian access through the Lot Burdened is not impeded (including, if required, creating alternative pedestrian access to that provided by the Grantee under this Easement through the Lot Burdened).

SIGNED SEALED AND DELIVERED
for and on behalf of EnergyAustralia
by KATHERINE MARGARET GUNTON
its duly constituted Attorney pursuant
to Power of Attorney registered
Book 4528 No. 401

Attorney

Witness

Authorised Officer of Manly Council

ePlan

Instrument setting out Terms of Easements or Profits à Prendre intended to be created or released and of Restrictions on the Use of Land and Positive Covenants intended to be created pursuant to Section 88B of the Conveyancing Act 1919.

Plan: DP1134518

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Full name and address of the owner of the Land:

Stockland Development Pty Limited
(ACN 000 064 835)
Level 25, 133 Castlereagh Street
Sydney NSW 2000

Executed on behalf of Stockland Development Pty Ltd (ACN 000 064 835) by BENJAMIN PHILIP DODWELL under Power of Attorney registration in Book 4541 No. 461 who declares that he has no notice of revocation of the said Power of Attorney:

Benjamin Philip Dodwell

Executed by Stockland Development Pty Limited ABN 000 064 835 by its Attorneys

under a Power of Attorney dated
registered Book No
in the presence of:

.....	.....
Signature of Witness	Signature of Attorney
TIM BEATTIE	
Name of Witness	Name of Attorney
DEVELOPMENT MANAGER, 14 YARALLA ST, NEWTOWN NSW 2042.	
Occupation and address of Witness	
.....	.....
Signature of Witness	Signature of Attorney
.....	.....
Name of Witness	Name of Attorney
.....	
Occupation and address of Witness	

DSlang

Authorised Officer of Manly Council

4868446v14
the Village, Balgowlah
(Preliminary Plan)

REGISTERED 28.09.2009

DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 1 of 2 sheet(s)

SIGNATURES, SEALS and STATEMENTS of intention to dedicate public roads, to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919, AS AMENDED IT IS INTENDED TO CREATE:

1. EASEMENT FOR PUBLIC FOOTWAY VARIABLE WIDTH LIMITED IN STRATUM (A)
2. EASEMENT FOR SERVICES VARIABLE WIDTH (B)
3. EASEMENT FOR LIGHT AND AIR AFFECTING THE WHOLE OF THE LOT
4. EASEMENT FOR CONSTRUCTION PURPOSES AFFECTING THE WHOLE OF THE LOT
5. RIGHT OF ACCESS VARIABLE WIDTH LIMITED IN STRATUM (F)
6. RIGHT OF ACCESS VARIABLE WIDTH LIMITED IN STRATUM (M)
7. RIGHT OF CARRIAGEWAY VARIABLE WIDTH LIMITED IN STRATUM (N)
8. EASEMENT FOR PARKING 2.1 WIDE LIMITED IN STRATUM (L)
9. EASEMENT FOR OVERLAND FLOW AFFECTING THE WHOLE OF THE LOT
10. EASEMENT FOR OVERLAND FLOW AFFECTING THE WHOLE OF THE LOT
11. EASEMENT FOR DRAINAGE AND OVERLAND FLOW 2 WIDE (G)
12. EASEMENT FOR DRAINAGE AND OVERLAND FLOW 2 WIDE (H)
13. EASEMENT FOR SUPPORT VARIABLE WIDTH (P)
14. EASEMENT FOR LANDSCAPING AND PEDESTRIAN PATHWAY VARIABLE WIDTH (Q)

SEE ADDITIONAL SHEETS FOR SIGNATURES

Use PLAN FORM 6A for additional certificates, signatures, seals and statements

Crown Lands NSW/Western Lands Office Approval

I.....in approving this plan certify
(Authorised Officer)
that all necessary approvals in regard to the allocation of the land shown herein have been given

Signature:.....
Date:.....
File Number:.....
Office.....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed subdivision set out herein
(insert 'subdivision' or 'new road')

OSlang
.....
* Authorised Person/~~General Manager/Accredited Certifier~~

Consent Authority: Manly Council
Date of Endorsement: 21.8.09
Accreditation no: N/A
Subdivision Certificate no: 4482/5
File no: 4482/5

* Delete whichever is inapplicable.

DP1134518

Registered: 28.09.2009
Title System: TORRENS
Purpose: SUBDIVISION

PLAN OF SUBDIVISION OF LOT A DP382578 AND LOTS A & B DP162462 & EASEMENTS OVER LOT 201 DP1065493, LOT 7 DP9650, LOT 2 DP303359, LOT 25 DP8949 & LOTS A & B DP347250

LGA: MANLY
Suburb/Locality: BALGOWLAH
Parish: MANLY COVE
County: CUMBERLAND

Surveying Regulation, 2006

I, ANTHONY GUY MITCHELL
of STRATASURV PO BOX 305 FIVE DOCK NSW 2046
a surveyor registered under the *Surveying Act, 2002*, certify that the survey represented in this plan is accurate, has been made in accordance with the *Surveying Regulation, 2006* and was completed on: 18-08-2008

The survey relates to LOTS 21 & 22

(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature ..... *Dated:* 03/07/2009
Surveyor registered under the Surveying Act, 2002

Datum Line: "X" - "Y"
Type: Urban/~~Rural~~

Plans used in the preparation of survey/compilation

DP776824	DP1102617	DP347250	DP1065493	DP8949
DP9650	DP499756	DP864555	DP162462	

(if insufficient space use Plan Form 6A annexure sheet)

SURVEYOR'S REFERENCE: 2220DP01i2.dwg

DEPOSITED PLAN ADMINISTRATION SHEET Sheet 2 of 2 sheet(s)

PLAN OF SUBDIVISION OF LOT A DP382578 AND LOTS A & B DP162462 & EASEMENTS OVER LOT 201 DP1065493, LOT 7 DP9650, LOT 2 DP303359, LOT 25 DP8949 & LOTS A & B DP347250

DP1134518

Registered: 28.09.2009

*OFFICE USE ONLY

Subdivision Certificate No: 4482/5 Date of Endorsement: 21.08.2009

SIGNED by STOCKLAND DEVELOPMENT PTY LIMITED (ACN:000064835) by its Attorney.
under a Power of Attorney dated registered Book oin the presence of:

on behalf of Stockland Development Pty Ltd (ACN 000 064 835) by BENJAMIN PHILIP DODWELL under Power of Attorney registration in Book 4541 No. 461 who declares that he has no notice of revocation of the said Power of Attorney:

Benjamin Philip Dodwell

..... Attorney	..... Attorney
..... Print Name	..... Print Name
..... Witness	..... Witness
..... Print Name	TIM BEATTIE Print Name
..... Occupation and address of witness	DEVELOPMENT MANAGER, 18 YARALLA ST, NEWTOWN, Occupation and address of witness
..... Date	24-08-09. NSW 2042. Date

EXECUTION:

SIGNED SEALED AND DELIVERED
for and on behalf of EnergyAustralia
by KATHERINE MARGARET GUNTON
its duly constituted Attorney pursuant
to Power of Attorney registered
Book 4528 No. 401

Attorney

Witness

SURVEYOR'S REFERENCE: 2220DP01i2.dwg

Site Waste Management Plan Data Sheet

Project Name	The Village, Balgowlah
Project address / location	Sylvan Ave, Balgowlah
Principal contractor	Abigroup Contractors Pty Limited
Person responsible for waste management on site (name and job title)	TBA (Ward Site Supervisor)
Person and company completing this form, if different	Cameron Hay (Ward Project Manager)

Type of waste arising (*add more rows if needed*):								
Material		Disposal						
Type and Quantity		Transporter	Destination	Recycled for use on site	Recycled for use off site	Recycling Facility	Development Site	Licensed Landfill
AC (m3)	2	Various	St Peters		Yes	Boral Recycling		
Concrete (m3)	6	Various	St Peters		Yes	Boral Recycling / Metropolitan		
Steel from demo of fence (m3)	4	Sell & Parker skip bin	Banksmeadow		Yes	Sell & Parker		
Misc fencing demo material &/or building waste (m3)	9	Bingo skip bins	Homebush Bay		Yes	Bingo		
Trees & shrubs (mulched m3)	6			Yes				
Existing material to be excavated (m3)	2000			Yes				
Existing Contaminated Material (GSW)	0 (not expected but if found)	Various Bogies / TD	Alexandria / Erskine Park					Alexandria Landfill / EnviroGuard

BG&E PTY LIMITED
ABN 14 104 853 081

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8 WINDMILL STREET
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29 July 2009

Ref. P:\S05015\Woodland Street Stormwater Design Cert-ltr - 29 July 2009.doc

Abigroup Contractors Pty Ltd
924 Pacific Highway
GORDON NSW 2072

Attention: Mr S Surjan

Dear Sir,

STAGE 1 - SYLVAN AVENUE, 162-182 WOODLAND STREET, BALGOWLAH, NSW
DESIGN CERTIFICATION - STORMWATER

BG&E Pty Limited, being Chartered Consulting Engineers and members of the Association of Consulting Engineers of Australia, hereby certify that this practice has carried out the civil design of the stormwater and overland flow for the development at 162-182 Woodland Street, Balgowlah NSW 2093.

We have carried out the stormwater design and checking to comply with the provisions of AS 3500.3 - 2003: National Plumbing and Drainage Code - Stormwater Drainage, Australian Rainfall and Runoff 2003 and Manly Specification for Stormwater Drainage 2003.

We have carried out the stormwater overland flow design to fulfil development condition DA097 in accordance with accepted engineering principles and practice. The methodology used for the design is as per the attached document *Sylvan Avenue Civil Design Methodology – June 2009* completed by this office.

Our involvement, and this certification, shall not be misconstrued as relieving the Builder and any other parties of their contractual responsibilities.

Yours faithfully,
for BG&E PTY LIMITED

JOE CATANZARITI
Director

enc.

TRANSMITTAL

BG&E

PROJECT: **Sylvan Avenue**

PROJECT NO: S05015

DESCRIPTION: Civil Works

TO: GENERAL DISTRIBUTION
Refer to Distribution section below

ORIGINAL DRAWING SIZE: B1

TRANSMITTAL SHEET: C1

DATE OF ISSUE			
05	19	26	28
06	06	06	07
09	09	09	09

REFERENCE NO.	TITLE	REVISION NUMBER			
	CIVIL DRAWINGS				
C_SK_21	Earthworks and Grading	A	B	C	0
C_SK_22	Stormwater Plan	A	B	C	0
C_SK_23	Road Pavement Plan	A	B	C	0
C_SK_24	Setout Plan				0
C_SK_25	Details	A	B	C	0
C_SK_26	Erosion and Sediment Control Plan and Details				0
ISSUED DRAWING SIZE					

DISTRIBUTION	COPIES			
Abigroup: att - Nick Kordas	P	P	P	P
Project Centre				P,C

H - Hardcopy (prefixed by the number off). P - PDF. C - CAD

ISSUED FOR				
Refer to Legend	X	X	X	C

A - Approval **AC** - As Constructed **AR** - As Requested **C** - Construction
CC - Construction Certificate **CM** - Comments **P** - Preliminary
QS - Costing / Pricing **R** - Revised **RW** - Review **SG** - Signature **SM** - Submission
T - Tender **V** - Verification **WC** - With Compliments **X** - Information

☑ Receipt acknowledgement NOT required

☐ Receipt acknowledgement required

Please fax this sheet to BG&E as Receipt Acknowledgement

Received by: _____ Date Received: _____ Signature: _____

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Level 2, 8 Windmill Street, Sydney NSW 2000, Australia ph: +61 2 9770 3300 fax: +61 2 9770 3399

SYLVAN AVENUE CIVIL DESIGN METHODOLOGY

Sylvan Avenue links up Woodland Street to The Village site via a roadway with parallel parking bays and a landscaped footpath. The roadway was designed in accordance with AS 2890.1 and limits the grade adjacent to the car bays to 5%. The dimensions of the road and the bays both comply with the relevant Standards. The crossover is to be built according to the local council standards.

There is an existing tree located along the boundary shared with The Village site that Council requires to be retained, but the surrounding ground levels are significantly lower than the proposed levels of the landscaped path. It is therefore proposed to install a retaining wall along the edge of the path so that the tree and surrounding ground levels are maintained.

Because the ground level around the tree is lower than the road it creates a low point which alters the nature of the existing overland flow. In order to ensure that the overland flow path is maintained it is proposed to install a box culvert underneath the path that will match the existing ground levels on the northern side of the path. This therefore puts the culvert at a higher level than the ground level around the tree, on the southern side of the path. In order to drain the smaller flows it is proposed to install a grated pit adjacent to the existing pit (just north of the tree) that has been installed to take the diverted flow from the Telstra property to the south. A 150mm dia pipe will connect the two pits in order to control the flow so that it doesn't overload the Telstra diversion system (which inturn runs through The Village).

Because the culvert is located higher than the surrounding land it is recognised that any overland flow will need to build up in this area before flowing through the culvert and out to the northern side where it will continue to flow as it previously did prior to the development. The culvert level on the southern side has been set so that no backflow will flood the neighbouring Telstra building to the south. However in a major storm event there will be a significant amount of ponding in this area. It is also understood that the existing levels indicate that the existing overland flow path is against the wall of the Village, and that an amount of ponding occurs before the flow path can continue.

The drainage from the road and path is taken by pits and pipes and discharges into the existing pits in the north east corner of the Woodland street site. It has been calculated that the amount of runoff from the road/path and the throttled overland flow are smaller than that able to be taken by the system through The Village, hence during this first stage an On Site Detention system is not warranted. When this site gets developed the stormwater layout will need to change to take into account an OSD system and the specific design requirements for the development.

THE VILLAGE, BALGOWLAH

BG&E CONSULTING ENGINEERS

SYDNEY
PERTH
MELBOURNE
DUBAI

TECHNICAL SPECIFICATION

for the

BUILDING STRUCTURE

covering

SITE PREPARATION
BULK EARTHWORKS
PILING
CONCRETE

- POST-TENSIONING
- POST-TENSIONED DESIGN BRIEF
- REINFORCEMENT
- FORMWORK
- IN SITU

STRUCTURAL STEEL

prepared for

Stockland Development Pty Ltd
Level 16, 157 Liverpool St
Sydney NSW 2000

Level 2, 8 Windmill Street
Sydney NSW 2000

TEL: (02) 9770 3300
FAX: (02) 9770 3399
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3 December 2007

Ref: S05015.02

Issue / Rev:	Description		Date
Specification Rev A	Issued for Tender		09/10/06
Specification Rev B	Issued for Contract Signing		15/06/07
Specification Rev 01	Issued for Construction		3/12/07
Filename: P:\Job S05015\Specification	Reviewed:	Approved:	

ISSUED FOR CONSTRUCTION

SITE PREPARATION 1

1 GENERAL 1
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2 QUALITY 1
2.1 SUBMISSIONS 1

3 SITE MANAGEMENT 1
3.1 SUBMISSIONS 1
3.2 EXISTING SERVICES 1
3.3 SITE RESTORATION 1

4 SITE CLEARING 1
4.1 SITE CLEARING 1
4.2 SPOIL 2

SITE PREPARATION

1 GENERAL

1.1 CROSS REFERENCES

Related worksections

Refer to the following worksections:

- Report on Geotechnical Investigation by Jeffery and Katauskas Pty Ltd.

2 QUALITY

2.1 SUBMISSIONS

Execution

Submit the methods and equipment proposed for the groundworks, including the following:

- Dewatering and groundwater control and disposal of surface water.
- Control of erosion, contamination and sedimentation of the site, surrounding areas and drainage systems.
- Dust control.

3 SITE MANAGEMENT

3.1 SUBMISSIONS

Execution

Submit the methods and equipment proposed for the following:

- Environmental protection.
- Traffic management.

3.2 EXISTING SERVICES

Marking

Before commencing earthworks, locate and mark existing underground services in the areas which will be affected by the groundworks operations including clearing, excavating and trenching. Reference is also made to services consultants documentation.

Excavation

Do not excavate by machine within 1 m of existing underground services.

3.3 SITE RESTORATION

Requirement

Where existing ground surfaces are not required to be varied as part of the works, restore them to the condition existing at the commencement of the contract.

4 SITE CLEARING

4.1 SITE CLEARING

Extent

General: Clear only the following site areas:

- Areas to be occupied by works such as buildings, paving, excavation, regrading and landscaping.
- Other areas designated to be cleared.

Contractor's site areas: If not included within the areas specified above, clear generally only to the extent necessary for the performance of the works.

Clearing operations

Removal: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, timber, stumps, boulders and rubble.

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, or 300 mm below finished surface in unpaved areas.

Old works: Remove old works, including slabs, foundations, pavings, drains and manholes found on the surface.

Existing grass: Remove grass to a depth just sufficient to include the root zone.

4.2 SPOIL

Off site disposal

General: Remove surplus excavated material and surplus site clearance material from the site.

Surplus material to be removed to approved waste disposal site, subject to council approval.

Mulch

Put cleared vegetation through a chipper. Reduce to pieces not larger than 75 x 50 x 15 mm and stockpile for re-use as mulch.

On site burial

Do not bury boulders, concrete fragments and the like on site.

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BULK EARTHWORKS

1 GENERAL

1.1 CROSS REFERENCES

Related worksections

Refer to the following worksections:

- Report on Geotechnical Investigation by Jeffery and Katauskas Pty Ltd dated 21 February 2003.

1.2 INTERPRETATION

Definitions

General: To AS 1348.1.

Description and classification of soils: To AS 1726.

Bad ground: Ground unsuitable for the purposes of the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground which is or becomes soft, wet or unstable.

Discrepancy: A difference between contract information about the site and conditions encountered on the site, including but not limited to discrepancies concerning

- the nature or quantity of the material to be excavated or placed;
- existing site levels; and
- services or other obstructions beneath the site surface.

Line of influence: A line extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

Rock: Monolithic material with volume greater than 0.5 m^3 which cannot be removed until broken up either by explosives or by rippers or percussion tools.

Subgrade: The trimmed or prepared portion of the formation on which the pavement or slab is constructed.

1.3 SITE INVESTIGATION

Report

- The site investigation report provided by Jeffery and Katauskas Pty Ltd is for information only. The geotechnical information and information on contaminants given is information on the nature of the ground at each tested part. It is not a complete description of conditions existing at or below ground level.

Notice

If the following are encountered, give notice immediately to Contractor and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Discrepancies.
- Rock.
- Springs, seepages.
- Archaeological deposits

1.4 DILAPIDATION SURVEY

Subcontractor to complete prior to commencement of works a dilapidation survey and report on the neighbouring buildings and retaining structures. The report will be used for future reference in assessing any damage arising from the works.

1.5 RECORDS OF MEASUREMENT

Excavation and backfilling

Quantities: If there are variations in contract levels or provisional quantities specified, or there are variations to the contract levels or dimensions of excavations, do not commence backfilling or place permanent works in the excavation until the following have been agreed with the Contractor and recorded:

- Depths of excavations related to the datum.
- Final plan dimensions of excavations.
- Quantities of excavations in materials as found, including rock.
- Quantities of fill and topsoil, imports being recorded separately.

Rock

Level and class: If rock is to be measured for payment purposes, whether as extra over excavation of material other than rock or for adjustment of provisional measurements, do not remove the rock until the commencing levels and the classes of rock have been determined and agreed with Contractor.

1.6 GROUND CONDITIONS

The Subcontractor will be deemed to have visited the site and reviewed information available about ground conditions during the tender period and to have allowed for this in their price.

2 QUALITY

2.1 INSPECTION

Witness points

Give 48 hours notice to Contractor, Structural and Geotechnical Engineers so that inspection may be made of the following:

- Items to be measured as listed in Records of measurement.
- Areas to be cleared and/or stripped of topsoil.
- Areas stripped of topsoil.
- Excavation completed to contract levels or founding material.
- Subgrade before placing sub-base, base, working base, filter fabric or membrane, as applicable.
- Filter fabric in place before backfilling.
- Base completed to contract levels.
- Stockpiled soil before spreading.

Hold points

Completion of removal of contaminated fill.

Archaeological deposits

2.2 TESTS

Geotechnical testing authority

General: Use a NATA registered laboratory and provide written details to Contractor for review. Any non-compliances are to be noted in a summary report issued to the Contractor.

Level of responsibility to AS 3798 Appendix B: Level 1 (Note Level 1 testing involves full time attendance and monitoring of fill placement and compaction by an experienced Geotechnician or Geotechnicians).

Testing

Compaction (density): Subcontractor to test for compliance.

Retesting: Subcontractor to rework and retest areas which do not achieve the required density, until that density is achieved.

Field density

Field dry density: To AS 1289.5.3.1, AS 1289.5.3.2, AS 1289.5.3.5 or AS 1289.5.8.1. If using AS 1289.5.8.1 calibrate the surface moisture-density gauge in accordance with AS 1289.5.8.4 before use.

Varying: Do not vary the test procedure for a given soil type.

Density index: To AS 1289.5.6.1.

Reference density

Standard maximum dry density:	To AS 1289.5.1.1.
Modified maximum dry density:	To AS 1289.5.2.1.
Minimum and maximum dry density, cohesionless soil:	To AS 1289.5.5.1.
Hilf density ratio and moisture variation:	To AS 1289.5.7.1.

Varying: Do not vary the test procedure for a given soil type.

Sampling: Follow the recommendations in AS 3798 clause 7.4.

Moisture curing of samples: Allow adequate curing times, or make appropriate allowances for poorly-conditioned compaction curves.

California bearing ratio: Sample and test to AS 1289.6.1.1, AS 1289.6.1.2 or AS 1289.6.1.3, as appropriate.

Test schedule

Type of test	Test method	Frequency/number of tests
Density Index	AS1289.5.6.1	50 No
Std Max Dry Density	AS1289.5.1.1	50 No minimum

Field density test locations

Fill: Test the areas of fill which are to support non-spanning concrete ground slabs and foundations, roads and paved areas, and areas of uncertain compaction.

Field density test frequency

At least

- 1 test per layer or 200 mm thickness per material type per 2500 m^2; or
- 1 test per 500 m^3 distributed evenly throughout full depth and area; or
- 3 tests per visit;

Proposed testing regime to be forwarded by Subcontractor to Contractor in tender documentation and reviewed by Geotechnical Engineer.

Confined operations: 1 test per 2 layers per 50 m^2.

Written notification of compaction test results to Contractor to be provided within 2 days of placing layer tested.

On completion, an engineering report is to be prepared and submitted to Contractor containing test details, results and commenting on compliance of works with specification requirements.

2.3 SAMPLES

General

Submit samples of the following to the Contractor for review.

- Each type of filter fabric.
- Each type of imported fill.

Samples of imported fill schedule

Fill type	Number of samples	Size
Select Fill	1	20 kg

2.4 SUBMISSIONS

Design

Calculations: Submit calculation by qualified Structural Engineer to show that proposed excavations and temporary supports, including where applicable supports for adjacent structures, will be stable and safe.

To be provided by Subcontractor to Contractor.

Tests

Imported fill: Submit certification or test results which establish the compliance of imported fill with the contract.

To be provided by Subcontractor to Contractor.

Materials

Submit details of materials proposed, including the following:

- Sources of imported fill.

To be provided by Subcontractor to Contractor.

Execution

Submit the methods to Contractor and equipment proposed for the groundworks, including the following:

- Excavation methods, stages, clearances, batters and temporary supports.
- Stockpiles and borrow pits.
- Placing and compaction methods and stages.

3 MATERIALS AND COMPONENTS

3.1 FILL

Fill material

General: Inorganic, non-perishable material.

Sulfur content: Do not provide filling with sulfur content exceeding 0.5% within 500 mm of cement bound elements (for example concrete structures or masonry) unless such elements are protected by impermeable membranes or equivalent means.

Structural fill

Excluded materials:

- organic soils;
- materials contaminated through past site usage only use in nominated areas;
- materials which contain substances which can be dissolved or leached out, or which undergo volume change or loss of strength when disturbed and exposed to moisture;
- silts or silt-like materials;
- fill containing wood, metal, plastic, boulders or other deleterious material.

Sources

Provide fill imported on to the site from suitable sources unless the fill type can be provided from:

- spoil recovered from the excavations.

Fill types

Select fill: Granular material complying with the following:

- Particle size: 75 mm maximum.
- Proportion passing 0.075 mm sieve: 25% maximum.
- Plasticity index: ≥ 2%, ≤ 15%.
- Hardcore: Graded hard material capable of being compacted to an even stable surface.
- Particle size: 120 mm maximum.
- Proportion exceeding particle size of 50 mm: 75% minimum.

Embankment fill: Graded material for road embankments with maximum particle size determined by location and layer thickness, but in any case not exceeding two-thirds of the compacted layer thickness.

Hand-packed hardcore: Hardcore packed by hand to an even surface before compaction.

Subsoil filter

Subsoil filter: Coarse sand or crushed stone graded to the Subsoil grading table.

Subsoil grading table

Sieve aperture (mm)	Percentage passing (by mass)		
	Fine filter	Coarse filter	Combined filter
26.5		100	100
19.0		90 - 100	95 - 100
9.5	100	75 - 90	90 - 97
4.75	80 - 100		75 - 90
2.36	65 - 90		60 - 78
1.18		10 - 30	35 - 55
0.60		0 - 2	18 - 25
0.30	7 - 16		5 - 10
0.15	0 - 4		0 - 3

Fill subgrades

Provide material in the top 150 mm which has a maximum particle size of 75 mm.

3.2 FILTER FABRIC

Material

Type: Polymeric fabric formed from a plastic yarn composed of at least 85% by weight of propylene, ethylene, amide or vinyledenechloride and containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.

Identification and marking: To AS 3705.

Protection

Provide heavy duty protective covering. Store clear of the ground and out of direct sunlight. During installation do not expose the filter fabric to sunlight for more than 14 days.

4 EXCAVATING

4.1 TOLERANCES

Surfaces

Finish groundworks to reasonably smooth and uniform surfaces conforming to the required tolerances.

Subgrades

General: The tolerances in the **Subgrade tolerances table** apply to finished subgrade levels unless overridden by the specific requirements (including tolerances) for finished surface levels and thicknesses of covering materials.

- Absolute level tolerance: Maximum deviation from design level.
- Relative level tolerance: Maximum deviation from a 3 m straight edge laid anywhere on each plane surface.

Subgrade tolerances table

Item	Level tolerance (maximum)	
	Absolute	Relative
Cut subgrade in earth and fill subgrade	+ 0 - Unspecified	20 mm
Cut subgrade in rock	+ 0 - Unspecified	Unspecified

Subcontractor to provide detailed survey of site to Contractor prior to commencement of other works.

Other groundworks

Groundworks supporting construction:	Level tolerance (maximum) + 0, -30 mm
Vertical faces and batters:	Plan location tolerance (maximum) at any point on the surface + 0, -50 mm, + being inwards from excavated face.

4.2 STRIPPING

General

Extent: Areas to be cut and areas to be filled and areas to be occupied by structures, pavements, embankments and the like.

Materials to be stripped:

- Soils not suited to support loads or to be incorporated in fills.
- Topsoils, where unsuitable and where needed for subsequent revegetation.

Maximum depth: 100 mm.

Stripped material stockpiles

Topsoil: Stockpile site soil approved for re-use and imported soil where necessary. Establish stockpiles to heights not exceeding 1.5 m. Provide adequate drainage and erosion protection. Do not burn off or remove plant growth which may occur during storage. Do not allow traffic on stockpiles. If a stockpile is to remain for more than four weeks, sow with temporary grass. Protect the topsoil stockpiles from contamination by other excavated material, weeds and building debris.

Stockpile size and location to be reviewed by Contractor.

4.3 EXCAVATION

Extent

Site surface: Excavate over the site to give correct levels and profiles as the basis for construction, paving, filling and landscaping. Make allowance for compaction or settlement.

Footings: Excavate for footings, pits, wells and shafts, to the required sizes and depths. Confirm that bearing capacity is adequate.

Restrictions on clearing and stripping: Refer Landscape Consultants specification.

Existing footings

If excavation is required below the line of influence of an existing footing, use methods which maintain the support of the footing and ensure that the structure and finishes supported by the footing are not damaged.

Archaeological

If archaeological deposits are found Contractor is to be advised immediately.

Proof rolling

Extent: Proof roll excavations for pavements, filling and non-spanning slabs on ground and foundations to determine the extent of any bad ground.

Proof rolling method:

- Roller type and size: Static, 8 tonnes
- Number of passes: 6
- Settlement limit (mm): 20

Rock excavation classes schedule

Rock class	Type of excavation	Mechanical means required to break up
A	Bulk	Bucket Excavator
B	Bulk	Ripper
C	Detailed	Pneumatic Hammer

Spoil stockpiles and dumps

Stockpile sizes and locations to be submitted to Contractor for approval.

4.4 PROVISIONAL DEPTHS

Contract depths

The footing or pier depths shown on the drawings are indicative only.

4.5 EXPLOSIVES

General

Do not use explosives.

4.6 SUBGRADES AFFECTED BY MOISTURE

General

Where the subgrade is unable to support construction equipment, or it is not possible to compact the overlying pavement only because of a high moisture content, perform one or more of the following:

- Allow the subgrade to dry until it will support equipment and allow compaction.
- Scarify the subgrade to a depth of 150 mm, work as necessary to accelerate drying, and recompact when the moisture content is satisfactory.
- Excavate the wet material and remove to spoil, and backfill excavated areas.

4.7 BEARING SURFACES

General

Provide even plane bearing surfaces for loadbearing elements including footings. Step to accommodate level changes. Make the steps to the appropriate courses if supporting masonry.

Deterioration

If the bearing surface deteriorates because of water or other cause, excavate further to a sound surface before placing the loadbearing element.

4.8 REINSTATEMENT OF EXCAVATION

General

Where excavation exceeds the required depth, or deteriorates, reinstate to the correct depth, level and bearing value.

Particular

Below or within the "line of influence" of footings, beams, or other structural elements: Concrete of strength equal to the structural element, minimum 25 MPa.

Below slabs or pavements: Provide selected filling compacted to the specified density. In cut subgrades if the over excavation is less than 100 mm, do not backfill, but make good by increasing the thickness of the layer above. Backfill rock depressions and over excavation of subsoil drains using coarse subsoil filter.

