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accredited building certifiers & development managers

R165589

Construction Certificate
Determination

Issued under the Environmental Planning and Assessment Act 1979 Section 109C (1) (b), 81A (2) and 81A (4)

Certificate No. 2005/566

Council	Pittwater
Determination date of determination	Approved 15 April 2005
Subject land Address Lot No, DP No.	 80 McCarrs Creek Road, Church Point Lot 36 DP 11691
Applicant Name Address Contact No. (phone)	 Mr C Duncan 5 Wren Court, Castle Hill NSW 2154 9844 6650
Owner Name Address Contact No. (phone)	 Mr Craig & Mrs Andrea Duncan 5 Wren Court, Castle Hill NSW 2154 9844 6650
Description of Development Type of Work	 New Dwelling & Detached Carport
Builder or Owner/Builder Name Contractor Licence No/Permit	 Trevor Robertson 14570C
Value of Work Building	 $396,091.00

Attachments

1. Long Service Levy receipt no.34311 dated 30 March 2005
2. NSW Rural Bushfire letter dated 19 July 2004, reference no. CV20040705118826S
3. Bushfire Hazard Assessment Report, prepared by Building Code & Bushfire Hazard Solutions dated June 2005

COUNCIL COPY

Suite 13/90 Mona Vale Road Mona Vale NSW 2103 P.O. Box 326 Mona Vale NSW 1660 **ph: 9999 0003** fax: 9979 1555
email: insightdevelopment.com.au **ABN** 38 089 727 346

Plans & Specification approved
List plans no(s) & specifications Reference

1. Architectural Details & Construction Specifications, reference no. 01904, Sheet Nos 1 to 11 inclusive, prepared by The Pole Home Centre, dated 25 February 2005
2. Sydney Water Approval dated 3 March 2005
3. Stormwater Management Plan, reference no. Sheet 1/1, endorsed by B & A Jenkins, Licensed Plumber, dated 28 February 2005
4. Erosion & Sediment Management Plan, reference no. EDA05-117/1, prepared by Landscape Architectural Services, dated March 2005
5. Ecological Sustainability Plan, reference no. EDA05-117/1, prepared by Landscape Architectural Services, dated March 2005
6. Structural Details, reference no. 21834-S1(A), S2(A) & S3, prepared and endorsed by Jack Hodgson Consulting Geotechnical & Structural Engineers, dated 4 March 2005
7. Completed *Form 2* of Pittwater Council Geotechnical Risk Management Policy

Certificate

I certify that the work if completed in accordance with these plans and specifications will comply with the requirements of S81A(5) of the Environmental Planning and Assessment Act 1979.

Signed

Date of endorsement 15 APR 2005
Certificate No. **2005/566**

Certifying Authority

Name of Accredited Certifier	Tom Bowden
Accreditation No.	93
Accreditation Authority	Dept of Infrastructure, Planning & Natural Resources (NSW Accreditation Scheme)
Contact No.	(02) 9999 0003
Address	13/90 Mona Vale Road, Mona Vale NSW 2103

Development Consent

Development Application No.	**NO431/04**
Date of Determination	**25 October 2004**

BCA Classification **1a & 10a**

LONG SERVICE
BUILDING & CONSTRUCTION

30 March 2005

Building and Construction Industry
Long Service Payments Corporation
Ground Floor
cnr Donnison & Baker Streets
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

CRAIG JOHN WATSON DUNCAN
5WREN COURT
CASTLE HILL NSW 2154

Levy Receipt

Receipt No.
00034311

Received from: (Name of person or organisation paying for levy)

CRAIG JOHN WATSON DUNCAN

the amount of

$792.00

Payment details:

Cheque	000028	$792.00	CRAIG DUNCAN

being payment for Long Service Levy as detailed below

Levy Payment Form number	0274221
Council/Department/Authority	PITTWATER COUNCIL
D.A. Number	N0431/04
Work address	80 MC CARRS CREEK ROAD CHURCH POINT NSW 2105
Estimated value of work	$396,091.00
Levy payable (No exemption)	**$792.00**
Total levy paid	**$792.00**

Signed: (Signature of authorised person)

Date

30-3-05

42147

All communications to be addressed to:

WARRINGAH / PITTWATER FCC
NSW Rural Fire Service
PO BOX 111
TERREY HILLS NSW 2084

Telephone: (02) 9450 3000
e-mail: george.sheppard@rfs.nsw.gov.au

WARRINGAH / PITTWATER FCC
NSW Rural Fire Service
THOMPSON DR OFF KAMBER RD
TERREY HILLS NSW 2084

Facsimile: (02) 9450 1028

The General Manager
PITTWATER Council
PO BOX 882
MONA VALE NSW 1660

Your Ref: N0431/04
Our Ref: CV2004070511882 GS

Attention: Andrew Piggott

Date: 19-Jul-2004

Dear Andrew,

RE: Land Use Application for 36 / 11691, 80 McCarrs Creek Road, Church Point NSW 2105

I refer to your letter dated 05-Jul-2004 seeking our advice in accordance with section S.79BA of the Environmental Planning & Assessment Act 1979 for the above property.

Based upon an assessment of the plans and documentation received for the proposal, the NSW Rural Fire Service, in respect to bush fire matters, provides the advice that the development should have the following conditions:

1. Construction shall comply with AS3959 - 1999 level 1 'Construction of Buildings in bushfire prone areas'.

2. Roller doors, tilt-a-doors and the like shall be sealed to prevent the entry of embers into the structure.

3. Roofing shall be gutterless or have leafless guttering and valleys are to be screened to prevent the build up of flammable material.

4. The entire property shall be managed as an 'Inner Protection Area' as outlined within section 4.2.2 in Planning for Bushfire Protection 2001.

5. All fencing shall be constructed from non-combustible materials.

For any enquiries regarding this correspondence please contact George Sheppard.

Yours faithfully,

Craig Geddes
Fire Control Officer

The NSW Rural Fire Service is satisfied that this development proposal conforms to the specifications and requirements of Planning for Bushfire Protection 2001 as required under section 79BA of the Environmental Planning & Assessment Act 1979 No 203, or when adopting the RFS recommendations included in this document, has adequately addressed issues concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bush fire.

The RFS will not be liable for any loss, damage, costs or injury including consequential, incidental, or financial loss arising out of the use of this advice.

Pittwater Council

OFFICIAL RECEIPT

15/04/2005 Receipt No 165589

To INSIGHT DEVELOPMENTS

Applic	Reference	Amount
GL Re	PRVC-Priv 1 X	$30.00

Total:	$30.00
Amounts Tendered	
Cash	$0.00
Cheque	$30.00
Card	$0.00
Money Order	$0.00
Agency Rec	$0.00
Total	$30.00
Rounding	$0.00
Change	$0.00
Nett	$30.00

Printed 15/04/2005 9:52:20
Cashier CDicks

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Telephone: (02) 9456 2288 Facsimile: (02) 9456 2277

BUSHFIRE HAZARD ASSESSMENT REPORT

PROPOSED RESIDENTIAL DEVELOPMENT

LOT 36 DP 11691
No 80 McCarrs Creek Road, McCarrs Creek.

Prepared on the Authority of:
Mr Craig Duncan
5 Wren Court
Castle Hill NSW 2154.
Ref No 40379

CONTENTS

1.0 INTRODUCTION

The proposal relates to the demolition of an existing dwelling to allow construction of a new sole occupancy dwelling on an existing allotment at Lot 36 DP 11691 HN 80 McCarrs Creek Road McCarrs Creek.

Under Pittwater Council's Bushfire Prone Lands Map the area identified as the hazard is north and northeast of the subject property across McCarrs Creek Road. The whole of the subject property is within a 100 meter buffer zone from a designated Category 1 bushfire prone area. Therefore the application of Planning for Bushfire Protection - 2001 (PBFP) must apply in this instance.

To accord with PBFP we are suggesting the development is classified as infill development.

2.0 PURPOSE OF REPORT

This Bushfire Hazard Assessment Report is to provide the owners, The Rural Fire Service and Council with an independent bushfire hazard determination together with appropriate recommendations for both building construction and bushfire mitigation measures considered necessary having regard to construction within a designated 'bushfire prone' area.

The recommendations contained within this report may assist in forming the basis of any specific constructional conditions and / or bushfire mitigation measures that Council and / or the NSW Rural Fire Service may elect to place within any consent conditions issued for the subject Development Application.

3.0 SCOPE OF THIS REPORT

The scope of this report is limited to providing a bushfire hazard assessment and recommendations for the subject property. Where reference has been made to the surrounding lands, this report does not purport to directly assess those lands, rather it may discuss bushfire impact and / or progression through those lands and possible bushfire impact to the subject property.

Where Council considers a bushfire risk is associated with surrounding private lands or lands owned by an authority, Council should seek to issue notice under Section 66 of the Rural Fire Services Act on any or all surrounding properties for the purposes of reducing and maintaining safe levels of vegetation and thus reducing the possibility of bushfire impact to the subject property and any adjoining properties.

4.0 REFERENCED DOCUMENTS AND PERSONS

Comments provided are based on the requirements of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act), the RFS document known as 'Planing for Bushfire Protection – 2001' for the purposes of bushfire hazard determination and Australian Standard AS3959 – 1999 titled 'Construction of buildings in bushfire-prone areas' as amended for building / structural provisions.

The author has made a single site visit to the subject property.

a) COMPLIANCE TABLE.

The following table sets out the projects compliance with *Planning for Bushfire Protection – 2001.*

	North	East	South	West
Vegetation Structure.	N/A.	**6 Woodlands**	N/A	N/A
Vegetation Type.	Group.	**Group. 2**	Group.	Group.
Distance from boundary	Metres	**20 Metres**	Metres	Metres
Slope	Degrees Up/Down Slope	**>5 Degrees Up/~~Down~~ Slope**	Degrees Up/ Down Slope	Degrees Up/Down Slope
Required Asset Protection Zone	Metres	**20 Metres**	Metres	Metres
Proposed Asset Protection Zone.	Metres	**28 Metres**	Metres	Metres

Category of bushfire attack.		**Medium**		
Required construction Level.	Level	**Level 1**	Level	Level
Proposed construction Level.	Level	**Level 1**	Level	Level

Asset Protection Zones Compliance Yes / ~~No~~.
Notes:

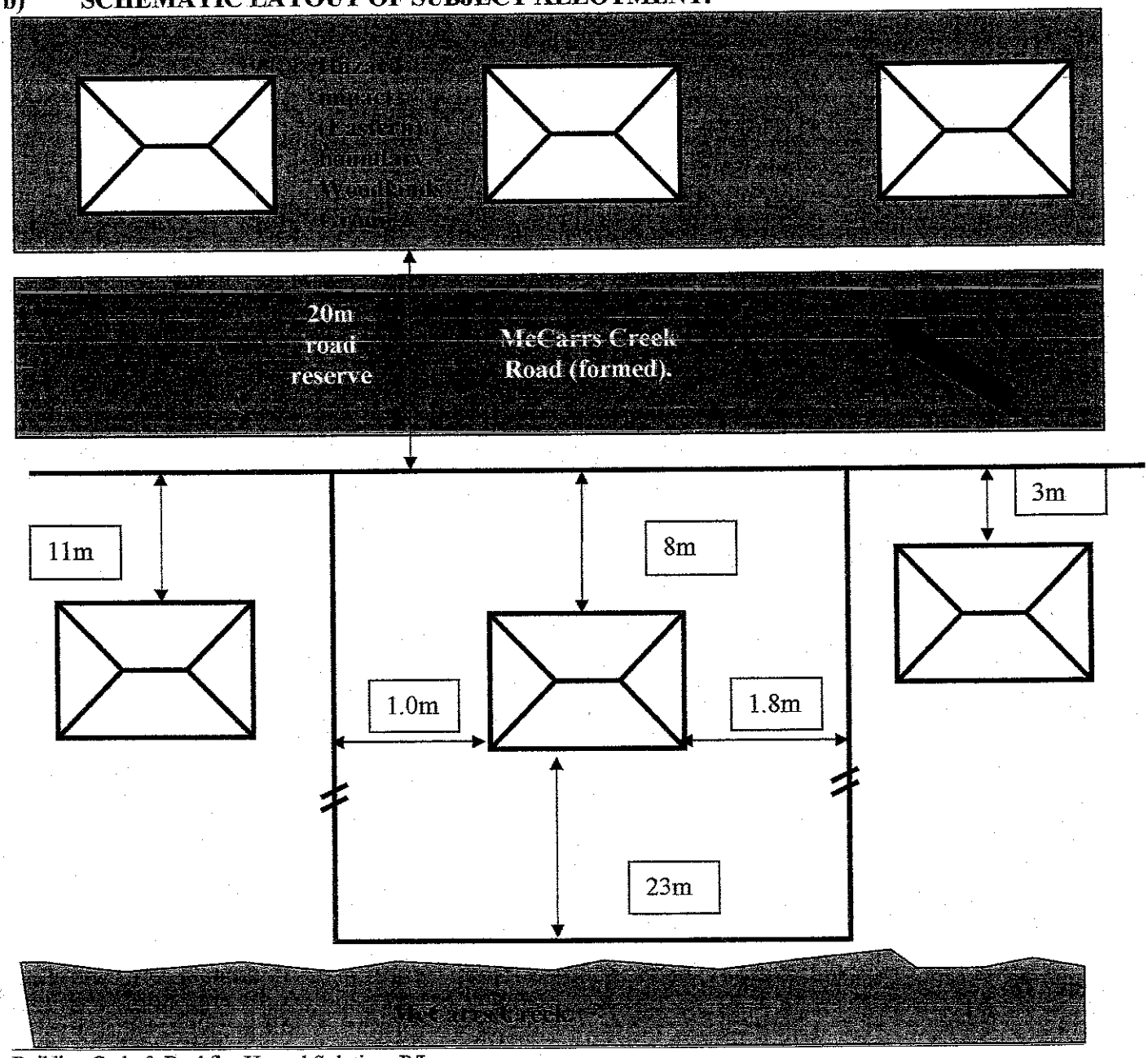
Including the formed McCarrs Creek Road and an 8 metre setback within the subject property the required Asset Protection Zones are exceeded for this development.

Construction Level Compliance Yes / ~~No~~.
Notes:

Any bush fire impact to the subject property would be travelling downslope through private properties opposite on McCarrs Creek Road. The vegetation within these allotments is a mix of broad leaf ground cover below gum trees. The construction materials proposed for the new dwelling exceed that required for Level 1 construction and do in fact form the foundation for Level 3 Construction.

Guideline Ref.	Proposed development determinations.	Compliance
Property Access (Driveway).	Direct access is available from McCarrs Creek Road.	Yes
Water Supply.	In ground street hydrants are available along McCarrs Creek Road.	Yes
Evacuation.	Evacuation satisfactory using existing road infrastructure.	Yes
Electrical Supply.	Aerial supply provided.	Yes
Other.	N/A.	N/A

b) SCHEMATIC LAYOUT OF SUBJECT ALLOTMENT.



5.0 BUSH FIRE HAZARD ASSESSMENT

5.01 Preface

Properties considered to be affected by possible bushfire impact are determined from the local Bushfire Prone Lands Map as prepared by Council and or the Rural Fire Service. All property development within affected areas is subject to the conditions detailed in the legislated document 'Planning for Bushfire Protection - 2001' (PBFP). Set back distances for the purpose of creating Asset Protection Zones (APZ's) must be applied and any buildings must then conform to corresponding regulations detailed in Australian Standard 3959 'Construction of buildings in bushfire prone areas'.

Planning for Bushfire Protection – 2001, (PBFP) formally adopted on the 1st August 2002 provides for the protection of property and life (including fire-fighters and emergency service personnel) from bushfire impact.

The thrust of the document is to ensure that developers of new properties or sub-divisions include the constraints associated with the construction of buildings in bushfire prone areas within their proposed development sites. PBFP is applicable to proposed development inside a determined Category 1 or 2 areas and also inside a buffer zone radius of 100m from a Category 1 bushfire area or 30m from a Category 2 bushfire area.

The document also acknowledges 'infill' developments associated with re-development of existing properties and allows some higher levels of building safety where the increased 'set backs' (APZ's) may not be achievable. The subject development relates to the construction of a new dwelling on an existing allotment. To accord with PBFP we are suggesting the development is classified as infill development.

The approving body for integrated development (dual occupancy and subdivisions) is the NSW Rural Fire Service Head Office, Rosehill. The approving body for infill development (alterations, additions and single occupancy development on existing allotments) for this area is the NSW Rural Fire Service, Terrey Hills District Office.

5.02 Location

The subject property is known as Lot 36 DP 11691 HN 80 McCarrs Creek Road McCarrs Creek. The front (eastern) boundary of the property abuts the formed McCarrs Creek Road and the rear (western) boundary adjoins the tidal McCarrs Creek. The northern and southern boundaries abut existing residential allotments with private residential dwellings upon them.

Existing residential dwelling to be demolished.

Southern neighbouring allotment.

Subject property.

Photograph No. 01 - View south from within the subject property.

Existing dwelling on northern neighbouring allotment.

Subject property.

Photograph No. 02 – View north from within the subject property.

5.03 Slope and Topography

The slope must be assessed for 140 metres from the proposed building footprint. The slope within the subject property is on a significant down slope toward McCarrs Creek. East of the subject property the slope continues on a similar gradient of greater than 15 degrees upslope, away from the subject property. For the purposes of determining the appropriate category of bushfire impact from Table A3.3 Appendix 3 the average slope that would most significantly influence bushfire impact was determined to be greater than 5 degrees upslope.

Photograph No. 03 - View south from McCarrs Creek Road towards the Subject Property.

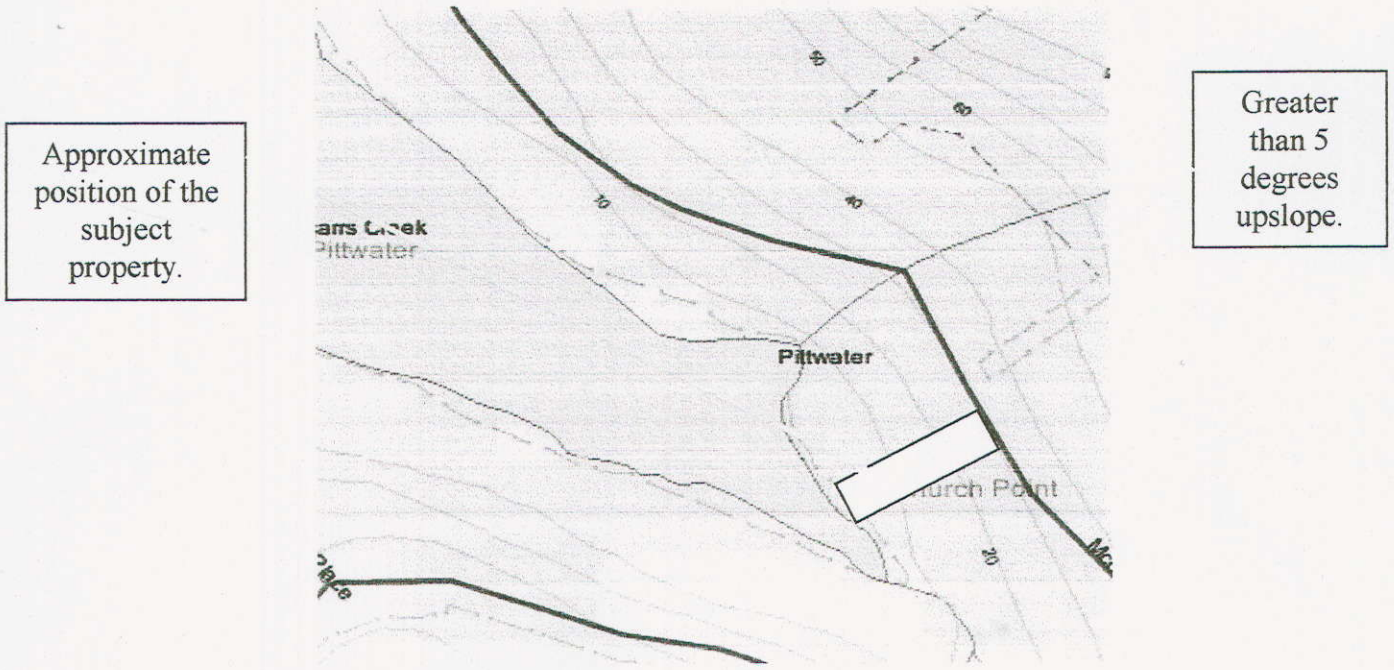


Image 01: Excerpt from "topomap" © Department of Lands 2004

5.04 Vegetation

Vegetation within the property is a mix of gums above a mixed understorey of broad leaf plants and established gardens and lawn areas. The vegetation on neighbouring properties is similar to that within the subject property. The vegetation east of the subject property (across McCarrs Creek Road) is denser and consists of gum trees with 70% interlocking canopies above a mixed understorey of Casuarina's, broad-leafed plants, privet, lantana and other weed varieties. This vegetation has been identified as a Category 1 Vegetation under Pittwater Councils Bushfire Prone Lands Map. For the purposes of determining the appropriate category of bushfire impact from Table A3.3 Appendix 3 the vegetation was determined to be Woodlands, Vegetation Structure 6, Group 2.

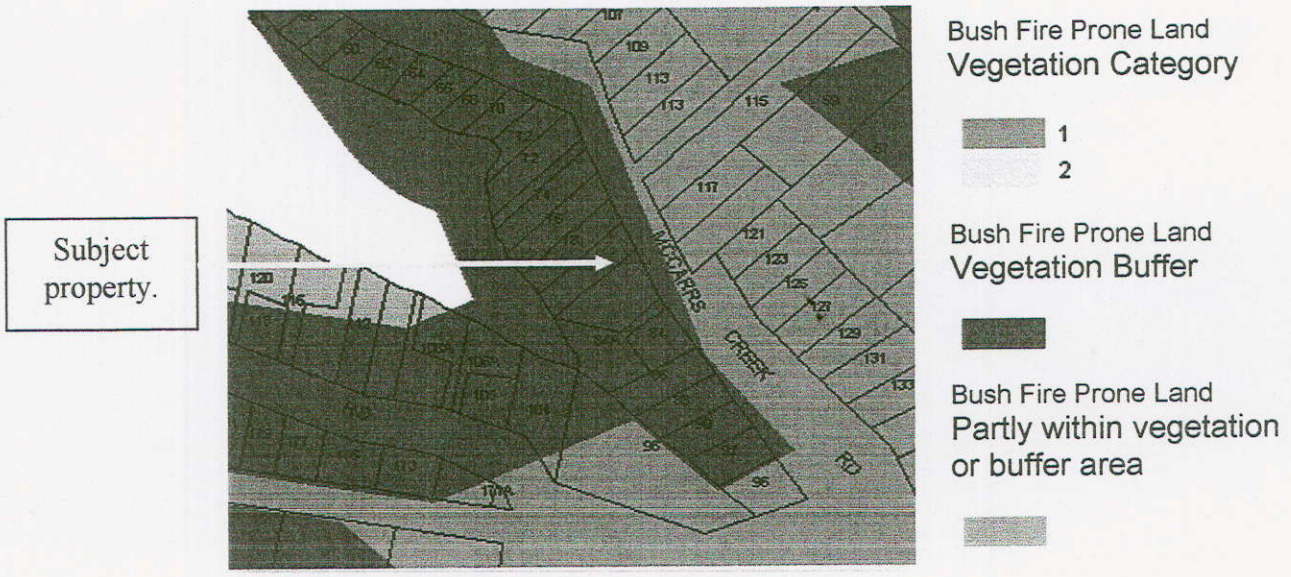
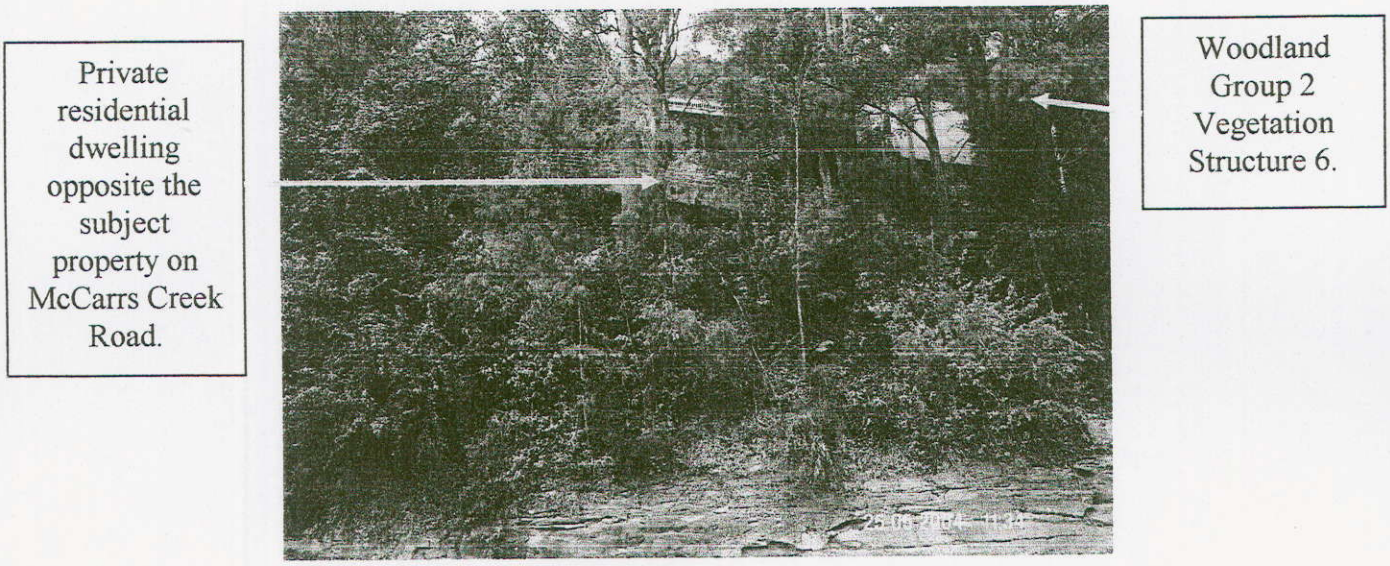


Image 01: Excerpt from Council Bushfire Prone Lands Map.



Photograph No 04 View east from McCarrs Creek Road illustrating the vegetation identified as Category 1 on the above Bushfire Prone Lands Map.

Existing residential dwelling to be demolished.

Subject property.

Northern neighbouring dwelling.

Photograph No 05 View west toward McCarrs Creek.

5.05 Asset Protection Zones

The proposed building platform is set back from McCarrs Creek Road by approximately 8 – 9 metres. The Asset Protection Zone (APZ) can be taken to include the formed McCarrs Creek Road and exceeds 20 metres.

It is important to note that beyond the APZ (within the Category 1 Vegetation) there are several existing private residential dwellings. Around these dwellings there are some maintained gardens, driveways and paths that provide fire fighter access to the hazard and will also reduce expected bushfire behaviour towards the subject property (see photograph 04).

5.06 Fire Fighting Water Supply

Existing in ground street hydrants are available along McCarrs Creek Road and are considered satisfactory for the replenishment of fire services appliances. The nearest hydrant is located north of the subject property.

5.07 Property Access – Fire Services & Evacuation

Access to the property is available directly from McCarrs Creek and is not altered as part of this development. Fire fighters have direct access to the subject property and occupants can evacuate to McCarrs Creek Road and along existing road infrastructure should evacuation be neccessary.

6.0 SITE & BUSHFIRE HAZARD DETERMINATION

6.01 Planning for Bushfire Protection - 2001

'Planning for Bushfire Protection – 2001' (PBFP) is applicable to those lands determined as being within a 'bushfire prone area' in accordance with a local Bush Fire Prone Lands Map as provided by the Rural Fire Service and Council.

The most appropriate method of determining site bushfire hazard under the terms of PFBP is to consider the site in a singular form. In doing so it is noted that under Clause 3.2.2 of the document reference is made to the determination of bushfire prone areas where it states;

Bushfire prone areas are defined as those areas;

- *within or within 100m of high or medium bushfire hazards; or*
- *within or within 30m of low bushfire hazards.*

In this instance the subject property is within a 100 metre buffer zone from a Category 1 Bushfire Prone Area, being woodland, vegetation structure 6, group 2. It is therefore appropriate to apply PBFP to the eastern boundary (being the hazard impact side) as follows:

a) Vegetation Category 6, Group 2, Woodland.
b) Slope greater than 5 degrees upslope.
c) Minimum asset protection zone required 20m.
d) Available land for APZ is 28 metres including the formed McCarrs Creek Road.
e) The dwelling is within a bush fire attack category of Medium and as such would require construction to that of level 1 under AS 3959 – 1999.
f) The proposed construction materials form the basis for Level 3 construction.

6.02 Australian Standard AS 3959 – 1999 'Construction of buildings in bushfire –prone areas'

AS 3959 - 1999 (as amended) provides for three (3) levels of building construction these being Levels 1 – 3 with Level 1 being for medium bushfire attack, Level 2 for high bushfire attack and Level 3 for extreme bushfire attack. The Australian Standard specifies constructional standards for buildings within low and medium bush fire attack categories as determined by the Planning for Bushfire Protection – 2001 document.

6.03 Correlation between AS3959 and Planning for Bushfire Protection

Bushfire Category	Maximum radiant heat impact (kWm2)	Level of construction under AS3959-1999
Low	14.5	No special construction requirements
Medium	16.0	Level 1
High	21.0	Level 2
Extreme	31.0	Level 3
Flame Zone	>31.0	Outside scope of code

6.04 Site Specific Bushfire Hazard Determination

All property development must be assessed on an individual basis as broad-brush approaches of documents such as PBFP may not be applicable in every instance. The proposed development at 80 McCarrs Creek Road meets the guidelines laid out in PBFP. Recommendations made to increase the protection of the dwelling and for emergency personnel protecting the subject properties.

a) Within the area depicted as Category 1 Vegetation surrounding this development there are private residential dwellings.
b) The required APZ of 20 metres is exceeded in this instance.
c) Vegetation within the site will be maintained as an APZ consisting entirely as an Inner Protection Area (IPA).
d) Water supplies for fire fighting purposes are adequate.
e) Constructional recommendations to that of Level 1 will be included.
f) Recommendations as to the maintenance of APZ's will be included.

6.05 Viable Constructional Method

The objectives of Planning for Bushfire Protection – 2001 are for the protection of life including fire fighters. Provided these objectives can be met the construction of buildings is feasible and both the Rural Fire Service and Council should be in a position to consider such applications.

We have reviewed the plans available for this development from The Pole Home Company, Job No 019/04 Sheets 1 to 11 and are satisfied that all aspects of the proposed new dwelling will meet the requirements for Level 1 construction.

Specific attention has been made to the bifold doors indicated on the plans. Clarification with the Rural Fire Service Planning and Development Department is that the screening is for the purpose of heat dissipation during a bushfire emergency. Providing adequate precautions have been made to protect the dwelling from the expected radiant heat (Medium equates to 16 kWm^2) then the RFS can be satisfied that reasonable precautions have been made to protect the dwelling and its occupants. In this regard where the doors are not screened it is proposed to increase the glazing in these doors to toughened glass (Level 3) to compensate for the absence of screening. The doors must still be tight fitting so as to prevent the ingress of smoke and embers.

These measures will provide improved protection as, during periods when the dwelling is unoccupied or during bushfire emergencies these doors will be closed for security and protection purposes however the same assurance cannot be said for that of screen doors.

7.0 FIRE SERVICE RESPONSE

The combat agency for bushfire in the area is the Rural Fire Service with stations located at Ingleside and Terrey Hills. The NSW Fire Brigades are the responsible agency for property protection in this area with a station located at Mona Vale.

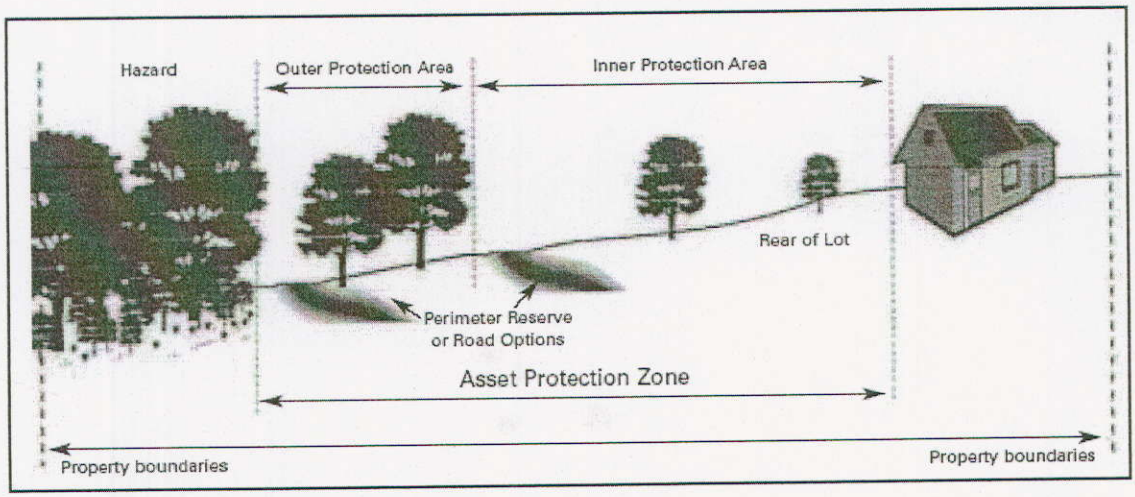
Fire services coverage is considered satisfactory in this area.

8.0 RECOMMENDATIONS

Having regard to the Rural Fire Service's document, 'Planning for Bushfire Protection – 2001' and the need for a site-specific bushfire hazard determination we recommend the following be included as part of Councils consent conditions. Compliance with PBFP having regard to construction level and APZ's is possible for this application.

8.01 Asset protection zone and grounds.

- That all grounds between the building footprint and the front (eastern) boundary within the subject property be maintained as an Asset Protection Zone (APZ).
- That the APZ consist entirely of an Inner Protection Area (IPA). The IPA shall consist of intermittent trees with no interlocking canopies above rockeries, maintained low level gardens, paths or lawns.
- That gardens containing timber or bark mulch are not located directly below the windows of any part of the building. Such gardens are to be a minimum of 1.0m radius from any window.
- That gardens located against the external wall of the building shall not contain shrubs larger than 1.0m in height.
- That the grounds are maintained on a routine basis and particular attention to pruning and removal of dead fuels is made prior to the commencement of the bushfire danger period (1st October to 31st March) and at least once during the danger period.



8.02 Constructional Requirements.

In this instance construction to that of Level 1 under AS3959-1999 is determined to be a minimum for the Development. We recommend the following measures be considered to provide adequate constructional measures.

- That any proposed residential dwelling construction is compliant with a construction Level of 1 under AS3959 – 1999 as amended, in particular:
- That, excluding masonry walls, framed walls shall incorporate breather type sarking with a flammability index of not more than 5 or an insulation material conforming to the appropriate Australian Standard for that material.

- That suspended floors will be either greater than 600mm from the finished ground level or where any one bearer at any point is lower than 600 mm above finished ground level the subfloor space shall be fully enclosed with non-combustible cladding or any timber flooring bearers and joists be of fire retardant treated timber.
- That the verandas or decks be either a non-combustible slab, sheeted tongue in groove solid flooring or where space decking is used the decking timbers shall be fixed with a clearance of not less than 5 mm between adjacent timbers.
- That weather strips or drought excluders be fitted to all hinged external doors.
- That with the exception of the front entrance door tight fitting screen doors are fitted with corrosion resistant steel bronze or aluminium mesh with a maximum aperture size of 1.8mm.
- That all openable windows, including louvers shall be screened with a corrosion resistant steel bronze or aluminium mesh with a maximum aperture size of 1.8 mm, in such a way that the entire opening remains screened when the window is open.
- That where glass doors are not screened the glazing in these doors be of toughened glass (Level 3) to compensate for the absence of screening. The doors must still be tight fitting so as to prevent the ingress of smoke and embers.
- That supporting posts be either non-combustible or where they are timber, they shall be fire retardant treated timber for a minimum of 400 mm above the finished ground level or mounted on galvanised metal shoes with a clearance of not less than 75 mm above the finished ground level.
- That all vents or weep holes be fitted with spark guards made from steel bronze or aluminium mesh with a maximum aperture size of 1.8 mm.
- That the whole of the roof shall be of non-combustible material, eg colour bond style metal sheeting or cement / clay tiles or masonry shingles.
- That all gaps under the corrugations or ribs of the roofing material where it meets the fascia or wall shall be sealed or protected by
    - fully sarking the roof: or
    - by providing corrosion resistant steel or bronze mesh with a maximum aperture size of 1.8mm, profiled metal sheet, compressed mineral wool, or similar material.
- That rib caps or ridge capping be sealed in accordance with the above clause.
- That all penetrations for roof lights or ventilators shall be sealed with a non-combustible sleeve or lining.
- That thermoplastic sheet in a metal frame may be used for a roof light, but the diffuser installed at ceiling level shall be of wired or toughened glass.
- That vented roof lights and roof ventilators shall be protected from the ingress of embers by the installation of steel or bronze mesh having a maximum aperture size of 1.8 mm.
- That all eaves shall be fully enclosed and the fascia or gaps between the rafters shall be sealed. Any lining and or joining strips shall be non-combustible.
- That all gutters valleys and downpipes shall be of non-combustible materials and provided with materials designed to prevent the accumulation of leaf litter. These gutter protector materials shall have a flammability index of <5. ('Guttergard' leaf guard or similar)
- That no box gutters are to be installed.
- That no plastic air vents to be used in any external wall or eve.

8.03 Additional Recommendations

- That where LPG gas bottles are installed they shall be positioned with the safety valves facing away from the building or at a location having the least bushfire impact. All gas cylinders shall have clearly marked gas shut off valves positioned for easy access by fire fighters.

8.04 Construction materials.

Where reference has been made to 'fire retardant treated timber' or 'DAR Hardwood' within this report reference should be made to Warrington Fire Research Group report "The suitability of various untreated timbers for building constructions in bushfire prone areas" and The NSW Rural Fire Service Development Control Note 001 released 24/05/2004. In these documents several species of timber were tested to the requirements for Level 3 construction and the following were found to meet the requirements of AS3959 – 1999 as amended and therefore suitable for use where "Fire retardant treated timber" is called for and Level 3 construction is required:

- ✓ Blackbutt
- ✓ Kwila (Merbau)
- ✓ Red Iron Bark
- ✓ Red River Gum
- ✓ Silver Top Ash
- ✓ Spotted Gum
- ✓ Turpentine

Also in these documents several other species of timber were tested to the requirements for Level 1 and Level 2 construction and the following were found to meet the requirements of AS3959 – 1999 as amended and therefore suitable for use where "Fire retardant treated timber" is called for and Level 1 or 2 construction is required:

- ✓ Balau (Selangan)
- ✓ Forest Red Gum
- ✓ Jarrah
- ✓ Tallowwood
- ✓ Yellow Stringybark

8.05 Fencing.

- That no brushwood style fencing is permitted on any of the proposed boundaries.

NOTE: *Although the Australian Standard permits the use of Bronze Screening it is well known that bronze interacts with aluminium framings and can oxidise (corrode). This process is accelerated in salt air environments. It is our opinion that given the location of this property and the requirement for level 1 construction it would be practicable to use either aluminium or steel mesh screening only.*

9.0 CONCLUSION

The determination of any bushfire hazard must be made on a site-specific basis that includes an assessment of the local bushland area and its possible impact to the subject property. A site-specific determination was undertaken and assessments made mindful of the possible impact bushfire could have on the proposed development.

In this instance the subject property is vulnerable to possible bushfire impact from the eastern boundary only. The distance to the woodland and the fact that it is upslope specified an APZ of 20 metres be implemented. The area available within the subject property and including the formed McCarrs Creek Road is 28 metres exceeding the requirement in this instance.

With an APZ of >20 metres and an upslope greater than 5 degrees a bushfire attack category of "Medium" is indicated. A bushfire attack category of "Medium" implies construction to Level 1 under AS 3959. Architectural drawings reviewed for the proposed dwelling outline materials that suggest construction to Level 3.

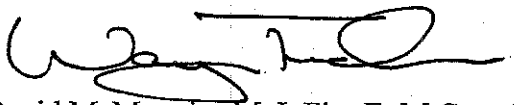
We have included in this report recommendations as to the construction materials and design of the dwelling to comply with that of Level 1 under AS3959 – 1999 as amended. We have also included recommendations as to the establishment and management of the Asset Protection Zone.

The recommendations contained within this report may form the basis of specific bushfire mitigation conditions that Council may place within any Development consent conditions pertinent to the proposed development.

In consideration of the site specific bushfire risk assessment and other bushfire safety measures contained in this report it is our opinion that when combined, they will provide a reasonable and satisfactory level of bushfire protection to the subject development and also satisfy both the Rural Fire Service's concerns and those of Council in this area.

We are therefore in support of the development application.

Prepared by
Building Code & Bushfire Hazard Solutions P/L



Wayne Tucker for

David McMonnies M. I. Fire E. M Cons Mgt.
C\40379 80 McCarrs Creek Road McCarrs Creek BFH Rpt 01

I note that Planning for Bushfire Protection –2001 has an appropriate disclaimer attached to it and similarly, my interpretations and opinions are also given in the same good faith.

10.0 ANNEXURE 01

List of Referenced Documents

a) Environmental Planning and Assessment Act 1979

b) Rural Fire Services Act 1997 as amended

c) "Planning for Bushfire Protection" - NSW Rural Fire Services 2001

d) "Construction of buildings in bushfire prone areas" - A.S. 3959 – 1999 (as amended)

e) "Pittwater Council's Bushfire Prone Lands Map"

f) Documents and concept drawings supplied by The Pole Home Centre dated 19-05-2004 Job No 019-04 Sheets 1 – 11/11.

h) Acknowledgement to

Department of Lands TOPOMAP
Dept Infrastructure Planning and Natural Resources - Landview

Attachments

Attachment 01:

Site analysis of the subject property (Sheet 1/11 No 019-04 as supplied from The Pole Home Centre).

Calculations	
total site area	897.9m²
site coverage	174.7m²
driveway/ paths	60.9m²
landscaped area	73%
floor space	246.7m²
floor space ratio	0.27:1

Schedule of Exterior Finishes	
colorbond roofing	deep ocean
colorbond guttering	bushland
mini orb cladding	bushland
select texturecoat finish	dune
aluminium windows	dark blue
aluminium sliding & bifold doors	dark blue

no easements

no right of way

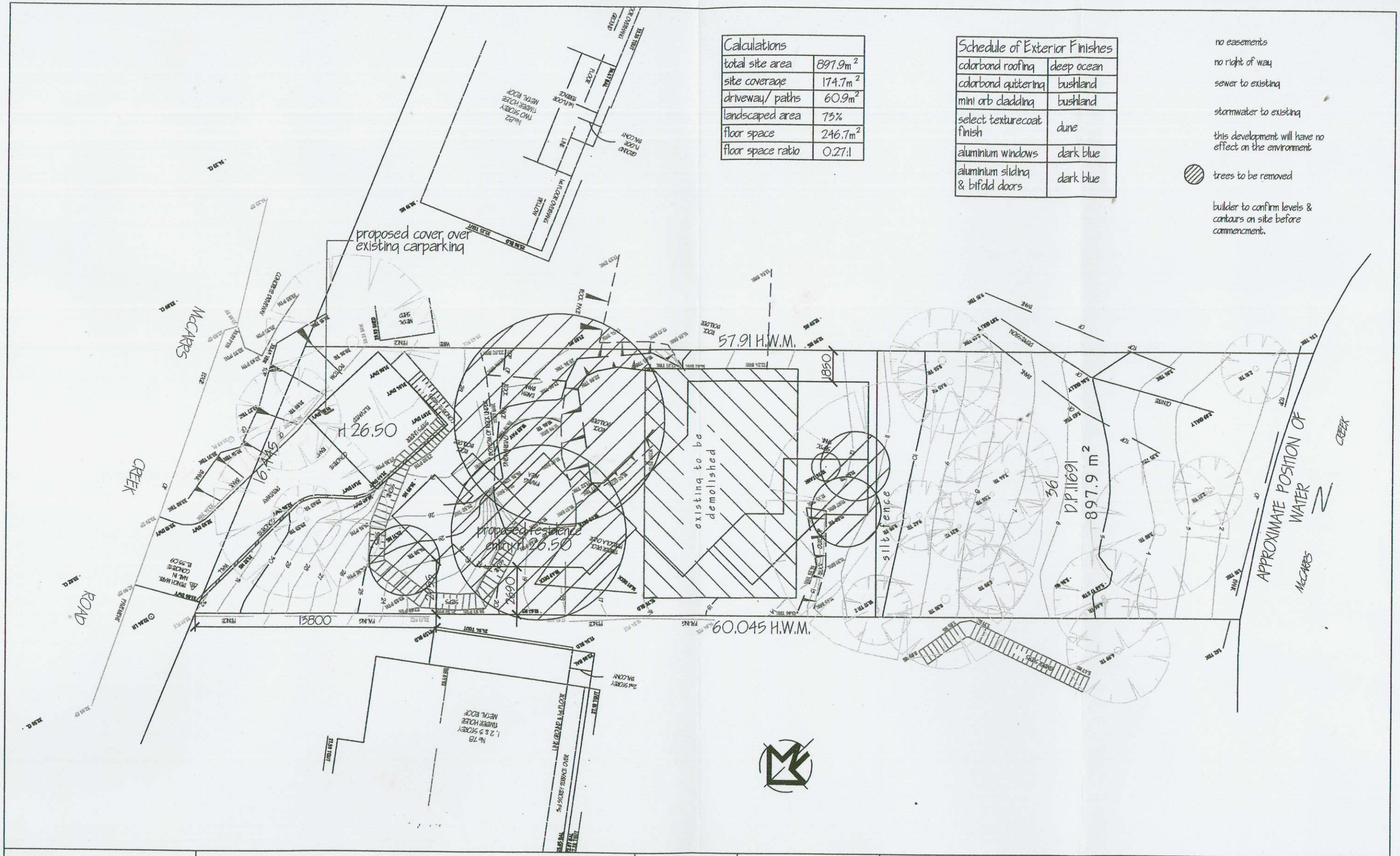
sewer to existing

stormwater to existing

this development will have no effect on the environment

trees to be removed

builder to confirm levels & contours on site before commencement.



Client	Duncan Residence		
Site Address	80 McCarrs Creek Road		
	Church Point		
Job Number	019 04	Scale 1:100	19/05/04

THE POLE HOME CENTRE

Suite 2/101 Victoria Street,
East Gosford, NSW 2250
Phone (02) 4323 4043
Fax (02) 4323 6303
Mobile Phone 0416 233 635

abn 55 072 909 365
acn 072 909 365

General Notes

Written dimension shall be taken in preference to scaled dimensions and verified on site before commencement of any works.

Sheet No.

1/11

BUILDING DESIGNERS ASSOCIATION OF NEW SOUTH WALES INC.

SPECIFICATION

of works for the erection of

Dwelling & carport.

for

Mr. C. Duncan

at

lot no. 32 **D.P.no.** 11691.

80 McCarrs Ck. Road.

Church Point

COUNCIL COPY

SPECIFICATION	Revision 17

BUILDING TYPE

SINGLE DWELLING ☐	VILLA OR TOWNHOUSE ☐	INDUSTRIAL BUILDING ☐
DUAL OCCUPANCY ☐	GARAGE ☐	OFFICE BUILDING ☐
MEDIUM DENSITY UNITS ☐	RETAIL BUILDING ☐	ADDITION ☐
FARM SHED ☐	..... ☐	..... ☐

CONSTRUCTION

CAVITY BRICK ☐	TIMBER FRAMED ☐	A.A.C.BLOCK/PANEL ☐
BRICK VENEER ☐	STEEL FRAMED ☐	MASONRY BLOCK ☐
SINGLE BRICK ☐	STEEL CLAD ☐	CONCRETE PANEL ☐
		F/C SHEET ☐

ADDENDUM

If any difference in requirements exists between this specification and the Building Code of Australia or relevant Standard that may apply to the construction of any building nominated by this specification, then the requirements of the Building Code of Australia and/or the appropriate Standard shall take precedence over this specification for any construction.

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REVISION 17 – FEBRUARY 2005
BCA 2005
BASIX Vers. 1.0 (NSW only)

SPECIFICATION

FOR THE ERECTION AND COMPLETION OF BUILDING AT: LOT No. 36 DP No 11691.

ADDRESS 80 McCarrs Ck Road TOWN/AREA Church Point

MUNICIPALITY / SHIRE / CITY Pittwater POST CODE

FOR. Mr. C. Duncan. Hereinafter called the Proprietor.

The builder must ensure that relative drawings, plans and construction comply with the prescribed construction, the Local Government Act, the Building Code of Australia and that the work and services are performed by the Builder to the satisfaction of the Proprietor and Lending Authorities.

INSPECTION NOTICE

This is to apply only if inspections are required by the Lending Authority. The building is to be inspected by the Society or Bank Representative at the following stages of construction and the Builder is to give the Lending Authority and Owner at least (2) clear working days notice that inspections are required.

1. When trenches for footings have been prepared or rock surfaces scabbled and in the case of reinforced concrete footings , when reinforcement and depth pegs have been placed in position just prior to placing of concrete. Footings must not be commenced until the trenches have been inspected and approved by the Society Representative.
2. On completion of floor, wall and roof framing with noggins in position and veneer walling, but before flooring is cut down, roof covering is laid and wall linings and sheetings are secured.
3. When the internal wall coverings have been secured and fixing out commenced, apron mouldings must not be fixed until flashings have been inspected and approved.
4. ON COMPLETION OF BUILDING. The owner is cautioned that if works have advanced beyond these stages without the requisite notices being given, inspections made and unsatisfactory conditions are discovered later, the offer of a loan or the terms and conditions of a loan may be varied by the lending authority.

REGULATIONS AND NOTICES:
The builder is to comply with the Building Code of Australia as amended and as applicable to the particular State or Territory in which the building is being constructed and the requirements of legally constituted Authorities for local Government and/or Services. The Builder is to give all notices, obtain all permits and pay all fees required by such Authorities. If any difference in requirements exists between this specification and the Building Code of Australia or relevant Standard that may apply to the construction of any building nominated by this specification then the requirements of the Building Code of Australia and/or the appropriate Standard shall take precedence over this specification for any construction. Where manufacturers materials, components, design factors and construction methods comply with the Performance Requirements of the B.C.A. these may be accepted by approval authorities as an alternative as per the Deemed to Satisfy Provisions.

INSURANCE:
Insurance of the works against fire will be effected as nominated in the Building Contract. The Builder shall at his own expense adequately insure against Public Risk and arrange indemnification in respect of his liability under the Workers' Compensation Act, Work Cover and/or other regulations as applicable.

VISIT THE SITE:
Builders tendering are to visit the site and satisfy themselves to the nature and extent of the work, the facilities available and the difficulties entailed in the execution of the said works. No extra amount above the accepted price will be allowed because of work arising due to neglect of this precaution, or assumptions made in respect of levels or ground slopes.

LABOUR AND MATERIALS:
The Builder is to provide all materials, labour, fittings and plant required to construct and complete the work. Materials shall be of the standard specified and workmanship in each trade shall be performed by tradesmen of that particular trade and in conformity with current good building practice.

SET OUT:
The Builder shall be responsible for the accuracy and clear delineation of the site boundaries and location of the buildings there on. The Builder is to set out and maintain the works in accordance with the drawings. Figured dimensions to be taken in preference to scale.

PLANS AND SPECIFICATIONS:
Any work indicated on the plans and not in the specification or vice versa, and any item not shown on either plans or specifications but which is obviously necessary as part of proper construction and/or finish, is to be considered as so shown or specified and is to be duly done as part of the contract. Any variations to plans or specifications to be agreed and recorded by the proprietor and the builder/contractor.

PLANS ON JOB:
The builder must at all times maintain on the job a legible copy of the plans and specifications,bearing the approval of the Municipal Authority concerned or Principal Certifying Authority.

STANDARDS
Where an Australian Standard (AS) or Australian New Zealand Standard (AS/NZS) is nominated in this specification then that nomination refers to the latest revision of that Standard unless the Building Code of Australia references a different revision.

EXCAVATOR - BCA part 3.1.

EARTHWORKS AND EXCAVATIONS:
All earthworks shall be designed and constructed in accordance with the guidelines of AS3798. Stormwater and other surface water drainage by underground piping or surface diversions shall be in accordance with AS/NZS3500.
All siteworks shall be in accordance with the Environmental Planning and Assessment Act and Regulations for siteworks for the erection of a building, safeguarding excavations, backfilling, preventing soil movement and supporting neighboring buildings. Drainage requirements must be determined according to the soil classifications BCA part 3.1.1.0 and part 3.2. Drainage in reactive soil areas must comply with the requirements of the clauses

FOOTINGS AND PIERS: BCA part 3.2.2
Excavate for all footings, piers, etc. to dimensions and minimum depth shown on plans or otherwise specified, or to depths necessary to secure solid bottoms and even bearing throughout similar strata. Bottoms of excavations to be level and stepped where necessary. Grade, fill and ram where necessary to receive concrete floors where shown on ground level.
At completion of foundations, all excavations to be filled, well rammed to ground level and surplus soil spread as directed. All seepage and soakage water to be effectively dealt with and diverted clear of the building. Excavate for and lay agricultural drains to back of walls retaining earth and to any other sections of foundations as may be necessary and/or directed.

ROCK EXCAVATIONS:
Should rock of any type be encountered in excavation of the works the cost of its removal is to be considered as an extra to the contract and charged for at a rate per cubic metre as indicated in the schedule of rates. The Proprietor is to be notified when rock is encountered in excavations.

CONCRETER - BCA part 3.2.3

All structural concrete shall be ready mixed and in compliance with AS3600, and unless otherwise specified on Engineers drawings, shall be of N20 grade.
The concrete shall be supplied by an approved firm and delivery dockets shall be kept on the job for inspection by the proprietor if he so desires. The concrete for minor works, where strength of concrete is not critical, such as paving on solid ground, may have a minimum compressive strength of 15MPA if unreinforced and 20 MPA if reinforced. Alternatively, such concrete may be mixed on site where the aggregate proportions and water/cement ratio can be controlled so that the required compressive strengths can be obtained.
All concrete work shall comply with the AS3600. Maximum slump shall be 80mm unless otherwise specified by Engineer. Concrete shall be carefully handled and placed to avoid segregation and shall be adequately compacted by means of mechanical vibrators or rodding and spading to ensure maximum compaction. Reinforcing mesh fabric to AS 1304 and all reinforcing bars mild steel grade unless otherwise specified.

FOOTINGS: BCA parts 3.2.3, 3.2.4 and 3.2.5
Where sites have soils or foundations of reactive nature or problem sites footings shall be approved by a practising structural engineer and in the case of known highly swelling soils or other unstable soils special precautions may have to be taken in the design and construction of concrete footings. In the case of concrete suspended floors to first floor it will be necessary for size of footings to be specified by a practising structural engineer. Footing sizes to be as per AS2870 part 1.
At completion of footing excavations fill to the underside of floor slab with approved hardcore so as to provide a minimum depth of 100mm. Such hardcore may be carried under minor interior footings if required. Cover areas as noted on drawings with waterproof membrane allowing sufficient at perimeters to extend membrane up face of footing to terminate under external brickwork.
Owners are advised that foundations and associated drainage of all buildings requires continuing maintenance to assist footing performance and advice is available in the CSIRO information sheet 10-91. It is the owners responsibility after occupation to maintain the site in accordance with this document.

TERMITE PROTECTION: BCA part 3.1.3
Where the building is being erected in a prescribed termite area and protection is required by regulation of local government or state authority then protection against subterranean termites shall be installed in accordance with AS 3660. Details of method of protection to be used shall be submitted where required, prior to commencement of building works. Written certification, signed by the installer, that the method used and the manufacturers specification complies with the Australian Standard shall be provided to the relevant authority and owner where required. A durable notice must be permanently fixed in a prominent location in the building prior to its occupation indicating: 1. The method and date of installation of the system and the need to inspect and maintain the system on a regular basis. 2. Where a chemical barrier is used, the life expectancy as listed on the National Registration Authority label and recommended date of renewal. Note that AS3660 and BCA lists the minimum acceptable level of protection only. Owners and/or builders may specify and install additional protection if desired

FORMWORK: All formwork for concrete shall be in accordance with AS 3610.

PATHS: (see AS 3727 for guide to residential pavement construction)
Provide paths as indicated on plans. Concrete to be as previously specified and surfaced with wooden float. Excavate for and lay paths to even grades, true lines and curves. Car tracks to be a minimum of 100mm thick and paths a minimum of 75mm. Provide expansion joints in paths at a maximum spacing of 1200mm with bitumen impregnated felt joining strips the full thickness of concrete with tooled V-joints above same.

CROSS SECTION DIMENSIONS OF REINFORCED CONCRETE FOOTINGS: for buildings with timber framed floors. for sites classified a or s according to AS2870.

CONSTRUCTION OF WALL	Normal thickness of wall to be supported (not more than)	Size of Concrete (width x depth)	
		For stable soil foundations Class A	Other foundations not subject to significant movement Class S
	mm	mm	mm
Brick, single storey with wall height not exceeding 4200mm excluding any gable.	270	400x300	400X400
	110	300x300	400x400**
Brick, two storey with external wall height not exceeding 7200mm excluding any gable internal wall height not exceeding 7200mm. ** use 11TM reinforcement Top and Bottom	270	400x400	400x500**
Brick veneer, single storey with wall height not exceeding 4200mm excluding any gable.	110	300x300	300x400
Brick veneer, two storey with external wall height not exceeding 7200mm excluding any gable.	110	300x300	300x400
Timber frame, single storey – foundation walling measured from the top of the strip footing.			
Up to 1500mm height	110	300x300	300x400
Exceeding 1500mm and up to 3000mm height	110	300x400	300x400

REINFORCEMENT FOR STRIP FOOTINGS	Width of Strip Footing	Minimum number of main wires per layer using 8TM or 11TM fabric	Minimum number of 10mm dia. bars per layer	Minimum number of 12mm dia. bars per layer
	300	3	3-Y10	3-Y12
	400	4	4-Y10	4-Y12

Where wall thickness exceeds as specified above, increase footing width to maintain the offset and provide additional bar or bars so that bar centres do not exceed 200mm, or an additional width of trench mesh, maintaining in all cases the required concrete cover.

CONCRETE FLOORS: BCA parts 3.2.3
Provide concrete floors where indicated on plans. Where not specifically detailed, floors are to be a minimum of 100mm thick, reinforced with No. F72 hard drawn reinforcing fabric set 32mm below top of concrete. Floor slabs to be full thickness and free from grooves and ridges. Finish surface in one operation as required for tiling or otherwise to fine finish with float or steel trowel and sponge. Thickness of floors shall be maintained under tiling recesses in all cases.
Note that in Climate Zones 6,7 and 8 the edges and underneath some concrete slab construction may require thermal insulation.
INTEGRAL FLOOR SLABS AND SLAB ON GROUND: BCA part 3.2.5
Grade whole area occupied by floor to a minimum depth as required to remove top soil and grass roots etc. Determine level of top of floor to habitable rooms, a minimum of 150mm above highest point of adjacent proposed external ground level (adjust for fill or general excavation as required) or as otherwise required by Local Council.
The external finished ground surface must be graded to drain water away from the building at a minimum slope away of 50mm over the first 1m as per BCA Part3.1.2.3
Excavate for perimeter and other main footings to minimum depths as shown on Engineers drawings or to depths necessary to obtain solid bottoms and even bearing throughout a similar strata. Allow for sufficient recess for brickwork if carried under main foorings so as to reduce the amount of concrete necessary, provided that the fill is retained from displacement under the footings (by a temporary earth bank or similar) and provided also that a minimum of 100mm depth of the same hardcore is provided under all footings in such case, roadbase or ungraded bluemetal is recommended as hardcore, coalwash is NOT to be used. Reinforce to Engineers detail and pour in one continuous operation in concrete Grade 20 unless otherwise nominated. Residential slabs and footings must be constructed in accordance with AS2870 as amended.
SUSPENDED REINFORCED CONCRETE SLABS:
All concrete slabs to separate areas within or adjoining a building generally of timber floor construction shall be suspended. Temporary formwork must be removed prior to final inspection. Permanent metal formwork approved by the lending authority may be used with slab sizes and reinforcement according to manufacturers recommendation. Suspended floor slabs to have minimum of 100mm bearing on at least two sides and spans are not to exceed 2100mm except where specifically detailed. Solid fill forming may be used under concrete floors (eg. laundry, garage) adjoining the building providing that the level of the top of the slab is not less than 50mm below antcap and/or dampcourse level of the main building. For spans exceeding 2100mm, slabs supporting walls, cantilever slab floors or where beams and columns are used to support the slab, a practising structural engineers details shall be submitted with the drawings and specifications.
PRESTRESSED BEAM FLOORING:
Prestressed beams for areas to be constructed by this method shall be delivered to site and stacked for storage on timber packers to avoid damage and where stacked one above the other the timber packers shall be positioned in verticle lines.
Beams shall be purpose made by the manufacturer for this particular project, designed in accordance with AS3600. Beams shall be individually marked for their respective location on the job and positioned in the work to comply with manufacturers key drawing. Cutting or drilling into beams or modification in any way shall be done only with the express authority of the manufacturer or their site representative.
Seating for beams shall be true to line and level before positioning beams commences to ensure even,uniform bearing and such seatings shall be not less in length than shown on the drawing or as follows :
Brickwork - bearing not less than 100m
Steel - bearing not less than 70mm.
Concrete - bearing not less than 75mm.
A.A.C. lightweight concrete external walls - bearing not less than 140mm.
Internal walls - full bearing across width of wall.
Spacing of beams and fibre cement infill panel placement shall be strictly to manufacturers detail. Topping slab concrete shall have a 28 day strength of not less than 20 MPA and thickness shall not exceed 50mm unless shown on the drawings. Reinforce with nominal F52 Mesh U.N.O.
Topping slabs shall be continuously cured for 7 days to prevent non structural cracking.

BRICKLAYER - (construction of masonry building shall be as per AS3700) BCA part 3.3

CLAY BRICKS:
To be sound, hard, of well burnt clay and shale and comply with specifications AS1225 'Burnt Clay and Shale Building Bricks'.
SAND LIME BRICKS:
To Comply with AS1654 'Calcium Silicate Bricks' and have a transverse strength no less than as per Specification AS1640 'Clay Bricks'.
CONCRETE BLOCKS OR BRICKS:
To comply with AS4455 Masonry Building Blocks/Pavers
SAND:
To be clean, sharp and free from all impurities. **CEMENT MORTAR:** To be one part fresh cement to 3 parts sand.
LIME MORTAR: BCA part 3.3.1.6
To be one part lime to 3 parts sand. Lime to be well slaked before use. **COMPO MORTAR:** To be one part cement, one part lime and 6 parts sand. All bricks to be well wetted before use. This not to apply to textured bricks. Footing courses to be grouted solid with cement mortar. All brickwork to be properly bonded, laid on full bed and all perpends filled. All piers are to be built solid and each course grouted as work proceeds. Carry up all work true and plumb to even gauge and in level courses the full height and thickness required. The brickwork faces above damp course level to be finished with neatly ironed or raked joints. Beds and joints to be kept to a reasonable thickness. Finish all other exposed brickwork faces with neat struck joints.

BUILD THE FOLLOWING IN CEMENT MORTAR; BCA part 3.3.1.6
All brickwork to underside of floor bearers level. All 110mm thick brickwork. All copings, steps, brick balustrade walls, sills, piers, wing walls, retaining walls. Bric'k Fences on alignment and/or brickwork under timber fencing also concrete blocks or bricks. **Build compo mortar:** All other Brickwork, including concrete masonry.
SLEEPER PIERS: BCA table 3.2.5.2.
230 x 230mm up to 1.5 high, footings are to be two courses of 350mm work. Where pier height exceeds 1.5m up to a maximum of 2.4m footings are to be two courses of 470 work and lower portion of pier to be 350 x 350. Concrete footings must be 500mm square and 200mm thick for an effective supported floor area of not more than 20m². All footings must have Engineers details for soil other than class A or S.
ENGAGED PIERS:
To be minimum of 230 x 110, spaced at not more than 1.8m centres up to 1200 high to support floor bearers and at similar centres to stiffen walls supporting concrete slabs. Piers over 1200 high to be 230 x 230. All engaged piers to be anchored to walls with specified wall ties.
VENEER WALLS: BCA 3.3.1.2
To be 110mm Brickwork built in Compo Mortar on foundation walls as previously specified. Internal faces to be 38mm from timber frames. Build in 3mm galvanised wall ties opposite each alternate stud, four courses above level of bottom plate, then every fourth course and spaced not more than 460mm horizontally and 610mm vertically or 610mm horizontally and 460mm vertically. Ties to be left open for attachment to studs. A cavity space of between 25mm and 50mm must be maintained throughout. Where thermal insulation is required to comply with Energy Efficiency requirements, clear cavity spaces must be maintained. Cavities and weep holes to be clean and clear at damp course level. All mortar droppings to be caught on paper or other material and removed before internal linings are fixed. Mortar joints on inside face walls to be flush with brickwork.
SPECIAL WALLS: (if shown on plans)
Walling not of timber. Veneer on-timber or masonry to be constructed as per Structural Engineers Detail and Certificate.
SINGLE LEAF MASONRY: (Garage Walls etc.)
Footings as per BCA part 3.2.5.1 engaged piers and reinforcing to be as per part 3.3.1.
ACCESS:
Adequate access in the external foundation wall must be provided with a weatherproof lockable door and crawl access is to be provided to all under floor areas.
VENTILATION: BCA part 3.4.1
Sub-floor areas shall be ventilated by means of evenly distributed openings with an unobstructed area of 7300mm2 per lineal metre of external wall. Where particle board flooring is used the unobstructed area shall be increased to 7500mm2 per lineal metre and evenly spaced. Ventilation of internal walls shall be a minimum of 22000mm 2/m run of wall. Vents to be immediately below bearers and similarly provide vents under verandah floors and suspended floor slabs. Sufficient cross ventilation to be provided through all walls below floors. No section of the under-floor area should be so constructed that is will hold pockets of still air. Appropriate special provision to be made where a gas bath heater is installed. Ventilation may be varied by Local Council

BRICK REINFORCEMENT:
In full brick cavity walls at two courses above level of the highest opening built into each 110mm thickness one continuous strand of 64 wide galvanised metal reinforcement lapped 100mm at joints and full width of layer at intersections.