Line of influence

Angle from horizontal: 30° to horizontal

4.9 SUPPORTING EXCAVATIONS

Removal of supports

Remove temporary supports progressively as backfilling proceeds.

Voids

Guard against the formation of voids outside sheeting or sheet piling if used. Fill and compact voids to a dry density similar to that of the surrounding material.

4.10 ADJACENT STRUCTURES

Temporary supports

General: Provide supports to adjacent structures where necessary, sufficient to prevent damage arising from the works.

Lateral supports: Provide lateral support using shoring.

Vertical supports: Provide vertical support where necessary using piling or underpinning or both.

Boundary supports: Provide temporary shoring at the perimeter of the site as required.

Permanent supports

If permanent supports for adjacent structures are necessary and are not described, give notice and obtain instructions.

Encroachments
If encroachments from adjacent structures are encountered and are not shown on the drawings, give notice and obtain instructions.

5 PLACING AND COMPACTION

5.1 PREPARATION FOR FILLING

General
Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements. Shape to assist drainage. Remove materials which will inhibit or prevent satisfactory placement of fill layers, loose material, debris and organic matter. Compact the ground exposed after stripping to achieve the required density (as per Section 5.4) of overlying fill. All test results to be forwarded to Contractor for review.

Benching
If fill is to be placed on a surface which slopes more than 1:4, bench the surface to form a key for the fill. As each of layer of fill is placed, cut the existing ground surface progressively to form a series of horizontal steps > 1 m in width and > 100 mm deep. Recompact the excavated material as part of the filling. Shape to provide free drainage.

Under slabs, foundations, paving and embankments
Compact the ground to achieve the densities specified for these locations. If necessary loosen the ground to a depth of > 200 mm and adjust the moisture content before compaction to a density consistent with subsequent filling.

Rock ledges
Remove overhanging rock ledges.

Drainage during construction Provide means of keeping the works dry during construction by gravity drains or pumps if necessary.

5.2 FILTER FABRIC

Preparation
Before placing the filter fabric trim the ground to a smooth surface free from cavities and projecting rocks.

Placing
Lay the fabric flat, but not stretched tight, and secure it with anchor pins. Overlap joints 300 mm minimum.

Filter fabric schedule

Location	Type of fabric	Properties
Refer drawings		

Proposed filter fabric sample is to be issued to Contractor for review.

5.3 PLACING FILL

General
Layers: Place fill in near-horizontal layers of uniform thickness, deposited systematically across the fill area.

Extent: Place and compact fill to the designated dimensions, levels, grades, and cross sections so that the surface is always self draining.

Edges: At junctions of fill and existing surfaces, do not feather the edges.

Mix: Place fill in a uniform mixture.

Previous fill: Before placing subsequent fill layers, ensure that previously accepted layers still conform to requirements, including moisture content.

Placing at structures
General: Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading. Carefully place first layers of fill over the top of structures.

Concrete: Do not place fill against concrete until the concrete has been in place for fourteen days.

Depth of fill to be placed over pipes or culverts (mm): Refer Services Consultants.

Moisture content

Adjustment: Where necessary to achieve the required density or moisture content or both, adjust the moisture content of the fill before compaction. Ensure the moisture distribution is uniform, and avoid saturation at the specified density.

Required moisture content during placing (%): within 2% of the optimum moisture content.

Rain: If rain is likely, crown the placed fill, seal using plant with rubber tyres or smooth wheels, and grade to prevent ponding.

Fill schedule

Location	Fill type	Depth (mm)	Maximum layer thickness (loose) (mm)
Refer drawings	All compacted filling		300

Coarse fill material

Location:	Refer drawings
Moisture conditioning:	within 2% of the optimum moisture content
Maximum layer thickness (mm):	300 mm
Pre-compaction:	
To areas to be filled, layers of fill and materials	150 mm below permanent subgrade material in cuttings.

5.4 COMPACTING FILL

Tolerances

Finish the surface to the required level, grade and shape within the following tolerances:

- Under slabs and loadbearing elements: + 0, - 25 mm.
- Other ground surfaces: ±50 mm, provided the area remains free draining and matches adjacent construction where required. Provide smoothness as normally produced by a scraper blade.

Density

General: Compact each layer of fill to the required depth and density, as a systematic construction operation. Shape surfaces to provide drainage and prevent ponding.

Exposed ground surface: After stripping, compact to at least 150 mm deep.

Maximum rock and lump size in layer after compaction: 2/3 compacted layer thickness.

Fill batter faces: Either compact separately, or overfill and cut back. Form roughened surfaces to the faces.

Compaction schedule

Location and depth of filling	Required density	Moisture content during compaction (%)	Other requirements
Under Floor Slabs within buildings	98% max standard dry density	Within 2% of optimum moisture content	
Under footings	98% max standard dry density	Within 2% of optimum moisture content	Area to include total zone of influence of footing
Under roadway	100% max standard dry density	Within 2% of optimum moisture content	

Protection

Protect the works from damage due to compaction operations. Where necessary, limit the size of compaction equipment or compact by hand. Commence compacting each layer at the structure and proceed away from it.

Moisture content

Adjust the moisture content of fill during compaction within the range of 98 - 102% of the optimum moisture content determined by AS 1289.5.1.1 or AS 1289.5.2.1 as appropriate, in order to achieve the required density.

Minimum relative compaction table – applicable only to areas not nominated above in compaction schedule

Location	Cohesive soils. Minimum dry density ratio (standard compaction) to AS 1289.5.1.1 (std) or AS 1289.5.2.1 (mod)	Cohesionless soils. Minimum density index to AS 1289.5.6.1
Retail / Residential:		
- Fills to support minor loadings incl. floor loadings < 20 kPa and isolated pad or strip footings < 100 kPa.	98 std	70
Pavements:		
- Fill to support pavements	100 std	65
- Subgrade to 300 mm deep	98 std	80
- Sub-base courses	95 mod	n.a.
- Base course, heavily loaded	100 mod	n.a.
- Base course, other	95 mod	n.a.

5.5 GRADING

External areas

Grade to give falls away from buildings, minimum 1:100.

Subfloor areas

General: Grade the ground surface under suspended floors to drain ground or surface water away from buildings without ponding.

Refer architectural drawings.

6 BARRIERS AND MEMBRANES

6.1 PROTECTION TO MEMBRANES

Protective covering

Do not disturb or damage the protective covering of membranes during backfilling.

7 RETAINING WALLS

7.1 REINFORCED BLOCKWALLS

General

Refer structural notes for specification and drawings for details.

8 COMPLETION

8.1 COMPLETION

Records

Certified records of measurement: Submit a certified copy of the agreed records of measurement to the Contractor.

Construction records

General: Submit the following written documents to the Contractor:

- Site visit record; and
- Earthworks summary report, or Daily geotechnical reports.

Content: At least the following:

- The areas in which fill is placed.
- Levels after stripping.
- Materials exposed after stripping and the criteria upon which the decision to cease stripping was made.
- Levels after completion of the filling.

- Types of fill materials in various zones.
- Location and level of each compliance test, together with test results. State if a test is a retest of an area which was previously rejected.
- Action taken where testing indicated that the specified criteria had not been met.
- Any areas where fill material or compaction was to be of a greater or lesser standard than elsewhere on site.

Format: To AS 3798 Appendix C.

Temporary works

Temporary supports: Remove temporary supports to adjacent structures at completion.

PILING 1

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PILING

1 GENERAL

1.1 CROSS REFERENCES

General

Refer to the *General requirements* worksection.

This specification covers the installation of all the piling works necessary for "The Village" Condamine Street, Balgowlah NSW 2093.

The works are to be undertaken on a performance basis in accordance with the requirements of this technical specification and the contract drawings. The design and construction of the piles to accept the nominated loads are the sole responsibility of the contractor. Contractors are required to visit site and familiarize themselves with the existing conditions.

Design vertical loads for the main piles are nominated on the structural drawings. Advice regarding earth and water horizontal pressures are nominated in the geotechnical documents.

The contractor is to submit with the tender proposal a detailed methodology, design and testing procedure suitable for technical evaluation.

Final designs are to be submitted for review by the Structural and Geotechnical Engineers prior to the commencement of any work on site.

All structural elements of the building have been designed to achieve a minimum 50 years life expectancy without the need for significant repairs. The piles must also be designed to achieve this minimum standard.

The contractor is responsible in achieving all the objectives noted in this technical specification and the contract drawings. If an acceptable basement is not achieved, the contractor shall carry out remedial works to rectify, at their cost. Details and depth of walling system is the responsibility of the contractor.

Contactor is responsible for design and installation of any temporary anchors required during construction. Final restraint of the wall system is by final concrete structure. Reference is made to structural notes.

The contractor is to provide Design and Installation Certification to the satisfaction of the Structural Engineer and, in particular, the Council in the requisite stand alone form.

Scope of Works

- Core / stair base piling
- Building piling
- Retention wall piling, including temporary anchors
- Survey
- Dilapidation Report
- Any other specific situations where piles are indicated or required.

Related worksections

Refer to the following worksections:

Site Investigation Report

The following site investigation report prepared by Jeffery and Katauskas Pty Ltd is provided for general information only. Stockland Development Pty Ltd takes no responsibility for the accuracy of any of the information outlined in this report.

Title	Report No.	Date
Report on Geotechnical Investigation	17081S2rpt	21 February 2003

The geotechnical information given is information on the nature of the ground at each tested part. It does not provide a complete description of conditions existing at or below ground level. The contractor is to undertake whatever additional investigation and testing is necessary to verify the design parameters and provide the necessary contractual and Council certification.

1.2 STANDARD

General

Design and performance: To AS 2159 - "Piling - Design and Installation".

Materials and installation: To AS 2159 - "Piling - Design and Installation"

1.3 PERFORMANCE

Performance requirement

Provide installed piles that carry the working loads within the required settlement limits.

Design responsibility

Design piles which, when properly installed, meet performance requirements.

The responsibility for meeting these requirements remains with the contractor.

Settlement

Total pile settlement to be limited to 5mm.

Pile differential settlement between any two adjacent piles to be limited to 1 : 1000.

Total horizontal deflection to be limited to 10mm at any point along the walls.

2 QUALITY

2.1 INSPECTION

Witness points

General: Give sufficient notice so that inspections may be made by the Contractor and the Structural Engineer of the following:

- Setting out.
- Piles and piling material after delivery to site and before installation.
- Installation of piling.
- Pile heads after preparation.
- Pile load tests.
- Temporary anchors.

Concrete piles: Give sufficient notice so that inspection may be made of the following:

- Reinforcement cages after assembly and before installation;
- Excavated shafts, casings and sockets before placing reinforcement.
- Excavated shafts, casings and sockets before concreting.
- Concreting of piles.

2.2 LOAD TESTS

Requirement

Allow for carrying out Dynamic Load Testing, or approved equivalent, on 10% of the total piles located at random, and Integrity Testing on all piles.

The cost of both dynamic and integrity testing is to be separately identified by contractor.

The piles to be tested are to be nominated by the Structural Engineer. Piles to be dynamically tested will be nominated by Structural Engineer during construction.

Preliminary test piles

Install preliminary test piles and carry out preliminary load tests as nominated by the Structural Engineer.

Test data

Record the results of the pile load tests.

Failure

If a test pile fails to meet the load test requirements, give notice.

Type of test

Carry out Compression, Tension (uplift), Lateral load, Dynamic tests and Integrity tests.

Preservative treated timber piles

Testing to AS 2209 Appendix E.

2.3 SUBMISSIONS

Contractors

Submit name and contact details for proposed subcontractor specialising in foundation engineering.

Design

Performance: Submit detailed design proposal and calculations to ensure proposed piling system can achieve the specified requirements including loads and durability requirements.
Submit the sources of geotechnical information and design parameters used in the calculations.

Safety: Submit calculations demonstrating that the piles can be safely installed to the specified levels by the proposed methods, without damaging the piles or adjacent piles or structures.

Submit calculations demonstrating temporary anchors designed to carry loads.

Tests

Load tests: Submit 2 copies of integrity test and load test reports with executive summary of results.

Execution

General: Submit details of proposed piling methods, equipment and sequence.

Jetting and pre-boring: If jetting or pre-boring methods are proposed in conjunction with pile driving, submit details of the proposed equipment and methods.

Concrete piles: If it is intended that high alumina and early strength cements are to be used, submit proposals.

Submit survey results on a weekly basis.

Records

General: Submit 2 copies of records of data requested and including requirements of AS2159.

Contractor to submit 1 electronic set and 3 hard copies of as-built drawings of work.

Submit design certification for piles and anchors by qualified Structural Engineer with the requisite Professional Indemnity Insurance. Provide copy of certificate of currency.

Preservative treated timber piles: Submit treatment records.

Dilapidation Report

Contractor to carry out dilapidation report of internal areas of neighbouring buildings and issue 2 copies to the Client prior to commencing works.

3 MATERIALS AND COMPONENTS

3.1 UNTREATED HARDWOOD PILES

Standard

General: To AS 3818.3.

Timber

Durability class to AS 2209

Strength group to AS/NZS 2878

3.2 PRESERVATIVE TREATED TIMBER PILES

General

Treatment: Provide full length preservative treatment and air dry after treatment.

Timber

Durability class to AS 2209

Strength group to AS/NZS 2878

Grade description

Application: Grade requirements apply to the treated pile at the time of installation.

Grade requirements: Provide piles cut from live timber above the ground swell, approximately circular in cross section, having a continuous natural taper, sound and free from decay, pipe and heart rot, insect damage, termite galleries, dry side, short crooks, shakes, fractures and splits.

Permitted defects

Sapwood damage: If the minimum required depth of sapwood is maintained.

Surface gum and resin pockets, rot pockets and unsound knots: Individual defects permitted up to 20 mm in depth.

- Individual width: Not exceeding 7% of the pile circumference.

Termite galleries: Residual galleries to 20 mm diameter permitted in butt end of hardwood piles only.

Tolerances

Diameter (measured at the toe of the pile including the sapwood) (mm): - 0, + 25 mm.

Straightness: Select grade.

Heartwood

Softwood piles:

- Maximum heartwood at each end of piles: One third of the diameter.

Preparation

Trim the limbs flush with the surface at the base of the limb. Leave surface irregularities and lumps untrimmed.

3.3 PRESERVATIVE TREATMENT

Standard

General: To AS 2209.

Preservative type

Acidic ground water: Creosote.

Alkaline ground water: Waterborne multisalt (CCA).

Identification

Disc location: On the butt end.

Additional information: Month of treatment and charge number.

Disc format: 3.

3.4 CONCRETE PILES

Performance requirements

To meet durability performance requirements.

Piles to prevent soil and water ingress into the site.

Minimum cement content

Generally: 400 kg/m^3 minimum. Mix design to be submitted for approval by the Structural Engineer.

High alumina and high early strength cements

Do not provide.

Reinforcement

Clearance: Provide spacers on the reinforcement cage to maintain the correct cover. During installation of reinforcement in uncased holes keep the reinforcement cage clear of the sides of the hole.

Minimum cover (mm): 100mm

3.5 GROUT PILES

Performance requirements

To meet durability performance requirements.

Minimum cement content

Generally: 450 kg/m^3 minimum. Mix design to be submitted for approval by the Structural Engineer.

High alumina and high early strength cements

Do not provide.

Reinforcement

Clearance: Provide spacers on the reinforcement cage to maintain the correct cover.

Minimum cover (mm): 100mm

4 EXECUTION

4.1 ADJOINING PROPERTIES

Damage

If damage is caused to adjoining properties, stop piling operations and give notice.

Vibration Limitations

Refer to requirements outlined in geotechnical report and structural notes.

4.2 SETTING OUT

Requirement

Engage the services of a licensed surveyor to peg the position of each pile and establish a grid of recovery pegs to enable the setting out to be checked.

Provide the necessary verification of the founding material and socket interface to satisfy the requirements of the design and installation proposal. Engage specialist geotechnical services directly as required to provide the required design and certification.

4.3 INSTALLATION

Inspection

Provide facilities necessary for inspection of piling including safe access, lighting and ventilation.

Concrete piles

Loose material: Do not allow loose material to fall down pile holes before or during concreting.

Liner: Pack well into position.

Piling system

Contractor to submit details of proposed piling system for review by the contractor and Structural Engineer.

Protection

Advise method of protection against deterioration, and ensuring 50 year design life.

Contractor to submit details for review.

Pile capacity schedule

Refer to structural drawings for vertical design loads.

Tolerances

Refer to AS 2159: Piling - Design and Installation.

Maximum permissible deviations:

-	Location in plan	- generally:	± 75mm
		- column starter bars	± 10mm
-	Founding depth level:	± 100mm	
-	Pile head cut off level:	+ 50mm - 0mm	
-	Straightness:	1 : 250, maximum of 50mm.	
-	Pile Ends:	1 : 50	

4.4 PREPARING PILE HEADS

Requirement

Prepare pile heads for incorporation into the structure.

Defective material

If the pile at or below cut off level, is damaged by driving, or is otherwise unsound, give notice.

Concrete piles

Roughen the surface at cut-off level. Clean and straighten the projecting reinforcement.

Steel piles

Clean the surfaces to be embedded in concrete. Remove temporary protective treatment where appropriate.

4.5 OVERDRIVEN PILES

Notice

If the pile is driven below the specified level, give notice.

4.6 RECORDS OF DATA

Ground level

Record the level of the surrounding ground at the time when the pile is installed.

Engage the services of a licensed surveyor to undertake a detailed survey and report on the "as-constructed" position of all piles to verify their compliance with the requisite tolerances. Contractor to advise of any piles out of tolerance.

5 COMPLETION

5.1 COMPLETION

On completion of the works, the Contractor is to remove from the site all spoil, excavated material from pile holes, and all other debris created during piling. Upon removal of all associated plant and equipment, the Subcontractor is to leave the site neat and tidy to the satisfaction of the Contractor.

Warranties

General: Submit a warranty to correct faults and make good damage that is caused by the pile installation or subsequent movement to that part of the superstructure supported on the piling, or to adjacent property, or to both.

Warranty period: To be advised by the Contractor.

CONCRETE POST-TENSIONING 1

1 GENERAL 1

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1.2 STANDARD 1

1.3 INTERPRETATION 1

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CONCRETE POST-TENSIONING

1 GENERAL

1.1 CROSS REFERENCES

General

Refer to the *General requirements* worksection.

This specification covers the design and construction of all the suspended concrete floor slabs and beams for "The Village" Condamine Street, Balgowlah NSW 2093.

The works are to be undertaken on a performance basis in accordance with the requirements of this technical specification and the contract drawings. The design and construction of the suspended concrete floor slabs and beams to support the nominated loads are the sole responsibility of the subcontractor.

Structural Design Brief is included in this specification.

Final designs are to be submitted for review by the Structural Engineer prior to the commencement of any work on site.

All structural elements of the building have been designed to achieve a minimum 50 years life expectancy. The suspended floor slabs and beams must also be designed to achieve this minimum standard.

The subcontractor is to provide Design and Construction Certification to the satisfaction of the Structural Engineer and, in particular, the Council in the requisite stand alone form.

Related worksections

Refer to the following worksections:

- CONCRETE REINFORCEMENT

1.2 STANDARD

General

Post-tensioning: To AS 3600.

1.3 INTERPRETATION

Definition

Grouted pre-packed aggregate: Concrete made by grout intrusion into pre-packed aggregate.

2 QUALITY

2.1 INSPECTION

Witness points

Give sufficient notice so that inspection may be made of the following:

- Tendons fixed in place.
- Commencing initial or incremental stressing.
- Stressing tendons.
- Grouting tendons.

2.2 TESTS

General

General: Sample, test and assess the concrete for compliance.

Standard: To AS 1379.

Frequency of sampling: Spread site sampling evenly throughout the pour. For each prestressed element take at least 3 samples for 3 day, 7 day and 28 day testing, at the rate of at least one sample per 2 batches, from well distributed locations including the anchorage area. Cure 3 day and 7 day samples by the same method as the prestressed element.

Grout for tendon ducts

Compressive strength (75 mm cube) (MPa): 40

- Sampling frequency: 1 per pour
- Number of specimens per sample: 3
- Acceptance criteria: Average compressive strength equals or exceeds specified value.

Bleeding:

- Test method:
- Sampling frequency:
- Acceptance criteria:

Comply with recommendations of Concrete Institute of Australia publication "Grouting of Pre-stressing Ducts and Ground Anchors", dated June 1982.

Shrinkage (% at 24 hours):

- Test method:
- Sampling frequency:

2.3 SAMPLES

Materials

Duct-forming material: Submit samples of proposed material.

Tendon materials: Submit samples for testing.

2.4 SUBMISSIONS

Subcontractor

Submit the proposed system and the name and contact details of the post-tensioner.

Design

Calculations: Submit calculations of tendon jacking forces, extensions and losses for each stressing stage. Submit amount of draw-in expected in seating anchorages, friction wobble coefficient and friction curvature coefficient for tendons and duct-forming material.

Shop drawings

Submit shop drawings of post-tensioned work showing details of the proposed system, including the following:

- Profiles, sizes and details of tendons, proprietary anchorages, ducts, duct formers, splicing, sheathing, end block reinforcement and other associated components.
- Stressing requirements including sequence of stressing, jacking forces, tendon elongations, gauge pressures, and the basis of assumed loss calculations.
- Number, size and position of grout openings, vents and drain holes in the ducts.
- Proposed fabrication, handling and fixing methods for tendons and sheathing.

Tests

Grout: Before grouting submit certified test results for compressive strength and shrinkage of the proposed grout mix.

Anchorages: Submit performance test certificates for each type and size of anchorage and coupler.

High tensile steel: Submit test certificates.

Materials

Grout: Submit proposed grout mix including additives, if any.

Certificate of compliance: Submit the manufacturer's certificate of compliance with the relevant Australian standard for each delivery of prestressing steel and each delivery of anchorage components.

Grouted pre-packaged aggregate: Submit proposed details including aggregate grading and grout materials and proportions.

Epoxy grout: Submit proposed formulation.

Execution

Equipment: Submit details of proposed gauging, stressing and grouting equipment. Submit current calibration certificates for tensioning and tension measuring equipment.

Records

Post-tensioning: Record and submit the following data:

- Concrete mix and quality.
- Details of placing and curing including dates.
- Details of placing of reinforcement and tendons.
- Date of post-tensioning operation.
- Name of operator.
- Type and identification numbers of equipment used.
- Piston areas.
- Identification of tendons.
- Stressing method (single or double end, monostrand or multistrand).
- Calculated tendon extension at each stressing stage.
- Initial force or pressure where tendons are marked for measurement of elongations.
- Final force or pressure and elongation on completion of tensioning.
- Typical certified stress-strain curves for each 10 coils of wire or strand, or each parcel of tendon materials.
- Elongation remaining after release of jacks.
- Tendon breakage.
- Ramming pressure, if applicable.

Grouting: For each duct grouted, record and submit a record identifying the duct and tendons, giving the stressing and grouting dates, and showing the composition of the grout (water:cement ratio, admixtures), grout tests, and details of grouting (including interruptions, topping up).

3 MATERIALS

3.1 GROUT

Grout properties

Maximum shrinkage: 1% by volume after 24 hours.

Maximum water:cement ratio: 0.45 (by weight).

Minimum compressive strength (75 mm cube): 30 MPa at 28 days.

Grout materials

Fine aggregate: Do not include in the grout for ducts, unless gross inside cross-sectional area of ducts exceeds 5x tendon cross-sectional area, in which case fine aggregate may be added.

- Grade: Passing 1.18 mm sieve.

Admixtures: Do not provide admixtures containing chlorides, nitrates, sulphides or sulphites. Include an anti-bleed additive.

Cement type to AS 3972: GP, free from calcium chloride and < one month old from date of manufacture.

Fly ash: Maximum 10% by weight of cement.

Epoxy grout

Commercial epoxy formulation of high compressive strength.

3.2 DUCTS

Material

Strong enough to retain shape, resist damage during construction, and prevent entrance of cement paste and water from the concrete. Material to be left in place must not cause deterioration or electrolytic action.

Size

To allow feeding of tendons, and grouting.

4 EXECUTION

4.1 TENDONS

Tendons

General: Provide post-tensioning tendons, anchorages, ducts, supports, grout and anchorage protection.

Care: Do not weld tendons, do not expose them to sparks, ground current or excessive temperatures.

Minimum concrete cover: Refer to structural drawings

Other requirements: Refer to structural drawings

4.2 POST-TENSIONING EQUIPMENT

Gauges

Standard: To AS 1349.

Maximum error in pressure indication: 1% of the maximum scale value.

Calibration of gauges and dynamometers

Calibrate at intervals not exceeding 6 months.

Jacks

Calibrate and measure friction losses at least once a year, or after re-sealing.

Calibration of gauges and jacks to be tested and certificate supplied dated not more than one week old from date of first use on the project.

4.3 POST-TENSIONING

Standard

Concrete cover generally: To AS 3600.

Concrete cover for structures for retaining liquids: To AS 3735.

Sheathing

General: If ducts are formed with sheaths, provide sheathing material strong enough to transfer the tendon stresses into the body of the concrete.

Stiffening: If tendons are to be installed after concreting, provide temporary stiffening within the sheath such that the duct shape and profile are maintained during concreting. After concreting remove the temporary stiffening and prove the duct using a suitable gauge before installing the tendon.

Splicing

Enclose splices in housing long enough to permit the necessary movements. Give spliced strands the same lay to prevent rotation.

Unbonded tendons

Provide galvanized or lead coated steel sheathing for lengths of tendon required to be unbonded, such that the tendon is permanently protected from corrosion.

Stressing

Procedure: Apart from light initial stressing to avoid early shrinkage cracking, do not commence stressing until the concrete has demonstrably attained the required transfer strength. When more than one wire or strand is stressed simultaneously, stress them equally. Do not leave tendons partially stressed.

Cutting tendons

Do not cut tendons until 7 days after grouting.

Protection of tendons and anchorages

On completion of stressing and grouting, permanently protect all exposed steel in the blockouts by painting with a Tar-Epoxy Primer, and the blockout shall be filled with an Epoxy based water soluble grout (50 MPa min at 28 days) to a surface consistent with the surrounding concrete profile to provide 40 mm cover to anchorage parts. Keep free of foreign matter end anchorages that are to be protected.

For internal stressing pockets, finish top surface flush with the surrounding concrete maintaining a minimum of 40 mm cover.

Protection of grout fittings and ducts

For bonded construction, protect from collapse and other damage.

Prestressing schedule

Structural element, tendon material, and tendon size to be submitted for review by the Structural Engineer.

4.4 GROUTING DUCTS

Preparation

Pressure test the ducts at the grout pressure using water before grouting, and rectify leaks/repair holes. Remove water from ducts immediately after curing has started, using oil-free compressed air. Keep ducts dry until grouting starts.

Grouting

Grout within 48 hours of completion of stressing. Prevent damage to grout vents and fittings during grouting. Do not use manually powered grouting machines. Completely fill the duct during grouting. Inject grout into voids between tendons, ducts and anchorages, until grout flows from vents without air bubbles. Close vents as they fill, progressively in the direction of flow. If there is a blockage or interruption, completely flush grout from the duct using water. Maintain concrete around grouted tendons at $\geq 5^{\circ}C$ for at least 3 days after grouting. Encase external tendons in dense concrete designed to minimise shrinkage cracking, and secured to the main concrete.

Grout openings

General: Provide grout openings, vents and drain holes as necessary, including at each end, and at high points except where tendon curvature is small and tendon is relatively level. Remove protruding vents and drains after the grout has set and make good to match the adjacent surfaces.

Maximum spacing: 15 m.

Grout pressure

Seal the duct on completion of grouting at a pressure $\geq$ 210 kPa. Fit pressure tap connections to each duct for this purpose.

STRUCTURAL DESIGN BRIEF
POST-TENSIONED FLOOR STRUCTURE

This document outlines the structural criteria and the design parameters to be adopted for the structural design and construction of the floor structure for "The Village" Condamine Street, Balgowlah NSW 2093.

The structural design shall be carried out in accordance with the provisions of the relevant Australian Standards and the Building Code of Australia, and in accordance with accepted practice and principles of structural engineering.

1.0 Design Parameters

1. Refer to the Design Loading Sheets for design loads to be adopted as a minimum.
2. Refer to architectural drawings for non-load bearing walls, façade, tiled areas, landscaping, pool structure, topping slabs, roof ballast etc to be allowed for in the design of the floor structure.
3. Structure has to have the same strength and stiffness requirements as that indicated by BG&E's documents.
4. Strength of the floor structure shall be adequate to resist the loads combinations in accordance with AS 1170 Structural Design Actions and AS 3600 Concrete Code.
5. Durability and fire rating of the floor structure to comply with AS 3600 as appropriate and the Building Code of Australia.
6. Maximum allowable bending moments to be transferred into columns are as follows:
   - Exterior Columns - 10% of the gross column stiffness
   - Interior Columns - 25% of the gross column stiffness
7. No live end anchorages are permitted in columns unless otherwise approved.
8. Floor structure to be designed for a "Moderate Degree of Crack Control" to AS 3600 as a minimum. Certain elements such as roofs, terraces, pool etc. will require a "High Degree of Crack Control" to AS 3600.
9. Floor deflections to AS 3600 as appropriate.

   Limited to span/250 total long term (span/125 cantilevers); span/500 incremental (span/250 cantilevers) for lightweight partitions; and span/1000 incremental (span/500 cantilevers) for members supporting masonry walls and brittle finishes. In addition to the above, floor total long term deflections are to be limited to the following requirements:

   - Floor deflection + or - 20mm maximum
   - Transfer Beams + or - 10mm maximum
10. Make an allowance for stairs and stair walls to be supported by the structure and, in particular, loads carried down by blade walls under landings.
11. The subcontractor is to allow for in situ concrete falls in the top surface of roof slabs, balconies, terraces, landscaped areas etc. Refer to Architects drawings for extents and locations.