ANT CAPS:
To all brickwork and piers, at the level of underside of floorbearers, ant capping of 0.5mm gauge galvanised steel or other approved metal is to be set, projecting 38mm beyond the internal faces of all brickwork and turned down at a 45 degree angle, lapped 13mm and soldered or crimped at all joints and corners so as to provide a continuous and effective barrier against termites throughout the length of the material. Whole of house protection against subterranean termite attack shall be installed in accordance with AS 3660.

TIES: BCA PART 3.3.3.1
Wall ties complying with AS/NZS2699 shall be used for all tie requirements. Corrosion protection and installation of wall ties is to comply with AS3700.

STEPS:
If shown on plan in bricks to match other exposed brickwork. To be built in solid work or where side walls are provided in consolidated filling. Treads are to be brick on edge, or pre cast concrete units with a maximum of 355mm going and a maximum of 190mm and minimum of 115mm rises.

LINTELS: BCA PART 3.3.3.4 AND 3.3.3.5
Provide galvanised mild steel angle iron or bars of the following sizes over openings to each 110mm thickness (or part thereof) of brickwork, all having a minimum of 110 bearing each end. All lintel angles to be placed with the longer leg vertical.

UPPER STOREY	EXTERNAL WALLS	INTERNAL WALLS
Up to 1210mm span	One 76mmx10mm bar	One 76mmx10mm bar
Up to 1570mm span	One 76x51x10 angle	One 76x51x10 angle
Up to 2410mm span	One 127x76x10 angle	One 127x51x10 angle
Up to 3010mm span	One 152x89x10 angle	One 152x89x10 angle

LOWER STOREY OR BASEMENT	EXTERNAL WALLS	INTERNAL WALLS
Up to 910mm span	One 76x76x10 angle	One 76x76x10 angle
Up to 1210mm span	One 102x76x10 angle	One 127x76x10 angle
Up to 1810mm span	One 152x76x10 angle	One 152x89x10 angle
Up to 2410mm span	One 152x102x10 angle	One 152x102x10 angle

FIREPLACE CHIMNEY and FLUES: BCA part 3.2.5.5. and 3.7.3

Reinforced concrete footings 300mm wider all round than brick construction to be provided. Build 110mm brick wall and/or corbel courses to support hearth. Non combustible material to be used for upper surface of hearth with a minimum thickness of 155mm and shall extend not less than 300mm beyond the front of the fireplace opening and not less that 150mm beyond each side of the opening. Local council may vary this requirement. Upper surface of hearth not to slope away from grate. Provide fireplace and chimney in position as shown and to the dimensions on plan. Mild steel bars or angles of suitable sizes and with a 110mm bearing at each end to support work over openings. Up to the level of 300mm above the underside of the arch or lintel, the back and sides of the fireplace to be constructed in two separate sections of solid masonry minimum 190mm thick not including cavity. Concrete masonry not permitted in construction of inner section, balance of walling to be minimum of 90mm thick. Flue to be rendered minimum 12mm thick. Mix; 1 cement, 2 lime, 10 sand or L.C. approved material. Chimney stack is to be not less that the height of the main roof ridge and is to be built in compo mortar. The flue is to be 250 x 250mm or one tenth of the area of the fireplace opening, whichever is the greater, gathered over to break daylight and pargetted to the full height. An 0.6mm galvanised steel tray, in one piece, holed for flue is to be set at level of one course above roof covering on the high side of the roof. The internal edges are to be shaped to form a quadrant gutter 25mm wide, sweated at corners. The tray is to project a minimum of 25mm beyond the external faces of brickwork turned up and/or down as required. Where the tray is turned up, a clearance of at least 6mm is to be maintained between the brickwork and the tray. Provide weep holes by leaving open vertical joints in brickwork above tray. Rake joints in brickwork ready to receive flashing to be provided by Plumber. A loose brick must be left on the back of the chimney stack. This brick must not be set until after the tray has been cleared of all mortar droppings.

HEATING APPLIANCES: Domestic type Oil, Gas and Solid Fuel heater installations shall comply with AS2918 'Domestic solid fuel burning appliances – Installation' or AS1691 'Rules for installation of domestic Oil Fired appliances' as applicable. Installation of gas fired appliances shall be carried out by a licensed gas plumber.

DAMPCOURSE: BCA part 3.3.4
Provide a continuous run of L.C. Approved dampcourse material to full width of wall thickness on all brickwork at level not higher than bottom of floor bearers and engaged piers. Dampcourse material is to be run in long lengths, lapped minimum 100mm at joints and full width at all intersections. To wall surrounding concrete and/or solid floors an additional run of dampcourse is to be laid, one full course above floor level and stepped down to meet lower dampcourse where other walls abut walls of bathroom, shower recess or laundry. Damp proof courses and flashings shall be installed to give performance as specified in AS/NZS 2904.

VERMIN PROOFING:
13mm mesh galvanised bird wire to be built into brickwork and taken across cavity and secured to bottom plate.

FLASHING:
L.C. approved dampcourse material to be built in under all window sills 25mm at back of wood sill and 50mm at each end of same. Flashing to be bent down across cavity and built 25mm into veneer wall. L.C. approved dampcourse material to be built in over all exposed window and external door openings.

WEEP HOLES:
Perpend joints are to be left open in exterior brick walls spaced approx. 600mm in course immediately over flashings of all exposed openings and to brick retaining walls, fender walls etc. as required. See Bushfire Clauses for protection of weep holes in bush fire areas.

RETAINING WALLS:
Retaining walls not specifically detailed, and foundation walling required to retain earth, are to be a minimum of 230mm thick, up to a height of 750mm of retained earth. Cavity walls used to retain earth are to have the leaf adjacent to the retained earth a minimum of 230mm thick, to a maximum of 900mm of retained earth height. All to be properly bonded (see 'Bonded Walls') and provide with a properly constructed agricultural drain to the earth side of retaining wall. For walls in excess of the above heights of retained earth, an Engineers detail will be required.

BONDED WALL:

Solid brick walls more than one brick width which are used to retain earth or are otherwise noted as 'Bonded Walls', shall be bonded throughout the thickness of the wall by either header bricks or equivalent tying. Where header bricks are used every sixth course shall be a header course or there shall be at least one header or

equivalent tie to every 0.13sq metres (every third course at 480mm centres) Walls 350mm or more in thickness shall have overlapping headers or ties to provide a continuous tie through the wall.

CAVITY WALLS:
Walls indicated as cavity walls to be constructed with two leaves 110mm thick spaced nominally at 60mm apart. Where thermal insulation is required to comply with Energy Efficiency requirements clear cavity spaces must be maintained. Connect the two leaves with wall ties as per AS2699 set nominally 600mm apart in every fifth course. Ties to be embedded a minimum of 50mm in each leaf. Keep ties clean of mortar droppings and cavity clear as work proceeds.

STRAPS:
BCA part 3.3.3To full brick cavity walls, secure door and window frames with 1.6mm galvanised iron straps set in brickwork. Straps to be 25mm wide and at least 300mm long, where practicable and spaced at a maximum of five courses apart. Set 25mm x 1.6mm galvanised iron straps 1800 apart and 1200mm down cavity with ends turned 75mm into brickwork to secure wall top plates.

COMPLETION:

Clean all cavities. Wait upon and make good after other trades. Replace all damaged and defective bricks. Clean all exposed brickwork with diluted spirits of salts, or as otherwise recommended by brick manufacturers, wash down with clean water and leave free from cement and mortar stains.

BRICKLAYER (Concrete brick) A.S. 1346 - BCA part 3.3.1

MORTAR: For normal conditions mortar to consist of:

	Above Dampcourse:	Below Dampcourse:
	1 part cement	1 part cement
	2 parts lime or lime putty	1 part lime or lime putty
Mortar mixes must comply with A.S. 3400 (BCA parts 3.3.1.6 and 3.3.1.7	9 parts clean sand	6 parts clean sand

The substitution of other plasticisers for lime is not recommended. Under no circumstances should the proportion of cement be increased.

GENERALLY:
Bricks are to be dry when laid in wall. When delivered on site bricks should be stacked openly and off wet ground and where practicable to be covered in wet weather. Footing courses to be grouted solid. All brickwork to be properly bonded, laid on full bed and all perpends filled.

JOINTS: BCA part 3.3.1.7

Finish all external brickwork and internal feature walls with raked joints. Finish all other brickwork with neat struck joints. U.N.O.

JOINT REINFORCEMENT AND CONTROL JOINTS: BCA part 3.3.1.8 and 3.3.1.9

In addition to reinforcement over openings as later specified provide joint reinforcement in bed joints at vertical spacings not exceeding 600mm. Control joints, providing a continuous vertical separation through the entire thickness of the wall, are to be provided where indicated on plans or where walls exceed 9m in length, as close as practical building will permit. Reinforcement not to extend across control joints.

AUTOCLAVED AERATED CONCRETE BLOCKS:
GENERALLY:
Lightweight blockwork shall be Autoclaved Aerated Concrete blocks consisting of sand, cement and lime and shall be installed to areas as indicated on drawings. Site provisions for storage of materials and for the mixing of adhesive shall be as recommended by the manufacturer.

WORKMANSHIP:
Fixings, fastenings, anchors, lugs and the like shall be of a type approved by the manufacturer and shall transmit the loads and stresses imposed and ensure the rigidity of the assembly. Block laying shall be in accordance with the manufacturers current published specifications.

TOLERANCES:
Maximum planar misalignment shall be 2mm along butt joints. The thickness and width of walls shall not vary by more than 5mm from design sizes. Deviation from plumb, level or dimensional angle must not exceed 5mm per 3.5m of length of member or 6mm in total run in any line.

INSTALLATIONS:
All lightweight blockwork shall be installed using thin bed adhesive mortar to all horizontals and perpends. The first course must be made true and level using a normal thick bed mortar with thin bed adhesive to fully seal the perpends. All thin bed adhesive shall be applied using a recommended notched trowel to obtain an even distribution of adhesive to achieve joint thickness of 2-3mm. All lightweight blockwork shall be laid in a format that the vertical joint of the lower course must be staggered at least 100mm relative to the vertical joint of the overlaying course. A slip/joint bond breaker must be installed between the first course and the foundations or slab on all internal and external walls to allow for differential movement between the blocks and the supporting structure. Build in as necessary all flashings, reinforcements, arch

bars, lintels, frames, straps, bolts, lugs, wall ties, metalwork, precast units, sills, partitions, joists and the like. Carefully set out and leave openings for other trades to eliminate cutting.

CONTROL JOINTS: BCA part 3.3.1.8

Control joints should be built into walls at no greater than 8m centres and at locations in accordance with the recommendations of the manufacturer. Masonry expansion ties shall be installed across the joint every third course.

COMPLETION:

On completion clean out all blocks, mortar, droppings, debris etc. and remove all scaffolding, make good all put-log holes and other blemishes and leave all work in perfect condition and protect until handover.

CONCRETE BLOCK and REINFORCED MASONRY: AS 3700 - BCA part 3.3.2

GENERALLY: All masonry units shall comply with AS1500 'Hollow Load Bearing Concrete Units'. Masonry shall be stacked on planks off the ground and in wet weather shall be covered with tarpaulins or otherwise kept dry. At the end of each days work the top of the wall shall be covered with tar paper, polyethylene sheets or by other means protected from becoming excessively week. Masonry units shall not be dampened prior to laying, but shall be laid in dry state.

MORTAR: BCA PARTS 3.3.1.6 AND 3.3.1.7

Mortar shall comply with AS123 in all respects. Plasticisers may be used when approved and where tests show the mortar with plasticisers meets the requirements of these specifications.

CONSTRUCTION BEDDING:

All face and end joints shall be fully filled with mortar and joints shall be squeezed tight. Slushing of mortar into joints shall not be permitted. The first course of blocks shall be laid in a full bed or mortar.

JOINTS:

Joints on all exposed surfaces shall be as specified. The joint shall be formed by striking the mortar flush and after it has partially set, tooling with the proper shaped tool to adequately compact the surface. The tool shall be of sufficient length to form a straight line free from waves. Internal joints shall be ironed. Where flush joints are left exposed, they shall be first compacted, then repointed and excess mortar removed. Joints shall be 10mm thick unless otherwise specified or directed.

PATTERNS AND BOND:

All walls shall be built plumb, true and level, to the thickness shown on the plans and with the pattern indicated, or running bond U.N.O.

CONTROL JOINTS:

Shall be located where shown and shall form a continuous vertical break from top to bottom of wall or from bond beam. Provision shall be made for adequate lateral stability. Joint shall be filled with mortar, raked back 16mm and pointed with a non-hardening plastic filler. No reinforcing shall be carried across control joint.

JOINT REINFORCEMENT: BCA part 3.3.2.3.

Reinforce every 600mm in height and in the two courses immediately above and below window openings. Lap mesh at least 150mm at all joints and intersections except at control and expansion joints where a slip joint must be provided.

BRACING DURING CONSTRUCTION:

Masonry walls constructed in locations where they may be exposed to highwinds during erection shall not be built higher than ten times their thickness unless adequately braced, or unless provision is made for prompt installation of permanent bracing such as intermediate floor or roof structure. Back filling shall not be placed against foundation walls or retaining walls before mortar or grouting has sufficiently hardened, or before wall has been permanently braced to withstand horizontal pressure.

WEATHERPROOFING: BCA part 3.3.4

All concrete masonry walls exposed to the weather or below ground level shall be adequately water proofed, using an approved paint or other coating and applied in accordance with the directions of the manufacturer.

CLEANING:

During the progress of the work, every effort shall be made to keep walls, that are to be left exposed, clean. Mortar smears shall be allowed to dry for a short period and shall then be promptly removed by trowel or wire brush or both. Care shall be taken to avoid damage to the mortar joint when brushing. Mortar burrs shall be promptly removed. At the conclusion of the work, walls shall be cleaned down, all scaffolding and debris removed and the wall left in good clean condition

BUSHFIRE PRONE AREAS – BCA 3.7.4

Performance requirements are satisfied for a class 1 building located in a designated bushfire prone area if constructed in accordance with AS3959.

N.S.W. Variation: (a) AS3959 – Construction of buildings in bushfire prone areas, excluding section 2 of that standard which is replaced by "Planning for Bushfire Protection, appendix 3 – Site Assessment for Bushfire Attack.

OR (b) subclause (a) as modified by development consent following consultation with NSW Rural Fire Service under sec. 79B of the Environmental Planning and Assessment Act 1979

OR (c) subclause (a) as modified for development consent with a bushfire authority issued under section 100B of the Rural Fires Act 1997

CONSTRUCTION OF CLASS 1 BUILDINGS as per acceptable methods in BCA clause 3.7.4.1 (for information only)

BUILDING COMPONENT	BUSH FIRE ATTACK CATEGORY		
	MEDIUM	HIGH	EXTREME
Flooring system	(a) Concrete slab on ground (b) Suspended concrete floor (c) Framed floor with all joists and bearers above 600mm above ground (d) Framed floor where timbers are less than 600mm above ground (i) All timbers fire retardant OR (ii) subfloor space fully enclosed as per the wall above OR (iii) fully enclosed with non combustible material or 6mm thick F.R. cement sheets	As per medium requirements	As per medium requirements except that where bearers and joists are greater than 600mm above ground and not enclosed, all timbers must be fire retardant treated or sheeted underneath with non combustible material.
Supporting posts, piers stumps, poles (except where enclosed as per flooring systems)	(a) Non combustible material (b) Fire retardant treated timber to 400mm above ground (c) Timber mounted on 75mm high stirrups	As per medium requirements	As per medium requirements except that all timber is to be fire retardant treated
External Walls	(a) Masonry, concrete or earthwall (b) Framed wall with (i) sarking having a flammability index not more than 5 OR (II) an insulation material of that standard (c) Timber logs with all joints between the logs planed and sealed (d) Combustible sheet cladding if cladding within 400mm of ground is covered by non combustible sheet material	As per medium requirements except that:- (a) P.V.C. cladding must not be used: and (b) Timber wall cladding must be fire retardant treated	As per high attack category
Windows	The openable part of a window must be screened with aluminium, steel or bronze corrosion resistant mesh with 1.8mm max. aperture size.	As per medium requirements except that: (a) timber must be fire retardant treated except if enclosed by non combustible shutters (b) Leadlight windows must be protected with non combustible material or toughened glass (c) Window screens must not be aluminium	As per high requirements except that windows not protected by non combustible shutters shall be glazed with toughened glass
External doors	External doors must be fitted with (a) weather strips or draught excluders to prevent build up of burning debris and (b) tight fitting screen doors with corrosion resistant mesh as per windows	As per medium requirements except that (i) aluminium mesh must not be used and (ii) leadlight panels must be protected by non combustible shutters or panels	As per high bushfire requirements except that:- (a) Timber doors must be fire retardant treated OR (b) Protected by non combustible shutters OR (c) Solidcore doors min.35mm

Vents and weepholes	Vents and weepholes must be protected by spark guards of corrosion resistant 1.8mm max. mesh size aluminium, steel or bronze	As per medium category except that aluminium mesh must not be used	As per high category requirements
Roof covering, eaves and fascias	(a) Timber shakes or shingles are not allowed. (b) Sheet roofing must be metal or fibre reinforced cement (c) Seal gaps under corrugations at wall or eaves line by (i) fully sarking roof OR (ii) corrosion resistant mesh as per weepholes or profiled metal sheet or mineral wool (d) Hip and ridge capping must be preformed with no gaps or gaps sealed as per (c) (e) Roof wall junctions must be sealed by: (i) fascia and eaves lining OR (ii) sealing to u/side of roofing at wall line with non combustible material (f) Tiled roofs must be fully sarked (including ridge) with sarking directly under tiling battens. All sarking must have Flammability Index less than 5	As per medium requirements except that (a) all roof sheeting must be non combustible and sarked: and (b) Timber eaves lining and/or trimming strips must be of fire retardant treated timber: and (c) Fascias must be non combustible or fire retardant treated.	As per high category requirements except that:- (a) Fibre reinforced cement or aluminium sheet must not be used for roof sheeting or fascias: and (b) Aluminium must not be used for eaves linings
Roof lights	(a) rooflight penetrations and shafts must be sealed with non combustible sleeve and linings (b) A rooflight may be of metal framed thermoplastic provided that the diffuser at ceiling level is wired or toughened glass in a metal frame (c) Vents in rooflights must have a steel or bronze mesh screens with 1.8mm max aperture size	As per medium requirements, except that: (a) roof light glazing must be wired glass (Thermo plastic or toughened glass must not be used)	As per the requirements for high category attack
Roof Ventilators	All components of roof ventilators, including rotary ventilators must be of non combustible materials and ventilation openings must be protected by 1.8mm max. aperture size non corrosive steel or bronze screens.		
Gutters and downpipes	Must be constructed of non combustible materials including materials or devices to stop leaves collecting or clogging.		
Verandah and decks	Supporting posts, columns and piers and external walls must comply with previous requirements as per this table for all categories. If sheeted or tongue and grooved solid flooring is used, the flooring system must comply with previous requirements for flooring systems.		
	(a) spaced timber deck flooring (i) gaps in deck strips must not be less than 5mm (ii) the perimeter of the deck must not be enclosed (iii) The deck flooring must be seperated from main building so fire will not spread	(a) spaced timber deck flooring must be fire retardant treated.	(a) as per high category except that all timber (including balustrades) must be fire retardant treated or all materials must be non combustible

NOTES:
(a) Fire retardant timber must comply with requirements of AS/NZS3837. Some timber varieties naturally meet the Ignition and Heat Radiance Parameters when tested to ASTM D2898 Method B without haveing to be fire retardant treated.
(b) External timbers in a verandah patio, deck or the like are regarded as protected also if they are under a roof or similar structure that projects to a line at an angle of 30° off the vertical from the base of the wall
(c) Where roofing systems are fully sarked, mesh protected vents may be necessary to reduce condensation in some areas.
(d) Where sub floor areas are enclosed termite protection must not be compromised.

ENERGY EFFICIENCY – BCA part 3.12

Performance provisions of the BCA part 2.6 requires that a building must have a level of thermal performance so that greenhouse gas emissions are reduced using energy efficiently . This level of thermal performance must facilitate the efficient use of energy for cooling and heating. This will be achieved by selection of materials and methods of construction of Building Fabric, External Glazing, Building sealing, Air movement and services as best suited to the particular Climatic Zone in which the building is sited. Map of Australian Climate Zones for Thermal Design can be viewed on the Australian Building Code Boards website at www.abcb.gov.au

R-Value is the Thermal Resistance of a component to heat and cold movement. Thermal movement is upwards or downward through a roof or a combination of both.

THERMAL RESISTANCE: minimum TOTAL R-Value required for various climatic zones									
BUILDING COMPONENT	CLIMATE ZONE								
ROOFS	1	2 - Altitude less than 300	2 - Altitude 300m or more	3	4	5	6	7	8
Direction of heat flow	Downwards		Downwards and upwards		Upwards				
Minimum Total R-Value required	2.2	2.2	2.5	2.2	3.0	2.7	3.2	3.8	4.3

BUILDING COMPONENT	CLIMATE ZONE							
WALLS	1	2	3	4	5	6	7	8
Minimum Total R – Value required	1.4			1.7	1.4	1.7	1.9	2.8
QLD. Variation minimum Total R-Value	1.0			n.a.	1.4	n.a		

Special Condition apply to two storey houses

FLOORS CLIMATE ZONES	6	7	8	
Suspended floors without heating and unenclosed around perimeter	1.0	1.0	2.5	Enclosed perimeters and heated slab floors have special requirements. Consult authorities

Added insulation to achieve minimum R-Values for various climate zones can be: (a) Reflective Insulation or (b) Bulk insulation or a combination of both. Reflective Insulation must be installed with not less than 20mm air space between the more reflective side and a building lining or cladding (note: cavity clearances are not to be reduced) and closely fitted against any penetration and or door/window frame, be adequately supported and overlapped to adjoining sheet not less than 150mm.Bulk insulation must be installed so that it maintains its position by not slumping and forming voids and must abut other installation or building members. Care should be taken that insulation does not interfere with the safety or performance of services or fittings. Insulation as manufactured must comply with AS/NZS4859.1.

R-VALUE OF INSULATION TO BE ADDED TO BUILDING COMPONENT TO MEET TOTAL R-VALUE REQUIRED									
ROOF TYPE	ROOFS	CLIMATE ZONE							
		1,2 Below 300m AHD altitude	1,2 at or over 300m AHD	3	4	5	6	7	8
Minimum required Total R-Value for roofs		2.2	2.5	2.2	3.0	2.7	3.2	3.8	4.3
FLAT ROOF, SKILLION ROOF AND CATHEDRAL CEILING – CEILING LINING UNDER RAFTERS									
TILED	Total R-Value of roof materials	0.4 downwards	0.4 down and up		0.40 upwards				
	Minimum R-Value of insulation to add	1.8	2.1	1.8	2.59	2.29	2.79	3.39	3.89
FLAT ROOF, SKILLION ROOF AND CATHEDRAL CEILING – CEILING ON TOP OF EXPOSED RAFTERS									
TILED	Total R-Value of roof materials	0.4 downwards	0.41 down and up		0.41 upwards				
	Minimum R-Value of insulation to add	1.79	2.09	1.79	2.59	2.29	2.79	3.39	3.89
FLAT CEILING WITH PITCHED ROOF – CAVITY ROOF SPACE									
TILED	Total R-Value of roof materials	0.7 downwards	0.35 down and up		0.35 upwards				
	Minimum R-Value of insulation to add	1.5	2.15	1.85	2.65	2.35	2.85	3.4	3.95
FLAT ROOF, SKILLION ROOF AND CATHEDRAL CEILING – CEILING LINING UNDER RAFTERS									
METAL	Total R-Value of roof materials	0.38 downwards	0.35 down and up		0.39 upwards				
	Minimum R-Value of insulation to add	1.82	2.12	1.82	2.61	2.31	2.81	3.41	3.91
FLAT ROOF, SKILLION ROOF AND CATHEDRAL CEILING – CEILING LINING OF TOP OF EXPOSED RAFTERS									
METAL	Total R-Value of roof materials	0.37 downwards	0.37 down and up		0.39 upwards				
	Minimum R-Value of insulation to add	1.83	2.13	1.83	2.61	2.31	2.81	3.41	3.91
FLAT CEILING WITH PITCHED ROOF – CAVITY ROOF SPACE									
METAL	Total R-Value of roof materials	0.5 downwards	0.4 down and up		0.4 upwards				
	Minimum R-Value of insulation to add	1.7	2.1	1.8	2.6	2.3	2.8	3.4	3.9

A roof must achieve the minimum Total R-Value specified. In Climate Zones 1,2, and 3 pitched roof material with a flat ceiling must have a Solar Absorptance value less than 0.55, RBM installed below the roof and the roof space ventilated by roof, gable, eaves or ridge vents that allow an unobstructed air flow with no dead air spaces, Vents must have a total fixed open area of not less than 1% of the ceiling area. OR not less than 2 wind driven ventilators in association with fixed vents subject to approval.

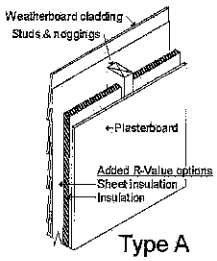
TYPICAL SOLAR ABSORPTANCE VALUES OF COLOURED ROOFS

Slate (dark grey)	0.9			Light Grey	0.45
Red, Green	0.75	Zinc Aluminium (dull)	0.55	off white	0.35
Yellow, Buff	0.6	Galvanised steel (dull)	0.55	Light Cream	0.3

EXTERNAL WALLS
An external wall must achieve the minimum Total R-Value for the relevant Climate Zone or in Climate Zones 1,2 and 3 to be shaded by a verandah, balcony, carport eaves and gutter or the like. The horizontal projection from the external face of the building must be not less than one quarter of the overall height of the wall measured from the internal floor vertically to the underside of the projection. This applies to all stories. NOTE: In Climate Zones 4,,5,6,7 and 8 all walls must achieve a surface density of not less than 220 Kg/m2 and in Climate Zone 6 be constructed on a flooring system that is in direct contact of ground i.e. concrete slab or in Climate Zones 6,7, and 8 incorporate insulation with an R-Value not less than 1.0 to the edges and underneath the slab.
These requirements to not apply to South facing walls in Climate Zones 1,2 and 3 south of latitude 20° south

R-VALUE OF INSULATION TO BE ADDED TO BUILDING COMPONENT TO MEET TOTAL R-VALUE REQUIRED					
TYPICAL WALL CONSTRUCTION	R - VALUES	CLIMATE ZONE			
		1,2,3,5	4,6	7	8
	Minimum required Total R – Value for Walls	1.4	1.7	1.9	2.8
(A) Weatherboard: minimum 70mm Timber Frame	Total R-Value of Wall Materials	0.47			
	Minimum R-Value of insulation to add	0.93	1.23	1.43	2.33
(B) Cement or Metal Sheet 70mm timber frame	Total R-Value of Wall Materials	0.4			
	Minimum R-Value of insulation to add	1.0	1.3	1.5	2.4
(C) Clay Masonry Veneer minimum 110mm Veneer	Total R-Value of Wall Materials	0.54			
	Minimum R-Value of insulation to add	0.86	1.16	1.36	2.26
(D) Concrete Block Masonry minimum 140mm Masonry	Total R-Value of Wall Materials	0.52			
	Minimum R-Value of insulation to add	0.88	1.18	1.38	2.28
(E) Cavity Clay Masonry 110 ext. veneer, 90mm internal (min)	Total R-Value of Wall Materials	0.67			
	Minimum R-Value of insulation to add	0.73	See note above		
(F) External insulated Clay Masonry Minimum 110 mm masonry	Total R-Value of Wall Materials	0.5			
	Minimum R-Value of insulation to add	0.9	1.2	1.4	2.3
(G) External insulated Corner Masonry minimum 140mm thick	Total R-Value of Wall Materials	0.48			
	Minimum R-Value of insulation to add	0.92	1.22	1.42	2.32
(H) Auto Claved Aerated Masonry minimum 200mm thick	Total R-Value of Wall Materials	1.73			
	Minimum R-Value of insulation to add	Nil	Nil	Nil	1.07

See diagrams next page for wall construction types A to H.



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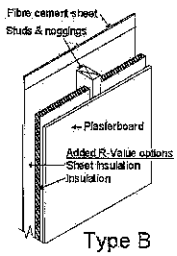

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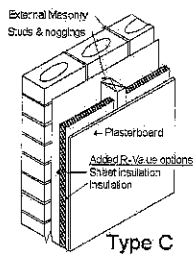

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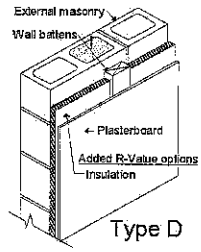

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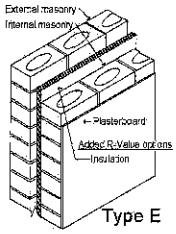

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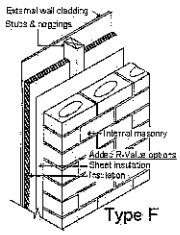

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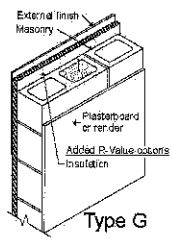

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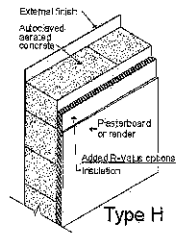


Type H

ENERGY EFFICIENT EXTERNAL GLAZING – BCA part 3.12.2
This part of the BCA applies to Class 1 buildings and class 10a buildings with a conditioned space.
Acceptable Construction Practice: The effective glazing area of a building must not exceed the percentages of the building area as per BCA Table 3.12.2.1. This table defines the maximum effective glazing area (Total glazed area of all windows in a storey) as a percentage of the total floor area of a storey. The glazing area limits listed provide only the minimal protection against overheating (heat flow into the building via the glazing) and heat loss (through the glazing) in cold conditions. The heat loss or gain can be controlled by siting of windows, shading, use of protective films, double glazing with air or gas fill in a sealed unit, and size of windows. Window manufacturers can supply windows to suit the requirements for the site Climate Zone and the window construction depends on shading of the glazed area by verandahs, balcony, fixed canopies etc. or a shading device. A shading device must restrict at least 80% of the solar radiation when in use and can be a shutter, blind, vertical or horizontal screen with blades, battens, slats etc. and be adjustable by the building occupants. Where necessary the nomination of glazing types, window locations, shading etc. should be carried out by an approved specialist.
NSW requirements to comply with BASIX Specifications are selectable in Nathers 2.32A

CARPENTER

GENERALLY:
All timber shall comply with the appropriate standard as listed below. Timber sizes to comply with AS1170.2 for serviceability and Design Wind Gust Velocities (permissible stress) of 33 M/s minimum. Substitution of some members may be required for higher Gust Wind Velocities and advice of local authorities Building Department or Structural Engineer should be sought as whether design to W41N or higher is required.
STRESS GRADES:
Visually Stress Graded Timber: Timbers whose species or place of growth is known may be visually graded for quality in accordance AS 2082.
Mechanically Stress Graded Timber of required stress grade according to AS/NZS 1748 may be used regardless of species.
Seasoned Timbers: All timber shall be regarded as seasoned only if its moisture content does not exceed 18 per cent.
FRAMING : BCA part 3.4.3.
Timber sizes in this specification are based on AS1684.4 Simplified Non-cyclonic areas with restrictions as follows: Maximum wind classification N2 (33m/s) - maximum roof pitch 30°- maximum building width 12.0m - maximum rafter overhang 750mm - maximum wall height at ext. walls, floor to ceiling 2400mm. The sizes are for information only and should not be used for construction. All design for a structure within these limits should be carried out by reference to AS1684.4
NOTE: for wind classification N3 (W41N) and N4 (W50N) Non-cyclonic areas with building widths 12.0m and up to 16.0m and with roof slopes exceeding 30° and up to 35°, design according to AS1684.2 is required
FLOOR FRAMING:
Ground floor timbers shall be only of hardwood, cypress pine or pressure treated Radiata or Canada Pine below a height of 300mm above finished ground level and must not be built into brickwork. Subfloor ventilation shall conform to BCA part 3.4.1. In Bushfire Prone Areas special conditions apply.
ANT CAPS:
To all brickwork and piers, at the level of underside of floorbearers, and capping of 0.5mm gauge galvanised steel or other approved metal is to be set, projecting 38mm beyond the internal faces of all brickwork and turned down at a 45 degree angle, lapped 13mm and soldered or crimped at all joints and corners so as to provide a continuous and effective barrier against termites throughout the length of the material. Whole of house protection against subterranean termite attack shall be installed in accordance with AS 3660.1
BEARERS:
Bearers should be laid in straight and normally parallel lines with top surfaces arranged to give level bedding for joists. Unless specifically noted as otherwise, bearers shall be located directly under all loadbearing walls, except where walls are located at right angles to line of bearers, in which case piers or other approved supports shall be provided for bearers at points where they cross under such walls. Bearers having minor excesses in depth shall be brought to required level by checking out underside over supports. Packing is to be avoided but where there is no alternative, corrosion resistant and incompressible sheet material over full area of contact may be permitted. Bearers having not more than permitted spring shall be placed so that they tend to straighten under loading. Joints in bearers, unless specifically detailed otherwise, shall be made only at points of support on which adequate bearing for both members can be provided and the joint shall be secured by means of bolting or spiking against displacement or separation.
JOISTS:
Joists shall be laid over bearers in straight and normally parallel lines with top surfaces set accurately to a common level to receive flooring. Underside of joists having minor excesses in depth to be notched out over bearers to obtain required common level. Packing may be employed if unavoidable similar to that for bearers, such packing to be securely fixed. Joists having not more than the permitted amount of spring shall be laid so that they tend to straighten under loading. Joints, unless specifically detailed, shall be made only over bearers or other supports. Joints occurring in joists which parallel and support wallplates shall be made at points of support which provide adequate bearing for both ends which shall be butted or scarfed to maintain a straight line. Posts shall be securely skew nailed;, from both sides to bearers at all points of support

Where floor joists abut solid masonry or concrete walls, they shall be supported on timber wall plates or bearers carried on walling, off-sets or attached piers; where such method is not practicable and height of floor is more than 1800mm above ground the ends of joists or bearers may bear in pockets formed in the wall which allow at least 12mm clear air space at sides and ends of members and provide solid bearing at least 100mm in depth.
Where the unsupported span of deep joists exceed 2700mm, 50mm x 50mm herringbone strutting or solid blocking of 25mm min thickness shall be provided in continuous rows between joists at not more than 1800mm centres.