2.0 Documentation and Construction

1. Stressing subcontractor to document all suspended floor structures, including all conventional reinforcement in floor slabs, lift lobbies, beams, trimming reinforcement at penetrations, anti-burst reinforcement, top mesh reinforcement to all exposed post-tensioned slabs etc.
2. BG&E will document horizontal elements for slabs on ground and all fire stairs.
3. BG&E will provide profile drawings for all suspended floor structures, in CAD format, to the stressing subcontractor.
4. BG&E will provide working loads for all columns and walls being transferred by the floor structure.
5. A procedure for the review of the stressing documents needs to be discussed and agreed.
6. Stressing subcontractor is required to carry out all inspections, including all conventional reinforcement indicated on their drawings, prior to pouring concrete.
7. Stressing subcontractor to provide design and construction certification of the floor structures as required by BG&E.
8. Stressing subcontractor to provide a copy of their current Professional Indemnity Insurance policy.

THE VILLAGE, BALGOWLAH

DESIGN LOADING SHEET

The Design Loading Sheet provided is "For Information Only". The subcontractor will need to make their own assessment of the design loads in accordance with the architectural, structural and all other relevant drawings and specifications prior to designing the suspended floor structures.

Carpark P2 - Garbage Room

- Self weight
- Superimposed dead load 1.00 kPa
- Live load 5.00 kPa

Carpark P2 & P3 - Carpark

- Self weight
- Superimposed dead load 0.20 kPa
- Live load 2.50 kPa

Carpark P3 - Plant Rooms

- Self weight
- Superimposed dead load 2.20 kPa
- Live load 5.00 kPa

Retail Level (General)

- Self weight
- Superimposed dead load
  - General services 0.30 kPa
  - Tiles (Assumed 60mm zone) 1.50 kPa
  - Partitions (Assumed lightweight, no masonry) 1.00 kPa
  - Masonry walls Refer Arch. Dwgs
- Live load (as per AS1170.1-2002)
  - Retail 4.00 kPa
  - Corridors / foyers / Mall 5.00 kPa
  - Stairs 5.00 kPa

Retail Level (Coles and Liquorland - Refer Design Briefs)

- Self weight

- Superimposed dead load

- General services	0.30 kPa
- Tiles in local areas only	1.50 kPa
(Assumed 60mm zone extent to be confirmed)	
- Plinths	Refer Arch. Dwgs
- Setdown areas	Refer Arch. Dwgs
- Masonry walls (if any)	Refer Arch. Dwgs
- 70-125mm thick concrete topping over Insulation to cool/freezer rooms (Extent to be confirmed by Coles)	1.75 – 3.13 kPa

- Live load

- Coles selling area	10.00 kPa
- Liquorland selling area	7.50 kPa
- Storage area / admin	15.00 kPa
- Fruit & Veg area	15.00 kPa
- Loading Bay	15.00 kPa
- Cool / freezer rooms	4.5 kPa / m height with min 15 kPa
- Service Yard	15.00 kPa
- Safes in admin area	(To be confirmed by Coles)

Levels 1 to 8 - Apartments

- Self weight
- Superimposed dead load 1.25 kPa
- Live load 1.50 kPa

Levels 1 to 8 - Terraces / Balconies

- Self weight
- Superimposed dead load 1.25 kPa
- Live load 2.00 kPa
- Balustrades (assume 1m high 190 solid block) 4.56 kN/m
- Balustrades - Glazing 0.35 kPa

Level 1 - Landscaping

- Self weight
- Superimposed dead load - 1.0m soil (max) 18.00 kPa
- Live load 1.00 kPa
- Live load (for trees) To be determined

Level 1 - Paved Areas

- Self weight
- Superimposed dead load 2.50 kPa
- Live load 5.00 kPa

Pool

- Self weight
- Superimposed dead load (1200 deep water + finishes) 17.00 kPa
- Live load 3.00 kPa

On Site Detention Tank

- Self weight
- Superimposed dead load (2500 deep water + finishes) 27.00 kPa
- Live load 3.00 kPa

Loading Dock

- Self weight
- Superimposed dead load 1.50 kPa
- Live load 15.00 kPa

Public Toilets

- Self weight
- Superimposed dead load 1.50 kPa
- Live Load 2.00 kPa

Office

- Self weight
- Superimposed dead load 1.50 kPa
- Live Load 3.00 kPa

Roof Level - Concrete Roof

• Self weight	
• Superimposed dead load (includes 75mm ballast)	3.00 kPa
• Live load	3.00 kPa

Roof Level - Metal Roof

• Self weight - Metal cladding	
• Superimposed dead load	0.50 kPa
• Live load	0.25 kPa

Foyer / Corridors / Lobbies

• Self weight	
• Superimposed dead load	1.25 kPa
• Live load	4.00 kPa

Stairs - Internal

• Self weight	
• Superimposed dead load	n/a
• Live load	2.00 kPa

Stairs- Fire

• Self weight	
• Superimposed dead load	n/a
• Live load	4.00 kPa

Façade

Precast Wall Areas

• Self weight (assume 180 precast wall)	4.32 kPa

Glazing Areas

• Self weight	0.50 kPa

Brickwork Areas (Including metal stud wall internal)

• Self weight	2.85 kPa

Note 1.0 kPa = 100 kg/m^2 approximately

GENERAL LATERAL LOADS

- Wind loads are in accordance with AS 1170.2 as follows:

Regional Wind Speed:	$V_R = 46ms^{-1}$
Region:	A2
Terrain Category:	3

- Seismic loads are in accordance with AS 1170.4 as follows:

Design Category:	B
Site Factor:	S = 0.67
Ground Acceleration:	a = 0.08

CONCRETE REINFORCEMENT 1

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1.2 STANDARDS 1

2 QUALITY 1

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3 MATERIALS AND COMPONENTS 2

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CONCRETE REINFORCEMENT

1 GENERAL

1.1 CROSS REFERENCES

General

Refer to the *General requirements* worksection.

This specification covers the design and construction of all the suspended concrete floor slabs and beams for "The Village" Condamine Street, Balgowlah NSW 2093.

The works are to be undertaken on a performance basis in accordance with the requirements of this technical specification and the contract drawings. The design and construction of the suspended concrete floor slabs and beams to support the nominated loads are the sole responsibility of the subcontractor.

Structural Design Brief is included in this specification.

Final designs are to be submitted for review by the Structural Engineer prior to the commencement of any work on site.

All structural elements of the building have been designed to achieve a minimum 50 years life expectancy. The suspended floor slabs and beams must also be designed to achieve this minimum standard.

The subcontractor is to provide Design and Construction Certification to the satisfaction of the Structural Engineer and, in particular, the Council in the requisite stand alone form.

Related work sections

Refer to the following worksections:
- CONCRETE POST TENSIONING

1.2 STANDARDS

General

Steel reinforcing materials: To AS/NZS 4671.

2 QUALITY

2.1 INSPECTION

Witness points

Give sufficient notice so that inspection may be made of the following:

- Reinforcement fixed in place.
- Cores and embedments fixed in place.

2.2 SUBMISSIONS

Design

Bending schedules: Submit marking plans and schedules showing location, shape, size and grade of reinforcement.

Tests

Certificate of compliance: Submit either the manufacturer's certificate of compliance with the relevant standard, or an independent testing authority's test certificates demonstrating compliance.

Execution

Changes: Submit proposed changes, if any, in the reinforcement shown on the drawings.
Mechanical splices: If mechanical bar splices are proposed or required submit details and test certificates for each size and type of bar to be spliced.

Damaged galvanizing: If repair to AS/NZS 4680 Appendix E is intended, submit proposals.
Welding: Give notice before welding reinforcement.

Splicing: Submit details of any additional splicing not documented.

Provision for concrete placement: If spacing or cover of reinforcement does not comply give notice.

3 MATERIALS AND COMPONENTS

3.1 REINFORCEMENT

General

Ductility grade: To AS/NZS 4671 class N.

Identification: To AS/NZS 4671 Section 9.
Surface condition: Free of loose mill scale, rust, oil, grease, mud or other material which would reduce the bond between the reinforcement and concrete.

Dowels

Standard: To AS/NZS 4671 grade 250N.

General: Provide each dowel in one piece, straight, with square cut ends free from burrs. Apply 2 coats of bitumen emulsion to half the length of the dowel at one end.

Tie wire

General: Annealed iron 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

Bending

General: To AS/NZS 4671 Section 19.

Fabrication tolerances

General: To AS/NZS 4671 Subsection 19.2.

3.2 PROTECTIVE COATED REINFORCEMENT

Extent

For concrete elements containing protective coated reinforcement, provide the same coating type to all that element's reinforcement and embedded ferrous metal items, including tie wires, stools, spacers, stirrups, plates and ferrules, and protect other embedded metals with a suitable coating.

Galvanizing

Standard: To AS/NZS 4680

Zinc coating (minimum): 700 g/m^2.

Preparation: Pickling to AS 1627.5.

Fabrication: Galvanize after fabrication.

Passivation: By dipping in 0.2% sodium dichromate solution.

Epoxy coating:

General: High build, high solids chemically resistant coating.

Thickness: 200 µm minimum.

Damage
If damage occurs to the coating undertake the following action:

- Galvanized coatings: Replace the damaged reinforcement.
- Epoxy coatings: Repair the damage to the **Epoxy coating** subclause.

4 EXECUTION

4.1 REINFORCEMENT SUPPORTS

Support types
General: Provide purpose-made concrete, metal or plastic supports, adequate to withstand construction and traffic loads, and in the form of chairs, spacers, stools, hangers and ties.

Exposure classification A1:

- Provide a protective coating to ferrous metal supports which extend to the surface of the concrete, or which are used with galvanized or zinc-coated reinforcement.

Exposure classifications more severe than A1: Provide either

- plastic supports of adequate strength and of a shape appropriate to the location; or
- concrete supports of the same concrete quality as the concrete element.

Supports over membranes
General: Prevent damage to waterproofing membranes or vapour barriers. Place a metal or plastic plate under each support.

Support spacing
General: Provide supports in adequate numbers and spacing to maintain reinforcement in the correct position within the tolerances under the **Fixing requirements** subclause.

Minimum spacing:

- Bars: ≤ 60 diameters.
- Fabric: ≤ 750 mm.

4.2 FIXING REINFORCEMENT

Fixing requirements
General: Secure the reinforcement against displacement by tying at intersections with either annealed iron 1.25 mm diameter (minimum) wire ties, or clips. Bend the ends of wire ties away from nearby faces of forms so that the ties do not project into the concrete cover.

Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections, and at other points as required.

Beams: Tie ligatures to bars in each corner of each ligature. Fix other longitudinal bars to ligatures at 1 m maximum intervals.

Columns: Secure longitudinal column reinforcement to all ligatures at every intersection.

Bundled bars: Tie bundled bars together so that the bars are in closest possible contact. Provide tie wire at least 2.5 mm diameter at centres ≤ 24 times the diameter of the smallest bar in the bundle.

Tolerances: To AS/NZS 4671 Section 19.

Dowels
Fixing: Embed the unpainted half of the dowels in the concrete placed first.
Tolerances:

- Location: ± half the diameter of the dowel.
- Alignment: 2 mm in 300 mm.

Splicing
General: To AS 3600 Subsection 13.2, for splicing additional to that documented. Obtain approval under the **Submissions** clause before implementation.

Welding
General: Do not weld reinforcement

- except where documented, or submitted and approved under the **Submissions** clause;
- within 75 mm of a bend with an internal radius < 12 bar diameters; or
- at points which have been re-bent.

Standard: To AS 1554.3.

4.3 REINFORCEMENT PROTECTION

Unencased reinforcement
General: Provide protection for 'starter bars' and other items projecting from cast concrete for future additions, and exposed to the weather.

Concrete cover
General structures: To AS 3600.

Structures for retaining liquids: To AS 3735.

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CONCRETE FORMWORK

1 GENERAL

1.1 CROSS REFERENCES

General

Refer to the *General requirements* worksection.

Related work sections

Refer to the following worksections:

- CONCRETE REINFORCEMENT
- CONCRETE IN SITU
- CONCRETE POST-TENSIONING

1.2 STANDARD

General

Formwork design: To AS 3610.

Formwork construction: To AS 3610.

2 QUALITY

2.1 INSPECTION

Witness points

Give sufficient notice so that inspection may be made of the following:

- Completed formwork before concrete placing.
- Evaluation of the finish.
- Used formwork, after cleaning and before reuse.

2.2 SUBMISSIONS

Design

Multi-storey work: Submit calculations to show that allowable concrete stresses will not be exceeded if

- formwork procedures or loadings differ from the information included in the project documentation;
- project documentation does not include formwork shoring or stripping procedures or allowable loadings from stacked materials; or
- props above a floor do not coincide with the props below.

Certification: Submit certification by a qualified structural engineer for the formwork.

Tests

Void formers: Submit test certificates to confirm that the formers comply with the following requirements, under laboratory conditions, when placed on damp sand and loaded with a mass of wet concrete at least the mass of the beams or slabs they are required to support:

- Deflection during placing and compaction of the concrete is less than the span of the beam or slab divided by 1000.
- Additional deflection between initial set and 7 days does not exceed span/400.

- Collapse and loss of load carrying capacity will occur not more than 48 hours after flooding with water, creating a void at least 60% of the original depth of the void former.

Execution

Documentation: Submit formwork documentation and details of proposed form linings, form facings, release agents and, where applicable, reuse of formwork. Submit details of support propping required for construction loads that exceed design loads for concrete of that age.

Reshoring: If intended, submit proposals.

Surface repair method: Before commencing repairs, submit the proposed method.

Slip formwork: Show on formwork drawings the method of lifting the forms during construction and the average rate of movement. Demonstrate that the proposed average rate will permit the production of concrete of the specified quality and surface.

Stripping single storey suspended work: If the requirements of AS 3610 cannot be met, give notice.

Stripping multi-storey suspended work: If the requirements of AS 3610 cannot be met, or if shores are not concentric floor to floor, submit formwork documentation with reference to loads and concrete properties.

3 MATERIALS AND COMPONENTS

3.1 MATERIALS AND COMPONENTS

Form linings and facings

Compatible with finishes applied to concrete.

Release agents

Compatible with applied finishes to concrete and the contact surfaces.

Void formers

Unwaxed cardboard or fibreboard, collapsible on absorption of moisture.

Lost formwork

Permanent or lost formwork, chloride free, which will not impair the structural performance of the concrete members.

Steel reinforcement decking

Acts as permanent formwork and positive tensile reinforcement in one-way reinforced concrete slab construction.

4 EXECUTION

4.1 FORMWORK

General

General: Design and construct formwork so that the concrete, when cast in the forms, will have the required dimensions, shape, profile, location and surface finish. Allow for dimensional changes, deflections and cambers resulting from the application of prestressing forces (if any), applied loads, temperature changes and concrete shrinkage and creep.

Openings: In vertical forms provide form openings or removable panels for inspection and cleaning, at the base of columns, walls and deep beams. For thin walls and columns, provide access hatches for placing concrete.

Reshoring: Do not reshore.

Corners

Work above ground: Chamfer at re-entrant angles, and fillet at corners. Face of bevel 25 mm.

Release agents

Before placing reinforcement, apply a release agent to form linings and facings. Do not coat the reinforcement and construction joints with release agent. Do not allow the release agent to "puddle".

Cleaning

Before placing concrete, remove free water, dust, debris and stains from the forms and the formed space.

Permanent loading

Do not place permanent loads, including masonry walls, on the concrete structure while it is still supported by formwork.

4.2 DIMENSIONAL TOLERANCES

Dimensional tolerances

Position: Construct formwork so that the position of finished concrete is within the tolerances stated in the **Position tolerances table**. When out of position and out of plumb measurements are added together, they must not exceed the tolerances stated below.

Position tolerances table

Surface finish class to AS 3610	1	2	3	4	5
Maximum deviation from correct position (mm)	5	10	15	20	30

Dimensional tolerance schedule

Dimension or measurement	Location or element	Tolerance (mm)
Thickness	Slabs	+10mm, -0mm
Vertical Dimension	Floor to floor at edge of building	± 10mm

4.3 FORMED SURFACE FINISH

Visually important surfaces

For concrete of surface finish classes 1, 2 or 3, set out the formwork to give a regular arrangement of panels, joints, bolt holes, and similar visible elements in the formed surface. Form 45° bevels, 25 mm on the face on corners and angles.

Formed surfaces schedule

Surface finish class to AS 3610	Concrete element or surface	Integral finish	Form lining type	Bolt hole filling
1	Not Applicable			
2	Exposed surfaces above ground floor to receive paint or ≤ 10mm thick applied finish.	-	Ply	Fill
3	Exposed surfaces in basement and surfaces with > 10mm applied finish over	-	Ply	Fill

Surface finish class to AS 3610	Concrete element or surface	Integral finish	Form lining type	Bolt hole filling
4	Concealed concrete surfaces.	-	Ply	Fill
5	Below ground	-	Ply	Fill

4.4 FORM TIE BOLTS

Removable bolts

Remove the bolts without causing damage to the concrete.

Cover

Position formwork tie bolts left in the concrete so that the tie does not project to within 50 mm of finished surface.

Bolt hole filling

General: Provide material matching the surface colour.

Recessed filling: Fill or plug the hole to 6 mm below the surface.

4.5 SLIP FORMWORK

General

Type: Slip formwork or moving formwork that consists of suitable equipment, constructed and operated by personnel experienced in its use.

Height of the forms

1200 mm maximum.

Provision for inspection

Provide a hanging scaffold below the moving formwork, from which surface treatment and inspection may be carried out.

4.6 VOID FORMERS

General

Cast designated suspended ground floor slabs and beams on void formers. Keep void formers dry until use, place them on a firm level surface, cover with a waterproof membrane, and place reinforcement and concrete with minimum delay.

4.7 STEEL REINFORCEMENT DECKING

Installation

General: Fix sheeting to structural steel supports with puddle welds, or with welded shear studs in composite construction.

Propping: Provide temporary propping during concrete placing and curing.

4.8 STRIPPING AND REMOVAL

Formwork removal

Extent: Remove formwork, other than steel reinforcement decking, including formwork in concealed locations.

Timing: Do not disturb forms until concrete is hard enough to withstand it. Do not remove formwork until concrete is strong enough to support loads without unacceptable deflection.

Stripping of formwork

General: To AS 3600 where it is more stringent than AS 3610.

Post-tensioned concrete: Do not remove form supports supporting post-tensioned concrete members until sufficient prestress has been added to support the loads.

Multi-storey work: Provide for stripping without disturbing props supporting succeeding floors.

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IN SITU CONCRETE

1 GENERAL

1.1 CROSS REFERENCES

General

Refer to the *General requirements* worksection.

Related worksections

Refer to the following worksections:

- CONCRETE REINFORCEMENT
- CONCRETE FORMWORK
- CONCRETE POST-TENSIONING

1.2 STANDARDS

General

Concrete: To AS 1379.

Concrete structures for retaining liquids: To AS 3735.

Materials and construction: To AS 3600.

1.3 INTERPRETATION

Definitions

Cold weather: Surrounding outdoor shade temperature < 10°C.

Contraction joint: An unreinforced joint with a bond-breaking coating separating the concrete joint surfaces.

Control joint: A weakened plane contraction joint created by forming a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.

Expansion joint: An unreinforced joint with the joint surfaces separated by a compressible filler.

Hot weather: Surrounding outdoor shade temperature > 32°C.

Isolation joint: A joint without keying, dowelling, or reinforcement, which imposes no restraint on movement.

2 QUALITY

2.1 INSPECTION

Witness points

Give sufficient notice so that inspection may be made of the following:

- Base or subgrade before covering.
- Membrane or film underlay installed on the base.
- Completed formwork, and reinforcement, cores, fixings and embedded items fixed in place.
- Commencement of concrete placing.
- Surfaces or elements to be concealed in the final work before covering.

Rejection

Remove rejected concrete from the site.

2.2 MATERIAL TESTS

Material tests schedule

Material	Test method	Test frequency
Portland and blended cement (each type used)	To AS 3972	1 per month
Fly ash	To AS 3582.1	1 per month
Ground slag	To AS 3582.2	1 per month
Admixtures (each type used)	To AS 1478.1	1 per 6 months
Coarse aggregate		
Dense and lightweight:		1 per 2 months
-Particle size analysis	To AS 1141.11 and AS 1141.12	2 per month
- Particle density and water absorption	To AS 1141.6.1	1 per 3 months
- Particle shape	To AS 1141.14	1 per 3 months
- LA value	To AS 1141.23	1 per 3 months
- Soundness	To AS 1141.24	1 per 3 months
Fine aggregate:		
- Particle size analysis	To AS 1141.11 and AS 1141.12	2 per month
- Particle density and water absorption	To AS 1141.5	1 per 3 months
- Friable particles	To AS 1141.32	1 per 3 months
- Organic impurities	To AS 1141.34	1 per 3 months
- Soundness	To AS 1141.24	1 per 3 months
- Light particles	To AS 1141.31	1 per 3 months
- Sugar	To AS 1141.35	1 per 2 months

2.3 CONCRETE TESTS

Concrete testing

Dissemination of production information: If concrete is manufactured off site, register the project in accordance with AS 1379 clause 6.4.3.

Concrete testing methods

Sampling, identification and testing: To AS 1012. Sample the concrete on site, at the point of discharge from the agitator.

Test records

Records and reports: To AS 1012.

Control tests

Acceptance criteria:

- Average strength of all samples must exceed the required value.
- Strength of any one sample must be at least 0.85 of the required value.

Control tests requirements schedule

Refer drawings

Performance tests

General: Sample, test and assess the concrete for compliance.

Standard: To AS 1379.

Strength grade/Characteristic compressive strength: Spread the site sampling evenly throughout the pour. For concrete in columns and bearing walls, take one sample per batch. Use at least 2 specimens from each sample.

- Specimen size: 200 x 100 mm diameter but, if aggregate size exceeds 20 mm, 300 x 150 mm diameter.

Slump: Test at least one sample from each batch before placing concrete from that batch in the work.

Drying shrinkage: Test 3 specimens of each type of concrete every 3 months or every 3000 m^3 placed concrete. Base assessments on the average of the 3 specimens test results. Conduct 2 sets of tests on trial mixes.

Sampling frequency table

Number of batches for each type and grade of concrete per day	Minimum number of samples
1	1
2-5	2
6-10	3
11-20	4
each additional 10	1 additional

Concrete tests schedule

Property	Test method	Test/sampling frequency
Air entrainment	To AS 1012.4	Refer to drawings
Slump	To AS 1012.3.1	Refer to drawings
Characteristic compressive strength	To AS 1012.9	Refer to drawings
Early age strength	To AS 1012.9	Refer to drawings
Modulus of rupture	To AS 1012.11	Refer to drawings
Indirect tensile strength	To AS 1012.10	Refer to drawings
Drying shrinkage	To AS 1012.13	Refer to drawings
Density of plastic concrete	To AS 1012.5	Refer to drawings
Density of hardened concrete	To AS 1012.12.1 or AS 1012.12.2	Refer to drawings
Bleeding	To AS 1012.6	Refer to drawings

Embedded pressure pipes

Leak tests: Before embedment, leak test those pipes which will contain liquid or vapour at a pressure > 10 kPa.

2.4 SAMPLE PANELS

General

Supply sample panels to AS 3610 for the application specified.

Manufacture

Cast the panels using the formwork, concrete, compaction equipment, form release agents, curing and formwork removal methods that are to be used in the final work.

Storage

Maintain the panels on site undamaged and protected from the weather, as samples for future evaluation of completed work.

2.5 COLOURED CONCRETE

General

Supply sample blocks of concrete to be coloured with mineral oxides.

- Number: 4.
- Size (nominal): 300 x 300 x 50 mm.

2.6 SUBMISSIONS

Subcontractors

Submit names and contact details of proposed ready mixed concrete suppliers, and alternative source of supply in the event of breakdown of ready mixed or site mixed supply.

Design

Loading: Submit calculations to justify the adequacy of the structure to sustain any construction loads and procedures.

Shop drawings

Cores, fixings and embedded items: If the locations of these items are not shown or are shown diagrammatically, submit shop drawings showing the proposed locations, clearances and cover. Indicate proposed repositioning of reinforcement.

Tests

Material tests: Before supplying concrete submit test certificates based on samples from the most recent production or from stockpiles for the project, for the materials and properties listed in the **Material tests schedule**. Submit additional certificates at the scheduled frequency during the course of the works.

Dissemination of production information: Submit copies of the reports.

Embedded pressure pipes: Submit the results of leak tests.

Sampling and testing of specimens: Submit records providing the full history of sampling and testing. Submit test certificates, and retain results in tabular form on site.

Materials

General: Submit details of proposed sources of materials.

Foamed concrete: Submit details, including aggregate grading and mix proportions.

Curing compounds: If it is proposed to use a liquid membrane-forming curing compound submit the following information:

- Efficiency index.
- Certified test results for water retention to AS 3799 Appendix B.
- Evidence that an acceptable final surface colour will be obtained.
- Evidence of compatibility with concrete, and with applied finishes, if any.
- Methods of obtaining the required adhesion for toppings and render.

Concrete mixes: Submit details, including proposed admixtures and use, if any, of fly ash or granulated slag.

Execution

General: Submit proposals for mixing, placing, finishing and curing concrete including the following:

- Site storage, mixing and transport methods and equipment, if applicable.
- Addition of water at the site.
- Handling, placing, compaction and finishing methods and equipment, including pumping.

- Temperature control methods.
- Curing and protection methods.
- Curing period for low-pressure steam curing, if proposed.
- Target strength, slump and proposed mix for each type and grade of concrete.
- High early strength cement.
- Placing under water.
- Cutting or displacing reinforcement, or cutting hardened concrete.
- Sequence and times for concrete pours, and construction joint locations and relocations.
- Changes to the plastic concrete mix.

Sawn joints: Submit proposed methods, timing and sequence of sawing joints.

Ready mixed supply

Delivery docket: For each batch, submit a docket listing the information required by AS 1379, and the following additional information:

- Name of concrete delivery supervisor.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.
- The total amount of water added at the plant and the maximum amount permitted to be added at the site.
- The amount of water, if any, added at the site.
- Method of placement and climate conditions during pour.
- Serial numbers of identification certificates of each batch.
- Project assessment carried out each day.
- For special class performance concrete, specified performance and type of cement binder.
- For special class prescription concrete, details of mix, additives, and type of cement binder.

3 MATERIALS

3.1 POLYMERIC FILM UNDERLAY

General

Under internal slabs on ground including integral ground beams and footings, provide a vapour barrier or, in areas prone to rising damp or salt attack, a damp-proofing membrane.

Standard

Vapour barriers and damp-proofing membranes: To AS 2870. Minimum thickness to be 300 microns.

Base preparation

According to base type, as follows:

- Graded stone base: Blind with sufficient sand to create a smooth surface free from hard projections. Wet the sand just before laying the underlay.
- Concrete working base: Remove projections above the plane surface, and loose material.

Installation

Lay over the base, lap joints at least 200 mm and seal the laps and penetrations with waterproof adhesive tape. Face the laps away from the direction of concrete pour. Take the underlay up vertical faces as far as the damp proof course where applicable, and fix at the top by tape sealing. Locate vertical laps only on vertical or inclined surfaces. Patch or seal punctures or tears before pouring concrete.

3.2 HOT-MIX UNDERLAY

Not Applicable.

3.3 CONCRETE MATERIALS

General

Cementitious materials: Dry and uncontaminated.

Aggregate: Unsegregated and uncontaminated.

Admixtures: No deterioration.

Bagged cement

Standard: To AS 3972.

Type: GP.

Age: Less than 6 months old.

Chemical admixtures

Contents: Free of chlorides, fluorides and nitrates.

3.4 CONCRETE

Concrete performance

General: Mix must work readily into corners and angles, and around reinforcement, without segregation or excess free water on the surface, producing sound concrete, with minimal plastic settlement and shrinkage cracking.

Drying shrinkage (maximum including tolerances): 0.65 mm for concrete up to and including strength grade 32; 0.7 mm for higher strength grades.

Concrete performance schedule

Property	Acceptance criteria			
	Element A	Element B	Element C	Element D
Mix type				
Class of concrete (to AS 1379)				
Project assessment		REFER		
Cement type				
Maximum aggregate size (mm)				
Intended method of placement		TO		
Air entrainment - air volume (%)				
Slump (mm)		DRAWINGS		
Strength grade/characteristic compressive strength f'c (MPa)				
Early age strength (MPa)				
Flexural strength (MPa)		REFER		
Indirect tensile strength (MPa)				
Drying shrinkage		TO		
Density of plastic concrete (kg/m^3)				
Density of hardened concrete (kg/m^3)				
Water:cement ratio maximum		DRAWINGS		
Bleeding (mL/mm^2)				

Property	Acceptance criteria			
	Element A	Element B	Element C	Element D
Mineral oxide content				

Concrete prescriptive schedule

Property	Values			
	Element A	Element B	Element C	Element D
Mix type				
Minimum cement content (kg/m^3)		REFER		
Coarse aggregate: - Types				
- Size (mm):		TO		
- Proportions				
Fine aggregate: - Types				
- Proportions:		DRAWINGS		
Water:cement ratio, maximum				
Admixtures: - Types				
- Proportions				
Aggregate water absorption, maximum (%)				
Colour				

Ready mixed supply

Method: Use the batch production process. Deliver in agitator trucks.

Transport: Mode must prevent segregation, loss of material and contamination, and must not adversely affect placing or compaction.

Addition of water: Do not add water at the site after starting discharge.

Elapsed delivery time

Elapsed time between the wetting of the mix and the discharge of the mix at the site must be as short as possible, and must not exceed the criteria in the **Elapsed delivery time table**. Do not discharge below 10°C or above 32°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (hours)
10 - 24	2.00
24 - 27	1.50
27 - 30	1.00
30 - 32	0.75

Site mixed supply

Plant: Mix concrete in a plant located on the construction site.

Emergencies: Do not mix by hand.

3.5 CONCRETE TYPES

Foamed concrete

Cement, fine aggregate, water and foam.

Steel fibre concrete

Materials: Cement, coarse aggregate, fine aggregate, water and steel fibres. Admixtures and fly ash may be included.

Fibre strength: ≥ 350 MPa.

Fibre aspect ratio (length/cross sectional area):

- ≤ 300 mm^{-1}.
- ≥ 150 mm^{-1} for plain fibres.
- ≥ 60 mm^{-1} for fibres with a positive mechanical bond mechanism.

Mix:

- Slump: 80 mm.
- Water:cement ratio: Maximum 0.5.
- Minimum cement content: 350 kg/m^3.
- Air content (by volume): 6% maximum.

Glass fibre reinforced concrete

Materials: Cement, fine aggregate, water, and alkali-resistant glass fibres. Admixtures and fly ash may be included.

Properties:

- Density: At least 1900 kg/m^3.
- Modulus of rupture (characteristic value): 21 MPa.
- Limit of proportionality (characteristic value): 8 MPa.
- Glass fibre content (by weight): At least 5%.

Proportions: Achieve and maintain uniform mixing of the glass fibres and cement during application.

4 CORES, FIXINGS AND EMBEDDED ITEMS

4.1 CORES, FIXINGS AND EMBEDDED ITEMS

Adjoining elements

For adjoining elements to be fixed to or supported on the concrete, provide for the required fixings. Where applicable provide for temporary support of the adjoining elements during construction of the concrete.

Structural integrity

Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, do not cut or displace reinforcement, or cut or core hardened concrete. Ensure that embedded pipes and conduits do not adversely affect structural integrity.

Placement

Maximum deviation from correct positions:

- Cores and embedded items generally: ± 10 mm.
- Fixings including anchor bolts: ± 3 mm.
- Anchor bolt groups for structural steel: To AS 4100.

Water tracking: Ensure fixings do not allow water to track to reinforcement.

Inserted fixings

Methods: Do not insert fixings using drilling (including masonry anchors), or using explosive tools.

Protection

General: Grease threads. Cover and protect embedded items against damage.

Corrosion: Galvanize inserts, anchor bolts and embedded fixings.

5 PLACING AND CURING

5.1 CONCRETE WORKING BASE

Material

N20 concrete. Lay over the base or subgrade and screed to the required level.

Thickness

Minimum 50 mm.

Finish

Membrane support: Wood float finish or equivalent.

Surface tolerance

± 5 mm from the correct plane, ± 5 mm from a 2 m straight edge.

5.2 PLACING AND COMPACTION

Placing

General: Use placing methods that minimise plastic settlement and shrinkage cracking. Avoid segregation. Avoid loss of materials. Between construction joints, maintain a plastic concrete edge.

Layers: Place concrete in layers ≤ 300 mm thick, such that each succeeding layer is compacted before previous layer has taken initial set.

Placing slabs and pavements: Place concrete uniformly over the width of the slab so that the face is generally vertical and normal to the direction of placing.

Construction joints: Thoroughly roughen hard concrete joint surfaces. Remove loose or soft material, foreign matter and laitance. Dampen joint surface using clean water and coat with neat cement slurry.

Horizontal movement

Use suitable conveyors, clean chutes, troughs or pipes. Do not use water to facilitate the movement.

Vertical movement

In vertical elements, limit the free fall of concrete to 1500 mm per 100 mm element thickness, up to a maximum free fall of 3000 mm, using enclosed chutes or access hatches in forms. As far as practicable keep chutes vertical and full of concrete during placement, with ends immersed in the placed concrete.

Rain

Do not expose concrete to rain before it has set, including during mixing, transport or placing.

Sequence of pours

Minimise shrinkage effect by pouring the sections of the work between construction joints in a sequence such that there will be suitable time delays between adjacent pours.

Minimum time delay schedule

Between (pour locations)	Minimum period between adjacent pours (days)
Adjacent pours abutting vertical construction joints in walls	As agreed with Structural Engineer
Adjacent pours abutting horizontal construction joints in walls or columns	1
Columns and slabs	1

Between (pour locations)	Minimum period between adjacent pours (days)
Floor slab construction joints	1
Retaining wall construction joints	As agreed with Structural Engineer
"Pour strips" and adjacent concrete	As agreed with Structural Engineer

Compaction

General: Remove air bubbles and fully compact the mix.

Methods: Use immersion and screed vibrators accompanied by hand methods as appropriate.

Vibrators: Do not allow vibrators to come into contact with partially hardened concrete, or reinforcement embedded in it. Do not use vibrators to move concrete along the forms. Avoid over-vibration that may cause segregation.

Placing records

Keep on site and make available for inspection a log book recording each placement of concrete, including the following:

- Date.
- The portion of work.
- Specified grade and source of concrete.
- Slump measurements.
- Volume placed.

5.3 COLD WEATHER PLACING

General

Formwork and reinforcement: Before and during placing maintain temperature at > 5°C.

Concrete: Maintain the temperature of the freshly mixed concrete within the limits shown in the **Cold weather placing table**. "Outdoor" air temperature applies to the air temperature at the time of mixing and to the predicted or likely air temperature at any time during the next 48 hours.

Cold weather placing table

Outdoor air temperature	Temperature of concrete	
	Minimum	Maximum
≥ 5°C	10°C	32°C
< 5°C	18°C	32°C

Admixtures

Do not provide calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials

Do not allow frozen materials or materials containing ice to enter the mixer, and keep free of frost and ice any forms, materials, and equipment coming in contact with the concrete.

High early strength cement

Provide in severe weather conditions to enable the concrete to develop sufficient strength to permit formwork removal within the specified time. Do not provide as a substitute for the heating of materials or for adequate protection of placed concrete against low temperatures. Do not provide high alumina cement.

Heating

General: Heat the concrete materials, other than cement, to the minimum temperature necessary to ensure that the temperature of the placed concrete is within the limits specified.

Maximum temperature of water: 60°C when it is placed in the mixer.

5.4 HOT WEATHER PLACING

Mixing

Surrounding outdoor shade temperature > 38°C: Do not mix concrete.

Handling

Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses. Mix, transport, place and compact the concrete as rapidly as possible.

Placing

Formwork and reinforcement: Before and during placing maintain at ≤ 32°C.

Concrete: When being placed in the forms, the temperature of the concrete must not exceed the criteria in the **Hot weather placing table**.

Hot weather placing table

Concrete element	Temperature limit
Normal concrete in footings, beams, columns, walls and slabs	35°C
Concrete in large mass concrete sections; or concrete of strength 40 MPa or greater, in sections exceeding 600 mm in thickness	27°C

Temperature control methods

Select one or more of the following methods of maintaining the specified temperature of the placed concrete:

- Use chilled mixing water.
- Spray the coarse aggregate using cold water.
- Cover the container in which the concrete is transported to the forms.
- Cool the concrete using liquid nitrogen injection before placing.

5.5 PLACING UNDER WATER

Not permitted.

5.6 CURING

General

Protection: Protect fresh concrete, during the curing period, from premature drying and from excessively hot or cold temperatures. Protect fresh concrete from physical and thermal shock, from traffic likely to damage the surface, and from rain. If temperature of surrounding air is > 35°C, protect from wind and sun until the concrete can be covered. Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period. Prevent rapid drying out at the end of the curing period.

Curing period: Cure continuously from initial set until the total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, is at least the following:

- Fully enclosed internal surfaces/Early high-strength cement concrete: 3 days.
- Other surfaces/Ordinary Portland cement concrete: 7 days.

Curing compounds

Standard: To AS 3799.

Substrates: Do not use wax-based or chlorinated rubber-based curing compounds on surfaces forming substrates to concrete toppings and cement-based render. Do not use PVA compounds.

Application: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken at least seven days after application.

Hot weather curing

Do not use curing compounds. After placement, either

- pond or continuously sprinkle with water;
- immediately cover the concrete using an impervious membrane, or hessian kept wet, until curing begins; or
- if the temperature exceeds 25°C or if not protected against drying winds, protect the concrete using a fog spray application of aliphatic alcohol evaporation retardant.

Cold weather curing

Prevent plastic concrete from freezing, but do not use salt or chemicals. Maintain concrete temperature between 10 - 20°C for curing period.

Visually important surfaces

Produce uniform colour on adjacent surfaces.

Curing schedule

Concrete surface	Exposure classification	Curing method
Generally	All	As above for 7 days.

5.7 PROTECTION

Loading

Notice: Give notice before loading the concrete structure.

Protection: Protect the concrete from damage due to load overstresses, heavy shocks and excessive vibrations, particularly during the curing period. Do not place construction loads on self-supporting structures which will overstress the structures.

Surface protection

Protect finished and exposed aggregate concrete surfaces from damage.

6 JOINTS

6.1 CONSTRUCTION JOINTS

Location

Do not relocate or eliminate construction joints, or make construction joints not shown on the drawings. This includes emergency construction joints made necessary by unforeseen interruptions to the concrete pour.

Joint preparation

Roughen and clean the hardened concrete joint surface, remove loose or soft material, free water, foreign matter and laitance. Dampen the surface just before placing the fresh concrete.

Finish at construction joints

Butt join the surfaces of adjoining pours. In visually important surfaces make the joint straight and true, and free from impermissible blemishes relevant to its surface finish class.

6.2 EXPANSION JOINTS

Jointing materials

Type: Provide jointing materials compatible when used together, and non-staining to concrete in visible locations.

Foamed materials (in compressible fillers): Closed-cell or impregnated types that do not absorb water.

Bond breaking: Provide back-up materials for sealants, including backing rods, which do not adhere to the sealant. They may be faced with a non-adhering material.

Jointing material schedule

Location of joint, jointing material, and required properties.
Refer Drawings

Joint filling

Preparation: Before filling, dry and clean the joint surfaces, and prime.

Joint filling: Fill with jointing materials. Finish visible jointing material neatly flush with adjoining surfaces.

Watertightness: Apply the jointing material so that joints subject to ingress of water are made watertight.

6.3 DOWELS

Joint dowels

Provide galvanized steel reinforcing rod dowels in expansion and contraction joints, where required. Embed dowels normal to the plane of the joint, so that half the dowel lies on each side of the joint. Heavily grease or bitumen coat one half and fit an expansion cap to that end.

6.4 WATERSTOPS

Locations

Provide waterstops surrounded by fully compacted concrete, and located so that

- their correct positions in the finished work are ensured;
- the proper placing and compaction of the concrete is not inhibited; and
- reinforcement is not displaced from its correct position.

Waterstop types

Refer drawings.

7 PLINTHS AND DUCTS

7.1 CONCRETE PLINTHS

Construction

General: Provide galvanized steel surround at least 75 mm high and 1.6 mm thick, fixed to floor with masonry anchors. Fill with concrete.

Reinforcement: Single layer of F62 fabric.

Concrete: Grade N20.

- Finish: Steel float flush with the surround.

7.2 INTERNAL DUCT COVERS

Not Applicable.

THE VILLAGE, BALGOWLAH

BG&E CONSULTING ENGINEERS

SYDNEY
PERTH
MELBOURNE
DUBAI

TECHNICAL SPECIFICATION

for the

CIVIL WORKS

covering

ASPHALT ROAD SURFACING
ROADBASE & SUBBASE
ROADWORK ANCILLARIES
STORMWATER DESIGN & CONSTRUCTION

prepared for

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ISSUED FOR CONSTRUCTION

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ASPHALT ROAD SURFACING

1. GENERAL

1.1 CROSS REFERENCES

Client: Stockland Development Pty Ltd

Contractor:

Engineer: BG&E Pty Limited

Subcontractor:

1.2 STANDARD

General

Hot-mixed asphalt: To AS 2150.

1.3 INTERPRETATION

Definitions

Standard: To AS 1348.

Absolute level tolerance: Maximum deviation from design levels.

Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.

Relative compaction: The ratio between the field bulk density and the bulk density of the job mix when compacted in the laboratory.

2. QUALITY

2.1 INSPECTION

Witness points

Give sufficient notice so that inspection may be made at the following stages:

- Testing including proof rolling.
- Each pavement layer placed and compacted.
- Automatic level control devices in place.
- Surface prepared for priming, sealing or asphalt surfacing.
- Commencement of asphalt surfacing.

2.2 MIX TESTS

Process control tests

Perform tests of the type and frequency necessary to adequately control the materials and processes used in the construction of the works.

Records

Process control: Show the results of process control tests on control charts or graphs displayed on site in a readily accessible location and updated daily.

Methods

Use wet preparation methods where applicable.

Sampling

Process control tests: Determine timing and location.

Compliance assessment tests:

- Timing: Obtain materials samples at the time of delivery to the site.
- Location: Sample from selected sample sites within designated uniform test lots, consisting of an area placed, or compacted or both in one day. Test lots must be uniform in terms of material properties and density.
- Sample preparation: To AS 2891.2.1 and AS 2891.2.2, as applicable

Mix properties

Take samples from trucks at the mixing plant and test for mix properties using one of the following methods as applicable:

- Tar mixes: To AS 2891
- Marshall stability of compacted mix

Compactive effort: 50 - blow.

Variations in mix properties

Ensure that the maximum variation between the mix property of each sample and the job mix value is in accordance with the **Mix property table**.

Mix property table

Mix property	Maximum variation from job mix value
Aggregate passing 4.75 mm sieve or larger	± 4% by mass
Aggregate passing 2.36 to 0.3 mm sieves	± 3% by mass
Aggregate passing 0.15 mm sieve	± 2% by mass
Aggregate passing 0.075 mm sieve	± 1% by mass
Bitumen content	± 0.3% by mass
Added filler content	± 0.5% by mass
Mixing temperature	± 10°C

2.3 COMPACTION TESTS

Density tests

General: Perform a field bulk density test for each test site either

- on a core sample taken from the asphalt surfacing layer; or
- if the nominal layer thickness is ≥ 50 mm, measured in situ using a nuclear gauge.

Sample preparation: To AS 2891.2.1 and AS 2891.2.2, as applicable.

Characteristic value of relative compaction: Calculate the value of relative compaction using the formulae in the **Relative compaction table**, in which X and S are the mean and the standard deviation, respectively of the individual relative compaction test values for the lot.

Relative compaction table

Number of tests per lot	Characteristic value
6	X - 0.92S
10	X - 0.88S

Acceptance criteria

The relative compaction of each lot of pavement must meet the criteria of the **Asphalt compaction acceptance criteria table**.

Asphalt compaction acceptance criteria table

	Test criteria scale	
	A	B
Number of test sites per lot: - Core sample tests	6	3
- Nuclear gauge tests	10	5
Lot value for relative compaction	Characteristic value	Mean value
Minimum value: - Layer thickness up to 50 mm	96%	94%
- Layer thickness 50 mm or more	96%	96%

2.4 SAMPLES

General

Submit samples of the following at least one month before use in the works:

- Granular materials: One 50 kg sample of each proposed type and size of asphalt aggregate and cover aggregate.

Identification

Attach a tag to each sample showing relevant information including description, source and nominal size of material.

2.5 SUBMISSIONS

Tests

Certificate of compliance: If a certificate of compliance is acceptable as an alternative to testing a manufactured material, submit the manufacturer's certificate together with the results of recent tests undertaken by the manufacturer, showing compliance with test criteria.

Materials

Proposed job-mix: Submit the following details before commencing production:

- Combined aggregate particle size distribution.
- Binder content expressed as a percentage of the total mix.
- The filler content expressed as a percentage by mass of the combined aggregates.
- The asphalt mix properties.
- The proposed mixing temperature.

Delivery dockets: Submit a delivery docket at the time and place of asphalt mix delivery showing

- empty and loaded mass of the vehicle;
- date and time of loading;
- supplier and location of mixing plant;
- registration number of the vehicle;
- size and type of asphalt mix;
- class of binder;
- temperature of load at mixing plant; and
- laboratory stamp or other mark certifying compliance with the specified properties.

Execution

General: Submit proposals for the methods and equipment to be used for the roadworks, including the following:

- Staging of the work, access and traffic control methods.
- Disposal of surface water, control of erosion, contamination and sedimentation of the site, surrounding areas and drainage systems.
- Methods and equipment for each operation.
- Sources of materials.
- Material stockpiles.

Records of measurement

Submit certified records of work performed as follows:

3. MATERIALS

3.1 ASPHALT MATERIALS

Asphalt materials

Primer: Medium cut back bitumen to AS 2157, containing no fluxing oil.

Tack coat mix: 3:2 bitumen emulsion:water.

Bitumen emulsion: To AS 1160.

- Designation: ARS/170-60.

Coarse aggregate

Standard: To AS 2758.5.

Type: Clean, sound, hard, angular, of uniform quality, free from deleterious matter.

Crushed slag: Air-cooled blast furnace slag of uniform quality, generally free from vesicular, glassy or other brittle pieces.

Fine aggregate

Type: Clean, sound, hard, durable particles of natural sand or particles derived from crushed stone, gravel or slag, free from injurious coating or particles of clay, silt, loam or other deleterious matter.

Aggregate properties table

Property	Test method	Value
Particle shape	AS 1141.14	≤ 25 for wearing course ≤ 30 for binder course and corrective course
Wet strength	AS 1141.22	≥ 50 kN
Wet/dry strength variation-		≤ 35%

Binder

Type: Bitumen binder, class 170.

Combined aggregate grading

Provide a quantity of mineral filler at least 2% by mass of the combined aggregates.

3.2 ASPHALT MIX DESIGN

Requirements

General: Design the asphalt mix using the Marshall method.

Mix properties

Marshall stability: 4.5 kN minimum.

Marshall flow: 4.5 mm maximum.

Voids in total mix (maximum theoretical density based on apparent specific gravity of aggregates):

- Wearing courses: 3% - 5%.
- Binder courses and 7 mm mixes: 4% - 6%.

Voids in aggregate filled with bitumen:

- Wearing courses: 75% - 85%.
- Binder courses and 7 mm mixes: 70% - 80%.

4. ASPHALT SURFACING

4.1 TOLERANCES

Surface level

General: Provide a finished surface that is free draining and evenly graded between level points.

Edges abutting gutters: Within ± 5 mm of the level of the actual gutter edge.

Tolerances: The tolerances in the **Asphalt surface level tolerances table** apply to the finished level of each layer, unless overridden by the requirements (including tolerances) for the finished level and thickness of the surface course.

Asphalt surface level tolerances table

Item	Level tolerance:	
	Absolute	Relative
Longitudinal direction	± 10 mm	5 mm
Transverse direction	± 10 mm	10 mm

Thickness

Asphalt surface course: The following tolerances apply to variations in the compacted layer thickness from the specified thickness:

- Any one sample: + 10 mm, - 5 mm.
- The mean thickness of the core samples in a lot: + unspecified, - 0.

4.2 PREPARATION

Cleaning

Immediately before priming or tack coating remove loose stones, dust and foreign material from the base surface using a power broom or blower. Keep traffic off the cleaned surface.

Protection

Protect adjacent surfaces during spraying. Protect freshly sprayed surfaces from contamination.

Priming

Timing: Prime the base surface as soon as possible after compaction and finishing.

Potholes

Trim to a regular shape and a uniform depth of at least 75 mm, tack coat the edges and patch with asphaltic concrete.

4.3 TACK COATING

Tack coating

Apply tack coat 30 - 120 minutes before asphalt surfacing is placed. Cover the surface uniformly at an application rate of 0.10 - 0.30 L/m^2 of residual bitumen.

4.4 SPREADING

Spreading

Preconditions: Place asphalt surfacing in dry weather on a dry pavement surface at a pavement temperature of at least 10°C.

Operations: Spread the mix in layers covering the full width of the pavement, or, in the case of carriageways and wide pavements, in lanes of minimum width 3 m. Place layers in adjoining lanes to the same compacted thickness.

4.5 COMPACTING

Compaction

Before commencing compaction, correct any irregularities in line or level. Trim lane edges to a straight line. Compact asphalt surfacing uniformly as soon as it will support rollers without undue displacement, and complete rolling while the mix temperature is above 80°C.

Surface finish

Provide a surface uniform in appearance and free from depressions in which water can lie.

4.6 JOINT

Joints

General: Minimise the number of joints. Make joints that are well bonded and sealed and provide a smooth riding surface across the joint.

Transverse joints: Construct a transverse joint if the operation is stopped for more than 20 minutes or the pavement temperature falls below 90°C. Construct to a straight vertical face for the full depth of the layer, and offset in adjoining spreader runs and layer to layer by at least 2 m.

Longitudinal joints: Offset joints from layer to layer by at least 150 mm. Position longitudinal joints in the wearing course to coincide with the lane line.

Edges: Form exposed edges of each spreader run while hot to a straight line with a dense face inclined between vertical and 45°.

Cold joints: Tack coat the surface of cold longitudinal and transverse joint before placing the adjoining asphalt.

Abutting structures

Place asphalt surfacing to match the level of abutting surfaces such as kerbs, gutters, edge strips, manholes, or adjoining pavement in the same manner as for longitudinal and transverse joints. Fill spaces left unfilled between the spreader run and abutting edges with sufficient material to the proper height before compaction.

Matched junctions

General: If asphalt surfacing is to match an existing pavement, bridge deck, rail or other fixture, place the material to provide a smooth riding surface across the junction. Where necessary, remove sufficient of the existing pavement for this purpose. Where it is necessary to taper the thickness of a layer to provide a smooth riding junction, terminate the layer at a chase cut into the existing pavement about 20 mm deep and 400 mm wide. Where necessary, remove coarse particles from a layer of tapering thickness using hand raking.

Tack coat: Where the thickness of the layer tapers to less than twice the nominal size of the mix, tack coat the area upon which material of such thickness is to be placed uniformly at an application rate 0.50 - 0.75 L/m^2.

Surface finish

Provide a surface uniform in appearance and free from depressions.

4.7 DEFECTIVE SURFACING

Defective compaction

Minimum criteria for retention:

- Characteristic value of relative compaction of the lot: ≥ 90%.
- Mean of the individual relative compaction test values of the lot: ≥ 90%.

Defective layer thickness

Minimum criterion for retention:

- Mean thickness of the core sample in the lot: ≤ 10 mm below the required layer thickness.

Rejection

Extent: Remove areas of rejected asphalt surfacing, including defective joints and finish, to the full depth of the layer, and replace with complying pavement.

Joints: Treat edges of remedial work as specified for cold joints.

5. COMPLETION

5.1 COMPLETION

Traffic on pavement

Give notice before opening the pavement to traffic before the work is completed. Provide adequate means of protection.

ROADBASE AND SUBBASE 1

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ROADBASE AND SUBBASE

1. GENERAL

1.1 CROSS REFERENCES

Client: Stockland Development Pty Ltd

Contractor:

Engineer: BG&E Pty Limited

Subcontractor:

1.2 INTERPRETATION

Definitions

Standard: To AS 1348.

Absolute level tolerance: Maximum deviation from design levels.

Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.

Rigid pavement

Pavement construction in which the base consists of Portland cement concrete and the subbase consists of unbound materials, or cement treated materials, or lean mix Portland cement concrete.

2. QUALITY

2.1 INSPECTION

Witness points

Give sufficient notice so that inspection may be made at the following stages:

- Materials or areas of work ready for tests.
- Testing including proof rolling.
- Each pavement layer placed and compacted.
- Automatic level control devices in place.
- Subgrade material opened up so that its nature can be assessed.
- Prepared subgrade.
- Surfaces prepared for priming, sealing or surfacing.
- Placing subbase and base.

2.2 TESTS

Process control tests

Perform tests of the type and frequency necessary to adequately control the materials and processes used in the construction of the works.

Records

Process control: Show the results of process control tests on control charts or graphs displayed on site in a readily accessible location and updated daily.

Methods

Use wet preparation methods where applicable.

Sampling

Process control tests: Determine timing and location.

Compliance assessment tests:

- Timing: Obtain materials samples at the time of delivery to the site.
- Location: Sample from selected sample sites within designated uniform test lots, consisting of an area placed, or compacted or both in one day. Test lots must be uniform in terms of material properties and density.

Subgrade, subbase and base

General: Test for compliance with the specified density, and for criteria given in the **Subbase tests table** and the **Base tests table**.

Density test methods:

- Field dry density: To AS 1289.5.3.1, AS 1289.5.3.5 or AS 1289.5.8.1. If using AS 1289.5.8.1 calibrate the surface moisture-density gauge in accordance with AS 1289.5.8.4 before use on the site.
- Standard maximum dry density: To AS 1289.5.1.1.
- Maximum vibrated dry density: To AS 1289.5.5.1.
- Compaction: To AS 1289.5.4.1 (% of standard maximum dry density).
- Modified maximum dry density: To AS 1289.5.2.1.

Density tests schedule

Location	Test frequency
Subgrade	1 test per 500m^2 (3 minimum)
Base	1 test per 500m^2 (3 minimum)

Subbase tests table

Property	Test method	Test criteria	
		Subbase class 1	Subbase class 2
Liquid limit	AS 1289.3.1.1	30% maximum	35% maximum
Plasticity index	AS 1289.3.3.1	9% maximum	12% maximum
Linear shrinkage	AS 1289.3.4.1	5% maximum	6% maximum
Wet strength	AS 1141.22	80 kN minimum	50 kN minimum
Wet/dry strength variation	AS 1141.22	45% maximum	60% maximum
Unconfined cohesion	AS 1141.52	1 MPa minimum	1 MPa minimum

Base tests table

Property	Test method	Test criteria
Liquid limit	AS 1289.3.1.1	25% maximum
Plasticity index	AS 1289.3.3.1	6% maximum
Linear shrinkage	AS 1289.3.4.1	3% maximum
Flakiness index	AS 1141.15	35% maximum
Wet strength	AS 1141.22	100 kN minimum
Wet/dry strength variation	AS 1141.22	35% maximum
Unconfined cohesion	AS 1141.52	1.7 MPa minimum

Acceptance criteria

Each section of the subgrade or unbound pavement layer required to be tested must meet the criteria in the **Density acceptance criteria table**.

Density acceptance criteria table

Number of tests	Maximum number of results below the required density ratio		
	0 - 2% below	1 - 2% below	More than 2% below
0 - 5	1	1	Nil
6 - 10	2	1	Nil
11 or more	20%	10%	Nil

2.3 SUBMISSIONS

Tests

Compliance assessment: If compliance assessment tests are to be carried out by an independent testing authority, have the authority submit 3 copies of each test result.

Certificate of compliance: If a certificate of compliance is acceptable as an alternative to testing a manufactured material, submit the manufacturer's certificate together with the results of recent tests undertaken by the manufacturer, showing compliance with test criteria.

Materials

Delivery dockets: Submit a delivery docket at the time and place of delivery for each truckload of subbase and base material, showing

- empty and loaded mass of vehicle;
- date and time of batching;
- supplier and location of mixing plant;
- registration number of the vehicle; and
- nature of material.

Execution

General: Submit proposals for the methods and equipment to be used for the roadworks, including the following:

- Staging of the work, access and traffic control methods.
- Disposal of surface water, control of erosion, contamination and sedimentation of the site, surrounding areas and drainage systems.
- Methods and equipment for each operation.
- Sources of materials.
- Material stockpiles.

Cement treated materials: Submit proposed method of mixing.

Compaction: If it is proposed that a layer is to exceed 150 mm in thickness, submit evidence demonstrating that the proposed compaction equipment can achieve the required density throughout the layer.

3. MATERIALS

3.1 BASE AND SUBBASE MATERIALS

Material properties

Specified properties of materials apply to their condition as installed in the completed works. If it is expected that properties will change significantly during construction, adjust the delivered material accordingly.

Source material

Type: Crushed rock or natural gravel consisting of hard, dense, durable particles of uniform quality, free from deleterious materials or coatings including clay and organic matter, and containing at least 1% disintegrated, weathered, discoloured, soft, fractured, friable or poorly indurated fragments.

River stones: If the material is produced by crushing rounded river stones, 75% of the particles larger than 9.5 mm must have at least 2 fractured faces.

Base material

Type: Crushed rock, free from sand, complying with **Base particle size distribution table**. Determine particle size distribution after compaction in the pavement. Crusher run or screened and recombined materials are acceptable.

Base particle size distribution table

Sieve aperture (mm)	Percentage passing (by mass)
26.5	100
19.0	95 - 100
13.2	78 - 92
9.5	63 - 83
4.75	44 - 64
2.36	30 - 48

Sieve aperture (mm)	Percentage passing (by mass)
0.425	14 - 22
0.075	6 - 10

3.2 SUBBASE

Subbase material

Type: Crushed rock or suitable natural gravels complying with the distribution types specified in **Subbase particle size distribution table**.

Particle size distribution

Mixing: Do not mix materials to produce a specified grading.

Grading separation: Place materials of different gradings or from different sources in separate layers or separate sections of the work.

Fines ratio: The percentage passing the 0.075 mm sieve must be # 67% of the percentage passing the 0.425 mm sieve.

Subbase particle size distribution table

Sieve aperture (mm)	Percentage passing (by mass) for particle size distribution class				
	A	B	C	D	E
53.0	100				
37.5	85-100	100			
26.5	70 - 90	80 - 100	100		
19.0	60 - 80	70 - 90	85 – 100	100	
13.2	48 - 72	58 - 80	70 – 90	85 - 100	
9.5	42 - 66	48 - 72	60 – 80	70 - 90	100
4.75	28 - 55	32 - 60	42 – 65	48 - 72	70 - 90
2.36	20 - 44	23 - 47	28 – 50	34 - 60	48 - 72
0.425	9 - 20	10 - 27	14 – 24	14 - 34	19 - 42
0.075	4 - 8	4 - 16	5 – 10	6 - 20	9 - 25

Other required properties

Classify gradings of subbase material either Subbase class 1 or Subbase class 2 as described in the **Subbase tests table**.

Unsealed base and shoulder

Subbase class 1:

- Plasticity index: 4% minimum.
- Unconfined cohesion: 2.8 MPa minimum.

Mixing

Mix cement and water with the subbase material in mixing plant before placing the material. Provide mixes which are consistently uniform and of the required proportions and moisture content.

Particle size distribution

Provide the distribution before mixing with cement as described in the **Cement treated materials particle size distribution table**.