STUDS:
Housings or notchings to accept bracing, noggings, trimmers, lintels etc. may be made in any face of stud, providing that their depth does not exceed 10mm and the studs are designed as notched studs. Notches into stud depth are to be max. 20mm for diagonal cut in bracing only and providing also that where notchings or housings are made on opposite faces of the same stud, they shall be spaced not less than twelve times the width of the stud apart.
A stud to the side of openings may however have material equal to half its depth removed over an area sufficient to accept a head or lintel member, providing always that the head or lintel member continues through and is housed into the next stud adjoining the jamb stud.
Studs to sides of openings and studs supporting concentrated loads shall not be cut or notched except as permitted above. Junctions of loadbearing walls shall be framed with three studs. Well blocked and spiked together or with a solid post equal to the depths of intersecting walls.
In brick veneer construction framing of wall junctions with two studs is acceptable providing that such studs are joined at not less than 800mm centres along their height by securely spiking blocking pieces exceeding 200mm in length. Where corners are interrupted by windows the structural corner mullion shall be not less than 100mm x 100mm timber, or equivalent steel section.
Studs to side of openings shall have a depth equal to that of the common stud, except that double studs may be used providing that their total thickness is not less that the required single stud and that the studs are well spiked together. All notchings in studs shall comply with AS1684.4 table 6.1.

WALL PLATES:
Wall plates shall be in long lengths to each panel of walling and shall be not less than the size or lower in grade than common studs used in the particular wall section. Trenching shall be max. 3mm deep unless the design uses span tables based on remaining depth. Where plates are machined gauged to a uniform thickness trenching may be omitted. Where due to the use of different centre-to-centre spacing for studs and floor joists or for any other reason the points of support offered by joists, blocking pieces or concrete floors is not vertically over studs then a 75mm thick top plate shall be used in combinations as shown in AS1684.
Where roof trusses supporting tiled roofs are placed more than 50mm from wall studs, minimum thickness of top plates shall be 75mm unless otherwise specified hereunder. Where top plates are required to bear a major load arising from a roof strut, strutting beam, long span deep joists or the like, such loading shall be only at points immediately above a supporting stud, post or column. Where this is not practicable plate is to be adequately stiffened and the load distributed to adjoining studs by means of super imposed blocking pieces, close noggings from below or other approved means.
Where bottom plates are required to carry a stud to the side of an opening or a stud bearing a major load mentioned above the plates shall be supported by a joist, a blocking piece or a concrete floor slab directly beneath the point or points at which such studs are located.

EAVES BEAMS AND VERANDAH PLATES:
Eaves beams and verandah plates shall be provided to support rafters or trusses over full height openings or recesses in walls or over verandahs or porches covered by main roof structure. Any reduction in nominal size through mill dressing or scalloping shall be allowed for so that the minimum size listed is not reduced. The ends of eaves beams and verandah plates that are supported on stud wall shall be carried by studs or stud groups as for heads for equivalent spans. End fixing shall provide resistance to uplift or displacement. Verandah Posts to be not less than 100mm x 100mm in timber F11. If supporting roof loads they shall be as per AS1684.2.

ROOF FRAMING:
Pitch of roof is to be as shown on plans and length of rafter to longest ridge to be gauged to suit full tile courses.
Roof timbers are to be seated on timber wall frames, positioned so that they are adequately supported. Where supported on masonry walling, they are to be attached to timber wall plates of minimum dimensions 75mm x 38mm unless anchored directly to masonry. Wall plates to be secured to masonry as previously specified under bricklayer, where straps are used such straps are to be drawn snugly over and secured to top of plate. See bricklayer clauses for straps locations.

ROOFING BATTENS: Supporting roofing only. (Note: roofing battens are not suitable for the safe support of workers prior to fixing roof cladding). Battens should be continuous over a minimum of two spans and their design to suit rafter/truss spacing and batten spacing must be in accordance with AS1684 for the allowable roof mass.

CEILING JOISTS:
Joists shall be in single lengths where practicable, positioned beside and in direction of main rafters where practicable.
Secure to hangers with 35mm x 32mm timber cleats, MGP10 (seas.), strapping of 25mm x 1.7mm galvanised iron or equivalent fasteners. Provide ceiling joists as shown in tables or AS1684.4 supported from hanging beams so that their span does not exceed 2.4m where joist is continuous over two spans, otherwise reduce span to 2.lm. Provide ceiling battens 38mm x 25mm at 450 centres in timber grade F4 or better where required.

HANGING BEAMS:
End bearing of hanging beams shall be the full width of wall plates and they shall be positioned either directly over a stud or their load adequately distributed to stud by intermediate blocking or local reinforcement of wall plate. Where length of hanger exceeds 4.8mm the hanger is to be supported by a beam as for Strutting Beams and the size of hanger is to be governed by new span. (Roof not to be strutted off hangers or beam supporting hanger).

RIDGE BOARDS:
Ridge boards used in coupled roofs of simple construction, where they are not required to be strutted or propped and where opposing pairs of rafters are not separated by more than their own thickness at either side of their ridge junction, shall be 50mm greater in depth than rafters x 19mm thick. Otherwise they shall be 50 greater in depth and 35mm thick

VALLEY BOARDS:
Shall not be less than 19mm thick and of sufficient width to adequately support valley gutters.

UNDERPURLINS:
Underpurlins shall be in single lengths where possible and in straight runs at right angles to direction of rafters. Where splices cannot be avoided, joint shall be halved, lapped and spiked together at point of support. Ends of underpurlins shall not project (cantilever) beyond a support by more than 25 per cent of span distance of normal supports.

STRUTTING BEAMS:
Strutting beams may extend in any direction in roof space so long as their ends are supported on load bearing walls. Where supported by stud walling the beams shall land either directly above a stud of adequate size or their load shall be distributed over two or more studs by blocking or reinforcement of wall top plates. An initial clearance of 25mm shall be provided between underside of beams and top of ceiling joists. Loading of strutting beams over openings shall be avoided unless lintel above opening is sized to carry additional load.

MANHOLE:
Trim as required between ceiling joists for manhole 600 x 400mm minimum size. Line the opening and provide a suitable cover.

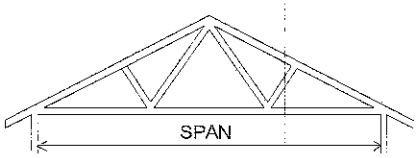
EAVES:
Project rafters to give a soffit at eaves of directed width and fix 200 x 25mm timber fascia or colourbond steel as directed. Where eaves are boxed in, soffit bearers (sprockets) of 50 x 38mm shall be provided, spaced to suit eaves lining and attached directly to outer ends of rafters. In brick veneer buildings the inner ends of soffit bearers shall be fixed to the frame so as to be 20mm or more clear above top of brickwork at time of construction.
In solid masonry buildings the inner ends of soffit bearers shall be located by means of 50 x 25mm hangers from rafters or wall plates.
In Bushfire Prone Areas fascias and eaves linings have special requirements.

PREFABRICATED TIMBER WALL FRAMES AND TRUSSES – BCA part 3.4.3
Where prefabricated frames and/or trusses are required for construction of the building, the manufacturers certification of construction according to AS1684.2 or AS1684.4 for the building on the particular site must be obtained. Where certification is attached to truss or framing members the certification labels shall be left in place after erection for approval by the appropriate Building Surveyor, P.C.A, or Council Authority. Timber trusses purpose manufactured for this project and engineer designed according to AS1720.1 are to be spaced at centres as directed, erected and fixed in accordance with the manufacturers instructions as approved. Support only on ends or designed bearing points. Where spacing of trusses exceeds 600mm centres provide intermediate ceiling joists in 100mm x 38mm hardwood (in F7) or 100mm x 50mm (in F8) supported from hangers at maximum of 2100 centres. Hanging beams shall be supported not more than 600mm from bottom chord panel points unless hangers are provided to nearest top chord panel points.

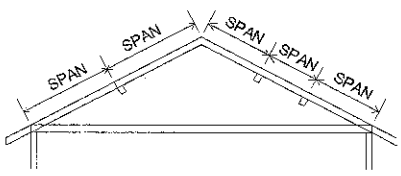
MASSES OF TYPICAL ROOF CONSTRUCTION

MASS OF ROOF	MATERIAL
10 kg/m2	Steel sheet roofing 0.50mm thick and battens
20 kg/m2	Metal sheet tiles or medium gauge steel sheet roofing , battens, 12mm softwood ceiling lining, sarking and lighweight insulation
30 kg/m2	Steel sheet roofing 0.775mm thick, 13mm plaster ceiling, roof and ceiling battens, sarking and lightweight insulation
40 kg/m2	Steel sheet roofing 0.75 thick, battens, graded purlins and high density fibreboard ceiling lining
60 kg/m2	Terracotta or concrete tiles and battens
75 kg/m2	Terracotta or concrete tiles, roofing and ceiling battens, 10mm plasterboard, sarking and insulation
90 kg/m2	Terracotta or concrete tiles, purlins, roofing and ceiling battens, 19mm hardwood ceiling lining, sarking and insulation

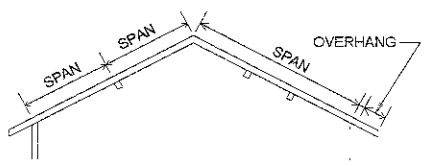
DEFINITIONS:
Spacing - Where this term is used the measurement shall be the centre-to-centre distance between members.
Span - Where this term is used the measurement shall be the face-to-face distance between members.
Reference is made to effective roof spans in the tables - the span is an indicator of the mass of roof being carried by the outer wall members.



TRUSSED ROOF



COUPLED ROOF WITH UNDERPURLINS



ROOF WITH LOADBEARING RIDGEBEAMS AND WALLS

TABLES OF TIMBER SIZES

Framing Member Stud Height 2400	Span	SINGLE STOREY TILED ROOF Unseasoned	Seasoned			SINGLE STOREY SHEET ROOF Unseasoned	Seasoned		
		F8	F5	MGP10	MGP12	F8	F5	MGP10	MGP12
BEARERS-									
Strutted roof – max. rafter span 3000									
@ 1800 spacing continuous over two	1500	100 x 75	2/120 x 35	2/120 x 35	2/90 x 35	100 x 75	2/90 x 35	2/90 x 35	2/90 x 35
or more spans-load bearing.	1800	125 x 75	2/140 x 35	2/120 x 35	2/90 x 35	125 x 75	2/120 x 35	2/120 x 35	2/90 x 35
Trussed Roof 9.0 Span. External									
Wall 1800 spacing continuous over	1500	175 x 75	2/170 x 35	2/140 x 35	2/140 x 35	125 x 75	2/120 x 35	2/120 x 35	2/90 x 35
two or more spans-load bearing.	1800	150 x 75	2/190 x 35	2/190 x 35	2/140 x 35	200 x 75	2/190 x 35	2/190 x 35	2/170 x 35
JOISTS-									
450 spacing-continuous over two or									
more spans	1800	125 x 38	120 x 45	120 x 35	120 x 35	125 x 38	120 x 45	120 x 35	120 x 35
WALL PLATES-									
Trenched for studs max. 3 @ up to 600 centres									
Raftered roof 3000 Span									
Top Plates		2/50 x 75	2/45 x 70	2/45 x 70	45 x 70	50 x 75	2/45 x 70	2/35 x 70	45 x 70
Bottom Plates		50 x 75	2/45 x 70	2/45 x 70	45 x 70	50 x 75	2/45 x 70	2/35 x 70	45 x 70
Trussed Roof 9000 Span									
Top Plates		3/50 x 75	--------	3/45 x 70	2/45 x 70	2/50 x 75	3/45 x 70	2/45 x 70	2/45 x 70
Bottom Plates		3/50 x 75	--------	3/45 x 70	2/45 x 70	2/50 x 75	3/45 x 70	2/45 x 70	2/45 x 70
JAMB STUDS- (70/75mm frame)	900	2/75 x 38	2/70 x 45	2/70 x 35	70 x 45	75 x 38	2/70 x 35	70 x 45	70 x 35
Truss or Rafter Span (9000 max.)	1800	2/75 x 50	3/70 x 45	2/70 x 45	2/70 x 35	2/75 x 38	2/70 x 45	2/70 x 45	70 x 45
Single storey or upper storey ext.	2400	3/75 x 38	4/70 x 45	3/70 x 35	2/70 x 45	2/75 x 38	3/70 x 45	2/70 x 45	2/70 x 35
or internal load bearing walls	3000	3/75 x 50	4/70 x 45	3/70 x 45	2/70 x 45	2/75 x 50	3/70 x 45	2/70 x 45	270 x 35
STUDS under concentrated loading @ 600 centres notched up to 20 for bracing Roof area 15m^2		3/75 x 50	--------	3/70 x 45	2/70 x 45	2/75 x 50	2/70 x 45	2/70 x 35	70 x 45
LINTELS*-	900	75 x 75	90 x 35	90 x 35	90 x 35	75 x 50	90 x 35	90 x 35	90 x 35
Raftered roof 3000 Span	1200	100 x 50	2/90 x 35	90 x 45	90 x 35	100 x 38	120 x 35	90 x 45	90 x 35
	1500	125 x 75	120 x 45	2/90 x 35	2/90 x 35	100 x 75	120 x 45	90 x 45	90 x 35
	1800	150 x 75	2/120 x 45	2/120 x 35	120 x 45	125 x 50	2/90 x 45	2/90 x 35	90 x 45
	2100	175 x 75	190 x 35	170 x 35	2/120 x 45	125 x 75	2/120 x 35	120 x 45	2/90 x 35
	2400	200 x 75	2/170 x 45	2/140 x 45	2/140 x 35	150 x 75	2/120 x 45	2/120 x 35	120 x 45
	3000	2/50 x 75	2/240 x 35	2/190 x 45	2/170 x 45	200 x 75	2/170 x 35	170 x 45	2/140 x 35
	3600	300 x 75	2/290 x 35	2/240 x 45	2/24 x 35	250 x 75	2/240 x 35	2/190 x 45	2/170 x 45
Trussed Roof 9000 Span	900	100 x 75	2/90 x 35	90 x 45	90 x 35	100 x 50	2/90 x 35	90 x 45	90 x 35
	1200	125 x 75	2/120 x 35	120 x 45	2/90 x 45	125 x 50	140 x 45	2/90 x 45	2/90 x 35
	1500	175 x 75	2/140 x 45	2/120 x 45	2/120 x 45	150 x 50	2/120 x 35	2/140 x 35	2/90 x 45
	1800	200 x 75	2/170 x 45	2/170 x 35	2/140 x 35	150 x 75	2/140 x 35	2/120 x 35	2/120 x 35
	2100	225 x 75	2/240 x 35	2/170 x 45	2/170 x 35	175 x 75	2/170 x 35	170 x 45	2/120 x 45
	2400	275 x 75	2/240 x 35	2/240 x 35	2/190 x 45	200 x 75	2/170 x 45	2/170 x 35	2/140 x 45
	3000	--------	2/290 x 45	2/290 x 35	2/240 x 45	250 x 75	2/240 x 35	2/190 x 45	2/190 x 35
	3600	--------	---------	---------	2/290 x 45	--------	2/290 x 45	2/290 x 35	2/240 x 45

SINGLE STOREY TILED ROOF

Framing Member Stud Height 2400	Span	Unseasoned F5	F7	F8	F11	Seasoned F5	MGP10	MGP 12
CEILING JOISTS at 600 centres over two or more max. 2400 Spans		125 x 38	125 x 38	100 x 50	100 x 50	120 x 35	120 x 35	90 x 45
HANGING BEAMS @ max. 2400 centres	2400	100 x 50	150 x 38	150 x 38	125 x 50	120 x 45	120 x 45	120 x 35
	3000	200 x 38	175 x 50	175 x 50	175 x 38	170 x 35	140 x 45	140 x 35
	3600	225 x 50	225 x 38	200 x 50	200 x 50	190 x 45	170 x 45	170 x 35
	4200	275 x 50	250 x 50	250 x 50	225 x 50	240 x 35	190 x 45	190 x 35
	4800	300 x 50	300 x 50	275 x 50	275 x 50	290 x 35	240 x 35	240 x 35
STRUTTING BEAMS @ 2400 centres,	2400	250 x 75	250 x 75	225 x 75	225 x 75	2/240 x 35	2/190 x 45	2/170 x 45
max. rafter span 3000	3000	300 x 75	300 x 75	275 x 75	250 x 75	2/240 x 45	2/240 x 35	2/190 x 45
	3600	--------	--------	300 x 75	300 x 75	2/290 x 35	2/240 x 45	2/240 x 35
RAFTERS @ 600 centres - roof mass 60 kg/m^2 continuous over two or more spans.	3000	150 x 38	125 x 50	125 x 38	125 x 38	120 x 35	120 x 35	90 x 45
Overhang		750	750	750	750	500	550	750
UNDERPURLINS CONTINUOUS SPAN. Max.rafter span 3000. Max. strut spacing 2400		--------	150 x 75	150 x 75	150 x 75	2/140 x 45	2/120 x 45	2/120 x 35
COLLAR TIES to each alternate pair of rafters halved and shouldered	up to 4200	75 x 50	75 x 50	75 x 50	75 x 50	70 x 45	70 x 35	70 x 35
	over 4200	100 x 50	100 x 50	100 x 50	100 x 50	90 x 45	90 x 35	90 x 35

NOTES:

1. Cantilevers shall not exceed 25% of the allowable span, except that allowable offsets and cantilevers of load bearing walls at right angles to bearers shall be as per Table 4.1 of AS1684.4
2. Multiple members shall be vertically nail laminated according to Clause 2.3 of AS1684.4
3. Edge distances for some sheet bracing materials may require a minimum plate depth and or minimum stud breadth of 45mm for joining sheets
4. For openings greater than 900mm a secondary jamb stud may be required to support a lintel as per tables

SINGLE STOREY SHEET ROOF

Framing Member Stud Height 2400	Span	Unseasoned F5	F7	F8	F11	Seasoned F5	MGP10	MGP12
STRUTTING BEAMS @ 2400 centres	2400	200 x 75	200 x 75	175 x 75	175 x 75	2/170 X 35	2/140 X 45	2/140 X 35
max. rafter span 3000	3000	225 x 75	225 x 75	225 x 75	200 x 75	2/190 X 35	2/170 X 45	2/170 X 35
under purlin span 2400	3600	275 x 75	250 x 75	250 x 75	225 x 75	2/240 X 35	2/190 X 45	2/170 X 45
RAFTERS @ 900 centres roof mass 20kg/m^2 continuus. over two or more spans	3000	125 x 38	125 x 38	100 x 50	100 x 38	120 x 35	90 x 45	90 x 35
Overhang		500	650	700	750	450	450	500
UNDERPURLINS CONTINUOUS SPAN Max.rafter span 3000. Max.strut spacing 2400		125 x 75	125 x 75	125 x 75	100 x 75	2/90 x 35	2/90 x 45	2/90 x 35

Where top plates are required to bear a load arising from the placement of a roof strut, such strut shall be located only at a point immediately above a supporting stud unless the top plate is adequately stiffened by means of an intermediate blocking piece. Where bottom plates are required to carry a stud to the side an opening or a stud bearing a major load, the plates shall be supported by a joist or intermediate blocking piece directly beneath that stud. Double studs to be well spiked to ensure their action as one structural member.

The above tables refer to size of studs notched up to 20 for bracing. For sizes of studs not notched refer to AS1684.

For doorway openings up to 900 wide where jamb linings or other comparable stiffening are used, common studs are permissible.

Lintels over 175 deep to be seasoned or a low shrinkage timber species used.

HIPS - Depth of Common Rafter + 50 x 13 less than Rafter thickness

RIDGE BOARDS - Depth of Common Rafter + 50 x 25 thick

VALLEY RAFTERS - Depth of Common Rafter + 50 x 38 thick
CEILING JOISTS, HANGING BEAMS, VALLEY BOARDS, COLLAR TIE - As for tiled roofs
For floor joists at 450 centres over single 1800 spans, 100 x 50 unseasoned F8 or F11 can be used. For bearers and joists of other stress grades and spans refer to AS 1684.4 or AS1684.2.
Direct load in relation to top plates is where rafters or trusses are placed within 1.5 times the thickness of the plate from the stud; random load is where the placement of rafters or trusses exceeds that limit. Where points of fixing of studs on bottom wall plates occurs directly above points of support provided by joists, blocking pieces or by concrete floors, bottom wall plate may be as shown above for direct load.

GABLES OR VERGES:
Where open gables or verges are indicated on plans such are to be formed as extensions to main roof with rafters supported on cantilever extensions of ridge boards, underpurlins and wall plates. Extension to wall plates shall be same size as underpurlin. Alternatively the overhang shall be framed with jack rafters set at right angles to and framed into the common rafters.
Where boxed gables are indicated, such gables shall be framed as above but with 75 x 50mm gable studs halved to side of verge rafters at centres to suit lining material and having 75 x 38mm soffit bearers fixed between the lower ends of gable studs and the structural walls as for boxed eaves. Horizontal location for gable studs and fixing for lower edges of gable linings shall be provided by a 75 x 38mm plate-on-edge let into the face of gable stud level with the soffit bearers. Boxed gables shall be securely strutted from the structural wall plate to support the weight of the gable framing and the roof covering.

UNCOUPLED ROOF WITH LOADBEARING RIDGEBEAMS AND/OR WALLS
Rafters supporting roof and ceiling loads – non coupled cathedral roof single span

Rafter Span	Rafter Spacing	Unseasoned				Seasoned			
		F5	F7	F8	F11	F5	MGP10	MGP12	F17
Tiled Roof Ceiled									
3000	600	200 x 38	200 x 50	175 x 50	175 x 50	175 x 45	140 x 45	140 x 45	140 x 35
Overhang		750	750	750	750	750	750	750	750
3600	600	250 x 50	225 x 50	225 x 50	200 x 50	240 x 35	170 x 45	170 x 45	170 x 35
Overhang		750	750	750	750	750	750	750	750
4200	600	275 x 50	275 x 50	250 x 50	250 x 50	240 x 45	240 x 35	190 x 45	190 x 45
Overhang		750	750	750	750	750	750	750	750
4800	600	275 x 75	275 x 75	300 x 50	275 x 50	290 x 35	240 x 45	240 x 35	240 x 35
Overhang		750	750	750	750	750	750	750	750
5400	600	------	300 x 75	300 x 75	275 x 75	------	290 x 35	290 x 35	240 x 45
Overhang			750	750	750		750	750	750
Sheet Roof Ceiled									
3000	900	175 x 50	175 x 50	175 x 50	150 x 50	140 x 45	140 x 35	120 x 45	120 x 45
Overhang		750	750	750	750	750	750	750	750
3600	900	225 x 50	200 x 50	200 x 50	200 x 50	170 x 45	170 x 35	140 x 45	140 x 45
Overhang		750	750	750	750	750	750	750	750
4200	900	250 x 50	250 x 50	225 x 50	225 x 50	240 x 35	190 x 45	170 x 45	170 x 45
Overhang		750	750	750	750	750	750	750	750
4800	900	300 x 50	275 x 50	275 x 50	250 x 50	240 x 45	240 x 35	190 x 45	190 x 45
Overhang		750	750	750	750	750	750	750	750
5400	900	300 x 75	275 x 75	300 x 50	275 x 50	290 x 35	240 x 45	240 x 35	240 x 35
Overhang		750	750	750	750	750	750	750	750

NOTE:
1. Allowable overhangs are based on a maximum birdsmouth depth of D/3. Where rafters are not birdsmouthed, the allowable overhang may be increased to 30% of the single span for that member, provided that the overhang does not exceed 50% of the actual backspan.
2. Overhang limits are only applicable where rafter ends are supported by a structural fascia.

TABLE OF TIMBER SIZES LOWER STOREY OF TWO STOREY CONSTRUCTION - TILED ROOF

Framing Member Stud Height 2400	Span	Unseasoned				Seasoned		
		F5	F7	F8	F11	F5	MGP10	MGP12
BEARERS								
Strutted Roof – max. rafter span 3000, bearers @ 1800 spacing continuous over two or more spans - load bearing.	1200	125 X 75	125 X 75	100 X 75	100 x 75	2/120 X 35	2/90 X 45	2/90 X 35
	1800	200 X 75	175 X 75	150 X 75	150 X 75	2/170 X 45	2/140 X 45	2/120 X 45
Trussed Roof - 9000 span. Bearers @ 1800 spacing continuous over two or more spans - load bearing	1200	150 x 75	150 x 75	125 x 75	125 x 75	2/120 x 45	2/120 x 45	2/90 x 45
	1800	225 x 75	200 x 75	175 x 75	175 x 75	2/190 x 45	2/170 x 45	2/140 x 45
JOISTS TO GROUND FLOOR			**Refer to**	**Single**	**Storey**	**Tables**		
WALL PLATES – Not trenched, external load bearing walls - Joists at 600 centres								
RAFTER OR TRUSS SPAN 3000 (70/75mm frame)	B/plates	2/50 x 75	2/50 x 75	2/50 x 75	2/50 x 75	3/45 x 70	2/45 x 70	2/35 x 70
	T/plates	3/50 x 75	2/50 x 75	2/50 x 75	2/50 x 75	3/45 x 70	2/45 x 70	2/35 x 70
9000	B/plates	3/50 x 75	3/50 x 75	3/50 x 75	2/50 x 75	-------	3/45 x 70	3/45 x 70
	T/plates	-------	3/50 x 75	3/50 x 75	2/50 x 75	-------	3/45 x 70	2/45 x 70
JAMB STUDS – (70/75mm frame)	900	3/75 x 50	3/75 x 38	2/75 x 50	2/75 x 38	3/70 x 45	2/70 x 35	2/70 x 35
Truss or Rafter Span (9000 max)	1800	4/75 x 50	4/75 x 38	3/75 x 50	3/75 x 38	4/70 x 45	2/70 x 45	2/70 x 45
Opening span	2400	-------	4/75 x 50	4/75 x 50	3/75 x 50	-------	3/70 x 45	3/70 x 35
	3000	-------	-------	4/75 x 50	4/75 x 50	-------	4/70 x 35	3/70 x 45
COMMON STUDS - @ 600 centres notched up to 20mm for bracing								
RAFTER OR TRUSS SPAN 3000		75 x 50	75 x 50	75 x 38	75 x 38	2/70 x 35	70 x 35	70 x 35
9000		2/75 x 38	2/75 x 38	2/75 x 38	75 x 50	2/70 x 35	70 x 45	70 x 35
LINTELS								
Raftered roof 3000 span	900	100 x 75	100 x 75	100 x 50	100 x 50	90 x 45	90 x 35	90 x 35
	1200	150 x 50	125 x 50	125 x 75	125 x 50	2/120 x 35	2/90 x 45	2/90 x 35
	1500	175 x 75	175 x 75	150 x 75	150 x 75	2/140 x 35	2/120 x 35	2/120 x 35
	1800	200 x 75	200 x 75	175 x 75	175 x 75	2/170 x 35	2/140 x 45	2/140 x 35
	2400	275 x 75	250 x 75	250 x 75	225 x 75	2/240 x 35	2/190 x 45	2/170 x 45
	3000	-------	-------	300 x 75	300 x 75	2/290 x 35	2/240 x 45	2/240 x 35
Trussed Roof 9000 span	900	125 x 50	125 x 50	100 x 75	100 x 75	2/90 x 35	90 x 45	90 x 35
	1200	150 x 75	150 x 75	150 x 75	150 x 50	2/120 x 45	2/120 x 35	120 x 45
	1500	200 x 75	200 x 75	175 x 75	175 x 75	2/170 x 35	2/140 x 35	2/120 x 45
	1800	225 x 75	225 x 75	225 x 75	200 x 75	2/190 x 45	2/170 x 35	2/170 x 35
	2400	300 x 75	300 x 75	275 x 75	275 x 75	2/240 x 45	2/240 x 45	2/240 x 35
	3000	-------	-------	-------	-------	-------	2/290 x 45	2/290 x 45

NOTES:Member sizes shown in the above table are for structures with an upper floor joist maximum span of 4800mm. (for greater spans see AS1684.2)
Direct load in relation to top plates is where first floor joists are placed within 1.5 times the thickness of the plate from the stud, random load is where placement of the joists exceeds that limit. Direct load in relation to bottom plates is where stud bearing occurs directly above points of support provided by joists, blocking pieces, or by concrete floors. Refer to single storey table for upper floor wall framing and roof. For doorway openings up to 900 wide where jamb linings or other comparable stiffenings are used common studs are permissible.
NOTE: Sizes shown in tables in this specification are intended only as a guide to the size and stress grade for a particular member of a building frame. All timber framing should be designed and constructed in accordance with AS1684.2 and/or AS1684.4
Sizes in this specification are based on AS1684.4 Simplified Non-cyclonic areas, with restrictions as follows:-
- **Maximum wind classification N2 (33m/s)**
- **Maximum Roof pitch 30°**
- **Maximum building width 12.0m**

Where a building exceeds the restrictions as listed above, design to comply with AS1684.2 will allow wind speeds up to N4 (50 m/s), roof slopes up to 35°and building widths up to 16.0m.

PERMANENT BRACING OF WALLS AS PER AS1684.2 Section 8 - BCA parts 3.4.3.8, 3.4.3.11, 3.4.3.19, 3.4.3.20 and 3.4.3.21
This section 'Permanent Bracing of walls as per AS1684 shows typical bracing applicable to timber frame construction as explanatory information only.
TYPE 'A' UNITS (Design racking resistance of 2kN). The following bracing units are deemed satisfactory type 'A' braces.
1. A pair of diagonal timber or metal section braces in opposite directions from each end of the wall as per fig (A) OR galvanised metal tensioned strap bracing as per fig (B).
2. Single diagonal timber or metal section brace as per figure (C).
3. A 900mm minimum wide panel of structural plywood as per figure (D).

Type 'A' Bracing – Pair of diagonals from each end of wall		
Timber	Metal Section	Tensioned Straps
50mm x 19mm for studs up to 2.7m long 75mm x 19mm for studs over 2.7m long Fixing: galvanised flat head nail 2.8mm dia. x 50mm long to each plate and stud.	18mm x 16mm x 1.2mm min. galvanised angle brace fixed with one 2.8mm dia. x 30 long galvanised flat head nail to each plate and stud edge.	Flat galvanised straps 0.8mm thick x 20 wide. Fixings: one galvanised flat head nail 2.8mm dia. x 30mm long to each plate and stud edge. Tension straps.

Type 'A' Bracing – Single diagonal at end of wall.	
Timber	Metal Section
75mm x 19mm min. fixed with two 2.8mm dia x 50mm long flat head galvanised nails to each stud and plate.	Galvanised angle brace fixed with two 2.8mm dia x 30 long galvanised flat head nails to each plate and stud

Type 'B' Units (design racking resistance of 4kN. The following bracing units are deemed to be satisfactory type 'B' braces
1. A pair of diagonal galvanised metal tension straps of minimum nominal dimention 30mm x 0.8mm in opposing directions on one side of timber frame. Ends of straps shall be bent over top and bottom faces of plates and fixed with four 3.15mm dia. x 30mm long galvanised flat head nails. Braces shall be fixed to stud edges with two similar nails to each crossing. End studs of braces section shall be strapped to top and bottom plates with 30mm x 0.8mm galvanised strap looped over plate and fixed to studs with four galvanised flat head nails 3.15mm dia x 30mm long each end of loop.
2. A 900mm minimum wide panel of structural plywood as shown in figure (D). Fixed as follows:

Plywood stress grade F8	Stud spacing 450mm to be 7mm thick ply.	Stud spacing 600mm to be 9mm thick ply.
Plywood stress grade F11	Stud spacing 450mm to be 6mm thick ply.	Stud spacing 600mm to be 7mm thick ply.
Plywood stress grade F14	Stud spacing 450mm to be 4mm thick ply.	Stud spacing 600mm to be 6mm thick ply.

Fixing: 2.8mm dia x 30mm long galvanised flat head nails at 50mm centres along top and bottom plates, 150mm centres along vertical edges and 300mm centres along intermediate studs.