Cement treated materials particle size distribution table

Sieve aperture (mm)	Percentage passing (by mass) for particle size distribution type:		
	B	C	D
37.5	100		
26.5	80 – 100	100	
19.0	70 – 90	85 – 100	100
13.2	58 – 80	70 – 90	85 – 100

Sieve aperture (mm)	Percentage passing (by mass) for particle size distribution type:		
	B	C	D
9.5	48 – 72	60 – 80	70 – 90
4.75	32 – 60	42 – 65	48 – 72
2.36	23 – 47	28 – 50	34 – 60
0.425	10 – 27	14 – 24	14 – 34
0.075	4 – 16	5 – 10	6 – 20

4. SUBGRADE, SUBBASE AND BASE

4.1 TOLERANCES

Surface level

General: Provide a finished surface which is free draining and evenly graded between level points.

Edges abutting gutters: Within ± 5 mm of the level of the actual gutter edge.

Tolerances: The tolerances in the **Surface level tolerances table** apply to the finished level of each layer, unless overridden by the requirements (including tolerances) for the finished level and thickness of the surface course.

Surface level tolerances table

Item	Level tolerance:	
	Absolute	Relative
Cut subgrade in earth and fill subgrade	+ 0 mm - unspecified	20 mm
Cut subgrade in rock	+ 0 mm - unspecified	unspecified
Subbase surface	+ 5 mm	10 mm - 10 mm
Lean mix concrete subbase surface	± 10 mm	5 mm
Base surface	+ 5 mm - 20 mm	10 mm - 20 mm

Compacted layer thickness

Subbase and base (individual layers and total thickness): + unspecified, - 10 mm.

4.2 SUBGRADE PREPARATION

General

Trim the subgrade to an even surface free from loose material.

Subgrades affected by moisture

Where the subgrade is unable to support construction equipment, or it is not possible to compact the overlying pavement because of a high subgrade moisture content, perform one or more of the following:

- Allow the subgrade to dry until it will support equipment and allow compaction.
- Scarify the subgrade to a depth of 150 mm, work as necessary to accelerate drying, and recompact when the moisture content approximates the optimum.
- Excavate the wet material and remove to spoil.

Draining depressions

General: Grade depressions to drain to the edge of the formation.

Rock subgrades: In rock subgrades, drain depressions with subgrade drains at least 150 mm wide, backfilled with coarse filter, and connected to the stormwater system or to longitudinal subsoil drains.

Unsuitable material

Remove roots, boulders, silt, organic matter and other unsuitable materials.

Backfilling

Select filling: Replace over-excavation, including excavation for grub holes and removal of wet or unsuitable material, with granular material complying with the following:

- Maximum particle size: 75 mm.
- Proportion passing 0.075 mm sieve: 25% maximum.
- Plasticity index: ≥ 2%, ≤ 15%.

Subbase material: In cut subgrades, if over-excavation, other than excavation to remove unsuitable material, requires a replacement layer less than 100 mm thick, do not backfill, but make good by increasing the thickness of the lowest pavement layer.

Coarse filter: Backfill rock depressions and subgrade drains with coarse subsoil filter.

4.3 COMPACTION

Fill subgrades

Maximum particle size of material in the top 150 mm: 75 mm.

Subgrade compaction

Dry density ratios: Compact the subgrade and backfilling to achieve the following:

- Cut subgrades in earth and fill subgrades (to a depth of 300 mm): 100%.
- Fill subgrades below 300 mm: 98%.
- Replacement of over excavation or unsuitable subgrade material: 100%.
- Backfilling grub holes: 100%.

Subgrade densities schedule

Location	Minimum density required
Cut subgrade in earth to a minimum depth of 150 mm	
Top 150 mm of fill subgrades	
Replacement of over excavation	
Replacement of unsuitable material	
Backfilling grub holes	

Proof rolling

Proof roll the subgrade using a smooth steel-wheeled roller of at least 10 t mass. Fill or replace depressions or soft spots developed on the subgrade during proof-rolling and continue rolling until uniform compaction is obtained.

Subbase and base compaction

Dry density ratios: Compact each layer to achieve the following:

- Subbase: 100%.
- Cement treated subbase: 100%.
- Base: 100%.

Cement treated material: Begin compacting immediately after spreading and complete it in a continuous operation not more than 2 hours after the cement and water have been mixed into the material.

Subbase and base densities schedule

Item description	Minimum density required
Subbase	95% or greater modified Max Dry Density Ratio
Base	98% or greater modified Max Dry Density Ratio

Compaction requirements

Apply uniform and sufficient compactive effort over the whole area to be compacted. Use rollers appropriate to the materials and compaction requirements.

Layer thickness

General: Compact the material in layers of 100 – 150 mm compacted thickness. Within these limits, provide layers of the same material in multi-layer courses which are of equal thickness.

Moisture content

General: During spreading and compaction, maintain materials at the optimum moisture content (standard compaction) appropriate to each material.

Tolerances:

- Cement treated subbase: ± 2%.
- Base: + 1%, - 2%.

Moisture control

General: Moisten prepared subgrades and preceding layers of subbase immediately before spreading subbase or base material. Keep the leading edges of subbase or base material moist until new material is added next to it. Do not wash fines from the subbase or base material.

Spraying: Maintain moisture content. Use water spraying equipment capable of distributing water uniformly in controlled quantities over uniform lane widths.

Cement treated material: Keep the compacted surface of each layer moist by watering until covered by further material or a bituminous curing seal. Apply bitumen emulsion or cut back bitumen to the final surface as soon as possible after the completion of compaction and in any case after not more than 8 hours.

Rectification

If a section of subgrade or pavement material fails to meet the required density or moisture content after compaction, rectify as follows:

- Fill subgrades: Remove the non-complying material, replace with fill material as specified in *Subgrade preparation*, and recompact.
- Cut subgrades: Rework the material and recompact.
- Pavement material: Remove the non-complying material, replace with new pavement material, and recompact.

Level corrections

Rectify incorrect levels as follows:

- High areas, unbound layers: Grade off.
- High areas, bound layers: Remove to the full depth of the layer, replace with new cement-treated material, and recompact.
- Low areas: Remove bound layers to the full depth and unbound layers to a minimum depth of 75 mm, replace with new material and recompact.

4.4 PLACING BASE AND SUBBASE

General

Weak surfaces: Do not place material on a surface which has been so weakened by moisture that it will not support, without damage, the constructional plant required to perform the work.

Spreading: Spread material in uniform layers without segregation, by direct tipping from suitable vehicles or using a mechanical spreader.

Segregation: Do not tip materials in heaps and then spread by grader. If material becomes segregated, remix using a rotary hoe or other suitable equipment.

Moisture content: Maintain wet mixed materials at the required moisture content before and during spreading. Add water to dry mixed materials through fine sprays to the entire surface of the layer after spreading, to bring the material to the required moisture content.

Layer thickness: 100 - 150 mm (after compaction). Provide equal layers in multilayer courses.

Joints

Plan spreading and delivery to minimise the number of joints. Offset joints in successive layers by at least 300 mm.

Cement treated subbase

Joints: Make longitudinal and transverse joints, as specified in *Junctions with existing pavements*,

- at the end of each day's work;
- where spreading has been halted for more than 2 hours; and
- where required.

4.5 JUNCTIONS WITH EXISTING PAVEMENTS

General

Trimming: Where the pavement is to be joined to an existing pavement remove a strip of the existing pavement at least 300 mm wide for its full depth and trim the edge to an angle of approximately 45° in steps of maximum height 150 mm before placing new pavement material.

4.6 FINISHING BASE SURFACES

Surfaces to be primed

Produce a tight even surface without loose stones or a slurry of fines. Construct the fine crushed rock surface slightly higher than the required levels and cut it to profile using a power grader towards the end of the compaction process.

Disposal of cuttings

Cuttings from the surface may be used in fills or elsewhere in the works.

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ROADWORK ANCILLARIES

1. GENERAL

1.1 CROSS REFERENCES

Client: Stockland Development Pty Ltd

Contractor:

Engineer: BG&E Pty Limited

Subcontractor:

1.2 INTERPRETATION

Definition

Associated elements: Includes kerbs, gutters and crossings.

2. EXECUTION

2.1 TOLERANCES

Associated elements

Absolute level tolerance: ± 10 mm.
Maximum deviation from design alignment: 25 mm.
Maximum deviation from a 3 m straightedge placed on horizontal, vertical, or sloping surfaces required to be straight: 5 mm.

2.2 REINSTATEMENT

General

Reinstate surfaces next to new pavement and associated elements.

3. COMPONENTS

3.1 ASSOCIATED ELEMENTS

Base

Place and compact base under associated elements to 75 mm compacted thickness and to the full width of the element.

Subbase

General: Subbase class 1 as specified in the *Roadbase and subbase* worksection, or crusher dust.

Concrete

Standard: To AS 1379 Grade N20.
Formwork: Form elements using fixed forms or slip forming equipment.
Curing: If using the curing compound method apply the curing compound at a rate of at least 0.5 L/m^2.

- Minimum curing time: 5 days.

Surface finish:

- General: Provide exposed surfaces with uniform texture and free from depressions.
- Formed surfaces: Remove the forms while the concrete is still green and rub the surface to a uniform texture free from blowholes.
- Other surfaces: Steel float finish.

Concrete kerbs and channels (gutters)

Manually or machine placed: To AS 2876.

Joints

Contraction joints: Weakened plane joints 3 mm wide extending at least one quarter the depth of the section, at approximately 3 m intervals, adjusted if necessary to avoid short closing lengths.
Expansion joints: Locate at junctions with drainage structures, at tangent points of curves of less than 25 m radius, and at 30 m intervals elsewhere. Do not tool off joint arrises abutting the seal.

- Fill: Select from preformed self-expanding cork, or 10 mm thick bitumen impregnated fibre board joint filler.
- Width: 15 mm.

3.2 TRAFFIC CONTROL DEVICES

Standard

General: To AS 1742.

3.3 LINEMARKING

General

Linemarking for traffic lanes, parking bays, direction arrows and crossings: 2 coats of linemarking paint compatible with the road surfacing material. To match existing roadway.

3.4 JUNCTIONS WITH EXISTING PAVEMENTS

General

Trimming: Where the pavement is to be joined to an existing pavement remove a strip of the existing pavement at least 300 mm wide for its full depth and trim the edge to an angle of approximately 45° in steps of maximum height 150 mm before placing new pavement material.
Existing sealed pavement: Trim the seal to a neat edge.

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STORMWATER DESIGN & CONSTRUCTION

1 GENERALLY

This section of the Specification shall be read in conjunction with all other Sections of this Specification.

2 DEFINITIONS

In this specification are listed below, the general conditions of contract shall be referred to for further definitions and terminology.

a. Local Authority
Shall mean any Local, State or Commonwealth Authority having jurisdiction over work herein specified.

b. Approved
Shall mean approved in writing by the Architect and/or Regulatory or Ruling Local Authority.

c. Principal
Shall mean "Stockland Development Pty Ltd" or their nominated representative

d. Architect
Shall mean "Allen Jack + Cottier" or their nominated representative

e. Consulting Engineer"
Shall mean "BG & E PTY LIMITED".

f. Contractor
Shall mean "the successful builder ".

g. Sub-Contractor
Shall mean the successful "Civil Stormwater Contractor" and shall mean that the sub-contractor is contractually obliged to undertake, carry out, execute, complete all works as required and specified.

h. Equal
Shall mean equivalent in performance, quality and approved by the Contractor following review by the Architect.

i. Provide'
Shall mean supply, deliver, install and warrant.

j. Specified
Shall mean required as part of the sub-contract.

k. Specification
Specification shall mean this document in its entirety with associated drawings, addendums (if applicable) and other referred documents for the contract works.

3 SCOPE OF CIVIL STORMWATER WORK

The Civil Stormwater work covered by these documents includes the completion of design, shop drawings and other documentation suitable for construction, co-ordination of the Civil Stormwater services with architecture, structure and other services, manufacture, supply, installation, testing, commissioning and subsequent maintenance for the stipulated period of the work specified herein and shown on the accompanying drawings.

Provide all manufactured items, materials, labour, delivery, tools, plant, appliances and fixings necessary for the proper execution of the works, together with all minor and incidental works.

The entire Civil Stormwater works shall comply with all the latest relevant Regulations and to all Local Authority requirements. The cost of any materials or equipment required to meet such regulations and requirements shall be included in the Tender whether specifically shown or described in the documents or not.

All materials and equipment shall be the best of their respective kinds, complying with the relevant Standards and Local Codes of Practice. All materials and equipment shall be new and shall be delivered to the site with the maker's label intact.

3.1 Design Responsibility

This specification and drawings represent a detailed brief of the Principal's requirements. The sub-contractor shall warrant as part of the contract that the works shall be fit for purpose.

The sub-contractor may submit alternative designs which the principal may accept but is not obliged to accept.

(1) Work Included

The Civil Stormwater services system referred to in this specification include:

Stormwater drainage;
Stormwater pits:
Stormwater Detention Tank;
Road Restoration;
Temporary Diversions of stormwater mains as necessary;
Co ordination with existing services within footpathsand roadways
All authority approvals required for the execution of the works.

4 WORKS BY OTHERS

Works associated with the Civil Stormwater Scope of Works, which will be provided by other trades is listed below, and the Sub-Contractor shall allow to co-ordinate with other trades and the Contractor, the construction and installation of the following "Work by Other Trades". The Sub-Contractor shall supply and setout all specified items that are required to be installed by others.

All work not included in the following, but required to complete the hydraulic installation shall be part of the Sub-Contractor's works.

Contractor's Work

- Set out of building grids to allow set out of core holes and drainage lines
- The Contractor will cast in all pipe cores, sleeves, fire collars or strip drains provided and located by the Sub – Contractor.
- The Contractor shall construct all spoon drains, dish drains and grated drains and provide these with falls to the outlets provided by the Sub-Contractor.
- Supply and installation of waterproof membranes in wet areas (except in pits as specified).

- The Contractor will excavate for and construct the concrete detention tank. The Sub-Contractor will supply and install all other equipment including the concrete covers and frames and stainless steel step irons.

5 REGULATIONS

The Sub-Contractor shall ascertain and comply with all rules, regulations and by-laws (including the latest amendments) of:

1. Workcover
2. The Environmental Protection Authority.
3. The Standards Association of Australia.
4. Manly Council
5. Energy Australia.
6. NSW Fire Brigades.
7. Roads and Traffic Authority.
8. Telecom Australia
9. Agility.
10. Building Code of Australia.
11. Sydney Water.
12. Any other Authority having jurisdiction over all or part of the installation to ensure that the equipment and installation, when manufactured and installed, shall comply with the rules and regulations.

Where Standards and Regulations are mentioned in this specification they shall include all amendments and interpretations.

On completion, all of the equipment and the entire installation is to be inspected by the appropriate authorities in the presence of the Contractor and Architect. Where certificates are to be obtained from the Local Authorities concerned, to the effect that equipment and installations comply with their requirements, they shall be forwarded to the Contractor Architect as a prerequisite of practical completion.

6 AUTHORITIES, PERMITS, FEES & CERTIFICATES

All work shall be carried out in accordance with the Local Authorities regulations and to the satisfaction of the Contractor.

The Sub-Contractor shall procure all necessary permits, certificates and approvals from Local Authorities and pay for all approvals.

The Sub-Contractor shall pay all fees relevant to his work and due to Local Authorities.

Test certificates for all essential services shall be provided by the Sub-Contractor to the Contractor prior to practical completion.

The terms of this Clause shall be completed without additional cost to the Principal.

7 RESPONSIBILITY

The Sub-Contractor shall make due allowance, and be responsible, for the following:

- Conformity with relevant authority and code requirements.
- Replacement of defective materials and workmanship.

- Guarantees as herein after specified.
- Quality assurance to ISO 9000 and as here after specified.
- Protection of own work until Practical Completion.
- Pay all fees.
- Co-ordination and Co-operation with other trades.
- Full time supervision.
- As Built Drawings in CAD format.
- All authority approvals and certificates and fees associated therewith.
- All set outs
- Labour for casting-in where applicable.

8 INSPECTION OF DOCUMENTS AND THE SITE

The Sub-Contractor is deemed to have visited the site and inspected all documents and programmes before tendering and is satisfied as to the true nature and extent of the work to be carried out under the contract. The Sub-Contractor shall ascertain for themselves all local information required in preparation of the tender, with particular reference to the relevant regulations and requirements of the authorities having jurisdiction over the work.

The Sub-Contractor shall include all necessary items which are implied but which may not be stated or shown on the drawings. The Sub-Contractor acknowledges that before tendering he inspected the site and that he has become conversant with all visible existing conditions of access to the site for building purposes and with services shown
on the hydraulic contract documents and has allowed for all such factors in his tender and with the associated conditions for access applicable to the Head Contract.

No claims arising from the neglect of the foregoing, on the grounds of ignorance of the amount and kind of work involved, and the conditions under which the works will be executed, will be allowed.

9 TENDER DRAWINGS AND SPECIFICATION

The drawings as scheduled are issued as a guide only and shall be considered to be diagrammatic and approximate. The drawings and specification are intended to be mutually explanatory and complete, but all work called for by one, even if not by the other, shall be fully executed. Should the documents be in conflict, the Sub-Contractor will be deemed to have included in his tender price for the larger quantity and the more expensive components, as applicable.

All discrepancies between documents shall be clarified with the Architect or Contractor prior to submission of tenders.

The Sub-Contractor shall provide everything necessary for the proper execution of the works, whether or not described in the specification, or shown on the drawings provided the same may be reasonably inferred therefrom.

Final setouts shall be determined from the latest architectural layouts.

Figured dimensions are to be followed in preference to scaling.

This specification shall be read in conjunction with the Hydraulic Services drawings and amendments during the construction of the project.

10 CO-ORDINATION

It should be noted that the general layout, sizing, arrangement and routing of services have been generally co-ordinated with other trades and must not be varied without consultation.

Notwithstanding this requirement, the Sub-Contractor shall, in carrying out his design and preparation of shop drawings, make such variation as may be necessary and dictated by site conditions and the most up to - date Architectural, Structural and other services layouts to obtain clearances from obstructions and other services. Invert levels shown on drawings are recommended only. Check on site before excavation or installation of pipework to ensure correct cover and fall. Submit proposed alterations to inverts and obtain approval before starting work. Do not scale the tender drawings. Verify all dimensions from the architectural drawings and by site measurements.

11 EXISTING SERVICES

The Sub-Contractor shall determine the location and position of existing services on and surrounding the site prior to commencing work. The Sub-Contractor shall determine that all existing services required to be connected are those to which the documents indicate, and that they are of the size and level shown on the drawings. No additional claims will be accepted for rectifying works that have been incorrectly connected as a result of failing to confirm the documented information on site prior to commencing this work.

All existing services to be connected to, other than Authority Services shall be cleaned, flushed out and tested to an equivalent standard of all new works, and to the satisfaction of the Contractor prior to their connection.

The Sub-Contractor shall not close down any existing services without giving at least 48 hours notification to the Contractor or without written approval to do so. After notification to the Contractor that the service is redundant, the Sub-Contractor may proceed to cap off, or seal the service off in the correct manner, as is required by the Authorities, the Contractor, or the Architect.

The Sub-Contractor will be responsible for checking with all Authorities and the concerning the location of any existing services on the site.

The Sub-Contractor shall disconnect, remove and seal off all redundant services to the approval of the Authority having jurisdiction.

The Sub-Contractor shall report site modifications, diversions and/or disconnection affecting the work. The Sub-Contractor shall provide all necessary assistance for the resolution of such difficulties in conjunction with the Contractor and Architect.

Prior to any site modifications, diversions and/or disconnection, the Sub-Contractor shall provide all temporary pipes, fittings, valves and sundry items necessary to maintain the supply to the building.

12 OBVIOUS WORK

The nature and spirit of the Specification and Drawings is to provide for the work herein, enumerated and shown on the tender documents, it is fully understood that the Sub-Contractor, on accepting the contract, agrees to furnish everything reasonably necessary for such an installation, notwithstanding any omission in the Specification and Drawings.

13 INSPECTION & SUPERVISION

If the specification, Laws, Ordinances or Authorities, require any work to be specially tested, inspected or approved, then timely notice shall be given by the Sub-Contractor of its readiness for inspection. If any such work shall be covered up without approval or consent, it must, if required, and at the Sub-Contractor's expense, be uncovered for examination and re-built after approval.

14 INSPECTION OF COMPONENTS

The Sub-Contractor shall make available to the Contractor, Architect and Consulting Engineer such facilities as may be required to enable them to inspect at the place of manufacture, the component parts of any item of equipment under the Contract. When requested, the Sub-Contractor shall provide all labour, materials and instruments required for the purpose of carrying out any tests.

Any items of equipment supplied under the Contract shall still be liable to subsequent rejection because of faulty workmanship or unsatisfactory performance, notwithstanding the previous acceptance of its component parts.

15 TRADE NAMES

Where trade names are used in this specification, their purpose is to establish a standard of quality and/or performance (including warranty period). Items of other manufacturers may be used if of equal quality and performance, provided that proof to that effect is submitted to and is approved by the Architect or Consulting Engineer in writing.

16 APPROVED SUB-CONTRACTORS

The Sub-Contractor shall submit, for approval, the names of Sub-Contractors to whom he proposes to sublet portions of the Civil Stormwater Contract.

17 PROTECTION

The Sub-Contractor shall be entirely responsible for all apparatus, equipment and appurtenances furnished by him or suppliers in connection with this work, and special care shall be taken to protect all parts, in such a manner as may be necessary or as directed by the Contractor. This protection shall include protective covers, crating, sheds, stores, or other means to protect the apparatus, equipment, and materials from the weather and to prevent dirt, grit, plaster or other foreign substances from entering the working parts of machinery or equipment.

Special care shall be taken to keep all open ends of pipes, ducts, flues, etc. closed while in storage and during installation.

The Sub-Contractor shall protect all parts of the building and the work of other trades from damage which may be caused by the Sub-Contractor's workmen. The Sub-Contractor shall be responsible for making good any such damage.

18 WARRANTY

The Sub-Contractor shall obtain all warranties, certificates, etc, for the work specified to be guaranteed or certified satisfactorily completed, and lodge same with the Architect on completion of the Agreement. All to guarantee all existing pipework equipment, etc that is to remain in the completed development as new pipework, equipment etc for the full guarantee period.

All plant, equipment and materials supplied under this Contract shall be covered by a minimum twelve (12) months warranty against faulty manufacture, workmanship and/or materials. The manufacturer's warranty shall be as nominated further or as required under trading regulations. The Contractor shall be responsible for the rectification and/or replacement of any portion of the installations which fail under warranty.

The warranty period shall commence as from the date of practical completion or replacement, as applicable but extension of the period shall be made in respect of replaced portions only.

19 AUSTRALIAN CONTENT

The Sub-Contractor shall endeavor to incorporate the maximum practicable Australian Content, unless noted otherwise.

20 NUISANCE

No work shall be carried out or materials handled in such a manner as to cause nuisance on the site or to other trades, the public at large or occupants of adjacent buildings.

All work causing a hazard to others shall have safety barriers surrounding the works in accordance with Workcover Regulations and the Contractor's requirements.

21 QUALITY SYSTEM

The manufacture and installation of the Civil Stormwater Services shall be governed by the Quality Assurance Programme, ISO 9000. The Sub-Contractor shall provide product quality and installation under that programme. The programme shall be one in which the Sub-Contractor has in place a quality control system which is subject to continual monitoring through quality audits by a recognised independent organisation.

22 SETTING OUT

Core Holes & Penetrations

The Sub-Contractor shall set out all core holes and openings as required necessary for the passage of pipes and/or conduits throughout the structure. Should additional holes or openings be required due to the failure to fulfil the conditions of this clause, then arrange approval to drill, at no extra charge, such holes or openings and pay all costs involved.

Do not cut any holes, openings, chases or otherwise with the work of other trades without the specific approval of the Contractor. Any damage done to other trades shall be made good without extra charge.

The Contractor is to cut all necessary penetrations through existing structure.

23 SHOP DRAWINGS

The Sub-Contractor shall prepare and submit for information before commencing manufacture or installation, fully coordinated shop drawings from which the subject works shall be built.

Shop drawings to be prepared by a qualified Civil Stormwater Engineer

Shop drawings to be prepared using the current AUTOCAD Release and to the same standard as the tender drawings. The drawings shall be to a scale of not less than 1: 100 and be on the one size drawing sheet.

Drawings shall be prepared generally in accordance with the drawings supplied with this Specification except where variations on the shop drawings are required to suit architectural, structural and other services requirements and site constraints.

Show all invert levels and sizes of all authority's inground mains.

The workshop drawings to be prepared and submitted by the Sub-Contractor shall include the following:-

- Civil Stormwater site services drawings of all the pipe systems for the project including all invert levels of pipework.
- Dimensioned drawings of all core holes proposed throughout the buildings.
- Detail drawings of, but not limited to the following:
- Sewer manholes, stormwater pits including kerb inlet pits, grated drains and other pit type structures;
- Detailed sections of the works and accurate positions of installed pipelines off boundaries.;

The Contractor and Consulting Engineer shall not be regarded as the Sub-Contractor's checking agents. Approvals of Shop drawings shall contain reference to all of the Sub-Contractors work, such as plinth dimensions, drain positions, penetrations, invert levels, pipe sizes, electrical terminations and the like, to enable proper co-ordination of these requirements with the trades concerned

Approval of workshop drawings shall be given in principle only without prejudice to the responsibility of the Sub-Contractor for the proper co-ordination, installation and operation of the services. If errors, omissions and interferences are noticed, bring them to the Contractor's attention.

Shop Drawings are examined for design intent only and any approval given is given in that regard only.

Prior to commencement of workshop drawings, the Sub-Contractor shall produce a drawing register and schedule of submission dates for approval by the Contractor.

The schedule is to enable the necessary approvals to be gained and for the Sub-Contractor to comply with the Contractors programme for installation of the services.

Six print copies and a CD Rom copy of shop drawings shall be submitted for approval. Allow at least 15 days for the return of the endorsed shop drawings or such longer period as may be nominated.

Where drawings are returned for amendment, such drawings shall be amended and resubmitted within sufficient time to prevent delay to the completion of the Works. Necessary re-submissions shall be made until such time as the drawings are approved.

Construction Drawings submitted to and retained will not be used for purposes other than those covered by these Works.

The schedule of shop drawings shall be up-dated from time to time and shall include the following information:

a) Approved drawings.
b) Current drawings submitted for approval.
c) Dates for re-submission for non-approved drawings.
d) Dates for submission of balance drawings.

Alterations shall not be made to any approved drawing unless resubmitting such drawing for approval.

When the Sub-Contractor's final checking is completed he shall issue to the Contractor and Architect a transparency copy of each and every Shop Drawing.

24 WORK AS EXECUTED DRAWINGS

During construction keep a current set of MARKED UP Working Drawings, clearly showing all deviations from the originally planned layout of the various services, in RED, for preparation of "WORK AS EXECUTED" drawings.

On completion provide the Contractor for checking purposes, three (3) complete Print copy and two (2) CAD disk (Autocad Release 2000) copy of "WORK AS EXECUTED DRAWINGS", fully dimensioned and correct in detail.

"WORK AS EXECUTED DRAWINGS" shall clearly indicate:

1. Location of all concealed piping.
2. Location of and inverts of all above ground and underground piping and drains.
3. Location and dimensions of piping in relation to property boundaries.
4. All other relevant information.

25 MAINTENANCE MANUAL

The Sub-Contractor shall supply four (4) complete sets of approved bound operating and maintenance instructions for the installations.

These instructions shall include one sepia and one CAD disc of the "work as executed drawings" as well as:-

- Index of Contents
- Drawing list
- Definition of terms
- Detailed description of services and design references under all modes of operation.
- Manufacturer's Warranties / Guarantees
- Testing of essential services and equipment as required by relevant Australian Standards
- Certification of systems by the relevant authorities.
- Names of actual suppliers of all plant and equipment used.
- Test and commissioning Certificates.
- The manuals shall be submitted to the Architect for approval.

Format to include :

- A4" size ring binder with hard coverage
- Title and volume number printed on spine and face of manual
- All contents to have reinforced binding holes
- Where this is not possible contents shall be contained in quality plastic pockets for easy removal.
- Suitable dividers provided
- Contents numbered or in other defined order.
- Submit a draft copy of the manual and drawings for approval before distribution.

26 CCTV INSPECTIONS

Carry out CCTV inspection of all in-ground sewer and stormwater drainage systems.

- Supply two (2) colour videos and reports prior to practical completion.

27 GENERALLY

The Sub-Contractor shall ascertain the routes of all his services in co-ordination with all other trade services, and the position of all conduits, pipes, cables and the like in connection with the works. The breaking or cutting of completed work must be avoided wherever possible. Damage caused in the course of the works shall be made good by the appropriate trades and the surface finished to match adjacent surfaces. The cost of making good will be borne by the Sub-Contractor if he has failed to carry out the requirements of the contract and in particular this Clause.

The Sub-Contractor is to carry out work in accordance with the Construction Programme current at the time. In the event of the Sub-Contractor failing to meet such Programme he shall work all necessary overtime or increase his workforce as need be and al extra costs will be at the expense of the Sub-Contractor.

The Sub-Contractor shall clean his work to normal standard including scrubbing polishing and vacuuming as required and to protect his work from subsequent damage and on completion remove the protective measures.

28 PRECAUTIONS IN CARRYING OUT THE WORK UNDER THE CIVIL STORMWATER CONTRACT

Unless otherwise specified in the Civil Stormwater Contract, the Sub-Contractor shall observe the appropriate current Australian Standards published by the Standards Association of Australia in respect of storage, transport and use of materials, explosives, plant and equipment and for work processes and for safety precautions, except where such Standard conflicts with any statutory requirement in which case the latter shall apply.

Where the contract does not specify precautions to be observed and in the absence of any statutory requirements or relevant Australian Standard, the Sub-Contractor shall ensure that suitable precautions are followed and all proper care is taken.

29 DAMAGE TO SERVICES

The Sub-Contractor shall before work commences in company with the Contractor check the location of all services. The Sub-Contractor shall immediately notify the Contractor and the Officer of the relevant authority in charge of the area in the event of damage to any water, gas, electric, drainage, sewerage, telephone, fire alarm, control cable or other services in the area. The Sub-Contractor shall render any assistance required in connection with any such incident, but otherwise work in that vicinity shall be stopped immediately and not recommence until instructed by the Contractor.