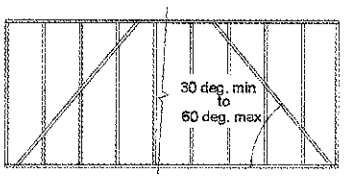


fig (A)

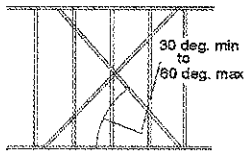


fig (B)

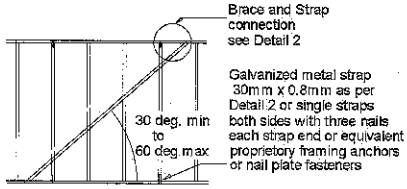


fig (C)

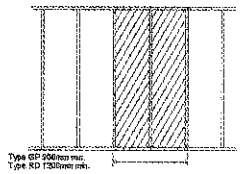


fig D

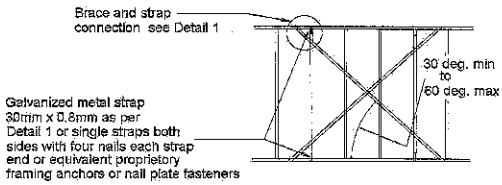
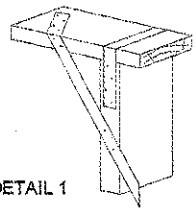
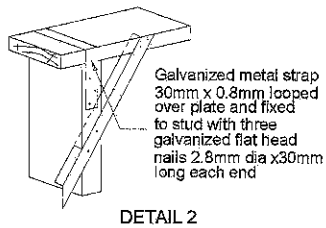


fig E


DETAIL 1



DETAIL 2

Diagrams as shown and explanation of the various types of bracings are not intended to specify bracing requirements for any timber frame construction. All bracing requirements for a particular design in timber framing must be determined in accordance with Section 8 of AS1684.2 or AS1684.4 as applicable.

TIEDOWN REQUIREMENTS: BCA tables 3.4.3.8, 3.4.3.9 and 3.4.3.18
Tie down requirements for timber frame construction can be determined from AS1684.4 Section 9 for maximum design gust wind speeds of 33m/sec. For wind speeds in excess of 33m/sec, design as per AS1684.2 is required.
Tie down fixings should be determined for the following connections:

a) bearers to piers	d) studs to bottom and top plates	g) battens and/or purlins to rafters
b) floor joists to bearers	e) rafters to top plates	h) collar ties to rafters
c) Bottom plates to floor joists or concrete slabs	f) rafters to ceiling joists	i) verandah plates and eaves beams to posts

NOTE: Special fastening requirements are required for type 'A' and 'B' wall bracing for connections (c) and (d) above.

CYCLONIC AND OTHER HIGH WIND AREAS
Where buildings are to be constructed in regions B, C, and D as per AS 1179.2 compliance with the Australian Wind loading Code AS1179.2-1989 or the Australian Standard Wind Loads for housing AS4055 is required.
In cyclonic areas buildings must be Engineer designed and/or structurally certified for wind speeds of 205.2 km/hr (55.7 m/s) in Region "C" and 243.4 km/hr (Vy 85 m/s) in Region D.
NOTE: High wind areas exist outside of cyclone regions B,C and D. Clarification of the category of the site should be sought from local authorities.

STEEL FRAMING AND OR TRUSSES - BCA part 3.4.2
MATERIALS:
All framing sections shall be manufactured from galvanised steel conforming to AS1397. Galvanised materials up to 3.2mm thick shall have minimum coating mass of 200 g/m2.Design, fabrication and fixing shall be as per recommendations of the component manufacturers design manual.
FABRICATION AND ERECTION:
All structural components may be fabricated into frames and/or trusses in the shop or on site and shall be cut accurately to length to fit firmly against abutting members and held so until fastened. Studs shall be seated squarely in bottom plates with webs at 90deg. to the face of the wall and accurately located, plumbed and securely fixed to top and bottom plates. Multiple studs shall be used as specified at concentrated load points. Plates shall be securely spliced to maintain continuity. Splices in studs are not permitted. Structurally adequate heads shall be fitted over openings in walls. All frames shall be adequately braced for transport and resist wind loads in service. Preferred fastening is by MIG welding. Other fastening such as carbon arc welding, self tapping bolts and screws or blind rivets of adequate strength may be used. All welds shall be cleaned and painted with zinc rich paint. The bottom plate shall be securely fastened to sub floor at centres as recommended and all site connections shall be as specified in design manual. Holes for electrical wiring, other cables and plumbing services shall be max. 33 dia. flanged holes in studs and noggins where required. Service pipes shall be effectively separated from framing by lagging and be securely fixed in cavities. Permanent electrical earthing of a steel frame building shall be carried out in accordance with the requirements of the local electrical authority. Where power tools are used on site, temporary earthing to the frame shall be made during construction. On completion of framing all debris shall be removed from cavities and bottom plates. Domestic metal framing shall be designed to comply with the load combinations as per AS3623.

STEEL WORKER - BCA part 3.4.4
GENERALLY:
All steel work is to be fabricated to details as shown on engineers drawings all work to be in accordance with AS4100 Steel Structures.
PURLINS AND GIRTS:
To roof and walls of building provide purlins and girts according to engineers details.
ROOFER AND SHEETER:
Cover roof and walls of building in full length sheets complete with all necessary flashings cappings etc. Secure as recommended by manufacturer and provide panels of selected translucent sheeting as indicated or directed.

ROOFER - BCA part 3.5.1
TILE ROOFING: BCA part 3.5.1.2.
Provide all roofs with first quality roofing tiles. Where pitch of rafters is less than 1:2.75 terra cotta Marseilles pattern, 1:3.7 Swiss pattern, 1:3.3 concrete tiles are used the roof shall be sarked with either 2 ply bituminous felt or double faced aluminium foil covered reinforced fabric as per AS1736. Between 1:3.7 and 1:4.5 slope, perimeter of roof shall be provided with an anti ponding board or device to ensure that all water will be discharged into eaves gutter, a clear space must be provided between edge of the device and the lowest side of the first batten so as to allow a free flow of water into the gutter. . Where one section of the roof discharges into a lower section, the discharge is to be widely distributed, and the roof is to be fully sarked. Elsewhere, where a spreader is used the roof shall be sarked from the point of discharge to Eaves with a minimum width of 1800mm approved sarking. Cover all ridges and hips with capping, starters and apex caps necessary and bed all capping and verge tiles on lime mortar and point with coloured cement mortar.
TERRA COTTA TILES:
To be glazed and manufactured in accordance with AS 2049. To be fixed to timber battens with copper wire ties every alternate tile, all fixed in accordance with AS2050.
CONCRETE TILES:
To conform to AS1757 and AS1758 and to be produced by manufacturers who provide a comprehensive guarantee and fix in accordance with AS1787. Tiles are to have an end lap of not less than 75mm. Where wiring holes are provided, every alternate tile in each course is to be tied to battens with approved wire. Where holes are

provided for nailing every tile in each third course is to be fixed with galvanised flat head nails at least 19mm into tile batten. Fixing to be as per AS2050.
CORRUGATED FIBRE CEMENT ROOFING:
To conform to AS1611 and fixed in accordance with AS1562 Pt.2. Minimum pitch of roof is to be 1:8 for large corrugations and 1:11 where the rafter length can be covered with a single sheet. Where pitch of roof is less than 1:6 in the case of large corrugations and 1:4.5 in the case of small corrugation end laps shall be at least 225mm and sealed. Sheets to be fixed with galvanised round head screws and felt washers set in mastic to each run of battens with side and end laps or other approved method in accordance with manufacturers instructions. All necessary accessories are to be provided and the roof is to be adequately birdproofed.
PROFILED STEEL ROOF: BCA part 3.5.1.3:
To be material as nominated on drawings. All necessary accessories to be provided and fixed according to manufactures recommendations. Roof is to be bird proofed. Sheet fixings and spacings are to be strictly as per manufacturers recommendations for the design wind speed for the area. Design and installation shall be in accordance with AS/NZS 1562.
SARKING:
Where sarking is specified or required by any authority the selection of and fixing shall be in accordance with the code of practice as specified in AS1736 for pliable roof sarking and/or AS1903-04 for reflective foil laminates. All installations must comply with the requirements of BCA part 3.7.4. in Bushfire prone areas.

FLOORING - BCA part 3.4.3.4

T & G STRIP FLOORING: BCA table 3.4.3.1:
Flooring shall be seasoned and stored in a way to preserve its delivery condition. Flooring boards shall be laid in straight and parallel lines with tongues fitted into grooves and cramped together with pressures suited to moisture content and seasonal conditions. End joints shall be made on a joist and joints in adjoining boards shall be staggered. Flooring shall be kept 12mm clear of walls or wall plates parallel with the direction of laying. Boards of normal width of 75mm and less shall be fixed with one nail at each joist and boards over 75mm shall be fixed with two nails at each joist. Nails in faces of boards are to be well punched to allow for subsequent sanding and stopping. Boards profiled for secret nailing are to be skew nailed through tongues at each joist with nail punched to permit the full entry of the tongue into the goove. Flooring is not to be cut in and fixed before roofing is complete, external walls sheeted or lined and all external openings covered.
SHEET FLOORING: BCA tables 3.4.3.2 and 3.4.3.3
The minimum height of sheet flooring above ground level and under-floor ventilation shall be in accordance with manufacturers instructions or as required by Council or Lending Authority.
Where sheet flooring is used in platform construction and a decorative finish is required it shall be sealed with a water repellent at time of fixing.
a) Structural Plywood: shall be manufactured in accordance with AS2269 and sheets stamped on the face side with manufacturers name or trade mark. Sheets shall be fixed in accordance with manufacturers instructions as approved.
b) Particle Board: Approved board bonded with phenolic resin to achieve a type 'A' bond as defined in AS1860 for plywood may be used in platform construction or as fitted flooring. Boards shall be fixed in accordance with manufacturers instructions as approved. The perimeter of flooring should be fully supported by joists or noggins. Other approved particle board may be used providing it is a minimum of 2100mm above the ground, well ventilated and the building completely weatherproof prior to fixing of the floor.
c) Compressed Fibre Cement: Sheet flooring not less than 18mm thick with density of not less than 1.8g/cm3 may be used in lieu of suspended concrete floors. Sheets shall be fixed in accordance with manufacturers instructions adequately flashed and suitably finished.

ELECTRICIAN

Provide all labour and materials necessary for the proper installation of electrical services in accordance with the appropriate AS Rules and requirements of the Local Supply Authority. Arrange with the supply Authority for connection from supply main to meter board. Provide for the proper installation and connect electricity stove/s and hot water unit/s. Provide light and power points as indicated on drawings or as directed and in accordance with AS/NZS1680. Provide box to enclose meters in accordance with the requirements of the Authority concerned. Arrange for inbuilt wiring for telephone, television, computer and security installation as required.

SMOKE DETECTORS/ALARMS : BCA part 3.7.2

Fire/smoke detectors selected by the owner and complying with the requirements of the Local Government Act and/or state or territory regulations must be fitted in the locations required and approved by the regulatory authority and shall be installed in accordance with AS3786.

LIGHTNING PROTECTION:

Where lightning protection is specified by the proprietor or required under regulatory provisions it shall be installed in accordance with AS1768.

EXTERNAL WALL CLADDING - BCA part 3.5.3

Weatherboards or profile sheeting as approved by the leading authority shall be fixed and flashed in accordance with manufacturers instructions and to the satisfaction of the lending authority. Weatherboards with laps as specified by the relevant AS shall be hardwood, pressure treated radiata pine or slash pine, cypress pine, baltic pine or western red cedar. The boards shall have a maximum moisture content of 15% be in long lengths with staggered end joints, securely nailed and fitted with angle stops. Western red cedar used externally shall be fixed with galvanised or cadmium plated fasteners. Boards exceeding 100mm in width shall be double fastened at all bearings. All boards shall be primed or sealed all around including rebates and ends before fixing. Where vertical boarding is used it shall be
fixed to battens at not more than 600mm centres and sarking acceptable to the lending authority placed behind the battens to provide air space and fixed to the frame work with adequate provision for discharge of moisture. External boarding shall be in one length or have joints specially designed for external use.
FIBRE CEMENT: BCA part 3.5.3.3:
a) Flat Sheeting: Fibre cement sheeting shall be not less than 4.5mm thick and close jointed to full height of walling or above sill level where weatherboard dadoes are specified. Horizontal joints shall be flashed with 0.42mm galvanised steel turned up 13mm against stud faces and down 12mm over sheet faces, lapped 25mm at joints. Internal angles of walls shall be flashed with 38mm x 38mm x 0.42mm minimum base thickness galvanised steel angles or bitumen coated metal flashing to full height of studs and lapped 50mm at joints. All vertical and horizontal joints and angles shall be covered with timber, fibre cement or other mouldings as approved by the lending authority. Trimmers of not less than 75mm x 38mm timber shall be provided between ends of floor bearers to support lower edge of sheeting.
b) Profiled sheeting and Weatherboard: As approved by the lending authority shall be fixed and flashed in accordance with the manufacturers instructions and to the satisfaction of the lending authority.

INTERNAL WALL LININGS

Line all internal walls not specified as otherwise with Gypsum plaster board fixed horizontally in full length sheets, or with staggered end joints to ceiling height. Sheets to have recessed edges and of thickness as recommended by the manufacturer for the stud, batten or support spacing. Fixing is to be with galvanised clouts, manufacturer approved screws and/or approved adhesive and be strictly in accordance with manufacturers instructions. Set all internal angles. Note: Where below 1200mm in laundry, bathroom and W.C. and at back of kitchen sink unit and below 1800mm in shower recess, only approved water repellent sheet shall be used. Note: Adhesives must not be used to fix sheets in tiled areas.
FIBREBOARD:
Sheets shall not be less than 4.5mm thick except where tiled. Sheets to be tiled shall not be less than 6mm thick. Where flush jointing is required fibreboard sheets shall be used, fixed and jointed in accordance with manufacturers instructions.

CEILING FIXER

CEILINGS: Provide Gypsum plaster board to all internal ceilings unless otherwise specified. Sheets to have recessed edges and to be 10mm thick when fixed to ceiling battens/joists spaced at not more than 450mm and 13mm thick for 600mm spacings. Fixing is to be with galvanised clouts and/or approved adhesive and is to be in accordance with manufacturers recommendations as approved. Provide selected cornices, neatly mitred, properly fixed and scrimmed and set at all joints in full wall lengths where practicable. Gypsum plaster board for ceilings and walls shall be as per AS2589. Sheets of different thickness may be used at other spacings where their manufacture and installation complies with the Deemed to Satisfy Provisions.

PLASTERER

To all brick walls not specified as feature brickwork or otherwise (with exception of garage) apply render to minimum thickness of 12mm. Render to consist of one part fresh cement to 3 parts clean sand with 10 per cent hydrated lime added. Use only whilst fresh. All brickwork to be well wetted before plastering is commenced.
GENERALLY: Point up all flashings externally with cement mortar and make good as required after other trades.

JOINER

GENERALLY:
Joinery timber is to be of durable species seasoned and free from those defects which might effect its appearance and/or durability. All to be D A R accurately cut and fitted, properly mitred and scribed as required and securely fixed. All surfaces to be left free of mill marks or other defects, filled where necessary and ready for painting or staining. Where wood plugging is required it shall be a suitable species properly seasoned.
JAMB LININGS AND DOORS:
1. DOOR FRAMES – BRICK BUILDINGS:
Shall be at least 100mm x 50mm solid rebated properly dowelled to thresholds. Mullions shall be 75mm thick and double rebated.
2. JAMB LININGS – INTERIOR DOORS ALL BUILDINGS, EXTERIOR DOORS TIMBER FRAMED AND BRICK VENEER:
Linings shall be a minimum of 38mm thick solid rebated to all door openings. Where return plaster reveals occur linings shall be 75mm x 50mm rebated. Alternatively for internal doorways 25mm linings may be used with 12mm planted stops. In brick veneer and timber framed construction 12mm clearance shall be provided over jamb linings to external openings. Linings to openings not having doors or to have swing doors are to be 25mm thick timber securely fixed. Other proprietory linings may be approved by the owner.
DOORS:
Fit accurately to door frame. Hang external doors with three 88mm steel butts and internal doors unless otherwise specified with two 88mm steel butts. External doors shall not be less than 2040mm x 820mm x 40mm thick. Where sheeted with plywood, waterproof plywood only shall be used. All framed glazed doors (external or internal) shall be minimum of 40mm thick. Internal doors shall be minimum of 35mm thick and free of warping.

WINDOWS AND FRAMES:
In brick veneer construction 10mm clear space shall be left between underside of sill and brickwork. In two storey construction with hardwood timber framing the clearance shall be increased to 20mm.

INSTALLATION:
All windows shall be installed in accordance with the requirements of AS2047-48 for Aluminium windows and AS2146-47 for timber windows.
STAIRS AND HANDRAILS: BCA 3.9.1 and 3.9.2
Stairways shall be constructed to the layout as shown on plans with treads of equal dimensions except where shown or where winders are required. All risers in any flight shall be of equal height. All flights shall have a minimum of 2 and not more than 18 risers. Vertical clearances above stairs shall be 2000mm min. to soffit of floor or structure above when measured vertically above nose of tread. Relationship of riser to going shall be between 1:2 and 1:1.35 unless otherwise directed or as permitted in AS1657. Balustrades shall be provided to all landings, decks roofs other elevated platforms where the vertical distance from that level is more than 1 metre above the adjoining floor or finished ground level. Height of the balustrade must be a minimum of 1 metre above landings etc. and not less than 865mm above the nosings of any stair treads or floor of a ramp. Openings in balustrades (decorative of otherwise) and space between treads, eg. riser opening must not allow a 125 mm dia sphere to pass through. Resistance to loading forces of a balustrade must be in accordance with A.S. 1170. Materials and finish of handrails, newel posts and balustrading shall be as directed or agreed by owner. Where balustrades are constructed of tensioned wires provision shall be made to maintain tension applied.

ACCESS AND MOBILITY
Where access and mobility requirements are to be addressed in the construction of a new building, AS1428.1 General Requirements for Access – New Building Work contains the minimum design requirements to enable access for people with disabilities. Revision of the BCA in order to address requirements of the Disability Discrimination Act (DDA) as applies to the construction of buildings with public areas will require that the latest revision of AS1428 should be used.

PLUMBER AND DRAINER
EAVES GUTTERS AND DOWNPIPES:
Eaves gutters and downpipes of material and finish as nominated on drawings shall be installed as per manufacturers specification to all eaves as required with falls to downpipes in positions shown and to comply with AS/NZS 2179.
VALLEYS:
To be 0.6mm thickness galvanised steel 450mm wide and fixed to valley boards with edge beaded well lapped and soldered or silicone jointed.
FLASHINGS:
Flash around chimney stacks, exhaust flues and wherever else required with approved flashings dressed well down onto roof slopes and taken vertically at least 75mm. Wedge step flashing into brickwork joints and point up with cement mortar. Eaves gutters, valleys and roof flashings shall be selected from materials compatible with each other and the roof covering to prevent bi-metallic corrosion. (See BHP publications TB8, TB15). Use of lead for flashings, gutters, downpipes and roofing is prohibited if the roof will collect potable water.
WATER SERVICES:
Where a reticulated water supply is available all work shall be carried out by a licensed water plumber. All water supply installations shall be carried out in accordance with AS3500 'National Plumbing and Drainage Code'.
RETICULATED RECYCLED WATER:
Where a utility supplied reticulated recycled water supply is connected as a dual reticulation it is important that no cross connection between the potable and recycled water can occur. There must be at least one external tap for each system and the recycled water system must have lilac coloured components. Identification markings and signage shall be installed as per AS1319 and AS1345. Recycled water cannot be used for human consumption or contact, household cleaning, personal washing or irrigation where fruit and crops are eaten raw or unprocessed.
BATHROOM FLOOR:
Provide a 50mm grating to overflow outlet in bathroom floor. Connect waste to system or install dry waste if approved..
WET ROOM FLASHINGS: BCA 3.8.1
Waterproofing of wet areas shall be designed and installed in accordance with requirements and construction techniques as per AS3740 and appendix for wall/floor combinations. All to be inspected and approved prior to covering. Where waterproof membranes are used in the construction of wet area membranes shall comply with AS/NZS4858
HOT WATER SERVICE:
All installations must comply with AS3500.4 Provide from H/water unit with selected tubing to points necessary. Terminate with taps selected. Provide inlet stop cock to hot water unit.
GAS SERVICE:
The whole of the work to be carried out as per requirements of the Local Supply Authority. The plumber is to be responsible for the gas service from fence alignment, including fixing of the meter and cover for same. Installations for bottled gas supply shall comply with the relevant standard.
SEWERED AREAS:
Provide a drainage system from pedestal pan and from wastes of all fittings unless a grey water system is to be installed and connect to the sewer main. where shown on site plan all to be in accordance with the rules and requirements of the Authority for Water Supply and Sewerage. Provide at least one gully outside the building. The Authority Certificate to be produced at Completion of the Work.
UNSEWERED AREAS:
Provide a drainage system from all fittings and from grease trap in accordance with the requirements of the Local Authority concerned. Excavate for drains to provide even falls throughout and a minimum cover of 300mm. Lay 100mm socketed vitrified clay pipes or P V C to take soilwater from wastes of washtubs, bath, shower, washbasin and grease trap. All pipes to be completely jointed with rubber rings or solvent cement as approved. All drain lines to be laid so that water is discharged into an absorption trench provided in position shown on plan. Provide an approved grease trap with lid in position shown to take the water from kitchen sink. Top of trap to be 75mm above finished ground or nearby concrete paving level. All drainage work from fittings to the drainage line outside the building to be in accordance with the rules and requirements of the Water Supply and Sewerage Authority for sewered areas. That Authority 'Special Inspection' Certificate of the work to be produced by the builder. All plumbing and drainage shall be in accordance with the Code of Practice for state or territory and regulating local government area.
GREYWATER REUSE SYSTEMS:
Where a greywater reuse system is proposed the installation shall comply with the following Australian Standards and Codes: AS1546 parts 1 and 3; AS1547; NSW Health 1998 AWTS guideline; NSW Health 2000 Domestic greywater treatment guidelines and sewered single domestic premises. An on site greywater reuse system is not permitted in Reticulated Recycled water areas. Domestic Greywater Treatment Systems (DGTS) and Aerated Wastewater Treatment Systems (AWTS) require a certificate of accreditation from NSW Health
SEPTIC SYSTEM:
In position shown on site plan provide and install septic system as nominated by the proprietor together with a holding tank and length of absorption trench installed in accordance with the manufacturers instructions and the requirements of the Local Authority. Installations shall comply with AS1546 part 1
STORM WATER TREATMENT METHODS::
Provide roof water drains from downpipes and from grates in paving where shown on site plan. Drains to be 100mm socketed vitrified clay pipes or PVC laid to an even and regular fall so as to have a minimum cover of 150mm. Drains to discharge into street gutter where possible. Where outlets are shown within the site they are to discharge at least 3000mm clear of the building into rubble packing 600mm diameter and 600mm deep. Acceptable solutions for stormwater drainage to be as per AS/NZS3500 part 3.2. Stormwater treatment systems should satisfy the following performance requirements:-
1. Conserve Water 2. Prevent Increases In Flooding/Erosion 3. Maintain water balance 4. Control Stormwater Pollution.
Systems suitable for detached dwellings are:- Roof/rainwater tank: Detention device: Infiltration device and Filter strips. These are also suitable for multi-dwelling developments in addition to Stormwater tanks and Bio retention devices.
RAIN WATER TANKS:
Install rainwater tanks of selected material on slab or support as nominated by tank manufacturer. Rainwater tanks may be trickle topped up (max. 2litres/minute) from a potable water supply main and internally reticulated. A dual supply system should have no direct or indirect connection between the mains potable supply and the rainwater tank supply. Inground concrete tanks may be installed as an option with a suitable pressure pump and a testable backflow prevention device as per AS/NZS2845.1 Where an above ground tank is connected to internal reticulation, a meter with a dual check valve is to be installed and a visible air gap between the mains supply and the rainwater tank as per AS3500 and AS2845.2.1. (See NSW Health circular 2002/1: Use of rainwater tanks where a reticulated mains water supply is availabel).
NOTE: Drain pipes must not be taken through the footings of the building. All seepage and soakage water is to be effectively dealt with and diverted clear of the buildings as shown on site plan. Trenches for drains where running parallel to the building must not be within 600mm of the footings of the building.

TILELAYER
GENERALLY:
For guidance on installation of ceramic tiles see recommendations as set out in AS3958 parts 1 and 2.
WALLS:
Cover the following wall faces with selected glazed tiles:
To bathroom generally to a height of 135mm.
To bath recess to a height of 1350mm.
To shower recess to a height of 1800mm.
To enclosing of bath and hobs
To WC to height of one row of tiles or as directed
Above kitchen sink/s and cooking area/s allow for four rows tiles. Finish at top and salient angles with round edge tiles. Provide vent tiles and selected recess fittings. Tiles to be fixed to a backing of Fibre Cement with approved adhesive. Areas for tiles can be increased by proprietors direction or as noted on plans.
FLOORS:
Cover floors of bathroom, shower recess, WC and ES with selected ceramic tiles, set in cement mortar or approved adhesive and graded to give an even and adequate fall to floor waste.

PAINTER
GENERALLY:
All paints, stains, varnishes and water colours are to be of approved brands as selected. Materials used for priming and undercoating are to be the same brand as the finishing paints or as recommended by the manufacturers of the finishes used. All finishing colours are to be selected by the proprietor. Do all necessary stopping after the priming has been applied. Rub down all surfaces to a smooth finish prior the application of each successive coat of paint. External joinery or other exposed woodwork to have a clear plastic finish is to be treated with a priming oil containing wood preservative and a water repellent.

EXTERNALLY:
All external woodwork to be given one coat of primer, one coat of oil based undercoat and one coat of gloss finish enamel or to be given one coat of clear primer, one coat of flat clear plastic and one coat of clear plastic.
PRIMING WEATHERBOARDS:
Any Pine is to be primed all round as well as on the ends before fixing: Hardwood, cypress pine, radiata pine and oregon are to be primed on external faces including rebates before fixing, pressure treated canada pine is to be primed at ends before fixing.
IRONWORK:
Eaves, gutters, downpipes, exposed service pipes and wrought iron etc. to be cleaned and primed and give one coat of gloss paint all round.
FIBRE CEMENT:
Clean and prepare all external fibre cement surfaces and finish with two coats of water based paint.
INTERNALLY:
All exposed woodwork in kitchen, bathroom, laundry WC EC to be prepared primed and then given one undercoat and finished with one coat of full gloss paint or to be stained and finished with two coats of clear liquid plastic as selected.
CEILINGS:
To be given one coat of sealer and two coats of paint. The finishing coat of bathroom, laundry, and kitchen ceilings to be semi gloss. UNO
WALLS:
All rooms except bathroom, laundry and kitchen to be given one coat of sealer and two coats of water based paint. To bathroom, kitchen, WC EC and laundry where no tiled or pre surfaced material is required, walls are to be given one coat of sealer, one coat of undercoat and one coat of gloss oil paint system.

GLAZIER: BCA part 3.6
All sashes, doors, fixed lights and other glass in building shall be selected and installed by procedures as set out in AS1288 and/or AS2047 for type, thickness and area of glass according to wind loading, human impact and other considerations for glazing in frames of timber, steel, stainless steel, aluminium and bronze according to type of frame, height of building and glazing compound and for design and glazing of unframed toughened glass assemblies. Specific attention should be made to the selection of frame materials, glazing, location in walls and orientation to the path of the sun for various climate zone. Where windows are not shaded by roof, eaves or other building projections, advice by an approved specialist or manufacturer should be sought to ensure that all installations comply with the Energy Efficiency requirements of the BCA..

FENCING
Provide paling fence 1500mm height to side and rear boundaries. Posts to be 125 x 50mm in sawn approved durable hardwood, morticed for two rails and sunk into ground 600mm at maximum of 2700 mm. Posts at angles in fencing to be 125mm square. Well ram around posts. Where rock is encountered posts are to be set in concrete. Fit two rows of 75 x 50mm hardwood rails into mortises. Cover framing with hardwood palings. Double nail to rails at top and bottom. Cut line at top and lop corners. All timber in ground or concrete to be well tarred or treated with an approved preservative. Allow for repairing any existing recommendations of the manufacturer.
FRONT FENCING:
Provide front fencing as directed.

ALPINE AREAS:
Where a building is to be constructed in an alpine area compliance with the requirements of BCA part 3.7.5. is required. Alpine areas are areas above Australian Height Datum (AHD) as follows:- NSW, VIC, ACT above 1,200 metres AHD. TASMANIA above 900 metres AHD. For sub alpine areas where significant snow loads may occur see BCA fig. 3.5.7.2

LANDSCAPING
The area to be landscaped shall comply with the landscape plan and requirements of the Local Council Authorities. Appropriate landscape design will reduce water usage in lawns and gardens by up to 50%. Selection of native (indigenous plants suited to the local micro climate along with exotic species from California, South Africa and the Mediteranean will normally require minimal maintenance and water use. *(BASIX website: see table D.2.1 for indigenous plants in various local government areas).*

CAR PARKING
All carparking and loading bays to be kerbed, guttered, sealed, drained, line marked and landscaped. Drainage of surface water into neighbouring properties is NOT permitted except where an easement is obtained. All car parks shall comply with the provision of Local Council Authorities.

COMPLETION
The building shall be completed in every trade. Sashes, doors, locks and all other equipment shall be checked and left in a satisfactory operating condition. Timber floors shall be at least rough sanded. Where fine sanding is specified see CA39: Code of practice for sanding interior wooden floors. All plant, surplus materials and rubbish is to be removed from site. Gutters and drains shall be cleared and the building generally to be left clean and fit for occupation.
The Builder is to furnish the Owner with:

1 Notification of Completion
2 All Keys for all doors.
3 Certificate of termite protection treatment
4 Certificate from Sewerage Authority re-sanitary drainage.
5 Invoices for all PC items required.

It is the responsibility of the builder to arrange any inspections necessary by Local Council, Waterboard or Lending Authorities and/or Principal Certifying Authority.
It is the responsibility of the Owner to apply to Local Supply Authorities for connection of Electricity from mains to meter box.
'APPROVAL TO OCCUPY' MUST BE OBTAINED.

BASIX: NSW only
BASIX: The Building Sustainability Index.

This is a planning tool that measures the performance of a new dwelling (residential) by comparing its potential to consume less mains water supply and energy than an existing average home.

Sustainability Indices are assessed for Energy, Water usage, Thermal Comfort, Stormwater treatment and reuse and Landscaping.

NSW Government targets of a 40% reduction in water consumption and a 25% reduction in Greenhouse Gas emissions can be achieved by dwelling design and sustainability features incorporated. These features may include design elements such as recycled water, rainwater tanks, AAA rated shower heads and taps. Heat pump or solar water heaters, gas space heaters, roofs, eaves, awnings and insulation of walls and ceilings.

BASIX Certificate must be submitted with Development Application and /or Complying Development Certificate applications for all of NSW as from 1 July 2005.

Data required to Complete a BASIX Assessment can be found via the BASIX Data Input checklist and should be used in conjunction with the BASIX Assessment Tool.

BASIX Specification

This information is part of the BASIX Specification version 1.0 dated 25 June 2004 © JULY 2004 NSW Department of Infrastructure, Planning and Natural Resources.

Extracts from the BASIX Specification are reproduced with the permission of DIPNR. Further information about BASIX can be found at www.basix.nsw.gov.au

SECTION A. WELL-VENTILATED REFRIGERATOR SPACE

A.1 OBJECTIVES

A.1.1 To improve the efficiency of the refrigerator by ensuring there is adequate air passing over the refrigerant coils.

A.2 PERFORMANCE REQUIREMENTS

A.2.1 PROVISION OF VENTILATION OVER REFRIGERANT COILS

(a) A refrigerator space is well ventilated if:

I. The refrigerator would be completely freestanding; or

II. The space for the refrigerator is enclosed on only three sides, including the rear and top; or

III. Where the refrigerator is installed there is at least a 75mm air space around all sides of the refrigerator ; or

IV. If the refrigerator is to be enclosed on three sides or more, excluding (ii), ventilation grills should be installed below the refrigerator (either in the floor underneath the refrigerant coils, from the rear, or within the plinth) and above the refrigerant coils to allow an airflow equal to the air flow that would pass over the refrigerant coils in A2.1(a)(III)

SECTION B. GREYWATER

B.1 OBJECTIVES

B.1.1 To ensure that public health and the environment are not adversely affected by the installation of a greywater re-use system.

B.1.2 To minimise the adverse impact on the amenity of the premises and surrounding land.

B.1.3 To provide for the reuse of resources.

B.2 PERFORMANCE REQUIREMENTS

B.2.1 GREYWATER DIVERSION DEVICES (GDD)

A greywater diversion device must be installed in accordance with the most recent edition of NSW Health's Greywater reuse in sewered single domestic premises.