30 COMMISSIONING

The Sub-Contractor shall be responsible for commissioning the various installations carried out under this contract. The commissioning programme shall be to the approval of the Contractor, Consulting Engineer and Local Authorities.

31 MAINTENANCE

The Sub-Contractor shall provide full maintenance and testing of the systems installed under this contract, all in accordance with the requirements of Contractor and the Authorities for the 12 months "defects liability period".

The maintenance period starts when the equipment arrives on site and ends at the end of the defects liability period for the works.

The Sub-Contractor shall carry out maintenance of each component at least as recommended by the respective authorities.

The results of all inspections and tests shall be recorded in a test record book provided by the Sub-Contractor for the purpose. This record book shall be handed to the Contractor after the Maintenance Period.

The Contractor shall be given notice of any sectional isolation or shutdown of the systems necessary to carry out any major maintenance or repair work.

The Sub-Contractor shall submit with their tenders, service proposals listing the duties carried out and annual costs included therefore.

32 DEFECTS LIABILITY

The Sub-Contractor shall guarantee all systems, work and materials provided under this Contract against all defects from the date of Practical Completion for the Defects Liability Period of 12 months.

During the defects liability period, the Sub – Contractor shall be responsible for rectifying all operational problems and replace all defective materials supplied and installed under the Contract.

The Sub-Contractor shall be responsible for all costs associated with damage arising from defective materials, equipment or faulty workmanship supplied or performed under the contract until the end of the Defects Liability Period.

Should the complete installation or any part thereof prove defective or fail to fulfil the requirements of this specification, performance of the relevant equipment shall be corrected by the Sub-Contractor at his own expense or the equipment will be liable to rejection.

The Sub-Contractor shall be responsible for the replacement of any portion of the installation so rejected and for all costs incurred thereby. The guarantee period shall then be extended to cover an additional twelve (12) months trouble-free performance or such longer period as may be nominated in the Agreement.

33 PRACTICAL COMPLETION/COMPLIANCE CERTIFICATE

On completion, the Sub-Contractor shall arrange a mutually agreeable date with the Contractor for a final inspection and the performance of such tests as the Contractor may require to satisfy himself that the installation is complete to the intent of the specification and in a satisfactory operating condition.

The Sub-Contractor shall deliver to the Contractor certificates showing satisfactory compliance with all Authorities having jurisdiction over the works and issue all certificates of compliance.

Before notifying the Contractor that the installation is ready for inspection and/or testing. The Sub-Contractor shall satisfy himself that the installation is in fact capable of passing such inspection and/or tests prior to notifying the Contractor.

If the Contractor and Architect or Consulting Engineer is obliged to re-inspect or attend further tests due to the Sub-Contractor failing to observe the foregoing provision, the additional costs incurred by the Consulting Engineer shall be deducted by the Principal for such monies as may be owing to the Sub-Contractor.

The date of practical Completion for this Contract shall be the date of Practical Completion of the Main Building Contract unless otherwise approved by the Architect or Consulting Engineer.

34 SCHEDULE OF RATES

The Civil Stormwater Sub-Contractor is to supply a detailed Schedule of Rates.

The Schedule of Rates are to be agreed upon by both the Sub-Contractor and the Architect.

They shall be used for the purpose of assessing progress claims and variations.

No payments shall be made to the Civil Stormwater Sub-contractor until the Schedule of Rates is supplied.

35 LICENSING OF CIVIL STORMWATER SUB-CONTRACTOR

The Sub-Contractor shall hold a current license issued by the Department of Fair Trading for all the contract works for the duration of the contract. A person so licensed shall be on the site of the works at all times such work is being performed and shall upon demand produce the license to the Authorities and the Contractor.

36 CONTRACT MANAGEMENT

The Sub-Contractor shall provide all the necessary on site personnel and off site back up personnel and facilities necessary to enable the works to be properly executed in accordance with the construction program. On request from the Contractor he shall supply the names, positions and authority of persons with responsibility for execution of all or part of the Civil Stormwater Contract works.

37 LABOUR, DIRECTION, CO-ORDINATION & CO-OPERATION

The Sub-Contractor shall provide either directly or through his Sub-Contractors all necessary labour for the carrying out and completion of the works in accordance with the provisions of this Contract including properly qualified personnel such as Managers, Foremen, Leading Hands and all other staff such as may be necessary to ensure constant and competent direction and superintendence of all Trades in all phases and part of the works to comply with the required standards of this Contract.

The Sub-Contractor shall be responsible for the proper co-ordination of all works of this Contract including the works of all his suppliers. The Sub-Contractor shall supervise all components expressly made for the works manufactured or stored or stockpiled off site.

38 SUB-CONTRACTOR'S REPRESENTATIVE

The Sub-Contractor's representative shall have sufficient command of the English language and of Australian construction and technical terminology to be able to read, converse and receive instructions in English and shall be committed to attendance on site for all hours while the subject contract works are in progress.

The Sub-Contractor's representative shall be required to attend site meetings between himself, the site manager and his consultants for the duration of the contract, at a time nominated by the site manager. The purpose of the meetings is to assist in attaining full co-operation between all concerned, as well as checking works in progress and co-ordination.

39 MANUFACTURER'S DIRECTIONS

Manufactured articles, materials and equipment are to be supplied, installed, connected, erected, used, cleaned and commissioned in strict conformity with manufacturer's printed directions unless otherwise specified. In any case, the Sub-Contractor is to obtain from the Supplier the manufacturer's requirements and practices. Retain manufacturer's directions of such articles on site for the Contractors or Architect's reference.

40 QUALITY OF WORK BY OTHERS

Where the proper execution of the works of the Sub-Contractor is dependent on or appreciably affected by the quality of any work to be carried out or that has been carried out by another Sub-Contractors, then such work shall be to the reasonable satisfaction of this Sub-Contractor in so far as it may affect this Civil Stormwater Sub-Contractor in the execution of his works.

If he shall consider that its quality or the manner of its execution or the time of execution is likely to obstruct or hinder him unduly in the carrying out of his Contract, then he must notify the Contractor accordingly in writing and supply particulars immediately on becoming aware and thereof stating in what respect the work in question is not to his satisfaction.

41 GENERAL - EQUIPMENT SUBSTITUTIONS

1. Substitutions of alternative makes or types of equipment from that included in accepted tender shall only be allowed on written approval of the Architect.

2. A written application containing full technical information of the proposed substitution, together with reason for change and any cost adjustment to the Contract that would result there from, must be submitted before any such substitution of equipment will be considered.

42 CO-OPERATION

Various items of apparatus and equipment will be furnished and set under other contracts. Where a connection, either directly or indirectly, is required check the requirements of other relevant Trades and Sub-Contractors and the plans and specifications covering each of these trades.

Closely schedule the Works so that these works will be installed at the proper time and without delaying the completion of the entire project.

Carefully check space requirements with other trades and/or Sub-Contractors to ensure that the equipment, piping, etc, can be installed in the space allotted for same.

Where congested areas of piping systems occur, prepare floor layouts for Consulting Engineer's review before commencing installation. Where similar arrangements occur complete one arrangement for consultants review before duplicating same on other floors.

43 FIXINGS IN HIGH STRENGTH CONCRETE

The Sub-Contractor shall ensure correct and sufficient fixing methods are employed on the works and acknowledges the use of post tensioned concrete slabs and high strength concrete in the structure.

44 STANDARDS

Unless otherwise specified, all works and materials shall comply with the following Standards (including amendments) and if nominated standards have been replaced, then the relevant replacement Standard :

AS 1260	Unplasticized PVC (UPVC) pipes and fittings for drain waste and vent applications
AS 1304	Welded Wire Reinforcing Fabric for Concrete
AS 1342	Precast Concrete Drainage Pipes
AS 1345	Identification of the Contents of Piping, Conduits and Ducts
AS 1415	Unplasticized PVC (UPVC) Pipes and Fittings for Soil Waste and Vent (SWV) Applications
AS 1449	Wrought Ally Steels - Stainless and Heat Resisting Steel Plate, Sheet and Strip
AS 1477	Unplasticized PVC (UPVC) Pipes and Fittings for Pressure Applications (Metric Units)
AS 1530	Methods for fire tests on building materials components and structures
AS 1646	Rubber Joint Rings for Water Supply, Sewerage and Drainage Purposes
AS 2032	Code of Practice for Installation of UPVC Pipe Systems
AS 3500	National Plumbing and Drainage Code
AS A185	Solvent-Welding Cements for use with Rigid PVC Pipe and Fittings
AS 4072	Components for the protection of opening in fire – resistant separating elements
○	Manly Council Stormwater Code – Latest editions
○	Roads and Traffic Authority minimum standards and codes applicable to Condamine Street works

SECTION TWO: PROJECT DESCRIPTION

45 PROJECT DESCRIPTION

The proposed development is located in Condamine Street Balgowlah and consists of the redevelopment of approximately 20,000 square metres of site area into a mixed use development, comprising a retail shopping centre and approx 250 apartments on a podium level above the retail shops.

The works included within the Civil Stormwater design and construct Sub Contract are for the construction of stormwater mains within the site, adjacent streets and adjacent properties to provide a fully functional authority approved stormwater systems on completion of the works.

The sub contractor shall make all necessary allowances within the tender for complete systems to be constructed and co- ordinated with other contractors and Authorities.

The works shall also include the disconnection of existing redundant services connections to the site and the temporary services during construction.

46 EXTENT OF WORKS

The work specified in this section shall include the supply, delivery to site, installation, testing maintenance and warranty of the following Hydraulic Services systems:-

- Stormwater Drainage
- Authority stormwater drainage services
- Temporary diversions of services if required.
- All excavation required for the installation of the works.
- Sediment and Erosion control measures to satisfy Manly Council requirements

47 GENERALLY

a) All work shall be carried out in accordance with those Authorities having jurisdiction and as may be further required by the Contractor, this specification and drawings.

b) The Sub-Contractor shall be totally responsible to fully co-ordinate the Civil Stormwater services with other trades.

c) Barriers, accessibility, protective measures and timbering shall be provided by the Sub-Contractor in accordance with the relevant Authorities' requirements.

d) The Sub-Contractor shall be responsible for, and shall make good, all excavations and as may further be required by the relevant Authorities. The Sub-Contractor shall also be responsible for making good any damage to roadways, footpaths, private property, etc, that has been caused by himself or his employees.

e) Allow for excavation to be carried out in "rock" material, and remove excess spoil.

48 STORMWATER DRAINAGE SYSTEMS

Provide a system of stormwater drainage piping to collect stormwater discharge from Lane 34, intercept the existing drainage line and extend to a new connection point adjacent to the corner of Griffiths and Condamine Streets as generally shown on the drawings.

Provide a system of stormwater drainage piping to collect stormwater discharge from the existing Telstra Site and the proposed Woodland Street Development site and intercept the existing 525mm stormwater line at the northern boundary of the site.

Provide a system of stormwater drainage piping to collect stormwater discharge from the stormwater detention tank and discharge to the new stormwater drainage in Condamine Street.

Provide a an overland flow culvert to drain excess flows form the existing sag area of Lane 34 to discharge into Condamine Street.

Provide capped connection points for the discharge from Telstra and Woodland Street site.

Note: Portions of the Civil Stormwater works are to be constructed for the Manly Council and these assets must be constructed to the minimum standards acceptable to Council. Proposed works are to be verified and signed off by Council Prior to commencement.

- Carry out CCTV inspection of all in-ground stormwater drainage systems after installation and prior to practical completion. The video shall be delivered to the Contractor for verification of the condition of the works .

The stormwater drainage systems shall be complete with kerb inlet pit, footpath crossings, sumps, grates, roof outlets, manholes, trench grates, landscape/planter drains, piping, valves, fittings etc, and as may be further specified under this part and as generally shown on the drawings or required for Authority approval of the systems..

49 STORMWATER DETENTION TANK

Provide a 500,000 litre stormwater detention tank complete with all trash screens, access grates, inspection ladders, orifice plate etc required for Manly Council approval.

SECTION THREE: MATERIALS, INSTALLATION REQUIREMENTS

50 WORKMANSHIP

All equipment is to be installed in a tradesman like manner, complying with AS 3500, the latest relevant Regulations, all local requirements and this specification.

Wherever possible, pipes shall be suspended from slab and walls to eliminate the number of vertical risers from ground to structure. Pipes shall be run parallel with walls, slabs and each other.

51 EXCAVATION

Excavation: Excavate to the services, levels and grades as required for underground services specified in the relevant services sections, including drainage, hydraulic, electrical and the like. Unless otherwise specified make the trenches straight between manholes, inspection points, junctions and the like, with vertical sides and uniform grades.

Rock Excavation: Shall consist of the removal of natural unweathered materials which cannot be removed until broken up by means of jackhammers. This does not include loose boulders, brick and old pavements.

Laying Program: Excavate trenches in sections of suitable length, lay and bed the relevant service length and backfill the trench section, with the minimum of delay and if possible on the same working day, unless otherwise specified or permitted.

Trench Widths: Subject to regulatory authority requirements, keep trench widths to the minimum consistent with the laying and bedding of the relevant service, and the construction of manholes and pits.

If the Sub-Contractor has exceeded the sectional area of excavations in consequence of any injudicious working, slips, falls blasting or any other cause other than by directed, then the Sub-Contractor shall, at his sole cost, remove such extra material and make good and fill.

Trench Depths: As required by the relevant service and its bedding method.

Obstructions: Cut back roots encountered in trenches to not less than 600mm clear of the relevant service. Remove such other obstructions including roots, stumps, boulders and the like which may, interfere with the proper functioning of the service.

Timbering: During excavation the Sub-Contractor shall advance the work in a careful, secure and safe manner and shall take all precautions against accidents and where necessary erect shoring/timbering to prevent earth or other material slipping or failing in or being shaken from the faces or sides of the excavation. Payment for the supply, erecting, withdrawing or abandoning or shoring/timbering shall be included in the Sub-Contractors tender price.

Trench Dewatering: The dewatering and disposal of all waters entering the Sub-Contractor's excavations shall be solely the responsibility of the Sub-Contractor. Any damage incurred by rainwater or rainwater runoff into the Sub-Contractor's excavations shall be solely the responsibility of the Sub-Contractor. Such damage shall be reinstated by the Sub-Contractor to the satisfaction of the or regulatory authority at his cost and no claim for additional cost will be allowed.

Road, Barriers & Lights: The Sub-Contractor shall provide and maintain efficient hoardings, barriers , night lights and temporary traffic arrangement as required by the Authority having control of the streets and/or roads. The Sub-Contractor shall apply for an obtain approval of all proposed temporary traffic arrangements required to carry out the works. The Sub-Contractor shall restore to the satisfaction of the local authorities all public and private streets, roads, lanes, footpaths, paved areas cultivated or grassed surfaces and all fences which may be disturbed by the operations of the Sub-Contractor. All trenches over 1.5mm in depth shall have parrawebbing erected on both sides of the trench.

Surplus Spoil: Surplus spoil shall mean such excavated material that is not required for the purpose of this contract and shall be removed from the site by the Sub-Contractor. The Sub-Contractor shall bear all costs associated with the disposal of surplus spoil including all cartage and tip fees.

Explosives: The use of explosives will not be permitted.

52 TUNNELLING

Provide tunnelling in lieu of trenches where required by Authorities.

Tunnelling shall comply with the requirements of the required authority. The use of explosives will be not be permitted. Use adequate shoring to prevent the collapse of the tunnel under all conditions.

Leave shoring in tunnel and backfill with sand under pressure after approval of pipework by Authorities and the Contractor.

53 PUBLIC UTILITIES AND EXISTING SERVICES

Where underground public utility lines and surface drainage works and underground pipes, conduits or cables exist in the vicinity of the works, the Sub-Contractor must take care to protect such services. Any damage to such services must immediately report to the responsible Authority and to the Contractor.

The cost of the necessary repairs or renewals to existing services shall be borne entirely by the Sub-Contractor - should negligence on the Sub-Contractor's part be proven.

54 EXCAVATION IN EXISTING PAVEMENT AND ROADWAYS

When excavating through existing pavement, saw the pavement and/or road to a depth of at least 100mm and then remove the material with pneumatic tools. If required by the Authorities, trenches across the existing roads shall be excavated and the pipeline constructed therein so that half the roadway is always maintained open to traffic.

Allow to place 25mm thickness steel plates to Council approval over open drainage trenches during and after each days work so as vehicular and pedestrian traffic flow is maintained.

55 MAKING GOOD

The Sub-Contractor shall be responsible for and shall make good any damage he may cause to the building and surfaces generally and any other works that may be distributed or injured by cartage, work generally or other operations. The reinstatement shall be at least as good a state of repair as before commencement.

56 GRADIENTS

Lay drains to gradients complying with the relevant authority's requirements and to the levels, if any shown on the drawings, and in any case not less than the following:

Pipe diameter (mm)	Sewer drains	Stormwater drains
65-80	1 in 40	1 in 60
100	1 in 60	1 in 100
150	1 in 80	1 in 150
225	1 in 90	1 in 225

57 PIPELAYING

Lay pipelines to uniform gradients falling to the outlets, straight between required changes of direction, properly supported, with watertight joints aligned flush at internal surfaces and with spigot ends pointed in the direction of flow. Provide the necessary fittings and accessories, including junctions, branches, inspection and cleaning openings, expansion joints, and the like.

Inspection Openings: Provide inspection openings as required by the regulatory authority and in any case

so that each straight length of sewer line can be inspected in at least one direction. Seal the openings with purpose-made covers fixed by a jointing method appropriate to the pipework. Where located external to building or indicated on drawings the opening shall be raised to surface level.

Cleaning Out: Flush the pipeline with clean water and leave it clean and free from debris on completion.

Pipeline Identification: Lay a detectable strap or plastic tape in the trench after pipelaying, testing and initial backfilling for all services.

Marker Plates: Provide a marker plate at ground level at each change of direction of the underground pipeline, engraved to show the direction of the line and the name of the service. Inset the marker in a 150 x 150 x 150 mm concrete block, with top set flush with the finished ground or surface level.

CCTV Video : Carry out CCTV inspection of all in-ground drainage systems after installation and prior to practical completion, The video shall be delivered to the Contractor for verification of the condition of the works.

58 UNDERGROUND INSTALLATION

Pipe Bedding: –Stormwater: Unless otherwise specified the pipework shall be laid on a continuous underlay of 10mm blue metal of minimum 75mm thickness after compaction or as required by the relevant standards . The bedding shall be graded evenly to the required gradient of the pipework.

Water Charged Ground: Where the base of a trench is unstable or water charged ground, drains shall be supported on steel reinforced concrete beams and piers designed for that purpose, and as specified in the relevant sections of AS 3500.2.

Submit details of all beams and supports for approval before commencing installation.

Side Support and Overlay: Fill to not less than 150mm above the top of the pipes. Compact in layers of not more than 150mm loose thickness without damage to the pipework.

Compaction: To AS 1289.

Cohesive material: Not less than 90% modified maximum dry density.

Non-cohesive material: Not less than 5% modified maximum dry density.

Backfilling Above Overlay: Backfill service trenches as soon as possible after approval of laid and bedded service. Compact as specified to the compaction density which applies to the location of the service trench. In pipe trenches, compact so that the pipe is buttressed by the walls of the trench. The initial 150mm of backfill shall be of the same material as specified under bedding. The next 150mm rest of the trench shall be backfilled with selected fill which contains no stones retained on a 25mm sieve. The remainder of the trench shall be backfilled with selected materials.

Place backfilling in layers not exceeding the thickness stated below when measured loose, and compact each layer as specified.

Maximum layer thickness: 150mm.

Do not place filling against concrete until the concrete has been in place for fourteen days, unless otherwise approved.

Compact each layer of general filling to the specified dry density of 90% MMDD.

Backfill for services under roads, pavements and concrete slabs shall be gravel sub-base class 2 compacted to 95% MMDD placed as nominated for general filing.

Provide compaction tests for all service trenches on the basis of not less than one test per service branch or as directed.

Protect the works during compaction from damage by compaction operations. Compact by hand if

necessary to prevent damage or disturbance to services, pipe joints and the like.

Prior to and during placing, bring the materials to within 2 % of the optimum moisture content determined to AS 1289 Method E1.1 for the filling type. The surface may be lightly sprinkled with water during compaction if necessary to replace moisture loss.

Minimum Cover Over Pipe: Unless overridden by regulatory authority requirement or otherwise specified, the following table shall apply:

pipes not subject to vehicular loading:	450mm
pipes subject to vehicular loading –	
not in roadways:	600mm
under sealed roadways:	600mm
under unsealed roadways:	750mm
pipes in embankments or subject to	
construction equipment loading:	750mm

59 ANCHORAGES

Anchor Blocks: Install anchorages in the form of lateral or longitudinal anchor blocks, of not less than 15 MPa concrete, to restrain lateral movement in pipelines at bends and changes of direction on pipework above 100mm diameter. Bear anchor blocks against the body of the fitting only, clear of joints, and against firm undisturbed ground or compacted filling.

Rubber Ring Jointed Pipelines: Where the gradient is greater than 1 in 20 (5%) concrete stops shall provided 150mm thick and built around the pipe extending from the bottom of the trench up to a height of 300mm above pipe and recessed 75mm into each side of the trench.

Submit to the Project Manager all details of the inground pipe systems including proposed positions of concrete thrust blocks for approval before installation of pipework commences.

60 BEDDING FITTINGS

Flexible Joints: Provide short lengths (not more than 600mm) of flexibly jointed pipe on each side of concreted fittings, pits, manholes, and the like, in principle as illustrated in AS 3500 Part 2.

61 CONCRETE ENCASING

Unless otherwise permitted by the relevant authority, and where indicated on the drawings concrete encase the following:

- Pipelines which cannot be provided with the required minimum cover;

Provide 15 MPa concrete, not less than 150mm above and below the pipe and 150mm each side or the width of the trench, whichever is the greater.

62 CONNECTIONS TO EXISTING

Connect new pipelines to existing drains as follows:

To Street Gutter: Enter the pipe into an opening made in the kerb, to finish with the kerb face, and seal. Restore the kerb and pavement as necessary, to match existing.

To Existing Stormwater Main: Arrange with Council permission to make connection to existing council main in the street and construct the works in accordance with relevant Council and Australian Standards.

63 INSTALLATION

Install pipework in straight lines and uniform grades without sags. Provide bends and sets as required, and sufficient unions, flanges, isolating valves and the like for satisfactory removal of piping and fittings for maintenance. Arrange and support pipework as necessary where suspended, so that it remains free from vibration whilst permitting necessary movements such as thermal expansion and contraction. Provide the fittings and components connected up and ready for testing the service. Keep the number of joints to a minimum.

Valves: Arrange together where practicable in operational grouping, in convenient and readily accessible positions.

Concealed Pipework: Pipework runs in false ceilings, roof spaces, under suspended ground floors, plant rooms, and the like: Arrange adjacent to and horizontally parallel with each other and with walls, beams and the like. Keep at lease 150mm above ground surface if under suspended ground floors. Provide adequate spacing of at least 25mm between pipes or pipe insulation, 50mm between pipes or pipe insulation and electrical cables. Take of branches at right angles.

64 PRE-CAST REINFORCED CONCRETE PIPES

Pre-cast reinforced concrete pipes for stormwater systems shall be first quality and in accordance with AS 4058 Class 'X' (2) unless under trafficable roadway where the RC stormwater pipes are to be in accordance with AS 4058 Class 'X' (4). Pre-cast reinforced concrete pipes to be installed in accordance with AS 3725.

Fittings: Junctions, bends shall be made with pits.

Jointing: Use rubber ring joints in accordance with manufacturer's instructions conforming to AS 1646.

65 UPVC PIPEWORK

UPVC Stormwater Pipes and Fittings: To AS 1254.

Pipe class: DWV (SN 6) for 100mm and Stormwater unless otherwise scheduled.

Jointing Methods: Solvent-cement joints: To AS 2032, Clause 3.2.1.

Rubber-ring joints: To AS 2032, Clause 3.2.2.

Pipeline Construction: Sewer pipelines: To AS 2032, Part 5.

Stormwater pipelines: To AS 2032, Part 7.

66 FIBRE REINFORCED CEMENT PIPES AND FITTINGS

Fibre Reinforced Cement (FRC) pipes and fittings for sanitary plumbing and stormwater drainage systems shall be first quality and in accordance with AS 4139 and be Class X.

Jointing: Pipes and fittings shall be jointed using Adcol rubber rings as manufactured by Hardies Pipeline Systems and jointed in accordance with manufacturers instructions.

67 ACCESS CHAMBER AND PIT CONSTRUCTION

Construct pits, sumps, access chambers and the like to the dimensions and locations as shown on the drawings and as follows, unless otherwise specified.

Access chambers, pits and sumps shall be precast concrete wherever possible, to the sizes scheduled, cast in-situ structures shall be made on site.

Floors and Walls: In situ concrete: 20mpa, unreinforced unless otherwise shown. Thickness not less than 100mm, unless otherwise shown or specified.

Brick: Walls of square of rectangular pits not more than 1500mm deep may be brickwork 230m thick in cement mortar, rendered, instead of unreinforced concrete.

Prefabricated concrete: Walls of spun precast sections not less than 60mm thick. Floor cast in situ or prefabricated. Provide cored holes as required.

Finish to exposed surfaces: Smooth, equal to steel trowelled render or concrete cast in steel forms. Cove of splay internal corners. Bench floors and fall to drain.

Render: (If required): 1 cement:3 sand, minimum thickness 20mm.

Reinforcement: If depth of pit exceeds 1500mm: F718 mesh to AS 1304 in floor, and in walls from depth 1200mm downward. Cover 50mm from inner face of walls and lower face of floor. Place main wires in walls horizontally.

Ladders: To AS 1657, stile type to clause 5.7 or individual rung type to clause 5.8, as applicable. Provide ladder to pits deeper than one metre, cast or built into the pit walls clear of drain outlet openings or discharges.

Rungs: Stainless steel rod, Grade 304, 450mm wide.

Rung spacing: 300mm maximum, 250mm minimum with bottom rung not more than 450mm from the floor and top rung not more than 450mm below surface level.

Levels: Top level of cover or grating, including frame:

- In paved areas, flush with paving surface.
- Gratings taking surface water runoff: As necessary to receive the runoff without ponding.

Pipe Connections: Build inlet and outlet pipes into the pit walls during construction. In existing pits, make openings of the correct size and pack the joint around the pipe to the full thickness of the wall with 1:3 mortar.

Benching: All access chambers, stormwater pits and grated sumps whether of the precast type or cast in-situ shall have the entire base of each pit or sump benched with 4:2:1 concrete to form half pipe channels for straight through or branch flow. The benching shall have considerable slope from the structure walls to the half pipe channel. In all cases 50mm cross fall shall be provided at the pipe inverts across the structure.

68 PIT COVERS

Provide each pit with a pit cover as shown on the Drawings or scheduled, of a size appropriate to the depth of the pit.

Cast iron covers shall be complete with frames with all edges machine fitted and have removable plastic lifting hole plugs. All covers and frames shall be set to the level of the finished surface levels and filled in with the same materials as used for the surrounding surface. Provide a brass edge trim around each cover situated inside the building.

69 GRATINGS FOR SUMPS AND GRATED DRAINS

Cast iron grating and frames shall be set to the level of the finished surface levels. Grating sizes and type shall be as indicated on the drawings.

Grates shall be provided for the following duties:-

Class A Light Duty	-	10 kilonewtons (1 tonne)
Class B Medium Duty	-	80 kilonewtons (8 tonne)
Class C Heavy Duty	-	150 kilonewtons (15 tonne)

Class D Extra Heavy Duty - 210 kilonewtons (21 tonne)

70 JOINTING MATERIALS

Cleaning: Joints shall be cleaned free of any foreign materials, dirt and grease before any attempt is made to complete the joints.

Joint Preparation: Joints shall be cut true and square, burrs and swarfs removed and chamfer lightly, ground or filed around the pipe.

- **Silver Solder:** Silver solder shall contain not less than 5% silver. Verification of the silver content shall be given in writing to The Proprietor. Care shall be taken not to overheat the joint, and apply the correct flux as recommended by the manufacturer.

- **Prohibited:** Bronze welding is not permitted.

- **Cement:** Cement shall be Portland cement Type 'A' complying with AS 3972 stored in a dry and moisture fee state and mixed as required.

- **Rubber Ring Gaskets:** Vitrified Clay Pipes: shall be jointed using toroidal rubber rings complying with AS 1741 of approved manufacture.

- **Lubricant:** Lubricant for lubricating the rubber ring and insertion type gaskets and the outside surfaces of spigot ends of pipes shall be of an approved non-toxic vegetable based type and shall be applied in accordance with the manufacturers' instructions.

- **Nuts and Bolts:** Nuts and bolts shall generally conform to the relevant Australian Standard be heavily galvanised by the hot-dip process. Where galvanised iron to cast iron flanges butt, galvanised bolts shall be used. Where brass to brass or brass to cast iron flanges butt and any underground or under water flanges are required, bronze or stainless steel bolts shall be used.

- **Silicone Sealant:** Silicone sealant shall be self-polishing with anti-fungicide addictive equal to Ciba-Geigy manufacture and used as recommended by the manufacturer. White shall be used around vitreous china sanitary ware and clear for seal under fixture taps and stainless steel.

- **Solvent-Welding Joint:** Polyvinyl Chloride (PVC or UPVC) pipes shall be jointed by solvent-welding of the type recommended by the manufacturer. Clean joint with approved solvent cleaning fluid. Apply liberally an even layer of the approved solvent cement to both surfaces of the joint and allow to stand to become touch dry. Apply a second coat to both surfaces of the joint and push together. Remove surplus solvent with a clean, dry cloth complying with AS/NZS 3879.

MATERIALS SCHEDULE

PIPEWORK INSTALLATION SCHEDULE :

SERVICE	LOCATION	MATERIAL	NOMINAL PIPE SIZE
Stormwater drainage	Above ground	'Ensign' Cast iron with coupling joints	100 - 150
Stormwater drainage	Above ground	Cast iron with mechanical joints	Equal to and greater than 225
Stormwater drainage	Below ground	VCP	Equal to or less than 225
Stormwater drainage	Below ground	Class 'X' RCP	> 225
Stormwater drainage	Footpath Crossings	R.H.S	150 x 100, 100 x 100

Note: All pipework to be stamped with relevant authorities marks and approved for purpose intended.

TENDER FORM SCHEDULE - A

CIVIL STORMWATER SERVICES - PROJECT : THE VILLAGE CONDAMINE STREET, BALGOWLAH.

NOTE:
All items of equipment and works included for in the base tender bid must comply with the requirements of this Specification. Where compliance is not possible this shall be specifically detailed. Non-complying equipment, etc., may be offered as an alternative only with the appropriate price variation.

1.	Stormwater Drainage	$	.00
2.	Detention Tank	$	.00
3.	Lane 34 Overland flow culvert	$	.00
4.	Telstra /Woodland Street stormwater	$	.00
5.	Lane 34 Stormwater works		
6.	Work Shop Design Drawings	$	.00
7.	As Built Drawings & Manuals	$	.00
8.	52 Weeks Maintenance and Warranty Service	$	.00
9.	Sydney Water Sewer extension	$	.00
	Total Contractors Work:	$	.00

NAME OF TENDERER: _____

ADDRESS: _____

SIGNATURE: _____ DATE: _____

TENDER FORM SCHEDULE – B

Project : THE VILLAGE CONDAMINE STREET , BALGOWLAH

Tender Form

Tender Fixed Price EXCLUDING GST (in words), _____

_____

_____

Time to commence works from acceptance of Tender: _____ (Weeks)

Approximate number of manhours on site to complete Sub-contract: _____(Hours)

I/We unconditionally guarantee the performance of the installation and completion of the works in accordance with this Specification and accompanying Drawings.

Company: _____

Signature: _____

Witness: _____ Date: _____

NAME OF TENDERER: _____

ADDRESS: _____

SIGNATURE: _____ DATE: _____

TENDER FORM SCHEDULE – C

HYDRAULIC SERVICES

Project :

SCHEDULE OF NON COMPLIANCE

This schedule forms part of the Tender.

The Tenderer has examined the Specification and agrees that the equipment offered complies with the Specification, except as stated below. On failure to complete these details, it shall be taken that the equipment complies in all respect with the Specification.

The equipment offered does not comply with the Specification in the following respects:

NAME OF TENDERER: _____

ADDRESS: _____

SIGNATURE: _____ DATE: _____

SCHEDULE OF RATES - E

HYDRAULIC SERVICES

Project :

Provide rates for the following, as per Specification:

EXCAVATION

Excavation - other than rock/m^3 :
Excavation - in rock/m^3 :

STORMWATER DRAINAGE

600mm RCP pipe 1 metre deep :
600mm RCP pipe 1.5 metres deep :
600mm RCP pipe 2 metres deep :
600mm RCP pipe 3 metres deep :
525mm RCP pipe 1 metre deep :
525mm RCP pipe 1.5 metres deep :
525mm RCP pipe 2 metres deep :
525mm RCP pipe 3 metres deep :
450mm RCP pipe 1 metre deep :
450mm RCP pipe 1.5 metres deep :
450mm RCP pipe 2 metres deep :
450mm RCP pipe 3 metres deep :
375mm RCP pipe 1 metre deep :
375mm RCP pipe 1.5 metres deep :
375mm RCP pipe 2 metres deep :
375mm RCP pipe 3 metres deep :
225mm VCP pipe 1 metre deep :
225mm VCP pipe 2 metres deep :
225mm VCP pipe 3 metres deep :
225mm VCP bend :
225mm VCP junction :

Council Standard Double Grated Gully Pit :
900MM Square stormwater pit to Council requirements :
Connection to existing pit in Griffiths Street :
Sediment and Erosion Control :
Excavation /metre cube :
Bedding/ metre cube
Removal of excavated material /metre cube.

SYLVAN AVENUE

168 – 182 WOODLANDS STREET

BALGOWLAH NSW 2093

STOCKLAND DEVELOPMENT PTY LTD

LANDSCAPE
TECHNICAL SPECIFICATION

Rev A

2 June 2009

OCULUS

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AUTHORISATION

Issue Status	Preliminary	Tender	Approved For Construction
Prepared by:	Specification Landscape Architect signature		02.06.09
Checked by:	Project Landscape Architect signature		02.06.09
Approved by:	Project Director signature		02.06.09
Signing of the Quality Record above to Approved For Construction (AFC) Status is evidence that this Specification has been verified as conforming with the requirements of the Consultant's Quality Plan. Where the Quality Record has not been signed to AFC Status, all information in the Specification is intended for non-AFC purposes only as design verification has not been executed.			

REVISIONS: Specification Sections bearing this note, show amendments (if any) throughout the Section in the following manner:

Clauses containing amendments show the current revision designation eg: *Rev* 2 in the line below their titles, adding to previous revision designations there if any.

Substituted or *additional* texts are shown in *italics*. Superseded text is deleted by removal entirely. If whole clauses are deleted the clause title is retained and bracketed words *(Clause not used)* added to the title. All changes are flagged in the left margin by a vertical line as indicated in this paragraph.

Adjustments of format, spelling, or punctuation are not identified, unless likely to affect the sense.

The current revision merges the amendments of any immediately previous revision by converting italic text to normal and removing margin flag lines. The whole of the currently revised Section is reissued.

The full scope and extent of revisions should be comprehended by comparison with previous editions.

REVISIONS OF THIS SECTION

Rev	Date	Amendment Description
A	02.06.09	Issued for Tender

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001 GENERAL

1.01 SCOPE

OUTLINE DESCRIPTION: Provide the labour, materials, plant and services, to carry out the operations necessary for the proper performance of the landscape works as shown on the drawings and as specified herein. All works within this section shall be carried out by an landscape contractor who is a member of the Landscape Contractors Association (LCA) and shall include but not be limited to the following:

- Detail site grading following bulk earthworks;
- Preparation for and supply and installation of paving base courses including trimming, compaction and aggregate,
- Supply and installation of stone pavers laid to patterns shown on the drawings,
- Supply and installation of broom-finish concrete paving and saw cuts,
- Supply and installation of custom-designed timber and steel bench seat;
- Supply and installation of pole street lighting;
- Supply and installation of 1800mm high plastic coated man proof chain wire fences;
- Supply and installation of steel edges and concrete kerb pieces;
- Supply and installation of pole top luminaries;
- Supply and installation of horticultural grade pine bark mulch;
- Excavation, cultivation, detail trimming and grading to planted areas,
- Preparation, supply and installation of planting medium and mulches, turf, feature trees plants, stakes and ties in natural ground;
- Design, supply and installation of irrigation system; and
- 52 week plant establishment period

1.02 STANDARDS

AUSTRALIAN STANDARDS: Unless otherwise specified in the Contract, and where applicable, materials and workmanship shall be in accordance with the relevant standards of the Standards Association of Australia.

CURRENT EDITION: A standard application to the Works shall be the edition last published prior to the closing date for tenders unless otherwise specified.

1.03 GENERAL REQUIREMENTS

All works are to comply with the requirements of the regulatory authorities and the relevant provisions of Australian Standards, Local Council, EPA and the Building Code of Australia. Particular attention is to be given to the storage, transport and use of materials, work processes and safety precautions. All work shall be deemed to be inclusive of making good adjacent works where necessary.

Where any conflict arises between the requirements of this specification, and the requirements shown on the drawings, the requirements shown on the drawings shall apply.

1.04 SAMPLES

REQUIREMENT: Submit representative samples of the plants and other materials and products specified in the SAMPLES SCHEDULE in SUBSECTION 999 SCHEDULES.

PLANT SAMPLES: Submit a plant sample of each species for inspection and approval in the condition in which it is proposed to supply it to the site. Prior arrangements should be made for inspection at the source of supply.

REJECTION: Replace, at no additional cost, plant and other samples rejected as unsuitable for use, including samples rendered unsuitable by the process of examination (eg. for root condition). Samples not rejected may be included in plant material for use in the Works.

1.05 APPROVED SUPPLIERS

PLANT MATERIAL: Obtain materials, including construction materials, plants and turf, from approved suppliers. Furnish proof of ordering if requested. No extension of time will be granted if plant material is not available because of late ordering. Advise immediately if supply difficulties are encountered.

1.06 INSPECTION

NOTICE: Give not less than 48 hours' notice so that inspection may be made of the following, as applicable:

- Where an activity re-occurs provide notice for each occurrence;
- Setting out completed. Provide registered surveyor verification of set out as per design with notice;
- Plant materials available at the source of supply;
- Paving set out and commencement;
- During construction of slabs and footings;
- Furniture commencement and completion;
- Plant material set out before planting;
- Planting, staking and tying completed;
- Upon practical completion of the work; and
- Upon completion of Defects Liability work and Plant Establishment Period.

PERIODIC INSPECTIONS: The Superintendent's representative will make regular periodic inspections at the beginning of each month during the establishment period and the Defects Liability Period.

1.07 TESTING

INDEPENDENT TESTING AUTHORITY: Unless otherwise specified, any testing required by the Contract to be by an independent authority shall be carried out by an approved member of the National Association of Testing Authorities Australia (NATA). The cost of any materials, assistance and making good which results from the taking of job samples shall be borne by the Contractor and will not be considered as forming the basis of a claim against the Principal. Costs for all testing are to be borne by the Contractor.

1.08 PROTECTION

All existing trees to be retained including those on adjacent sites that may be affected by the works are to be photographed as a record of their health and vigour. Photographs are to be taken of the canopy, trunks and root area and provided to the Superintendent in a book form with each photograph dated as a record of each tree.

All existing trees are to have protective fencing provided at a minimum to extend around the canopy or drip line of the tree or 3 metres from the outer edge of the tree trunk, whichever is the greatest. Fencing is to be a minimum of 1.8 metre high steel mesh chain wire mesh and is to be maintained throughout the construction period. If work is required near the tree the fences are to be reinstated immediately after the task is completed. Mulch around the tree base with well composted leaf litter mulch within the fenced area.

Storage of materials, mixing of materials, vehicle parking, disposal of liquids, machinery repairs and refuelling, site office and sheds shall not occur within five (5) metres of any existing trees.

Ensure the survival and continued growth of existing trees. Where indicated, protect and preserve trees during construction operations by fencing or armouring to the extent of the dripline as shown on the drawings.

Trees shall not be removed or lopped, unless specified and approval to do so is given by the Superintendent. The landscape architect must be notified prior to all such work.

Make good any damage to tree crown or root systems as soon as possible by approved Tree Surgeon. When a tree has been damaged to such an extent that it must be removed, the Contractor shall at no variation to the contract provide a new suitable approved tree as directed by the Superintendent.

1.09 WORK NEAR TREES

Do not add or remove topsoil within the drip line of trees. If it is necessary to excavate within the drip line, use hand methods such that root systems are preserved intact and undamaged. Open up excavations under tree canopies for as short a period as possible.

ROOTS: Do not cut tree roots exceeding 50mm diameter unless permitted. Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system. Immediately after cutting, apply a bituminous fungicidal sealant to the cut surface to prevent the incursion of rot or disease.

BACKFILLING: Backfill to excavations around tree roots with a mixture consisting of three parts by volume of topsoil and one part of well rotted compost with a neutral pH value, free from weed growth and harmful materials. Place the backfill layers, each of 300mm maximum depth, compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 300mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

COMPACTED GROUND: Avoid compaction of the ground under trees. If compaction nevertheless occurs, for example from the operation of heavy constructional plant, loosen the soil by coring.

CORING: Carry out coring by forming 75mm diameter 300mm deep core holes at 900mm centres for the whole of the area affected by backfilling the core holes with sand watered in.

1.10 AUTHORITIES' APPROVALS

The Contractor shall be responsible for obtaining all necessary permission and approvals from regulatory authorities prior to commencing any work relating to that authorities plant or equipment. This shall include the payment of all application, supervision and inspection fees charged by the authority.

The Contractor shall provide documentary evidence of approval by the relevant authority of all works that shall have ownership passed to a Service Authority, Public Authority, or Council. This shall include the payment of all application, supervision and inspection fees charged by the authority.

1.11 FIRE PRECAUTIONS

BURNING: Burning is not permissible on site unless approved by the Superintendent.

002 EARTHWORKS

2.01 SITE CLEARING AND MINOR GRADING

MINOR GRADING: Supply all the machinery and equipment necessary to do the job in an efficient manner. All earthworks shall be carried out in accordance with finished contours and levels indicated on drawings, and to ensure water flows away from buildings and drains to sumps.

Construct filling out of approved material in layers approximately 150mm thick compacted sufficiently to minimise slumping and further internal packing down. Corners and intersections of planes shall be rounded and gradual. Grading from edging's shall have horizontal shoulders, minimum width 500mm, before any change of level.

2.02 EROSION CONTROL

REQUIREMENT: Plan and carry out the work to avoid erosion, contamination, and sedimentation of the site and surrounding areas, and drainage systems.

The Contractor shall provide all erosion and run off control measures necessary to obtain approval and maintain a licence under Section 171 of the State Pollution Control Commission Act. Notwithstanding any approvals obtained, it shall be the Contractor's responsibility to avoid erosion, contamination and sedimentation of the harbour and surrounding areas and drainage systems as may result form the site works.

NECESSARY MEASURES: Adopt such measures as may be necessary for erosion control, including the following where applicable:

- Staging: Staging of operations (eg clearing, stripping);
- Restoration: Progressive restoration of disturbed areas;
- Drains: Temporary drains and catch drains;
- Dispersal: Diversion and dispersal of concentrated flows to points where the water can pass through the site without damage;
- Spreader banks: or other structures to disperse concentrated run-off;
- Silt traps: Construction and maintenance of silt traps to prevent discharge of scoured material to downstream areas;
- Temporary grassing: or other treatment to disturbed areas (eg contour ploughing);
- Temporary Fencing

MAINTENANCE: After each rain inspect, clean, and repair if required, temporary sediment control works.

2.03 CULTIVATION

PREPARATION: Prepare the sub-grade to receive topsoil by removal of turf and cultivation, and where directed treat the area to be topsoiled with herbicide. Remove existing weeds as specified in WEED ERADICATION

Herbicide types: Non residual.

CULTIVATION: Cultivate by ripping to the depths specified below, to loosen the compacted ground. Do not disturb services or tree roots; if necessary cultivate these areas by hand. During cultivation, thoroughly mix in any materials specified to be incorporated into the sub-grade.

Deleterious material: Remove stones exceeding 50 mm, and all other deleterious material brought to the surface during cultivation, including roots, sticks, weeds, rubbish and the like.

SUB-GRADE SURFACES: Trim after cultivation to shapes and levels such that the required depth of topsoil or planting mix can be placed to the specified finished surface levels.

CULTIVATION DEPTHS: Cultivate to the minimum depths specified below, as applicable:

TURF AREAS: Cultivate along the contours to a depth of 150mm.

MASS PLANTED AREAS: Cultivate along the contours to a depth of 150mm.

003 BASECOURSES, PAVEMENTS AND TRIM

3.01 BASECOURSE

GENERALLY: Supply and install basecourse material to non-permeable paving areas as detailed on the drawings.

MATERIALS:

Base Course: Fine crushed rock shall be manufactured from approved hard durable stone free of clay lumps, organic matter and objectionable quantities of pyrites or other deleterious substances. The material may be crusher run or screened, and re-combined. Particle size distribution after compaction in the pavement shall comply with the limits prescribed in the following table.

AS Sieve Size (mm)	Percentage Passing by Mass
25.5	100
19.0	95-100
13.2	78-92
9.5	63-83
4.75	44-64
2.36	30-48
0.425	14-22
0.075	6-10

If non-plastic, the material shall have a Maximum Dry Compressive Strength of not less than 1.7 MPa.

The Los Angeles abrasion loss shall not exceed 35.

The soluble sulphate salt content, expressed as percentage S04 by mass, of fine crushed rock shall not exceed 0.1%.

The proportion of misshapen particles in the fraction retained on the 9.5mm sieve shall not exceed 15% using 3:1 ration.

Liquid limit shall not exceed 25%.

Plasticity index shall not exceed 6.

Linear shrinkage shall not exceed 3%.

INSTALLATION: Trim and consolidate soil sub-base. Any soft, yielding, organic or other unsuitable material in the sub-grade shall be removed and then replaced with approved filling compacted in maximum 150 layers. The finished formation after consolidation shall follow the profile of finished pavement surfaces. On sub-grade lay base course to a minimum compacted thickness of 100mm.

Base course material shall not be placed on the sub-grade until those layers have been compacted and approved. Material shall not be placed over a layer weakened by moisture.

Crushed materials, when delivered, shall have a moisture content within +/-2% of the Modified Optimum Moisture Content. Spread material in uniform layers as near as practicable to the required thickness indicated on the drawings. Compact base material between edges using compaction equipment approved by the Construction Manager. Use vibratory or static smooth drum rollers, hand tamp for areas not accessible by mechanical equipment. Adjust level if required by addition of material and re-compacting.

Base course shall be compacted to 95% of modified maximum dry density.

If requested by the Superintendent, testing shall be carried out in selected locations. If directed, remove or re-work base course material and re-compact to approval.

3.02 CONCRETE PAVING

GENERALLY: Supply and install broom-finished insitu concrete paving to the locations as indicated on the drawings; and, supply new concrete path to match and tie into existing Woodland Street footpath

MATERIALS: Concrete shall be mixed to volumetric proportions of 4 parts aggregate, 2 parts sand and 1 part cement, mixed, placed and cured in accordance with the Australian Standard 1480 - 1974 as applied to 'Minor Works' 28 day strength of 32 MPa (min.). A firm approved by the Superintendent may only supply ready mixed concrete.

All surfaces are to be finished uniformly by screeding and floating prior to applying the final finish. After all surface moisture has evaporated cure concrete by applying two coats of Boral 'Jet seal' or equivalent to the surface. Do not cure with plastic sheeting, membrane paper or intermittent wetting and drying, as this will cause blemishing.

Do not deposit a large quantity of concrete at any point and move it or work it along the forms. Do not use concrete which has developed an initial set, or which has not been placed in the forms and compacted within 20 minutes after discharge from the agitator.

Place concrete in one continuous operation between construction joints, and within such intervals of time that the contact surface of the preceding concrete is still in a plastic condition. Paving laid to a minimum depth as shown on the drawings and specified by engineer with saw cut joints as shown on the drawings. Basecourse to be as specified in BASECOURSE.

BROOM FINISH: After screeding and floating, give the surface a coarse scored texture by drawing an approved scoring tool (stiff broom) across the surface. Broom finishing to run perpendicular to the length of the path.

REINFORCING: Prior to pouring concrete install a single layer of F72 reinforcing mesh 30mm from the top of the concrete as detailed.

JOINTING: Construct movement joints (including expansion, and contraction joints, isolation joints, and saw-cut control joints) in the locations and to the details shown on the Drawings.

SAMPLE PANEL: No concrete will be permitted to commence until a seven day old sample panel, 1 500 mm x 1 500 mm of each concrete type has been approved by the Superintendent.

When the sample panel has been approved, all cured concrete shall in the opinion of the Superintendent match the sample or otherwise be rejected.

3.03 STONE PAVING UNITS

Bluestone paving is to be laid both on building structure and natural ground to the locations and details shown on the drawings. Bluestone shall be equal to diamond sawn bluestone that supplied by BAM Stone:

BAMSTONE
204 Hamilton Road
Port Fairy
VIC 3284
Ph: (03) 5568 3655
Fax: (03) 5568 2454
Email: info@bamstone.com.au

All bluestone shall have the following properties:

Property	BAM Bluestone (basalt)	Test Specification AS/NZS
Bulk Specific Gravity (kg.m-3)	2587	ASTM C97-02
Water Absorption		ASTM C97-02
% by weight	1.25	
%by volume	3.22	
Flexural Strength (MPa)		ASTM C880-98
- Dried Strength	14.2	
- Soaked Strength	15.7	
Compressive Strength (MPa)		ASTM C170-90 (1999)
- Dried Strength	130.8	
- Soaked Strength	107.7	
Abrasion Resistance Index (Ha)	27	ASTM C1353-98
Slip Resistance (Wet)		AS/NZS 4586:2004
Diamond Sawn Finish		
BPN	65	
Class	V	
Contribution to Risk of Slipping	Very Low	
320 grit Honed Finish		
BPN	41	
Class	X	
Contribution to Risk of Slipping	Moderate	

The colour variation for each unit shall be within the range of approved samples on site.

Units with chipped edges or delaminated surfaces will be liable for rejection.

The maximum extent of natural pitting within any slab shall be 30% of the total surface area. The maximum size of any individual hole or pit in the slab shall be 8mm.

The Contractor is to note that bluestone paving has a minimum 8-10 week lead-in time from time of ordering to delivery on site. The Contractor is to ensure that all paving is ordered in sufficient time to suit his programme for completion of the works and to make necessary allowances for cutting and breakages.

Use the following types of pavers as shown on the drawings:

Size	Finish
300mm x 400mm x 50mm	Diamond Sawn
450mm x 400mm x 50mm	Diamond Sawn
600mm x 400mm x 50mm	Diamond Sawn
900mm x 400mm x 50mm	Diamond Sawn

Tolerances on these dimensions shall be ± 5mm.

SAMPLES

Provide samples panels of designated paving finishes, including samples of junction details, typical cross fall as part of the work for approval before commencing further pavement. Sample paving is to match approved benchmark sample.

FALLS AND LEVELS

Grade paving to even falls to drain away from buildings and edges to drainage outlets without ponding. General fall for drainage is 1.5%, minimum fall is 1%. Maximum cross fall is 2.5%. Where falls are not required, lay level.

Maintain the same finished level across junctions between different finishes.

TOLERANCES

All irregularities in stone dimensions shall be compensated by the mortar bed and jointing, not in the pattern of surface levels.

Surface level:

A) +or- 2.5mm from the specified level. Test procedure; lay a one metre straight edge in any direction on the finished surface. A 10mm wide feeler guage 5mm thick shall not pass under the straight edge at any point, including joints.

B) Lay a 300mm straight edge in any direction on the finished surface. A 10mm wide feeler guage 3mm thick shall not pass under the straight edge at any point on a slab.

C) The top edge of any slab shall not be higher or lower than the adjacent slab by more than 2mm.

D) The surface of grout in joints shall not be higher or lower than the adjacent slab by more than 2mm.

E) Across junctions between adjacent paving slab surfaces; 2mm.

Use a laser to check the accuracy of the laid subgrade, provide the Principals representative with levels and falls of completed work on request.

Test the finished paving to demonstrate that the surface is free draining, remove and relay slabs as necessary to eliminate any ponding.

JUNCTIONS

Provide movement joints over structural joints in the base and adjacent to buildings right through the paving and bed to the substrate. Fill joints with compressible material.

MORTAR BED

Paving shall be laid on a 30-35mm mortar bed of 3:1 sand:cement mortar.

The paving and coping to the pool deck shall be laid on a mortar bed with an approved anti-efflorescence additive.

JOINTS

Joints in the paving shall be 3mm wide between pavers filled with mortar grout of 4 cement 1 lime and 12 sand. Joints are to be finished flush. The mortar grout to the joints in the paving and coping to the pool deck shall include an approved anti-efflorescence additive.

Joints in the setts shall be 10mm wide filled with 7mm crushed basalt.

LAYING

The bluestone paving in the plaza is to be 40mm thick laid on a 35mm mortar bed on the structural slab. The bluestone paving to the residential garden is to be 40mm thick laid on a 30mm mortar bed on a 75mm thick reinforced concrete slab. The bluestone paving to the pool area is to be 40mm thick laid on a 30mm mortar bed on the structural slab or a 75mm thick reinforced concrete slab. The bluestone paving to the footpath is to be laid on a 30mm mortar bed on a 120mm thick reinforced concrete slab on compacted subgrade.

INSTALLATION: Apply slurry mix to the clean and dry base surface using a bucket and hard broom, ensuring complete coverage of the area to be laid. Apply mortar thick bed mix to the required thickness (minimum of 20mm), spreading to grade, tampered and float finished with a steel or wooden float. Once bed is prepared, and prior to placing stones, place slurry mix over the thick bed using a steel float. Ensure complete coverage of the thick bed. Select stone to suit required pattern and place on mortar bed and hand tamp each piece firmly into the bed. Only as much area should be prepared as can be completed in 15–20 minutes at any one time.

GROUT: Areas to be grouted shall be given 24 hours to cure but no more than 48 hours prior to grouting commencing. Apply slurry mix grout to stone beds using sponges and trowels. Spread grout mix with trowel over area to be grouted, then using circular motions with the sponge wipe the grout mix into all joints, ensuring complete coverage and removal of any air pockets in the joints. Excess material shall be sponged off.

EXPANSION JOINTS AND SEALANTS: Joints in concrete pavement slabs shall be carried through the stonework. Expansion joints shall be installed where stonework abuts restraining surfaces such as perimeter walls, kerbs and corners using a 10mm thick impregnated fibro board filler cut to the required depth, placed against restraining surface prior to placement of stonework. The joint filler shall have a bond breaker placed on the top edge, allowing grouting to be placed over it during the grouting process with a tooled joint formed for application of the sealant.

Where control joints occur under stonework the stone shall be sawn full depth exactly 24 hours after laying to allow the control joint to be protected through the stone ready for sealant. Sealant to all joints shall be Sikaflex-11F. Selected colour by the Principals representative placed in accordance with the manufacturer's recommendations.

3.04 PRECAST CONCRETE KERBS

GENERALLY: Supply and install precast concrete kerb pieces in the locations and details shown on the drawings.

Precast concrete is to be laid on 30mm mortar bed over reinforced concrete slab as detailed. The finish to all kerbs will be minimum Class 2.

Kerbs

500 x 350mm x 400mm

500 x 350mm x 800mm

500 x 350mm x 1200mm

SAMPLES: Two samples shall be submitted of precast units which exhibit the anticipated variation in appearance together with likely extent of any naturally occurring feature. The visual quality of all units shall be maintained within strictly controlled limits from the submitted control samples that will exhibit the acceptable range.

PROTECTION: Protect units against damage from the local crushing and chafing effects of lifting and transporting equipment and storage racking. During transport protect all visible arises with thick, non-rigid, inert, non-absorbent, crushable casings such as 50mm thick polyurethane foam.

HANDLING PROCEDURES: Carefully handle units by methods and appliances that will not injure the panels or cause connections to be over-stressed or deform. Store all units above ground surface so that the shape and surface conditions are not impaired. Bends, kinks, cracks, chipped edges or surface marking of units from mishandling or storing will be sufficient cause for rejection. Immediately after installation, that work shall be protected from damage and contamination.

MATERIALS: Concrete shall be mixed to volumetric proportions of 4 parts aggregate, 2 parts sand and 1 part cement, mixed, placed and cured in accordance with the Australian Standard 1480 - 1974 as applied to 'Minor Works' 28 day strength of 20 MPa (min.). A firm approved by the Principals representative only may supply precast concrete feature wall units.

Units shall have a 10mm arris to all exposed edges.

All rejected units shall be removed and replaced. No repair or remedial work shall be permitted except grinding providing that it is within tolerances specified.

CLEANING AND PROTECTION: All of the precast wall work shall be protected from damage in a manner approved of by the Principals representative until the completion of the contract.

Finished surfaces shall be free from mechanical imperfections such as scratches, scrapes and dents, and shall be free from finish imperfections such as spots, stains and streaks.

3.05 GALVANISED STEEL EDGING TO GARDEN BEDS

INSTALLATION: Steel edging shall be 150 x 5mm galvanised steel installed to true lines and levels in the longest practicable lengths, securely fixed using steel spikes at maximum 2.0 metre centres or as detailed.

Notwithstanding the above, the Contractor shall provide at least three steel spikes per length of edging, including one at either end of each sheet of edging. All spikes shall be securely driven and spot welded to the steel edging at the required location and as otherwise shown on the drawings. Rust-proofing or cold-galvanisation is to be applied to all welds. Generally, spikes shall be installed on the same side of steel edging to facilitate the provision of straight alignments and transitions as shown on drawings.

The Contractor shall install the steel edging so that all junctions and joints are finely fitted to minimise weed intrusion through the edges and so that the finished level at the top of the edging is flush with the finished mulch level of the bed. Steel edging to planting areas adjoining pavements, kerbs and the like shall be installed so that the top of the edging is level with the top of these fixed elements.

004 PLANT MATERIALS

4.01 TOPSOIL AND PLANTING MIXES

SOIL MIX – GARDEN BEDS

Planting mix for garden beds on grade, and in tree pits shall be equal or equivalent to:

Australian Native Landscapes 'Organic Garden Mix'

317 Mona Vale Road
Terrey Hills 2084

SOIL MIX – TURF

Soil mix for turf beds shall be equal or equivalent to:

Topsoil: General purpose soil to AS 2223.

Top dressing: To AS 2223, Clause 4.

Topsoil texture: Coarse (light) to medium, as defined in Table B2 of AS 2223.

Source: Import topsoil on to the site from an approved source. Nominate the supplier and location of the topsoil pit for inspection purposes.

4.02 FERTILISER

Deliver fertiliser to the site in sealed bags, branded with type and manufacturer.

Fertiliser type and application shall be as follows:

PLANTING BEDS: An approved prolonged release type having an NPK ratio of 6.3:1.8:2.7. Place around the root ball of plants at the time of planting at the rate shown below.

- For plants to 5 litre size: 20g per plant
- For plants to 10 litre size: 40g per plant
- For plants 25-45 litre size: 60g per plant.
- For larger plants: 90g per plant or as directed by manufacturer.

INDIVIDUAL PLANTINGS: An approved prolonged release pellet type having an NPK ratio of 6.3:1.8:2.8. Place pellets around the root ball of plants as indicated on the drawings, at the rate shown above.

Turf Areas:

N:P:K ratio of 9.2:4.0:4.9 equivalent to No. 17 Lawn food at the rate specified by the manufacturer.

4.03 MULCHES

Obtain mulches from a specialist supplier. Order early enough to ensure that mulch is available at the correct times. No extension of time will be granted because of late ordering. Furnish proof of ordering if requested.

Provide a sample of the mulch as specified in the SAMPLES SCHEDULE.