B.2.2 DOMESTIC GREYWATER TREATMENT SYSTEMS (DGTS)

(a) A domestic greywater treatment system that collects., stores, treats and may disinfect all or any of the sources of greywater must be either:

I. A greywater treatment system device that is accredited by NSW Health in accordance with the DTGS Accreditiation Guideline, as amended from time-to-time; or

II. An aerated wastewater treatment system (AWTS) accredited by NSW Health in accordance with the NSW Health's AWTS Guidelines, as amended from time-to-time; or

III. A facility that is purposed designed for a particular premises and approved in accordance with the Local Government (Approvals) Regulation 1999, as amended from time-to-time.

B.2.3 GREYWATER RE-USE STANDARDS

(a) Greywater must meet the requirements outlined in the most recent edition of NSW Health's Greywater reuse in sewered single domestic premises.

SECTION C. THERMAL COMFORT

C.1 OBJECTIVES

C.1.1 To maintain consistency between the assumptions made within the BASIX tool and the built outcome

C.1.2 To ensure an adequate level of thermal performance for the building fabric

C.1.3 To provide applicants, local government, principal certifying authorities and accredited certifiers with the technical requirements relating to commitments made in BASIX.

C.2 PERFORMANCE REQUIREMENTS

C.2.1. SIMULATION METHOD

(a) Assessments of the thermal performance of the dwelling undertaken through the 'Simulation' method within the BASIX tool are to be in accordance with the BASIX Thermal Comfort Protocols. Assessments are to be conducted by an accredited assessor using approved software.

(b) Terms used in assessor certificates that are defined or covered by this specification or the BASIX Definitions have the meaning given in this specification and the BASIX Definitions.

C.2.2. DEEMED-TO-COMPLY METHOD

(a) Assessments of the thermal performance of the dwelling undertaken using the 'Deemed-to-Comply' method within the BASIX tool are required to satisfy the performance requirements C2.3 to C2.9 (inclusive) below. Terms used on the BASIX Certificate have the meaning given in this document.

(b) If a commitment in a BASIX Certificate requires a person to do something in accordance with the BASIX Specification. Then the person must do that thing in accordance with the applicable requirements set out in clauses C2.3 to C2.9 (inclusive) below.

(c) If a commitment in a BASIX Certificate required a person to install something which meets the requirements set out in the BASIX Specification, then the person must install that thing so it meets the applicable requirements set out in clauses C2.3 to C2.9 (inclusive) below.

C.2.3 PRECONDITIONS

(a) The total area of all skylights must not occupy more than 2% of the gross floor area.

C.2.4 CONSTRUCTION

(a) Walls

I. Wall types: When a wall type is selected, the properties of the materials must be such that the required minimum R-value of the total system is achieved as stated in the 'Required Insulation and Roof Colours' section of the BASIX Deemed to Comply option.

II. Wall areas: The wall area is measured from the internal face of the external wall. It excludes the area of walls adjacent to garages, enclosed sub-floor zones, but includes walls of storerooms, laundries and party walls.

C.2.5 CROSS VENTILATION

(a) Living area cross ventilation

I. The total area of ventilation openings in all living areas must be greater than 12.5% of the floor area of all living areas.

II. Openings must be provided on opposite or adjacent walls of every living area.

(b) Bedroom cross ventilation

I. The bedroom must contain at least two windows or a window and a skylight, which can be opened

C.2.6 GLAZING AND SKYLIGHTS

(a) Orientation

For the purposes of the BASIX Thermal Comfort Deemed-to-Comply method, the orientations of north, south, east and west are defined as the following compass sectors: NORTH: 316-45, EAST: 46-135, SOUTH: 136-225, WEST: 226-315. (where 0 = north. 90 = east, 180 = south, 270 = west).

(b) Glazing and skylight types

I. Glazing types selected within the BASIX Deemed-to-Comply method, or on an assessor certificate if using the BASIX Simulation method must have the characteristics nominated in Appendix1 Glazing and skylight characteristics. (Available on BASIX website)

C.2.7 SHADING

(a) Eaves and projections

I. May include an eave, horizontal opaque projection, awning or pergola that will block solar gain for the length of the required projection.

II. Materials/construction: The device shall be made of a durable material suitable for external use.

III. The projection is measured horizontally from the face of the wall/building. The measurement may include fascias and/or gutters which are fixed and provide shading to the glazing.

IV. The eave/projection must be located such that the outside edge of the projection is no greater than 2400mm vertically above the sill of the glazing system or a proportionally equivalent projection.

(b) Vertical adjustable external shading

I. An adjustable shading device may comprise of shutters, louvres or panels.

II. Materials/construction: The device should be made of a durable material suitable for external use and must be able to be readily operated either manually, mechanically or electronically by the building occupants.

III. An adjustable shading device must comply with(d)(I) and (d)(II).

(c) Vertical fixed external shading

I. A fixed shading device may comprise of shutters, louvres or panels.

II. Materials/Construction: They should be made of a durable material suitable for external use.

III. A fixed shading device must comply with (d)(I).

IV. An adjacent building over 5 m in height and less than 3.1 m from glazing sill is equivalent to fixed vertical shading.

(d) Controlling solar gain

I. BLOCKING SOLAR GAIN: A shading device must restrict at least 80% of solar radiation at the summer solstice. IF: - Adjustable, when the shading device is fully closed or lowered, or – Fixed, at 9.00 am for glazing in the east sector; 12.00 pm noon for glazing in the north sector or 3.00 pm for glazing in the west sector

II. PERMITTING SOLAR GAIN: An adjustable shading device must permit at least 70% of solar radiation when fully opened at 12.00pm noon at the winter solstice if required to protect glazing in the north sector.

(e) Concessions to shading requirements

The following glazing concessions apply and are not required to comply with (a), (b), (c) or (d) above:

I. Five percent of the maximum glazing area may be unshaded.

II. Twenty percent of the north sector glazing may have eave/projection greater than the maximum eave/projection (i.e. 1100 mm) or vertical fixed shading as defined by C2.7(c)

C.2.8 REQUIRED INSULATION AND ROOF COLOURS

(a) Roof colour; Roof colour is defined by the solar absorptions set out in Table C.2.8

TABLE C.2.8. SOLAR ABSORPTANCE VALUES

LIGHT <0.475 MEDIUM 0.475 – 0.70 DARK >0.70

(b) Insulation

I. The technical and installation requirements for thermal insulation are in accordance with the Building Code of Australia, Volume 1 or 2, NSW Appendix

II. If a foil-backed blanket is used under the roof, then the R-value of the ceiling insulation may be reduced by R0.5

III. External garage walls do not require insulation to be added to the wall.

C.2.9 ROOF VENTILATION

(a) Roof ventilation is required to meet the following criteria:

I. *WIND-DRIVEN VENTILATOR: Not less than two wind-driven roof ventilators having an aggregate opening area of not less than 0.14 m2, in conjunction with eave vents, roof vents or the like having an aggregate fixed open area of not less than 0.2% of the ceiling area.*

II. *GABLE END VENTS: Not less than two gable end vents having an aggregate opening area of not less than 0.8m2.*

SECTION D. INDIGENOUS PLANT SPECIES

D.1 OBJECTIVES

D.1.1. To promote the planting of indigenous plant species to preserve the character of the local environment and promote a balanced ecosystem.

D.1.2. To ensure that the species selected are adapted to the natural rainfall patterns of the locality, and hence require minimal additional water consumption to remain healthy.

D.2 PERFORMANCE REQUIREMENTS

D.2.1 INDIGENOUS PLANT LIST

(a) The indigenous plants for each local government area are set out in Table D.2.1. of the full BASIX Specification on www.basix.nsw.gov.au

(b) In addition, a plant species is considered to be indigenous to a local government area for the purposes of BASIX commitment, if the local council for that area states in writing that the species is indigenous to that local government area.

(Note: Section paragraph numbering has been changed from BASIX sequence to correct numerical order.)

Generation of a BASIX Certificate can only be made in the NSW Department of Infrastructure, Planning and Natural Resources BASIX Website: **www.basix.nsw.gov.au**

ADDITIONAL REQUIREMENTS:

This is the specification referred to in the Contract dated: ...../...../..... .

Date for Completion: ...../...../..... .

..... PROPRIETOR / /

..... BUILDER / /

MASONRY CONSTRUCTION	Clay Bricks ☐	Face ☐	Commons ☐	Stone ☐
	Concrete Bricks ☐	Concrete Blocks ☐	AAC Blocks ☐	AAC Panels ☐
	Rendered ☐	Bagged ☐	Painted ☐	..... ☐
MORTAR JOINTS	Colour.....	Ironed ☐	Flush ☐	Raked ☐
SILLS	Brick ☐	Quarry Tiles ☐	..... ☐	
EXTERNAL WALL SHEETING	Timber Cladding ☐	Fibre Cement Cladding ☐	Metal Cladding ☐	PVC/Vinyl ☐
	Type.....	Type.....	Type.....	Type.....
FLOOR CONSTRUCTION	Timber ☐	Concrete ☐	Pre.Str. Beam Floor ☐	Steel ☐
FLOORING	T & G ☐	Species.....	Compressed FC Sheet ☐	Structural Plywood ☐
	Particle Board ☐	**Tiles:** Ceramic ☐	Terra Cotta ☐	Quarry ☐
DECKING	Treated Pine ☐	Other.....		
FRAME CONSTRUCTION	Timber ☐	Hardwood ☐	Pine ☐	Oregon ☐
	High strength galvanised steel framing ☐		Structural Steel ☐	..... ☐
ROOF CONSTRUCTION	Pitched Roof ☐	Exposed Rafters ☐	Oregon ☐	Hardwood ☐
	Roof Trusses ☐	Raked Ceiling ☐	Pine ☐	Steel Framing ☐
	Flat/Skillion ☐	..... ☐	..... ☐	
ROOF COVER	Concrete Tiles ☐	Terra Cotta Tiles ☐	Shingles/Slate ☐	Corrugated FC ☐
	Zincalume ☐	Colorbond ☐	Polycarbonate ☐	Profile.....
THERMAL INSULATION	Roof/ceiling ☐	Reflective Insulation Rating R.....		Bulk Insulation Rating R.....
	Walls ☐	Reflective Insulation Rating R.....		Bulk Insulation Rating R.....
	Floors ☐	Reflective Insulation Rating R.....		Bulk Insulation Rating R.....
INTERNAL WALL LININGS	Gypsum Plasterboard ☐	FC Sheeting ☐	Timber Panelling ☐	Cement Render ☐
	Face Brick ☐	Other.....		
WET AREA LININGS	WR Gyp. Plasterboard ☐	Villaboard ☐	Timber Panelling ☐	Laminated Panel ☐
CEILINGS	Gypsum Plasterboard ☐	Timber Panelling ☐	FC Sheeting ☐	..... ☐
CORNICE	Type.....	Size.....mm		
DOOR JAMBS	Timber ☐	Galvanised Steel ☐	..... ☐	
WINDOWS	Timber ☐	Aluminium ☐	Type/Manufacturer.....	
FLYSCREENS	Timber ☐	Aluminium ☐	Other ☐	
JOINERY	Timber ☐	Species.....	Stained/Polished ☐	Painted ☐
	Architrave Size.....mm	Skirting Size.....mm	Material.....	
	Kitchen Cupboards.....		Stained ☐	Painted ☐
	Front Door Type.....		Stained ☐	Painted ☐
	Other External Doors Type.....		Stained ☐	Painted ☐
	Internal Doors Type.....		Stained ☐	Painted ☐
	Garage Door Type.....		Size.....mm	Colour.....
EXTERNAL STAIRS	Timber ☐	Steel ☐	Concrete ☐	Brick ☐
INTERNAL STAIRS	Timber ☐	Steel ☐	Concrete ☐	Brick ☐
	as manufactured by.....		Balustrade type	
ELECTRICIAN	**Provide:**	Light Points.....	Single Switches.....	Two way switches.....
		Power Outlets.....	Single.....	Double.....
	Light Fittings.....		Smoke Detectors.....	Exhaust Fans.....
ROOF PLUMBER	Quad Gutters (size.....) ☐	Box Gutters ☐	Sheerline Gutters ☐	..... ☐
GUTTERS/DOWNPIPES	Downpipes 100 x 50 ☐	100 x 75 ☐	100 x 100 ☐	Round.....dia ☐
	Colorbond ☐	PVC ☐	Copper ☐	Zincalume ☐
	Aluminium ☐	Galvanised ☐		
WATER SERVICE	Copper pipe ☐	PVC Pipe ☐	Flex. pipe system ☐	.....
RETICULATED RECYCLED WATER	All Reticulation Systems for Recycled Water must have Lilac Coloured components and markings.			
RAINWATER STORAGE TANKS	Type.....	Size.....(kl)	Nos.	Pressure Pump ☐
STORMWATER STORAGE TANKS	Type.....	Size.....(kl)		
HOT WATER SERVICE	Electric ☐	Gas ☐	Solar ☐	.....
	Mains Pressure ☐	Gravity Fed ☐	Cylinder capacity.....litres	
INTERNAL SEWER SERVICE	Copper ☐	PVC ☐		
DRAINER	Sewer connection ☐	Septic System ☐	Aerated System ☐	Greywater diversion ☐
	PVC pipes ☐	Vitrified clay pipes ☐	Copper pipes ☐	
FENCING	Brick ☐	Paling ☐	Rail ☐	Brushwood ☐
	Front Boundary ☐	Side Boundary ☐	Rear Boundary ☐	Colorbond ☐
	As manufactured by		Type	
POOL	Type.....	Inground ☐	Above Ground ☐	Pool Cover ☐

This Schedule is to be fully completed. Items applicable should be marked - items with blank spaces will NOT be included in the works

PROPRIETOR..... BUILDER.....

DATE / /200

SCHEDULE OF RATE / P.C. ALLOWANCES AND MATERIALS

ITEMS	MODEL OR TYPE	PRIME COST
1. CONCRETE PIERS TO FOOTINGS		$
2. ROCK EXCAVATION : per cubic metre		$
3. AGRICULTURAL DRAINS: per lin. metre		$
4. STORMWATER		$
5. SEWER CONNECTIONS		$
6. CERAMIC TILES WALL $.....PER M2 S/O		$
S/O=SUPPLY ONLY FLOOR $.....PER M2 S/O		$
QUARRY $.....PER M2 S/O		$
7. SEPTIC INSTALLATIONS		$
8. GREYWATER TREATMENT INSTALLATION		$
9. BATHROOM VANITY & CABINET		$
10. EN-SUITE VANITY & CABINET		$
11. BASIN		$
12. BATH		$
13. TOWEL RAILS		$
14. SOAP HOLDERS		$
15. MIRRORS		$
16. TOILET SUITES		$
17. SHOWER SCREENS		$
18. LAUNDRY TUB		$
19. STAINLESS STEEL SINK		$
20. KITCHEN CUPBOARDS		$
21. OVEN		$
22. HOT PLATES		$
23. STOVE		$
24. DISHWASHER		$
25. EXHAUST FANS		$
26. RANGE HOOD		$
27. HOT WATER UNIT		$
28. SMOKE/FIRE DETECTORS		$
29. PHONE WIRING/FAX WIRING		$
30. T.V. WIRING/COMPUTER WIRING		$
31. INTERCOM WIRING		$
32. SECURITY INSTALLATION		$
33. AIR CONDITIONING, SINGLE UNIT		$
34. INTERNAL VACUUM SYSTEM		$
35. FRONT GATE		$
36. FRONT FENCE		$
37. CLOTHES HOIST		$
38. CONCRETE PATHS per lin. metre		$
39. GARAGE DOOR REMOTE CONTROL		$
40. LANDSCAPING (As per Design Supplied)		$
41. UNIT PAVING		$
42. RAINWATER TANKS		$
43. RETICULATED RECYCLED WATER SYSTEM		$
44.		$
45.		$
46.		$

Where there are additional items or different types of the same item a duplicate list should be added and agreed on by the proprietor and builder.

NOTE: The builder is to allow Prime Costs amounts of items set out in this Schedule above. All items to be selected by Owner. The Builders tender is to include the provision of all items, including the cost of cartage, freight, fixing and fitting as part of his contract. Adjustment for substituted fittings will be made on the basis of the prevailing retail price.

This is the specification referred to in the Contract dated: ...../...../..... .

Date for Completion: ...../...../..... .

.....PROPRIETOR / /

.....BUILDER / /

GEOTECHNICAL RISK MANAGEMENT POLICY FOR PITTWATER
FORM NO. 2 – To be submitted with detailed design for construction certificate

Development Application for _____
Name of Applicant

Address of site 80 McCarrs Creek Road Church Point

Declaration made by Structural or Civil Engineer in relation to the incorporation of the Geotechnical issues into the project design

I, JACK HODGSON (insert name) on behalf of JACK HODGSON CONSULTANTS PTY LTD (trading or company name)

on this the 23-2-05 (date)

certify that I am a Structural or Civil Engineer as defined by the Geotechnical Risk Management Policy for Pittwater. I am authorised by the above organization/company to issue this document and to certify that the organization/company has a current professional indemnity policy of at least $2million. I also certify that I have prepared the below listed structural documents in accordance with the recommendations given in the Geotechnical Report for the above development

Geotechnical Report Details:

Report Title: Risk analysis and management for proposed residence at 80 McCarrs Creek Road.
Report Date: 5-6-04
Author: Jack Hodgson

Structural Documents list:

21834-S1, S2, S3 Structural Design and Details
21834-C1 Slab reinforcement, pier & stair details.

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

JACK HODGSON. J Hodgson
(name) (signature)

Declaration made by Geotechnical Engineer or Engineering Geologist in relation to Structural Drawings

I prepared, and/or technically verified the abovementioned Geotechnical Report as per Form 1 dated and now certify that I have viewed the above listed structural documents prepared for the same development. I am satisfied that the recommendations given in the Geotechnical Report have been appropriate taken into account by the structural engineer in the preparation of these structural documents. I am aware that Pittwater Council relies on the processes covered by the Geotechnical Risk Management Policy, including this certification as the basis for ensuring that the geotechnical risk management aspects of the proposed development have been adequately addressed to achieve an "Acceptable Risk Management" level for the life of the structure taken as at least 100 years unless otherwise stated and justified in the Report and that reasonable and practical measures have been identified to remove foreseeable risk.

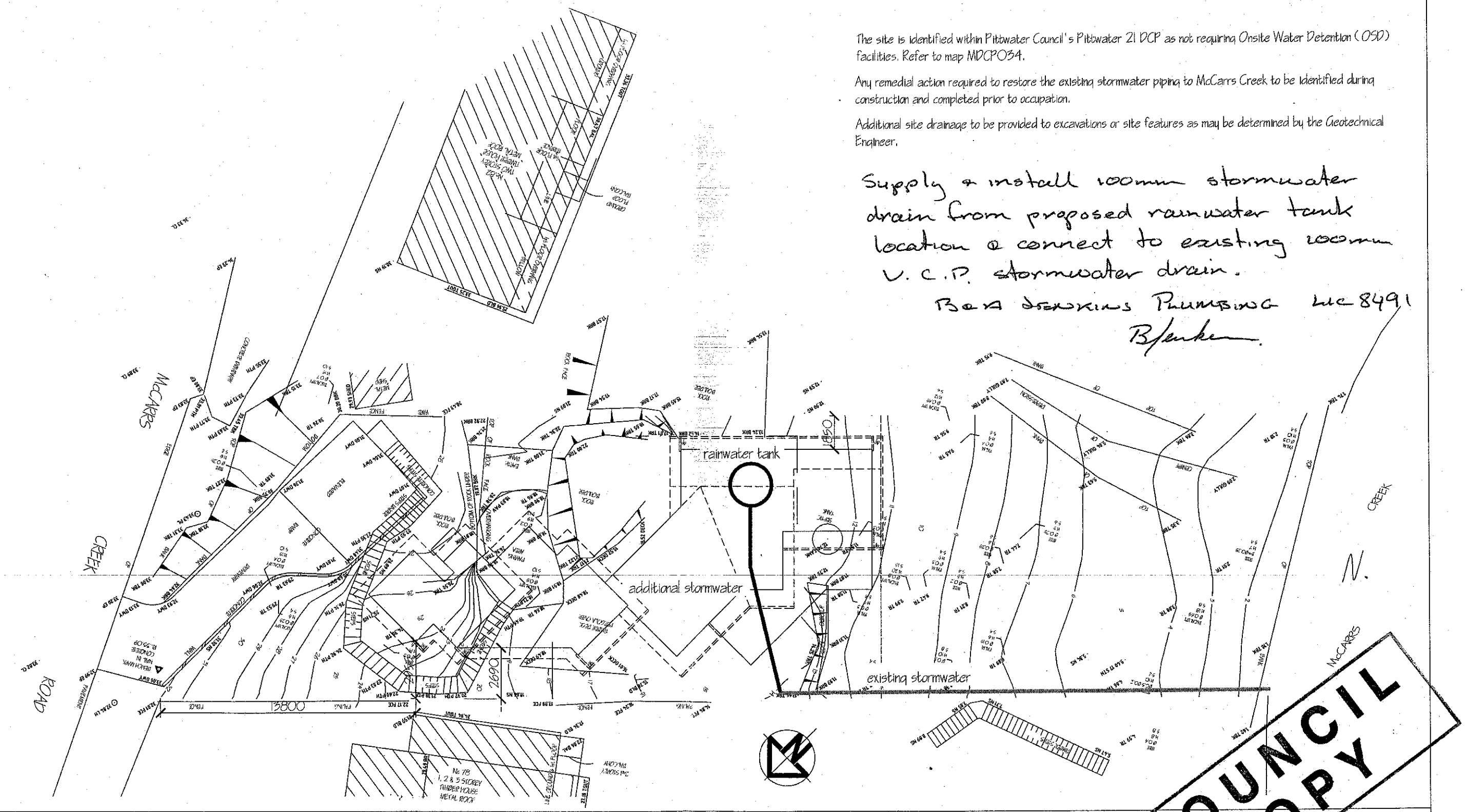
Signature ..... J Hodgson

Name ... JACK HODGSON

Chartered Professional Status ... MIE eng S.C F.I.E. AUST

Membership No. 14978

COUNCIL COPY



The site is identified within Pittwater Council's Pittwater 21 DCP as not requiring Onsite Water Detention (OSD) facilities. Refer to map MDCP034.

Any remedial action required to restore the existing stormwater piping to McCarrs Creek to be identified during construction and completed prior to occupation.

Additional site drainage to be provided to excavations or site features as may be determined by the Geotechnical Engineer.

Supply & install 100mm stormwater drain from proposed rainwater tank location & connect to existing 100mm V.C.P. stormwater drain.

Bob Jenkins Plumbing Lic 8491

B Jenkins

COUNCIL COPY

Client	Duncan Residence			General Notes	Storm Water Diagram
Site Address	80 McCarrs Creek Road			Stormwater management system in compliance with the requirements of section 3.1.2 "Drainage" of the BCA housing provision and AS/NZS 3500.3.2	Sheet No.
	Church Point			Rainwater tank to be fed by downpipes.	1/1
Job Number		Scale 1:200	28/02/05	Tank overflow to directly feed existing stormwater as shown.	

SYDNEY WATER
APPROVED

1. Position of structure in relation to Sydney Water's assets is satisfactory.
2. Connections to Sydney Water sewer/water services may only be made following the issue of a permit to a licensed plumber/drainer.
3. It is the owner's responsibility to ensure that all proposed fittings will drain to Sydney Water's sewer.
4. Any Plumbing and/or Drainage Work to be carried out in accordance with the Sydney Water Act 1994, AS 3500 and the NSW Code of Practice.
5. Gullies, Inspection Shafts and Boundary Traps shall not be placed under any Roof, Balcony, Verandah, Floor or other cover unless otherwise approved by Sydney Water.
6. Property No. 3432632

Reece, West Ryde
Quick Check Agent on behalf of
SYDNEY WATER

Per: 83/05/05

INSIGHT DEVELOPMENT CONSULTANTS PTY LTD

CONSENT NO. 431/04 DATE 25/10/04.

CONSTRUCTION CERT. NO. 2005/566.

CONSTRUCTION CERTIFICATE PLANS

15 APR 2005

T. Bowden Accreditation No. 93

WARNING

PLEASE NOTE: The stamping of this plan by Insight Development Consultants Pty Ltd does not relieve the Applicants responsibility to obtain approval from Sydney Water or other utilities prior to the commencement of any works.

Dial Before You Dig 1100

Calculations	
total site area	897.9m²
site coverage	174.7m²
driveway/ paths	60.9m²
landscaped area	73%
floor space	246.7m²
floor space ratio	0.27:1

no easements

no right of way

sewer to existing

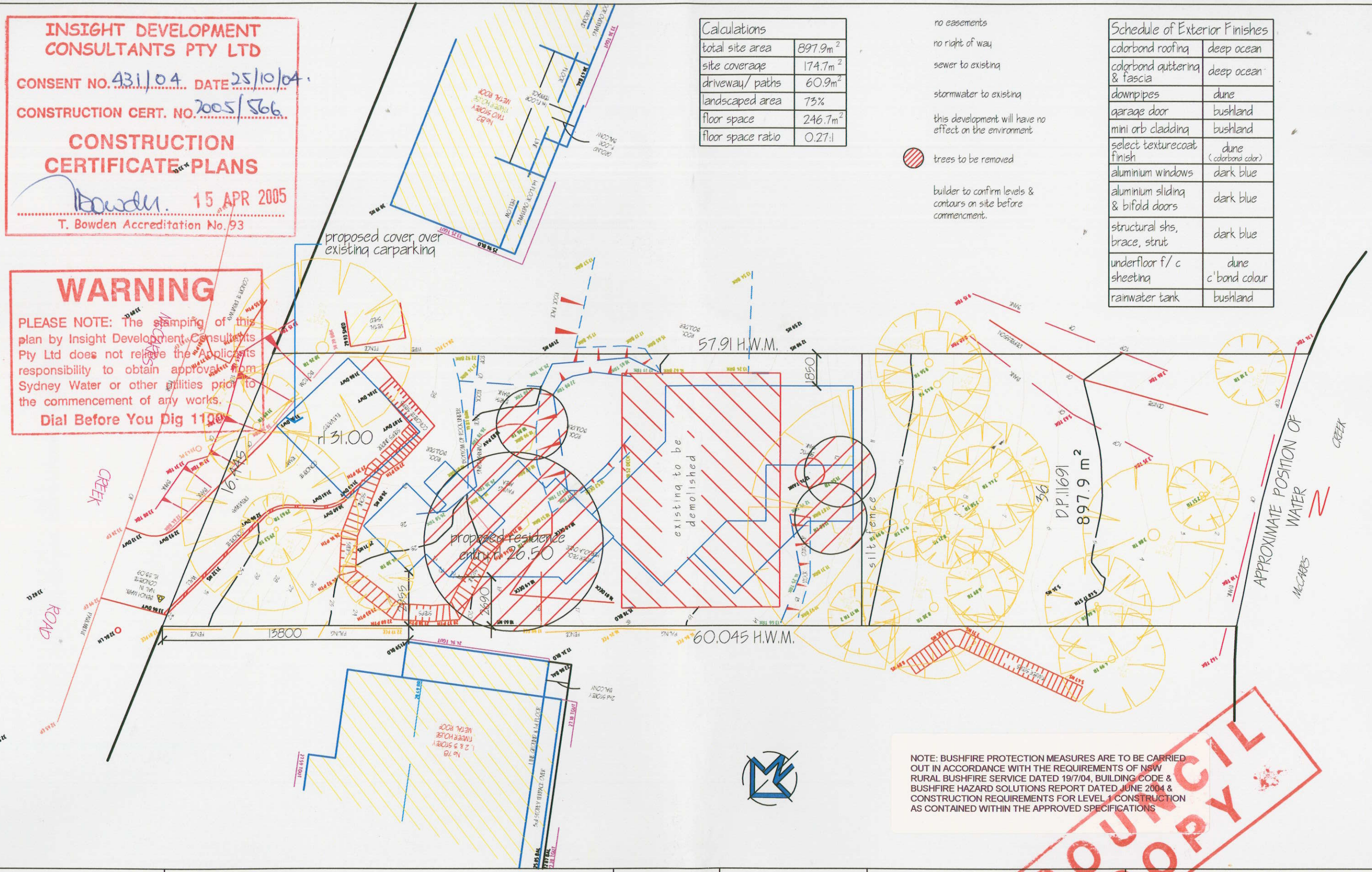
stormwater to existing

this development will have no effect on the environment

trees to be removed

builder to confirm levels & contours on site before commencment.

Schedule of Exterior Finishes	
colorbond roofing	deep ocean
colorbond guttering & fascia	deep ocean
downpipes	dune
garage door	bushland
mini orb cladding	bushland
select texturecoat finish	dune (colorbond color)
aluminium windows	dark blue
aluminium sliding & bifold doors	dark blue
structural shs, brace, strut	dark blue
underfloor f/c sheeting	dune c'bond colour
rainwater tank	bushland



NOTE: BUSHFIRE PROTECTION MEASURES ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF NSW RURAL BUSHFIRE SERVICE DATED 19/7/04, BUILDING CODE & BUSHFIRE HAZARD SOLUTIONS REPORT DATED JUNE 2004 & CONSTRUCTION REQUIREMENTS FOR LEVEL 1 CONSTRUCTION AS CONTAINED WITHIN THE APPROVED SPECIFICATIONS

COUNCIL COPY

Client	Duncan Residence		
Site Address	80 McCarrs Creek Road		
	Church Point		
Job Number	019 04	Scale 1:200	25 FEB 05

THE POLE HOME CENTRE

Suite 2/101 Victoria Street,
East Gosford, NSW 2250
Phone (02) 4323 4043
Fax (02) 4323 6303
Mobile Phone 0416 233 635

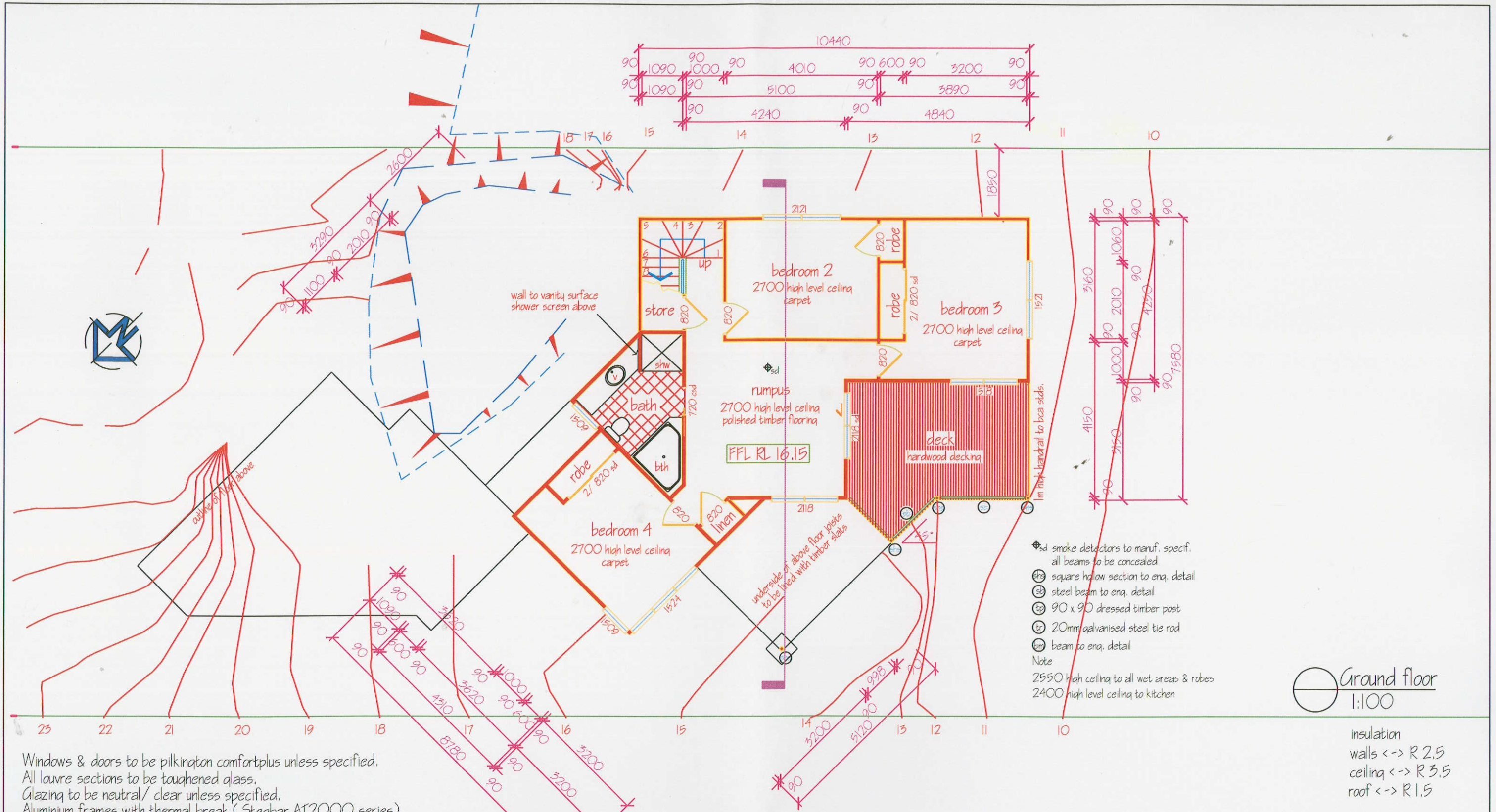
abn 55 072 909 365
acn 072 909 365

General Notes

Written dimension shall be taken in preference to scaled dimensions and verified on site before commencement of any works.