Mulch shall be free from soil, weed growth, and green material or other matter. Place mulch so that it is not in contact with the stems of plants. Mulch shall be of the following types:

Mass planting Areas:

HORTICULTURAL GRADE PINE BARK: Pine wood graded in size to 25mm to a depth of 75mm, free from wood slivers as supplied by:

Australian Native Landscapes Pty Ltd.
Lot 77, Myoora Road
TERREY HILLS NSW
Phone: 450 1444

4.04 SUB-GRADE ADDITIVES

LOCATION: Incorporate additives during cultivation to all mass planted areas to flocculate clay if encountered.

ADDITIVE TYPES:

Gypsum: Incorporate into the upper 150 mm layer at the rate of 0.25 kg/m^2.

4.05 PLANTS

GENERALLY: Plants shall be vigorous, well established, hardened off, of good form consistent with species or variety, not soft or forced, free from disease and insect pests, with large healthy root systems and no evidence of having been restricted or damaged. Trees shall have a single leading shoot.

ORDERING AND SUPPLY: All plant material shall be supplied from an approved supplier. Furnish proof of ordering if requested. No extension of time will be granted if plant material is not available because of late ordering. Advise immediately if supply difficulties are encountered. Take all necessary precautions to ensure that the plants arrive at the destination in good condition for successful growth.

Plants shall be transported from the nursery to the site in a covered vehicle, or other such approved method that provides plants with adequate protection. The roots of all plants shall be protected from drying out or overheating. Similarly, plants growing in soil in containers will be examined, watered and protected from drying out. The period of time between lifting and planting for open ground plant material shall be kept to an absolute minimum. Open rooted specimens, which cannot be planted immediately upon arrival, shall be heeled into the ground.

SUBSTITUTIONS: Make no substitutions unless approved in writing. Substitutions will not be approved if the Contractor has not complied with the Specification.

LABELLING: Label at least one plant of each species or variety in a batch with a durable, readable tag.

REPLACEMENTS: Replace, with plants of the same specified type, quality and size, any plants which fail, are stolen or are damaged during the work under the Contract.

WARRANTY: Furnish a warranty from the supplier attesting that the plants are true to the specified species and type, and free from diseases, pests, weeds and the like.

STORAGE: Wherever possible, plants shall be planted immediately after delivery to the site. If this is not possible, keep them in good condition by appropriate storage methods, or as may be directed. Prevent theft, drying out or damage from any cause including frost, wind, sun, vermin, animals and the like. Provide an on-site nursery for holding plant stock on site for more than 48 hours, of sufficient size, with provision for watering.

4.06 PLANT CONTAINERS

SIZES: Supply plants in weed-free containers of the sizes specified in the PLANT SCHEDULE as shown on the drawings.

4.07 TURF

GENERALLY: Supply and install turf of a thickness of not less than 30mm, as indicated on the drawings. Turf shall be installed to all level grassed areas on structure.

TURF

Shall be Soft Leaf Buffalo 'Matlida'

www.matildaturf.com.au

005 PLANTING WORKS

5.01 TURFING

Deliver turf to the site within 24 hours of being cut. Lay it within 36 hours of being cut, if possible. Prevent it from drying -out between cutting and installation.

INSTALLATION: Lay the turf along the final contours with staggered, close butted joints, and so that the finished turf surface is flush with adjacent finished surfaces of paving and the like. As soon as practicable after installation, roll the turf with a roller weighing not more than 90 kg per metre of width. On slopes too steep for rolling, lightly tamp the turf into place.

ESTABLISH WATERING: As soon as possible after rolling, irrigate thoroughly with a fine spray to the depth of 150mm. Continue as necessary to maintain moisture to this depth and to maintain the grass in a healthy condition.

PROTECTION: Protect newly turfed areas against traffic until grass is established.

MAKING GOOD: Lift failed turf and relay with new turf.

TOPDRESSING: When the turf is established, mow to 40mm height, remove cuttings and lightly top dress to a depth of 10mm with topsoil as specified in Topsoil Spreading.

MOWING: When the turf is established, mow at regular intervals to maintain an average height of 50mm.

WEEDING: Remove weeds that emerge in the turfed areas, or where necessary spray with a selected weedicide for broad-leafed weeds, to manufacturer's recommendations.

5.02 EXCAVATING FOR PLANTING

MASS PLANTING AREAS: Excavate a hole for each plant large enough to provide not less than 100mm all round the root system of the plant, or as shown on the Drawings.

STREET TREE AND CARPARK PLANTINGS IN TREE PITS: Excavate a hole 200mm deeper and 600mm wider than plant containers unless otherwise shown on the drawings. Break up the base of the hole to a further depth of 150mm, and loosen compacted sides of the hole, as necessary to prevent confinement of root growth to the hole.

5.03 PLANTING

LOCATIONS: Do not vary the plant locations from those shown on the Drawings unless otherwise directed. If it appears necessary to vary the locations and spacings to avoid service lines, or to cover the area uniformly, or for similar reasons, apply for directions.

PLANTING CONDITIONS: Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. Suspend excavation in other than sandy soils when the soil is wet, or during frost periods.

WATERING: Thoroughly water the plants before planting begins, immediately after planting, and thereafter as required to maintain growth rates free of stress.

DEPTH OF PLANTING: When the plant is in its final position in its hole or bed the topsoil level of the plant root ball shall be level with the finished surface of the soil surrounding the hole or bed. Test the depth by measuring the sides of containers. If backfilling is required to correct the depth, use topsoil mixture.

PLACING: When the hole or bed appears to be of correct size, and not before, remove the plant from the container with minimum disturbance to the root ball, and place it in its final position, in the centre of the hole and plumb.

BACKFILLING: Backfill with topsoil mixture.

GROUNDWORKS: Lightly tamp down the mixture and water to eliminate air pockets.

WATERING BASINS: Construct a watering basin around the base of each individually planted tree, consisting of a raised ring of soil capable of holding a minimum of 10 litres.

5.04 MULCH SPREADING

GENERALLY: Spread mulches evenly to the depths shown on the Drawings, and rake smooth to finish 25 mm below surrounding finished levels unless otherwise specified. Grade the finished surface evenly between design surface levels.

5.05 SPRAYING

REPORTING: Report any evidence of insect attack or disease amongst plant material immediately it is noted.

SPRAYING: If so directed, spray with an insecticide and/or fungicide approved prior to use, in accordance with manufacturer's recommendations, and to comply with statutory requirements.

5.06 STAKES

All plants should be healthy and self supporting. Stake plants only if necessary to avoid wind damage. Remove all stakes after the planting establishment period.

STAKES: Shall be durable hardwood, straight, free from knots or twists, and pointed at one end. Size: 38x38x1500 long or 50x50x2400 or as indicated on the drawings.

TIES: Shall be 50mm wide Hessian tie.

STAKING AND TYING: Provide stakes and ties to plants as shown on the drawings.

Drive stakes minimum 600mm into the ground or to the depth indicated on the drawings and clear of the root ball of the plant. For single staked plants, stake on the windward side.

Fix ties in a figure of eight pattern and staple to stake at least 300mm above ground level. Fix additional ties as required to stabilise the plant.

5.07 WEEDING AND RUBBISH REMOVAL

Collect empty plant containers daily during planting operations and remove or store on site for later removal if permitted, but ensure they are not able to be scattered by wind or other causes.

Regularly remove, by hand, rubbish and weed growth that may occur or recur throughout grassed, planted and mulched areas.

5.08 SUBSOIL DRAINAGE

GENERALLY: Provide subsoil drainage where indicated on the drawings and connect to nearest drainage pit.

Pipes to be 100mm slotted, convoluted polyethylene pipe. Joints, couplings elbows, tees and end plugs shall to the manufacturer's specification, wrapped with a filter fabric equal to Bidum grade U14.

PIPE LAYING: Provided adequate clearance for the proper laying and jointing of pipes is available, pipes shall be laid in trenches of minimum width of 300mm. Drains shall discharge directly into the stormwater system. Lines are to be laid to an even fall and be a minimum of 1:100 on a bed of 40mm gauge blue metal drainage aggregate or river gravel. Connect the lowest end of subsoil drains to the stormwater inlets.

TRENCH BACKFILLING: Trenches shall be backfilled with drainage aggregate so as to give a minimum 200mm cover all round. The aggregate shall extend from the bottom of the trench to within 300mm of the surface. Backfill above drainage aggregate shall be river sand, topsoil or planting mix as shown on the drawings.

5.09 DRAINAGE PITS AND COVERS

GENERALLY: Supply and install drainage pits and covers at drainage outlet positions to the locations shown in the Park area.

Drainage pits shall be 300 x 300mm polymer concrete drain sumps. Drain sumps shall be equal to PS33 drain sump as supplied by:

ACO Polycrete Pty Ltd
185 Briens Road
NORTHMEAD NSW 2152
Ph. 02 9630 2788
Fax. 02 9630 2733

006 FIXTURES AND FURNITURE

6.01 TIMBER SEATS

GENERALLY: Supply and install steel with timber battens bench seat to locations, dimensions and details as set out in the drawings.

MATERIALS: Ironbark hardwood timber battens.

60mm x 40mm x various lengths battens

60mm x 80mm x various lengths battens

60mm x 120mm x various lengths battens

FINISHING: Apply minimum 2 coats clear exterior oil suitable for ironbark.

6.02 TIMBER SEATS STRUCTURAL STEELWORK

GENERALLY: Supply and install steel members to locations, dimensions and details as setout in the drawings. All steel work is to be fully welded and hot-dip galvanised to form a solid, continuous and rigid frame to the seats

MATERIALS: Hot-dip galvanised steel angles and hot-dip galvanised steel flat bars.

6.03 TIMBER SEATS STAINLESS STEEL FACE PLATES

GENERALLY: Supply and install stainless steel plates to all exposed ends to the timber seats. The seats referred to are both the courtyard timber seats and the seat associated with the entry canopy.

MATERIALS: 5mm thick 316 grade stainless steel plate to fit internally at the end all seats. No more than a 3mm tolerance is to occur on all edges. The plate is to be attached directly to the galvanised steel frame using minimum M8 stainless steel bolts, nuts and washers. A plastic separation washer is to be placed between all stainless and galvanised steel junctions.

6.04 POLE MOUNTED LIGHTS

GENERALLY: Supply and install pole mounted lighting to locations shown on the drawings, including trenching, cabling and conduits, backfilling and making good, connections and electrical switching gear, to the locations shown on the drawings. The Contractor is to allow for the purchase of all materials including standard Energy Australia conduits and polymeric cable cover.

The Contractor will be responsible for all connection to fittings and cabling to mains supply source by a suitably qualified electrician to the satisfaction of Integral Energy. Lighting to the street will require a separate metering with connection to the LV supply of 'The Village'. The Contractor is to make allowance for all charges for connection.

Light poles and luminaries are to be:

BEGA 8200. 70W HIT-CE G12 IP65 INDIRECT (TILT) POLETOP LUMINAIRE - on 4.5m high x 114 diameter pole three pack epoxy painted to match those in 'The Village' as supplied by:

Zumtobel Lighting
333 Pacific Highway
North Sydney NSW 2005
T: (02) 8913 5000

6.05 STEEL MESH FENCE

Supply and install 1800mm high galvanised and coated steel mesh fence with painted galvanised CHS posts and top and bottom rails to the locations as shown on the drawings.

Fencing shall be equal to Cyclone® Chainwire

Chainwire shall consist of individual wire pickets helically wound and interwoven to form a continuous chain link having a 50 mm nominal mesh. Wire shall be 2.50 mm diameter, heavily galvanised, or 2.50 mm galvanised core PVC coated black.

Posts

Line posts shall be either 32 mm N.B. (42.4 mm OD) galvanised tube, end and corner posts shall be 50 mm N.B. (60.3 mm OD) galvanised tube.

Ties

Chainwire shall be securely fixed to tension wires at approximately 450 mm centres and posts in two places by wire ties to match fence with 1.57 mm diameter galvanised or galvanised core PVC wire coated. (Clips may also be used as an alternative.)

Bracing

Terminal posts shall be braced in line of fence with horizontal or diagonal stays of 32 mm N.B. galvanised tube clipped to posts.

Cable tension wires

Double twisted tension wire (or single Helicoil wire) for chainwire support shall be provided at top, centre and bottom of fence and shall be 3.15 mm diameter heavily galvanised or 3.15 mm galvanised core PVC coated. (4.00 mm diameter wire can be used if required.)

Caps

Posts shall be capped in a matching finish.

Footings

Intermediate posts shall be excavated to give a minimum depth of 600 mm. End and corner posts shall be 750 mm deep.

007 IRRIGATION

7.01 SCOPE OF WORK

This specification sets out a minimum performance standard for the design, supply and installation of an irrigation system to cover the landscaped areas as shown on the landscape drawings.

This includes the lawn areas, mass planting beds, and trees in natural ground.

The Contractor is to allow for the design and construction of a fully automated system. The system is to be supplied by recycled water from detention tanks at The Village or mains supply in Woodland Street.

Included in the irrigation contract will be the supply and installation of all drip lines, lateral pipework, pressure main, fittings, valves, controller and vacuum breaker back flow prevention assembly

The Contractor will be responsible for all connection requirements for power to the controllers and penetrations in the suspended slab for conduits and piping.

Detail design drawings are to be submitted to the Principals representative for approval, prior to the commencement of any work on site. The drawings will nominate all fittings, pipe locations and sizes and proposed controller locations.

The Contractor will be responsible for obtaining Water Board approval.

7.02 NOTICES AND FEES

Where notice is required by any statutory authority having jurisdiction over the work, the Contractor shall give such notice and make application accompanied by such plans and information as may be called for. He shall obtain all permits within such time as to ensure no delay to work and pay all fees associated therewith.

7.03 REGULATIONS

All work performed and equipment provided under this contract shall, in every respect, company with the regulation and requirements of:

(a) The Standards Association of Australia

(b) The Departments of Occupational Health, Safety and Welfare Regulation 1988.

(c) The Electricity Supply Authority.

(d) The Fire and Accident Underwriters Association of NSW.

(e) The Principal.

(f) Any other authority having jurisdiction over this particular installation.

7.04 CHANGES OR ADDITIONAL WORK

The Principals representative may, without invalidating the original contract, order changes or additions as may from time to time be deemed desirable or necessary for proper installation and operation.

All additional work will be done under the conditions of the original contract. No variation, deletion or addition shall be made to the contract works except by specific instructions in writing from the Principals representative. The Principals representative may refuse to recognise work carried out in contravention to this cause.

7.05 EXISTING SERVICES

The Contractor shall determine the exact location of all existing services.

The Contractor shall be responsible for the prevention of damage to any services once their location has been given to him. Damage to existing services shall be repaired at the Sub-Contractor's expense. No penetration is to be made to any sealed surface without prior approval of the Principals representative.

7.06 ORDERING AND DELIVERING OF EQUIPMENT

Tenders shall be based upon a guarantee that all materials and equipment required for the work can be obtained at such time as to enable the work to be completed by the Contract completion date. If any doubt exists regarding dates of supplies full information shall be submitted.

The Contractor shall be responsible for ordering all materials in ample time. Lack of such materials due to delay in ordering shall not constitute grounds for extension of time for completion.

7.07 QUALITY OF WORK AND EQUIPMENT

All equipment, materials and accessories in this Contract shall be new and shall conform to the appropriate current Australian Standard Specification. All installation methods and techniques shall conform to the appropriate current Australian Standard Specification.

Where a trade name, brand and/or catalogue number is referred to in this Specification, drawings and/or the accompanying schedules, the Tenderer may, unless otherwise specified, substitute other materials and equipment provided that in the opinion of the Principals representative, the characteristics of type, quality, finish, appearance, method of construction and/or performance are not less than that specified.

7.08 RESPONSIBILITY OF CONTRACTOR

It shall be distinctly and clearly understood that the Contractor has, before accepting this contract, investigated and satisfied themselves of everything and every condition affecting the works to be executed, the labour and equipment to be provided, and that the execution of this contract by the Contractor is founded upon their own examination, knowledge, information and judgment. The contract price, subject to approved variations, shall be accepted by the Contractor as full compensation for everything furnished and finished complete and for all loss or damage arising out of the nature of the work on the action of the weather or any unforeseen difficulties in execution of the work.

The Contractor shall be wholly responsible for the works from the time of commencing the contract until the completion, and for the workmanship, materials, discipline and any damages caused by acts or omissions of his employees.

Any work, which the Contractor proposes to sublet and all proposed secondary Sub-contractors to the Contractor, shall be subject to approval of the Principals representative. It shall be clearly understood that the conditions of this contract shall apply to all secondary Sub-contractors and that sub-letting of any works shall not free the Contractor from his contractual responsibility for the whole of the works.

A complete list of all secondary Sub-contractors to the Contractor proposed for any portion of the works shall be submitted with the tender. Only those Sub-contractors considered suitable by the Principal and the Principals representative shall be used on site.

7.09 COMPLETION

The completion of the contract will be accepted and notice of Practical Completion recorded only when works are completed to the satisfaction of the Principals representative. "As Constructed" circuit drawings and plans must be presented before practical completion is accepted.

7.10 QUALITY ASSURANCE

The Contractor shall complete a Quality Assurance Compliance form for each work phase to confirm that specification requirements have been achieved.

7.11 SETTING OUT OF WORKS

The Contractor shall be responsible for setting out the works from the points given on site and for constructing the works to the required line and level.

The Contractor will be provided;

- Pegs to define the position of trees, paths, paving and garden beds.
- Bench marks for reduction of levels (if required).
- Pegs to define lot boundaries (if required).

Unless the Contractor advises the Principals representative of any such marks which are missing at the commencement of the Contract, it will be assumed that all marks are in position.

A Licensed Surveyor nominated or approved by the Principals representative shall reinstate permanent survey pegs, which have been damaged or moved during construction, and the Contractor shall pay for the cost of such work in full.

Should survey pegs or marks be in the line of trenching operations, the Contractor shall advise the Principals representative prior to commencing work to enable their temporary removal or relocation of the works.

Drip Line Location

The Contractor shall mark out the location of all drip lines. The Principals representative shall give to the Contractor every assistance with this section of the Contract to ensure correct sprinkler location.

Pipework Location

The Contractor will peg out the location of each run of pipes and valve locations prior to trenching. Before installation is started in any given area, the Principals representative shall check all locations and give his approval. The Contractor shall advise the Principals representative immediately of any discrepancy between the site and the approved drawing.

Laying of the pipework shall be in accordance with the approved irrigation plan except that the Principals representative reserves the right to change the routing from that shown on the plan and to change the depth of trenches and cover over the pipe in case of obstacles.

In no event shall on-site changes of this nature affect the overall cost of the project unless previously agreed in writing, except where changes may substantially alter the quantity of pipework to be installed.

Stakes

The Contractor shall provide white painted timber stakes (pegs) or flags for setting out of the works. Pieces of PVC pipe will not be acceptable for marking stakes.

Stakes shall be clearly marked and flagged to designate the type of equipment to be installed at the point. Stakes shall be placed accurately to allow particular equipment to be installed within 100mm from the staked position. Where a stake is offset from the indicated position, it shall be clearly marked to show that it is offset.

The Contractor shall maintain this staking, replacing all stakes disturbed to the correct position, until planting is completed and its position is properly indicated on the as-constructed records.

7.12 WATER CONNECTIONS

The Contractor shall arrange for all works in conjunction with the Principals representative and allow for all charges and fees involved with the work.

The Contractor shall test the water supply in the presence of the Principals representative after the meter and back flow prevention assembly have been installed and before any other works begin. This test shall ensure that a flow of 85 LPM at 31 metres is available during a low demand period.

7.13 BACKFLOW PREVENTION

A 40mm backflow prevention assembly shall be supplied, installed, suitably housed and tested, as required by Sydney Water, in accordance with Australian Standards AS3500.1-1992 National Plumbing and Drainage Codes.

7.14 MASTER VALVE ASSEMBLY

A 40mm Sydney Water approved 24 volt Master solenoid valve with pressure reducing pilot shall be installed immediately downstream of the backflow prevention assembly. A tested gate valve shall be installed downstream of the solenoid valve for servicing purposes. This assembly shall be housed in a 1419 supported valve box.

7.15 PRESSURE GAUGE

One (1) 0-1000 kPa 65 mm dia faced glycerine filled pressure gauge with a brass on-off cock shall be connected to the irrigation mainline immediately downstream of the master valve and housed in the 1419 valve box.

7.16 AUTOMATIC IRRIGATION CONTROLLER

Cabinet for Housing of Controller

The electrical control cabinet shall be of heavy duty aluminium or powder coated sheet steel (2.5mm² thick) weatherproof lockable construction. It shall contain necessary fuses, circuit breakers, a 10 amp GPO an isolating switch, lightning protection on the automatic controller circuit, with space for the automatic irrigation controller. It shall be wall mounted where directed by the Principals representative. All entry and exit cables shall be encased in HD electrical conduits.

7.17 AS CONSTRUCTED RECORDS

The "as-constructed" details are considered as essential as any other component of the irrigation system. The Contractor shall prepare and hand over "as-constructed" Drawings and records in accordance with the requirements of the contract.

Irrigation System

The Contractor will be responsible for surveying and compiling 'as-constructed' records of all works. The Contractor shall co-ordinate with his Surveyor the recording of all information prior to back-filling of any trenches. Cost of this survey shall be borne by the Contractor.

Details

The as-constructed Drawings shall be supplied to the Principals representative in the following formats.

(i) An original reproducible plan drawn in ink on a quality grade of transparent film at the same scale as the drawings issued for construction.

The following shall be indicated:-

(a) Accurate location, size and type of all pipe fittings, valves, drip lines, cable joints, etc.

(b) Size and type of all power cables, cable pits, etc.

(c) Solenoid wiring colour code.

(d) Solenoid valves with station numbers.

Measurements to be recorded on the Drawings shall show each continuous length of pipe, relative to the nearest sprinkler or position and alignment of all valves, bends, fittings, pits, etc. All measurements shall be in metres to the first decimal point.

7.18 ELECTRICAL CIRCUIT DIAGRAMS

The Contractor shall provide "as built" detailed circuit diagrams for irrigation controller and control equipment.

Drawings shall be a minimum of A.3 size. One paper copy, laminated in clear plastic, shall be placed in an appropriate door mounted holder, and one set of transparencies forwarded to the Principals representative.

7.19 OPERATION AND MAINTENANCE MANUAL

The Contractor shall prepare and supply, at practical completion, two (2) sets of all operating and maintenance instructions and manuals covering all equipment installed under the Contract.

The Certificate of Practical Completion will not be issued until satisfactory copies of the operations and maintenance instructions as described above have been furnished to and approved by the Principals representative.

7.20 TESTING, COMMISSIONING & MAINTENANCE

The Contractor shall undertake all necessary testing, commissioning and maintenance of equipment installed within the irrigation control and pumping systems.

7.21 SYSTEM COMMISSIONING

Upon completion of all testing and functioning of the isolated part of the irrigation system, the Contractor shall program the controller for an automatic watering cycle, duration per station and frequency to be advised on-site by the Principals representative. This program shall be maintained for a period of not less than 7 days after the testing of the Works by the Contractor.

During this 7 day commissioning period, the Contractor shall be responsible for repair of all leaks, equipment malfunction, surface erosion or any damage resulting from the operation of the system.

008 ESTABLISHMENT

8.01 MAINTENANCE

The Contractor shall be responsible for the maintenance of all landscape works and parts thereof during the period of construction. The Planting Establishment Period shall commence following the completion of all landscaped areas to the satisfaction of the Superintendent.

The Contractor shall maintain the landscape works for the duration of the Planting Establishment Period, and shall leave the site in a clean and tidy condition to the satisfaction of the Superintendent.

8.02 DURATION

The Planting Establishment Period for all planting shall be as specified in SUBSECTION 999 SCHEDULES from the date of completion of landscaping.

8.03 ROUTINE MAINTENANCE AND JOINT INSPECTIONS

Routine maintenance shall be carried out in accordance with site requirements and prevailing weather conditions. In addition to routine maintenance visits, the Contractor shall visit the site at maximum fourteen (14) day intervals to determine status and effectiveness of maintenance previously carried out and in progress and the need for future maintenance activities.

Joint Maintenance Inspections shall be carried out with the Contractor and the Superintendent's Representative either as requested or each month.

8.04 RECORDS

The Contractor shall submit a written report to the Superintendent within four (4) days of each Joint Maintenance Inspection.

The report shall include date of visit, maintenance works completed, maintenance works in progress and maintenance works required. The report shall also give details of damaged or missing plants replaced together with a location diagram from the relevant sheet of the reduced landscape plan.

Observations and/or recommendations for work considered necessary for ongoing maintenance shall also be included in the report. The report shall also include records of watering stating which areas were watered and how much water was applied.

8.05 WATERING

Watering shall be carried out during the Planting Establishment Period to ensure that a discernible level of moisture is maintained all times. Plants must not be allowed to dry out.

Each watering shall comprise the application of ten (10) litres of water per plant at weekly intervals for a period of eight (8) weeks from the commencement of the maintenance period. Thereafter, each plant shall receive ten (10) litres of water at fourteen-day intervals for a further sixteen (16) weeks

The frequency of watering may be varied during periods of adequate rainfall and in accordance with the Superintendents directions.

8.06 WEED CONTROL

Control of grass and weed in mulch planted areas shall be carried out at a maximum four (4) week intervals. Spraying or weedwand application of glyphosate type herbicide such as Roundup shall be undertaken accordance with the manufacturer's recommendations. Weeds that cannot be controlled by herbicide shall be removed by hand.

Where the Contractor considers an alternative herbicide is required to control a specific weed, the Superintendents approval, in writing shall be obtained prior to use. Dead weeds shall be lopped flush with the ground surface and removed from site of the works.

8.07 DISEASE AND INSECT CONTROL

During the Plant Establishment Period, plants shall be sprayed to control disease and insect infestation, where directed by the Superintendent.

Where spraying is required by the Superintendent the Contractor shall undertake spraying as directed by the Superintendent and must obtain the Superintendents written approval to the type of chemical proposed for spraying before spraying is carried out.

Spraying shall only be carried out in accordance with manufacturer's recommendations and only on windless days. The Superintendent shall be informed 24 hours prior when this operation is to be undertaken. In no circumstances are pesticides to be used without the written consent of the Superintendent. Where required to be used, pesticides and their application shall comply with requirements of the Pesticides Act, 1978.

The cost of disease and insect control of all plants on the site shall be included in the scheduled rate for maintenance of the landscaped areas.

8.08 PLANT REPLACEMENT

Missing, stolen or dead plants, and plants nominated by the Superintendent as unsatisfactory, shall be replaced by the Contractor, at his cost, within 14 days of notification by the Superintendent.

Replacement plants shall be of similar size and quality and of identical species and variety to the plant being replaced unless otherwise directed by the Superintendent. Replacement plants shall be watered upon planting and thereafter in accordance with requirements in this Specification.

The cost of plant replacement shall be included in the scheduled rate for maintenance of the landscaped areas

8.09 LAWNS

Mowing/Trimming

Lawn areas shall be mowed at a height consistent with the growth habit of the grass variety. A regular height range of 10-15mm shall be maintained throughout the year.

Generally, except under wet conditions where the lawn shall be left, mowing is to be carried out on a weekly basis during the mowing season, November to March, and at bi-weekly intervals during April to October. On alternate mowings, a north-south and east-west pattern shall be adopted.

At the same time as mowing, lawn edges to planting beds, pathways, base of trees and other obstacles, shall be trimmed. When mowing or trimming, care shall be taken so damage to trees and shrubs is prevented. Clippings shall be removed from site.

Fertilising

Fertiliser with N:P:K ratio 10:4:6 (equivalent to "Multigro") or equivalent shall be applied each September and April at the manufacturer's recommended rate and maintenance applications in November and February at reduced rates.

Watering

The lawn area shall be watered so that the soil is soaked to a depth of 150 mm. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings. Water as necessary to maintain a vigorous and healthy growth.

Topdressing

Established lawns shall be topdressed the following Spring after establishment using a weed free imported sandy topsoil to a depth of 5mm. Further topdressing is only required to smooth out any depressions of irregularities in the lawn area as directed.

8.10 RUBBISH REMOVAL

Any bottles, paper, cigarette butts, etc. shall be removed by hand from the site. This work shall be executed regularly so that all areas are free from rubbish when observed at weekly intervals.

Leaf litter shall be removed from all path and lawn areas and spread evenly over the mulched areas or composted on site or removed form site as directed.

The removal of leaf litter shall be executed weekly during the months of April to August.

8.11 STAKES AND TIES

Adjust stakes and ties where necessary. Where plants are robust with well-developed systems and are strong enough to no longer require support, stakes and ties shall be removed. Where plants are unable to be self-supported or where stakes are damaged, plants shall be staked or re-staked.

All stakes and ties are to be removed at the end of the Establishment Maintenance Period.

8.12 FINAL INSPECTION AND FINAL CERTIFICATE

At the end of the Defects Liability Period, an inspection will be made by the Superintendent to ensure that all works under the Contract has been finally and satisfactorily executed by the Contractor

SUBSECTION 999 EXTERNAL WORKS SCHEDULES

01 SAMPLES SCHEDULE

Requirement: Submit the following samples:

Specimen or Item:	Quantity:
All Soil Mixes	5kg
Organic Mulch	5kg
Stone Pavers	3
Precast Concrete Kerbs	2
Broom Finish Coloured Concrete	1.5x1.5m panel
Plant Material	at nursery samples
Feature Trees	at nursery samples

02 WEED ERADICATION SCHEDULE

METHODS: Non residual herbicide (glysophate)

03 TOPSOIL SCHEDULE

Location:	Topsoil type:	Depth:
Refer Section 004 Subsection 4.01		

04 FERTILISER SCHEDULE

Location:	N:P:K ratio:
Planting beds	6.3:1.8:2.8 approved prolonged release granular
Individual planting	6.3:1.8:2.8 approved prolonged release granular

05 MULCH SCHEDULE

Location:	Mulch type:
Mass planted areas	Horticultural Grade Pine bark

06 PLANTING ESTABLISHMENT SCHEDULE

PLANTING ESTABLISHMENT PERIOD : 52 WEEKS