Sheet No. 1/11

BUILDING DESIGNERS ASSOCIATION OF NEW SOUTH WALES INC.



Ground floor
1:100

Windows & doors to be pilkington comfortplus unless specified.
All louvre sections to be toughened glass.
Glazing to be neutral/ clear unless specified.
Aluminium frames with thermal break (Steqbar AT2000 series),
satin chrome hardware.
Weather stripping to doors and windows.
Internal doors to bedrooms 2, 3 & 4 to be solid core.
Accoustic insulation to ceiling this level and rumpus walls.
Sliding robe doors all to be mirrored with thin profile frame in selected colour.

insulation
walls <-> R 2.5
ceiling <-> R 3.5
roof <-> R 1.5

living - 83.39m^2
deck - 16.59m^2

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Sheet No.
2/ 11

BUILDING DESIGNERS ASSOCIATION OF NEW SOUTH WALES INC.

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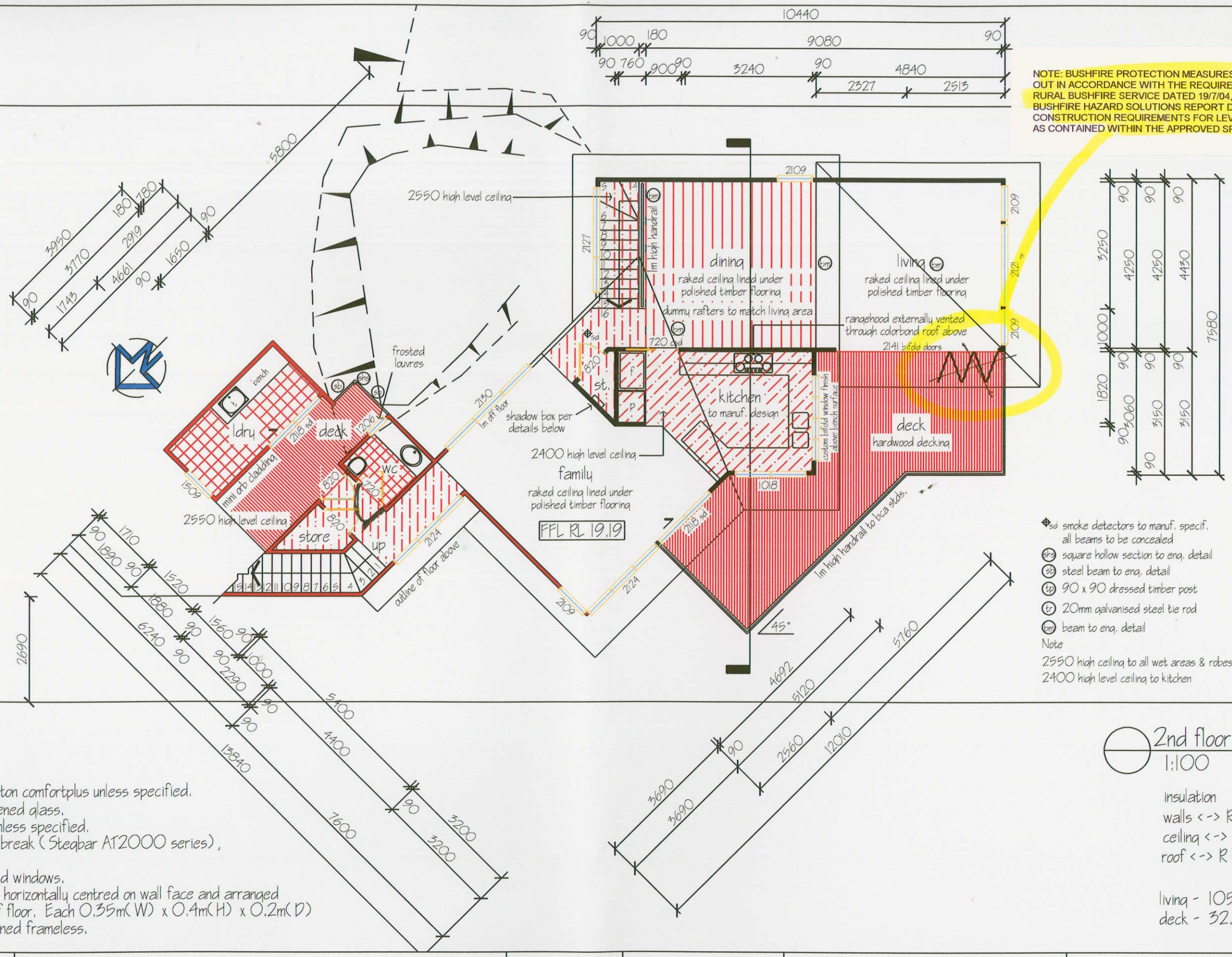

sd smoke detectors to manuf. specif. all beams to be concealed
shs square hollow section to eng. detail
sb steel beam to eng. detail
tp 90 x 90 dressed timber post
tr 20mm galvanised steel tie rod
hm beam to eng. detail

Note
2550 high ceiling to all wet areas & robes
2400 high level ceiling to kitchen

2nd floor level
1:100

insulation
walls <-> R 2.5
ceiling <-> R 3.5
roof <-> R 1.5

living - 105.19m²
deck - 32.95m²

Windows & doors to be pilkington comfortplus unless specified.
All louvre sections to be toughened glass.
Glazing to be neutral/ clear unless specified.
Aluminium frames with thermal break (Steqbar AT2000 series), satin chrome hardware.
Weather stripping to doors and windows.
Three recessed shadow boxes horizontally centred on wall face and arranged vertically commencing at 1m off floor. Each 0.35m(W) x 0.4m(H) x 0.2m(D) with 0.1m between. Gyprock lined frameless.

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Sheet No.
3/ 11

BUILDING DESIGNERS ASSOCIATION OF NEW SOUTH WALES INC.

site boundary

frosted louvres

wir

ens.

bedroom 1

raked ceiling lined under polished timber flooring

FFL RL 22.50

FFL RL 24.02

outline of floor above

glass ceiling to eng. detail

2700 high ceiling raking down with stairs

1835 bifold window

up

site boundary

3rd floor level
1:100

insulation
walls <-> R 2.5
ceiling <-> R 3.5
roof <-> R 1.5

living - 41.68m 2

Windows & doors to be pilkington comfortplus unless specified.
All louvre sections to be toughened glass.
Glazing to be neutral/ clear unless specified.
Aluminium frames with thermal break (Steqbar AT2000 series) , satin chrome hardware.
Weather stripping to doors and windows.

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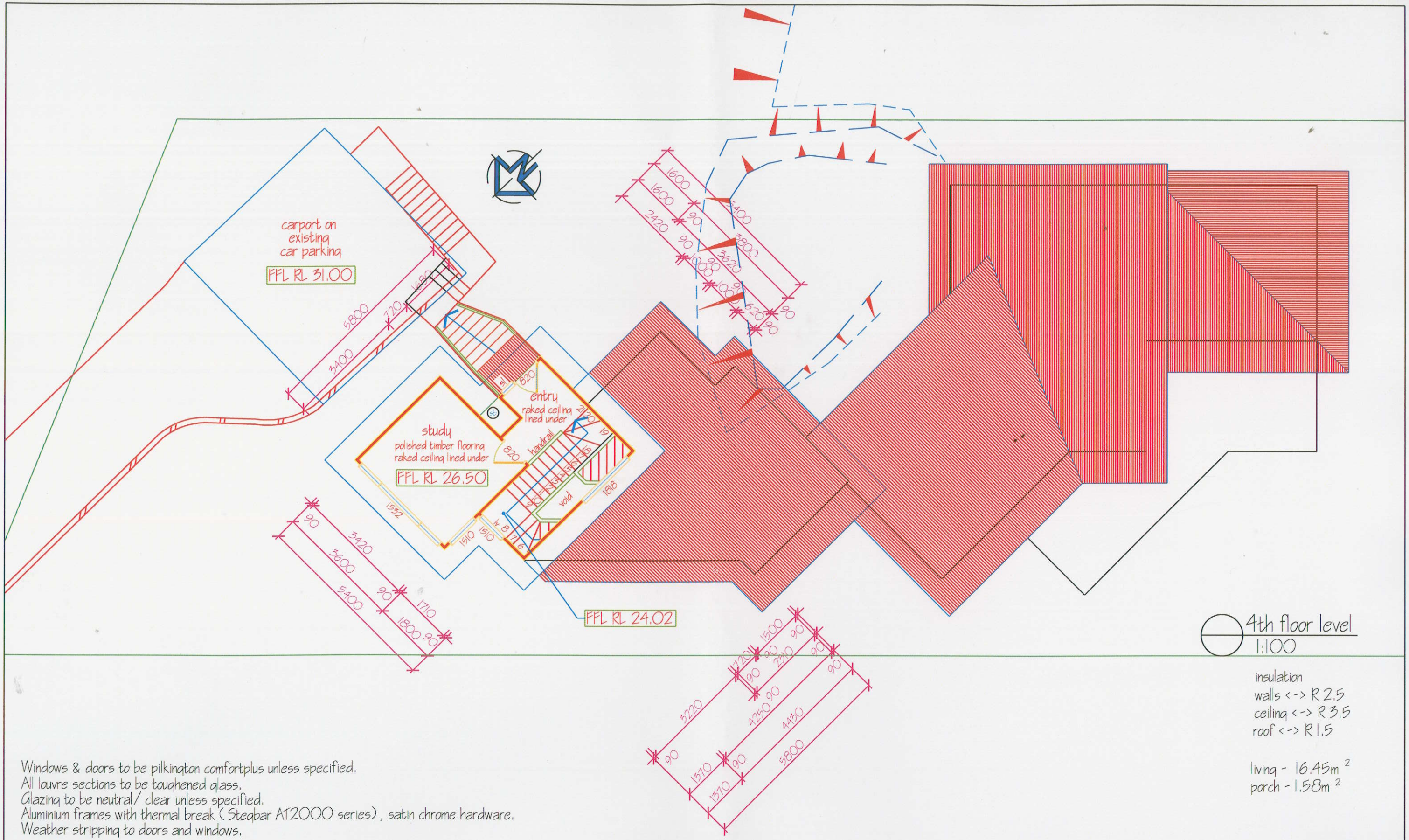
Sheet No.
4/11



4th floor level
1:100

insulation
walls <-> R 2.5
ceiling <-> R 3.5
roof <-> R 1.5

living - 16.45m ^{2}
porch - 1.58m ^{2}

Windows & doors to be pilkington comfortplus unless specified.
All louvre sections to be toughened glass.
Glazing to be neutral/ clear unless specified.
Aluminium frames with thermal break (Steqbar AT2000 series) , satin chrome hardware.
Weather stripping to doors and windows.

Client	Duncan Residence		
Site Address	80 McCarrs Creek Road		
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Job Number	019 04	Scale 1:100	25 FEB 05

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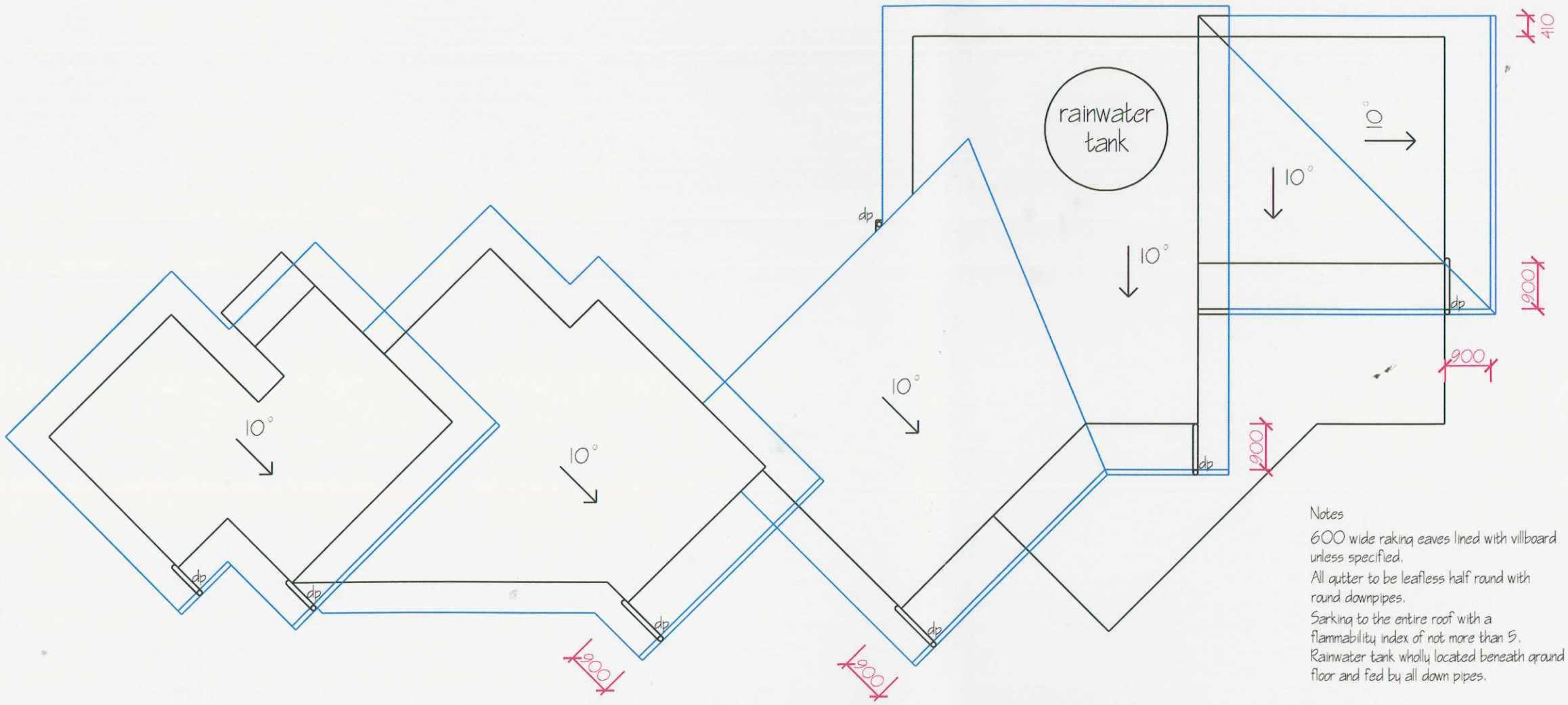
Sheet No.
5/ 11

site boundary



Notes

600 wide raking eaves lined with villboard unless specified.
All gutter to be leafless half round with round downpipes.
Sarking to the entire roof with a flammability index of not more than 5.
Rainwater tank wholly located beneath ground floor and fed by all down pipes.

site boundary

roof plan
1:100

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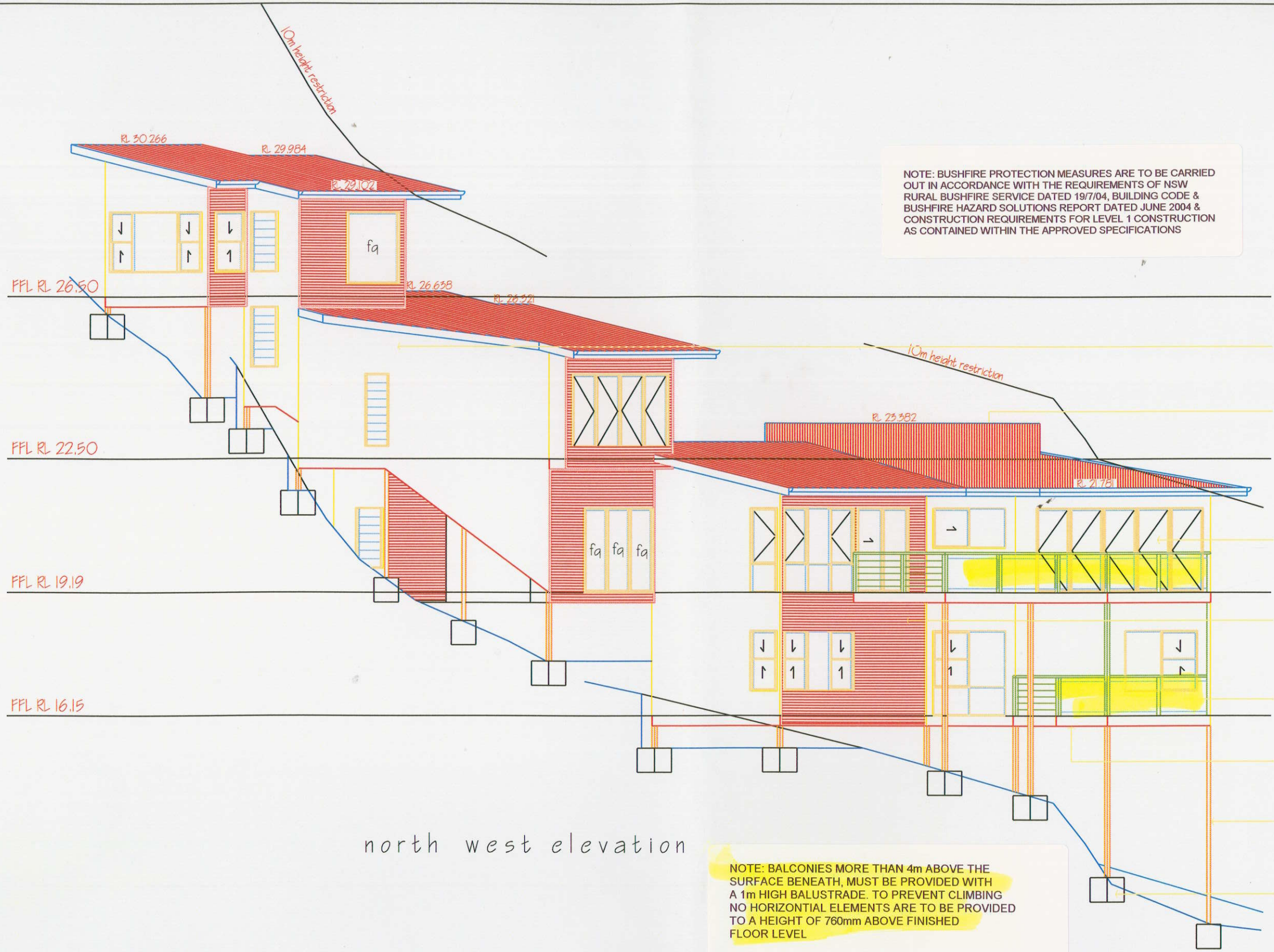
General Notes

Sheet No.

6/11

BUILDING DESIGNERS ASSOCIATION OF NEW SOUTH WALES INC.



north west elevation

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NOTE: BALCONIES MORE THAN 4m ABOVE THE SURFACE BENEATH, MUST BE PROVIDED WITH A 1m HIGH BALUSTRADE. TO PREVENT CLIMBING NO HORIZONTIAL ELEMENTS ARE TO BE PROVIDED TO A HEIGHT OF 760mm ABOVE FINISHED FLOOR LEVEL

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Job Number	019 04	Scale 1:100	25 FEB 05

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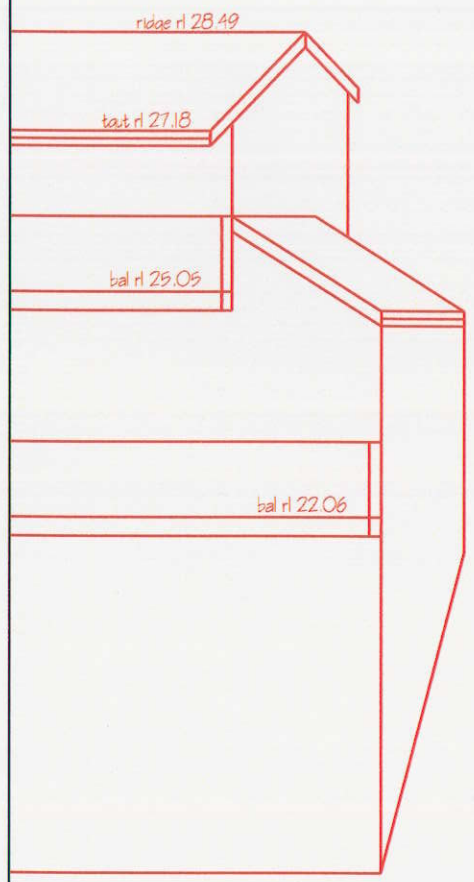
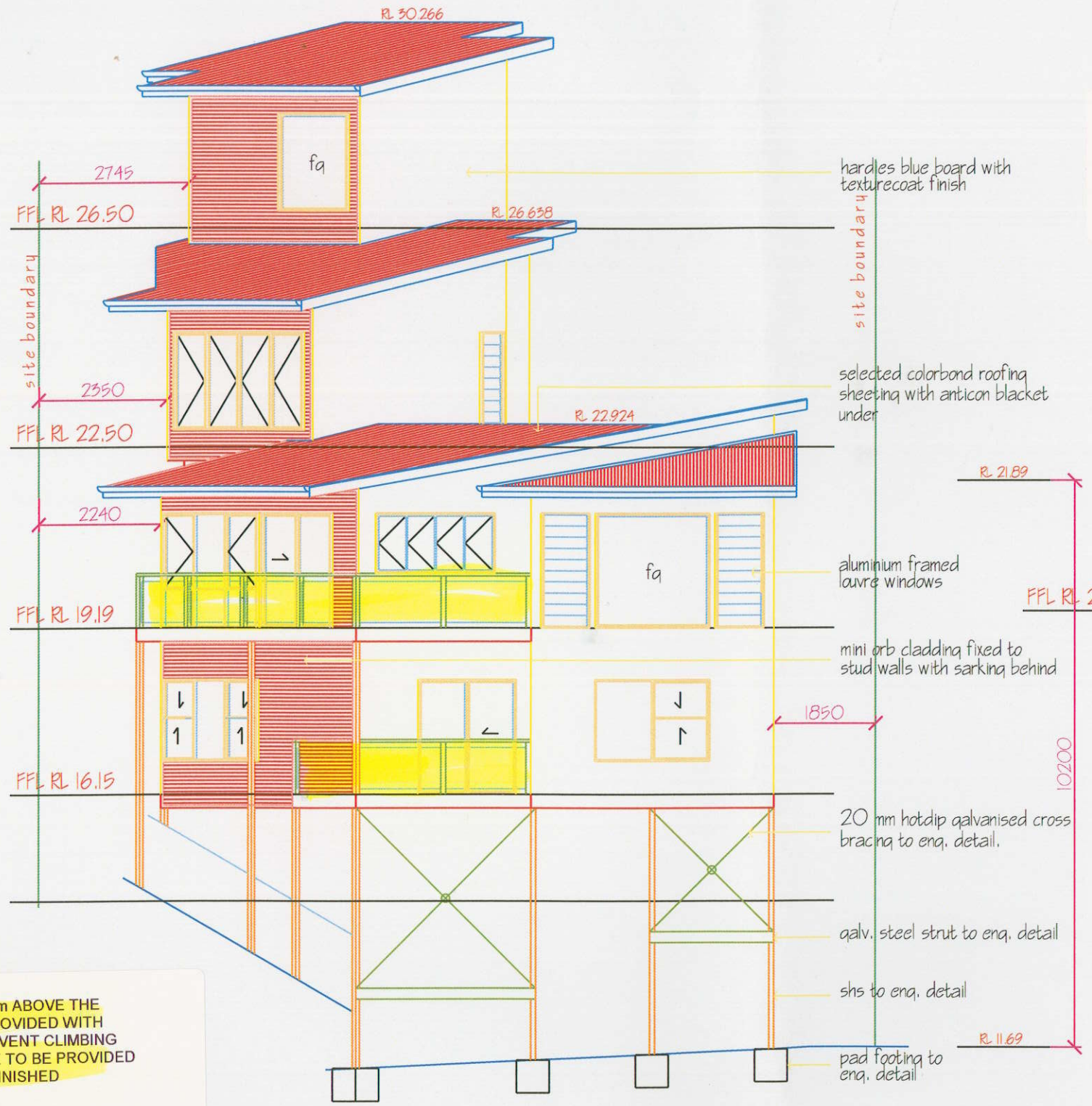
Sheet No.

7/11





south west elevation

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north east elevation

Client	Duncan Residence		
Site Address	80 McCarrs Creek Road		
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Job Number	019 04	Scale 1:100	25 FEB 05

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Sheet No.

8/11

BUILDING DESIGNERS ASSOCIATION OF NEW SOUTH WALES INC

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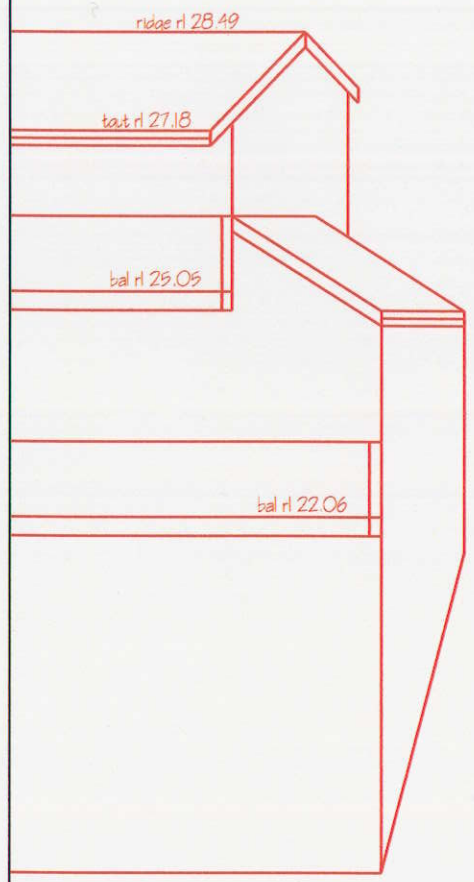
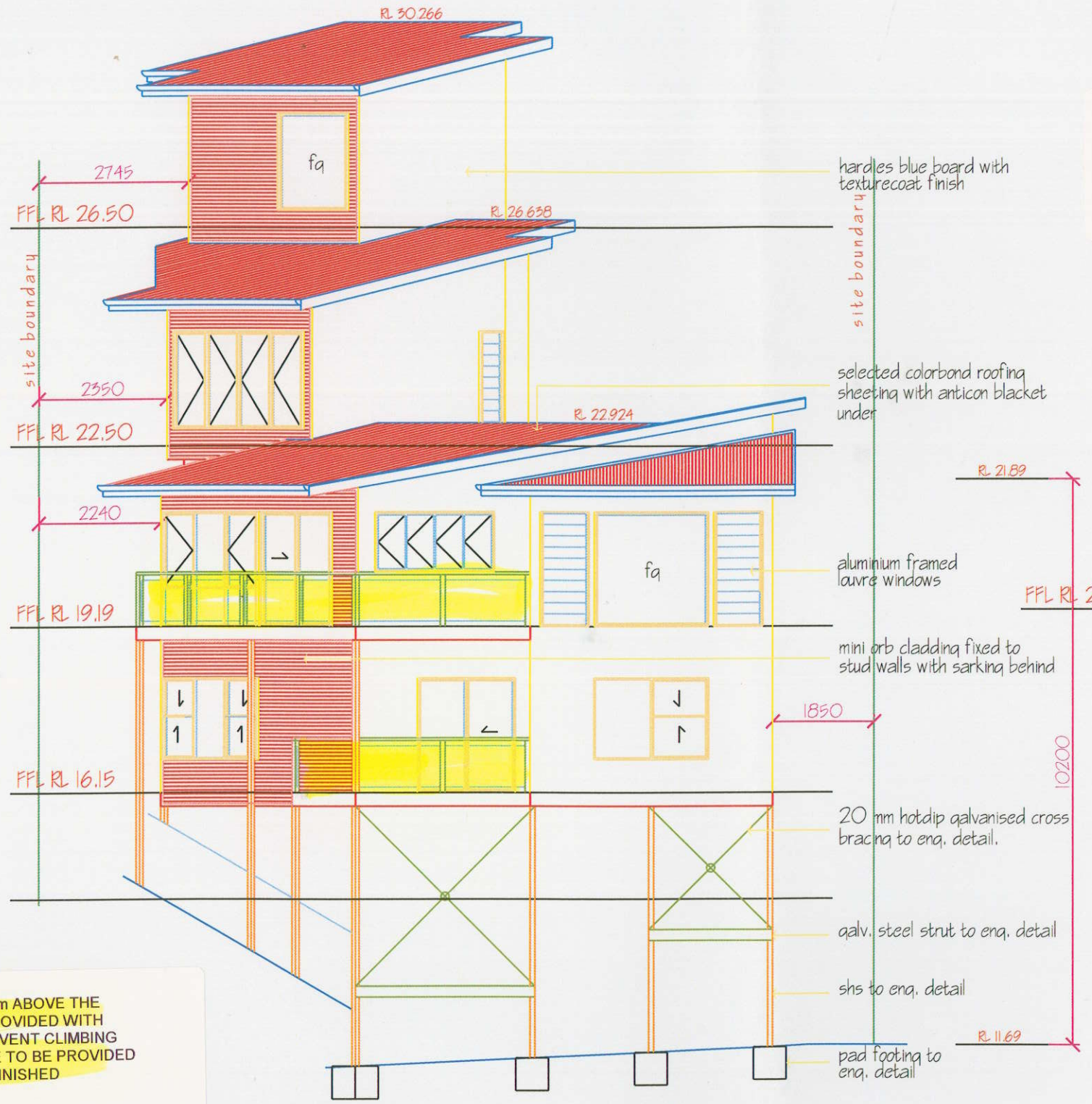
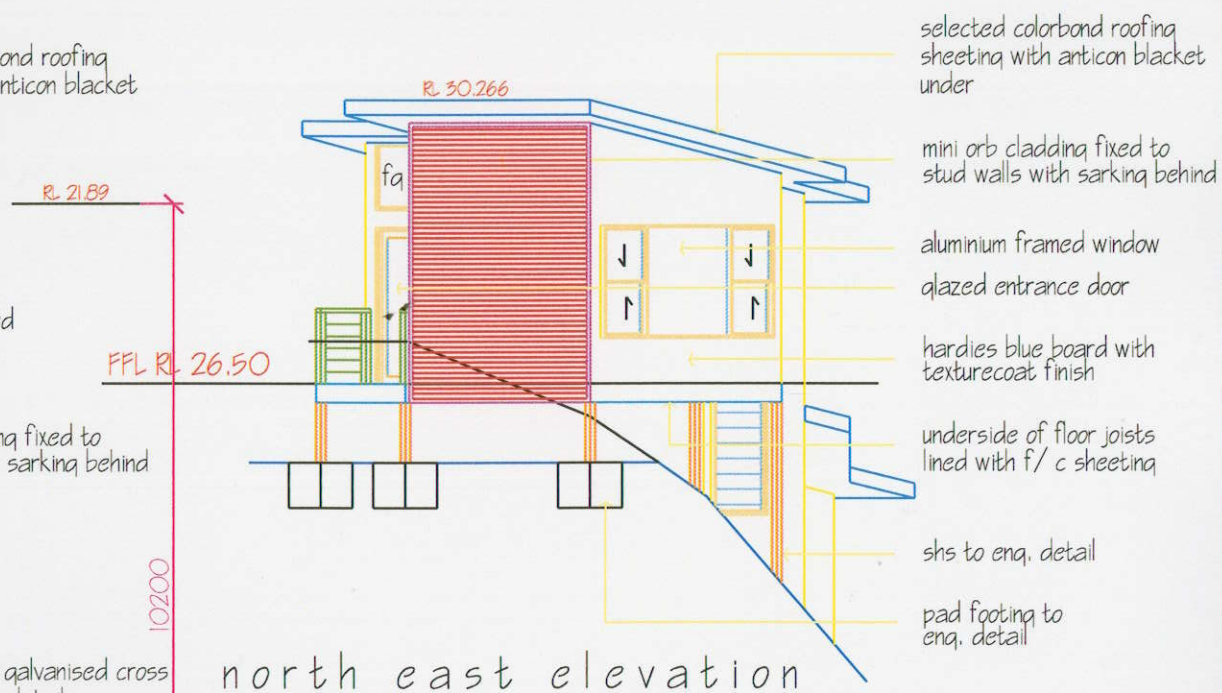




south west elevation



north east elevation

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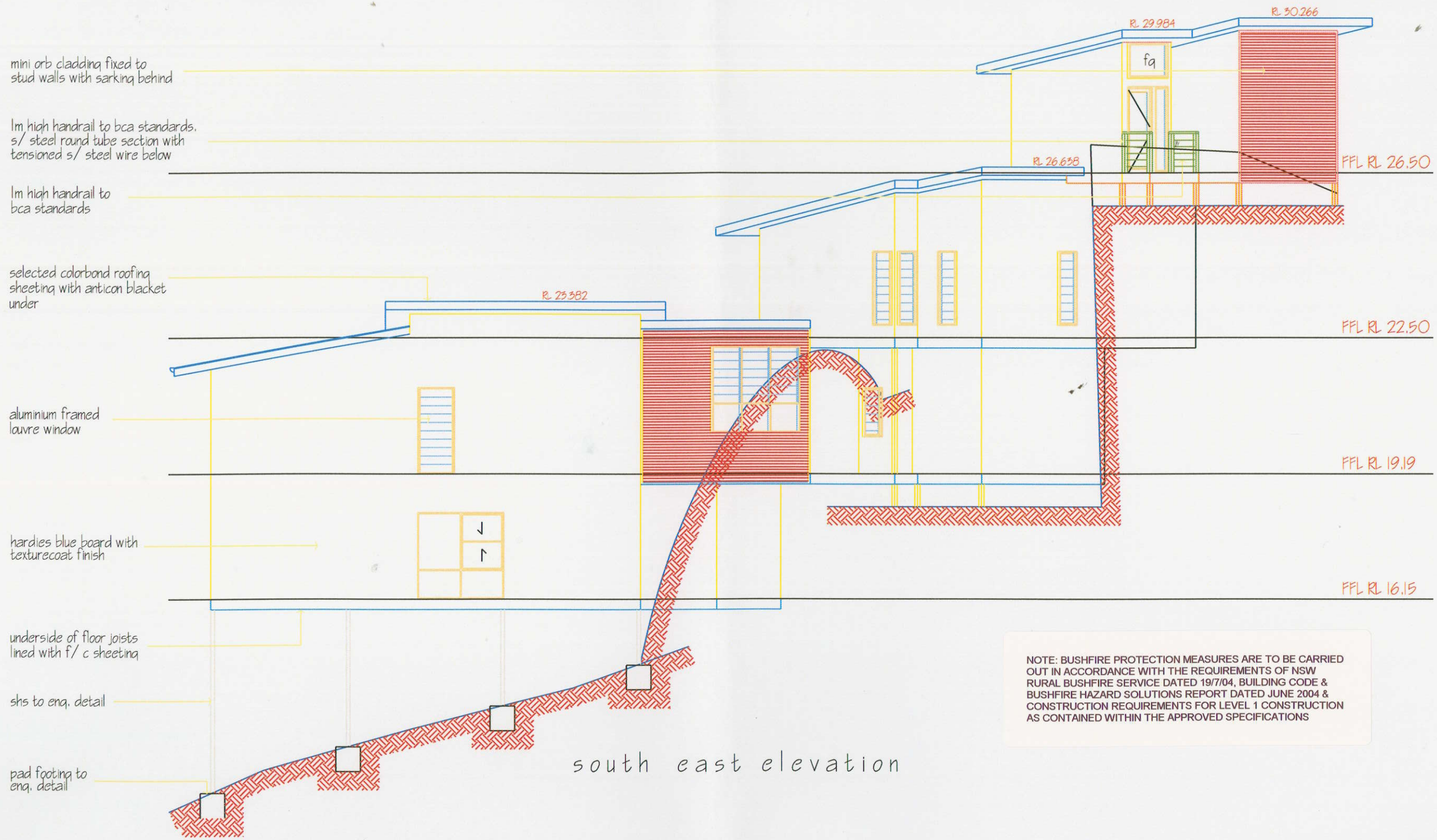

south east elevation

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9/ 11

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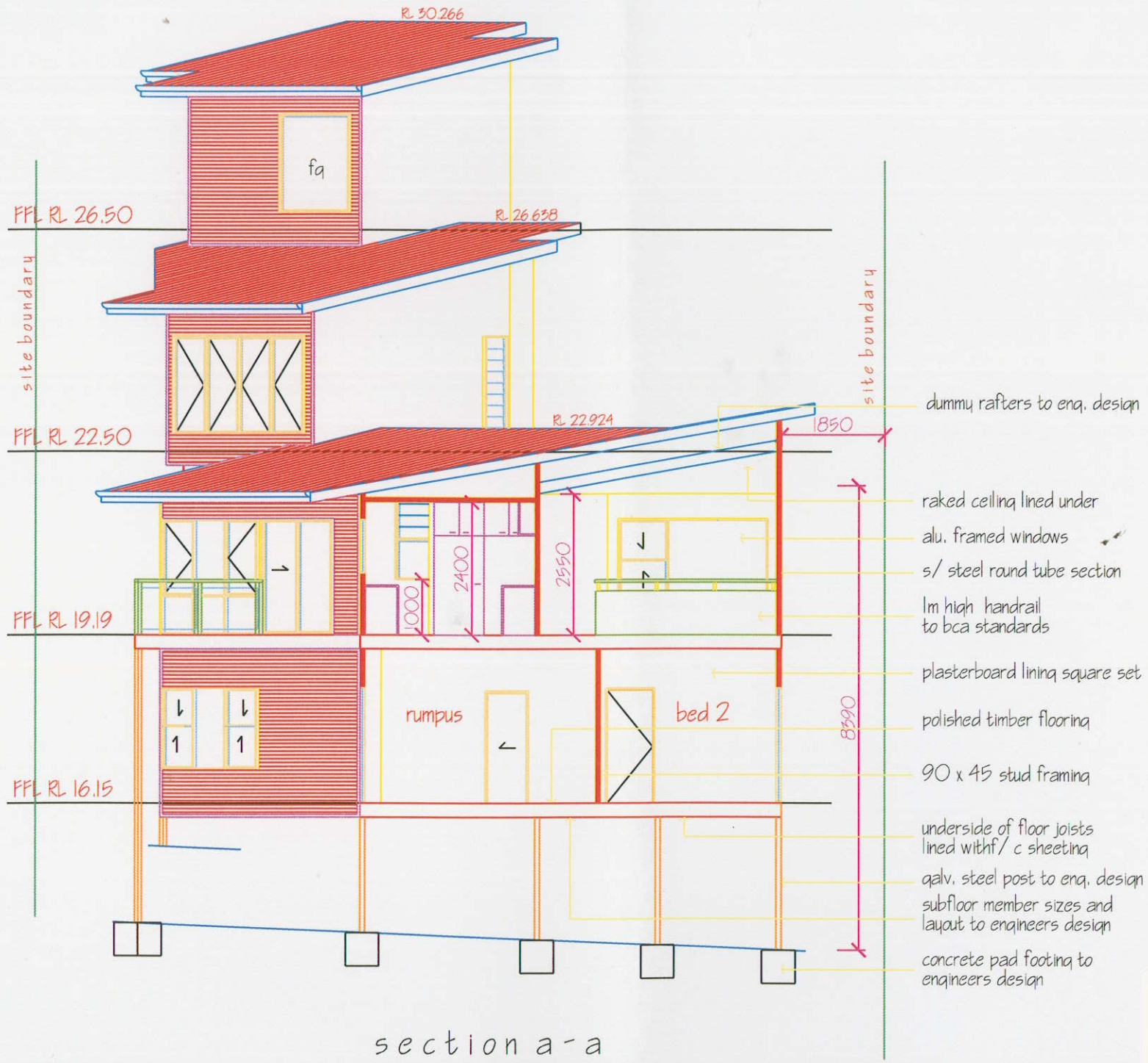

section a-a

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10/ 11

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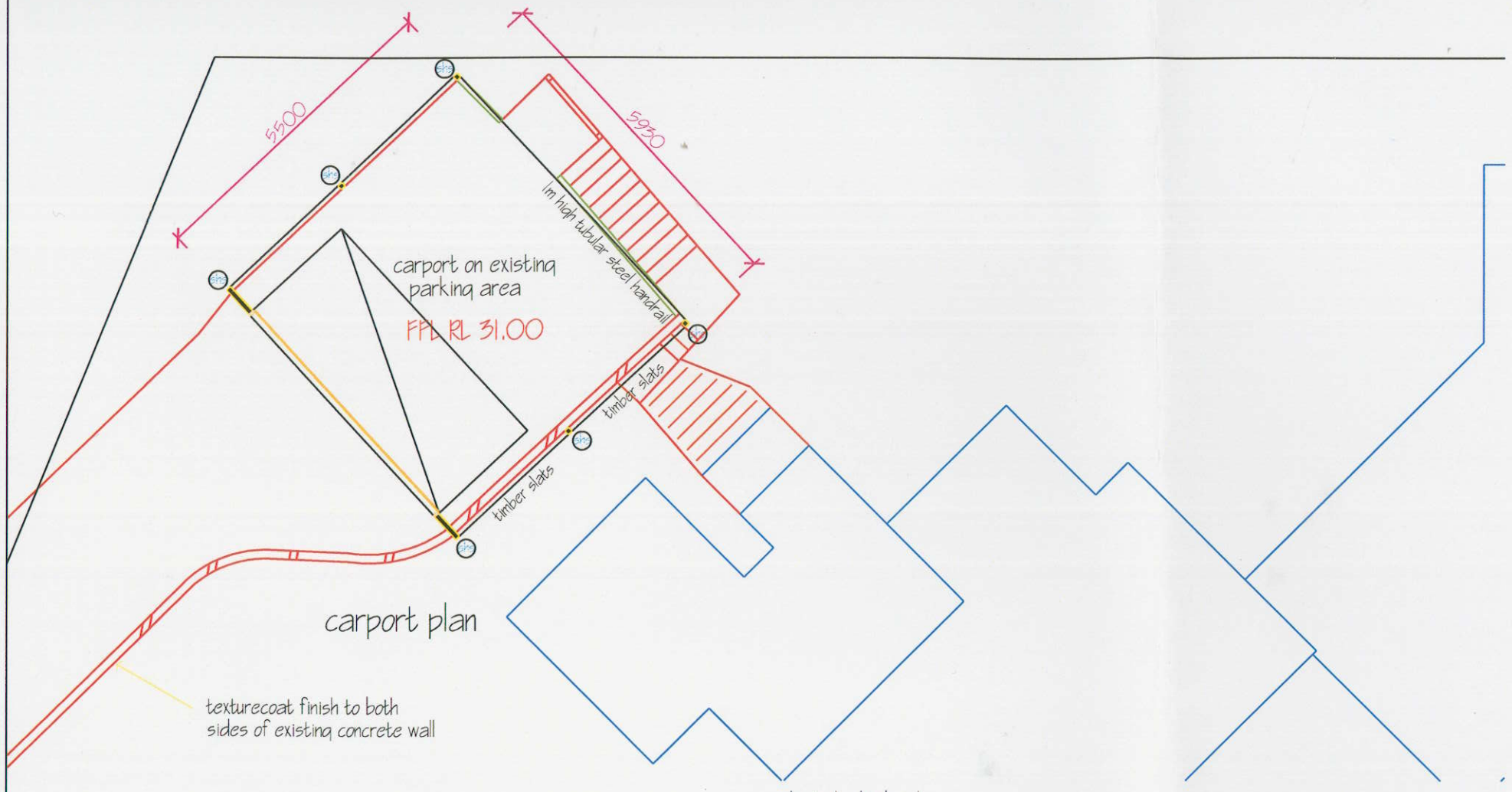
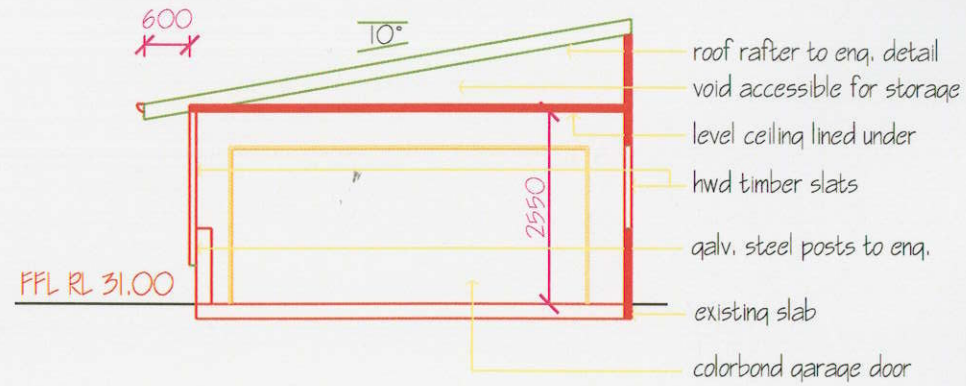


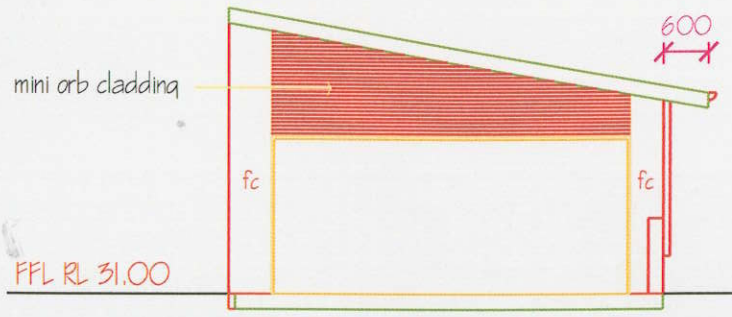
carport plan

texturecoat finish to both sides of existing concrete wall

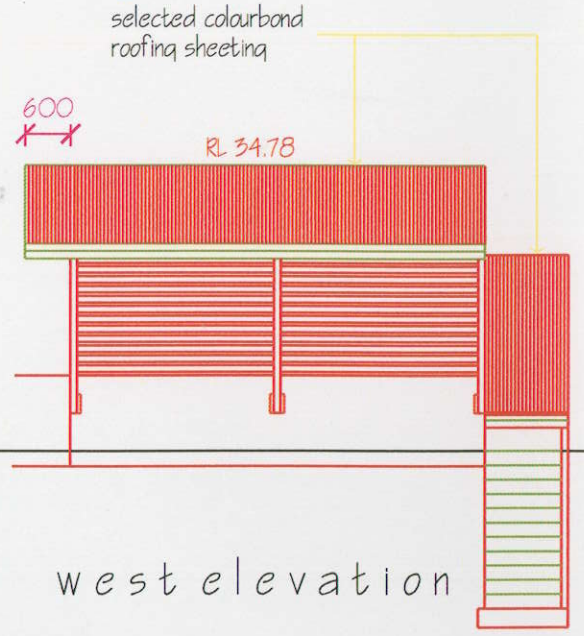


section a-a

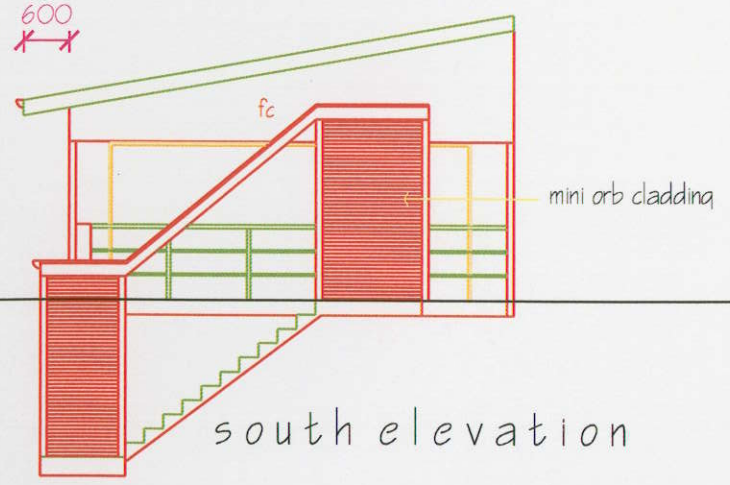
Note
materials to match house



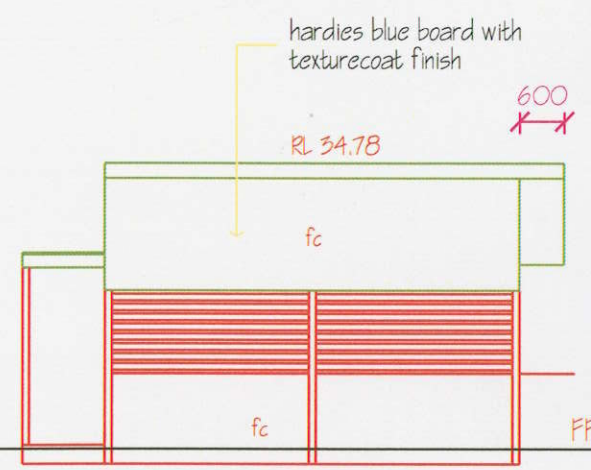
north elevation



west elevation



south elevation



east elevation

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	Church Point		
Job Number	019 04	Scale 1:100	25 FEB 05

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Written dimension shall be taken in preference to scaled dimensions and verified on site before commencement of any works.

Sheet No.

11/11

BUILDING DESIGNERS ASSOCIATION OF NEW SOUTH WALES INC.

VEHICULAR ACCESS
All vehicular access and movement within the site is constrained to the existing elevated concrete d'way platform. Due to this surface being fully sealed, there are no specific requirements necessary for removal of clay from vehicles leaving the site. Site access via the water reservewill be prohibited throughout the construction period without prior Council approval.

ASSET PROTECTION ZONE
Note that the upper slopes of the subject site from McCarrs Creek Rd to approximately contour 22m is to be maintained as an Asset Protection Zone (APZ) according to the recommendations contained within the Bushland Hazard Assessment Report prepared by Building Code and Bushfire Hazard Solutions dated June 2004

BOARD WALK
Construction of the boardwalk downslope of the proposed dwelling is to be carried out in accordance to the recommendations in the Aboricultural Assessment dated October 2004, prepared by Urban Forestry Australia.

Other Landscape Items

Nominated stepping stones in 75mm Compacted Deco. Gravel Pathways with Timber Edging.

Specified turf to graded & drained open areas

Alignment of proposed silt trap fencing as detailed

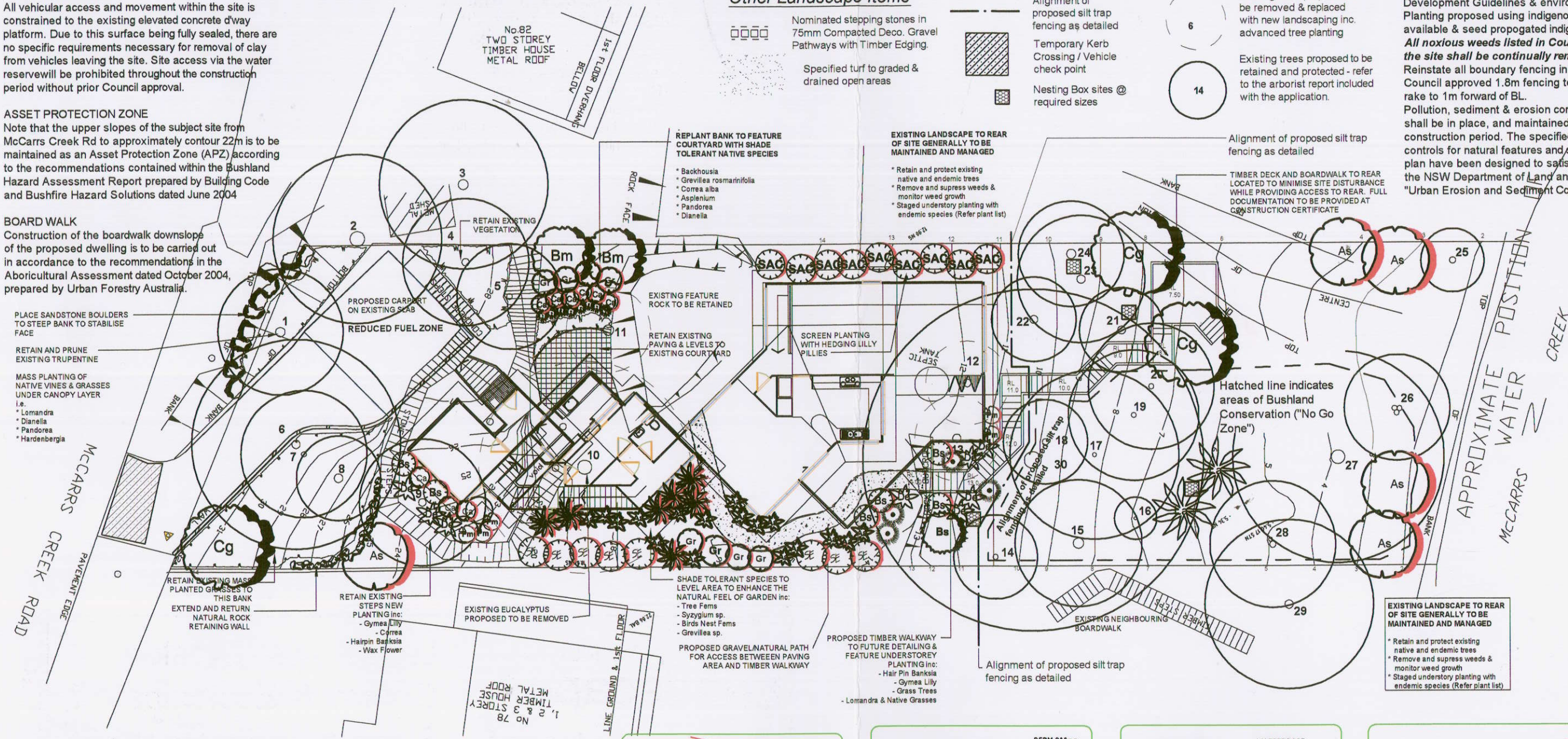
Temporary Kerb Crossing / Vehicle check point

Nesting Box sites @ required sizes

6 — Existing trees proposed to be removed & replaced with new landscaping inc. advanced tree planting

14 — Existing trees proposed to be retained and protected - refer to the arborist report included with the application.

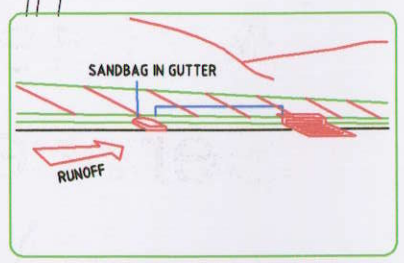
Plan prepared with reference to Pittwater Councils Development Guidelines & environmental requirements. Planting proposed using indigenous, commercially available & seed propogated indigenous species.
All noxious weeds listed in Councils lists located on the site shall be continually removed & supressed.
Reinstate all boundary fencing in poor condition with Council approved 1.8m fencing to rear of building line, rake to 1m forward of BL.
Pollution, sediment & erosion control devices as detailed shall be in place, and maintained for the duration of the construction period. The specified sediment and erosion controls for natural features and site works within this plan have been designed to satisfy the requirements of the NSW Department of Land and Water Conservations "Urban Erosion and Sediment Control" manual.



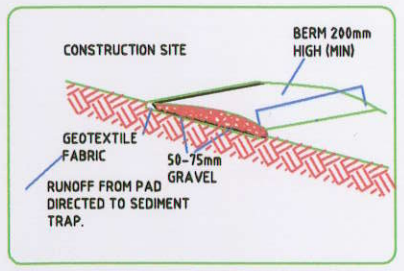
TREE SURVEY

No#	Tree Species Botanical Name*	Common Name	Approx Hght	Approx Spread	Tree Cond.	Proposed Action
1	Syncarpia glomulifera	Turpentine	8m	6m	F	Retain & Prune
2	Eucalyptus sp.	Gum Tree	20m	8m	G	Neighbouring - Retain
3	Syncarpia glomulifera	Turpentine	18m	8m	G	Neighbouring - Retain
4	Native evergreen canopied sp.	Unidentified	8m	6m	G	Retain & Protect
5	Callitrematis sp.	Callitrematis	5m	3m	F	Retain
6	Eucalyptus sp.	Gum Tree	25m	10m	G	Retain & Protect
7	Eucalyptus sp.	Gum Tree	20m	8m	P	Retain & Protect
8	Elaeocarpus reticulatus	Blueberry Ash	7m	4m	G	Retain & Protect
9	Syncarpia glomulifera	Turpentine	15m	5m	G	Retain & Protect
10	Camellia sp.	Blood wood	20m	10m	VG	Remove
11	Eucalyptus sp.	Gum Tree	8m	4m	VP	Remove
12	Livistona australis	Cabbage Tree Palm	15m	4m	G	Remove
13	Livistona australis	Cabbage Tree Palm	12m	4m	G	Remove
14	Glochidion ferdinandi	Cheese Tree	8m	4m	G	Retain & Protect
15	Syncarpia glomulifera	Turpentine	12m	6m	G	Retain & Protect
16	Archontophoenix cunninghamiana	Bangalow Palm	8m	2m	F	Retain
17	Native evergreen canopied sp.	Unidentified	8m	2m	G	Retain & Protect
18	Livistona australis	Cabbage Tree Palm	10m	4m	G	Retain & Protect
19	Native evergreen canopied sp.	Unidentified	12m	6m	G	Retain & Protect
20	Native evergreen canopied sp.	Unidentified	7m	6m	G	Retain & Protect
21	Backhousia myrtifolia	Grey Myrtle	3m	4m	G	Retain & Protect
22	Backhousia myrtifolia	Grey Myrtle	7m	4m	G	Retain & Protect
23	Livistona sp.	Fan Palm	8m	6m	G	Retain & Protect
24	Eucalyptus sp.	Gum Tree	15m	5m	P	Retain
25	Livistona australis	Cabbage Tree Palm	12m	5m	G	Retain
26	Syncarpia glomulifera	Turpentine	8m	5m	G	Retain
27	Eucalyptus sp.	Gum Tree	20m	10m	F	Retain
28	Glochidion ferdinandi	Cheese Tree	10m	5m	G	Retain
29	Ficus macrophylla	Moton Bay Fig	12m	8m	G	Retain & Protect
30	Eucalyptus sp.	Gum Tree	25m	15m	F	Retain & Protect

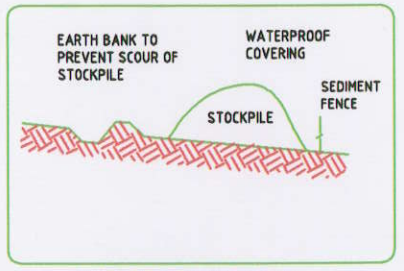
Tree Survey is based on a separate site visit undertaken by a trained arborist at the time of the landscape design, and may vary slightly from the information shown on the survey plan for the project.
Trees labelled "Retain & Protect" shall have tree protective fencing as detailed installed to dripline.



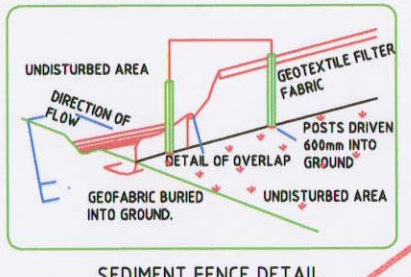
SANDBAG KERB SEDIMENT TRAP



TEMPORARY KERB CROSSING



DIVERSION BANK DETAIL



SEDIMENT FENCE DETAIL

LEGEND & SCHEDULE

Canopy Trees & Palms (8 required)

As — **Acmena smithii** (45Lt pots)
Lilly Pilly (Indigenous)
(Mat. Hght approx. 8-12m x 5-7m).
Qty Required: **5**

Cg — **Corymbia gummifera** (contract grown or 45Lt)
Red Bloodwood (Indigenous)
(Mat. Hght approx. 10-18m x 5-7m).
Qty Required: 3

Livistona australis (1 to 3m trunks).
Cabbage Tree Palm
(Mat. Hght 15m x 4m)
Qty Required: **2**
(replacement sp.)

Small Trees / Large Shrubs

Bm — **Backhousia myrtifolia** (45Lt pots).
Grey Myrtle (Indigenous)
(Ht x Sp. 4-5m x 3-5m) Qty Required: **2**

Cg — **Ceratopetalum gummiferum** (35Lt Pots).
NSW Christmas Bush (Indigenous)
(Approx Mat. Ht. x Sp. 4-6m x 3m)
Qty Required: t.b.a.

Bs — **Banksia serrata** (100Lt Bags).
Old Man Banksia (Indigenous)
(Mat. Ht x Sp. 4-7m x 5m)
Qty Required: **1**

Er — **Elaeocarpus reticulatus** (15Lt Pots).
Blueberry Ash (Native)
(Mat. Hght approx. 5-8m x 3-4m)
Qty Required: **t.b.a.**

Shade tolerant Shrubs

Cyathea australis (500mm to 1m trunks).
Soft tree fern (Mat. Hght 3-6 x 3m)
Qty Required: **10**

SAC — **Syzygium "Aussie Compact"** (300mm Pots).
Aussie Compact (approx. 3-5m x 2m)
Qty Required: **10**

Sf — **Syzygium "Express"** (200mm Pots).
Express Lilly Pilly (approx. 2-3m x 2m)
Qty Required: **8**

Asplenium australisicum (150mm pots).
Bird's Nest Fern (Native)
(Approx 750mm x 750mm) Qty Required: **25**

Pm — **Philotheca myoporiodes** (200mm Pots).
Long-Leaf Wax Flower (Indigenous)
(approx. 1.5m x 1.5m) Qty Required: **7**

Shrubs (30 total min. required)

Be — **Banksia ericifolia** (300mm Pots).
Heath Banksia (Indigenous)
(Approx. 3-5m x 3m) Qty Required: **t.b.a.**

Bs — **Banksia spinulosa** (200mm Pots).
Hair-Pin Banksia (Indigenous)
(approx. 1-2m x 1-2m) Qty Required: **5**

Ca — **Correa alba** (200mm pots).
White Correa (Native)
(Hght approx. 1m x 1m) Qty: **10**

Dx — **Doryanthes excelsa** (150mm pots)
Gymea Lilly (Native)
(Approx 1m x 1m) Qty Required: **10**

Gr — **Grevillea rosmarinifolia** (200mm pots).
Rosemary Spider Flower (Native)
(Hght approx. 2m x 3m) Qty Required: **10**

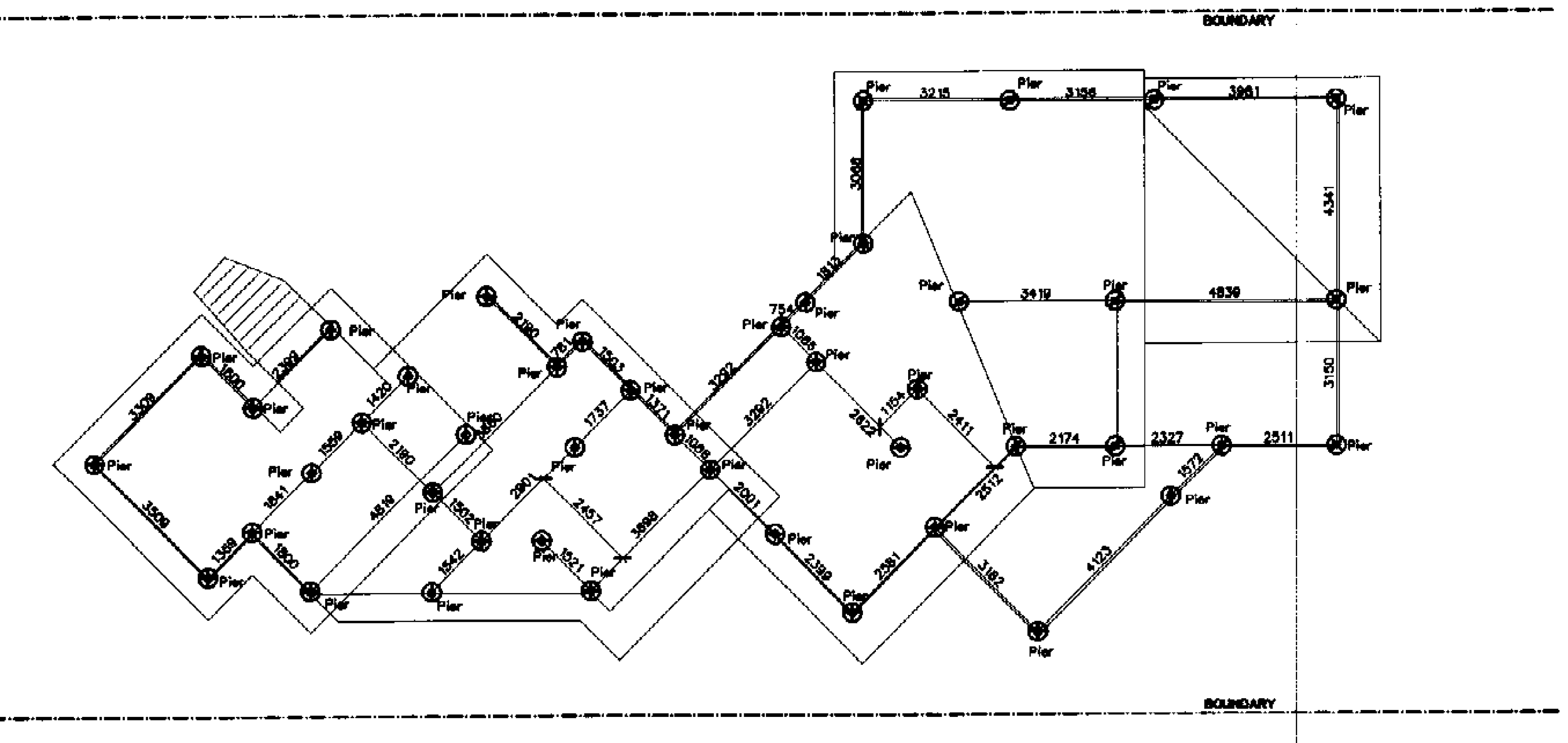
Xanthorrhoea media (300- 500mm trunks).
Grass Tree (Indigenous)
(approx. 1-2m x 1-2m) Qty Required: **5**

R.L.Frew
Landscape Architectural Services
PO Box 416
CREMORNE 2090
Lev 1, 112 Glover St,
MOSMAN 2088
Phone: 9908 5698
Fax: 9908 5798
Mobile: 0413 861 351

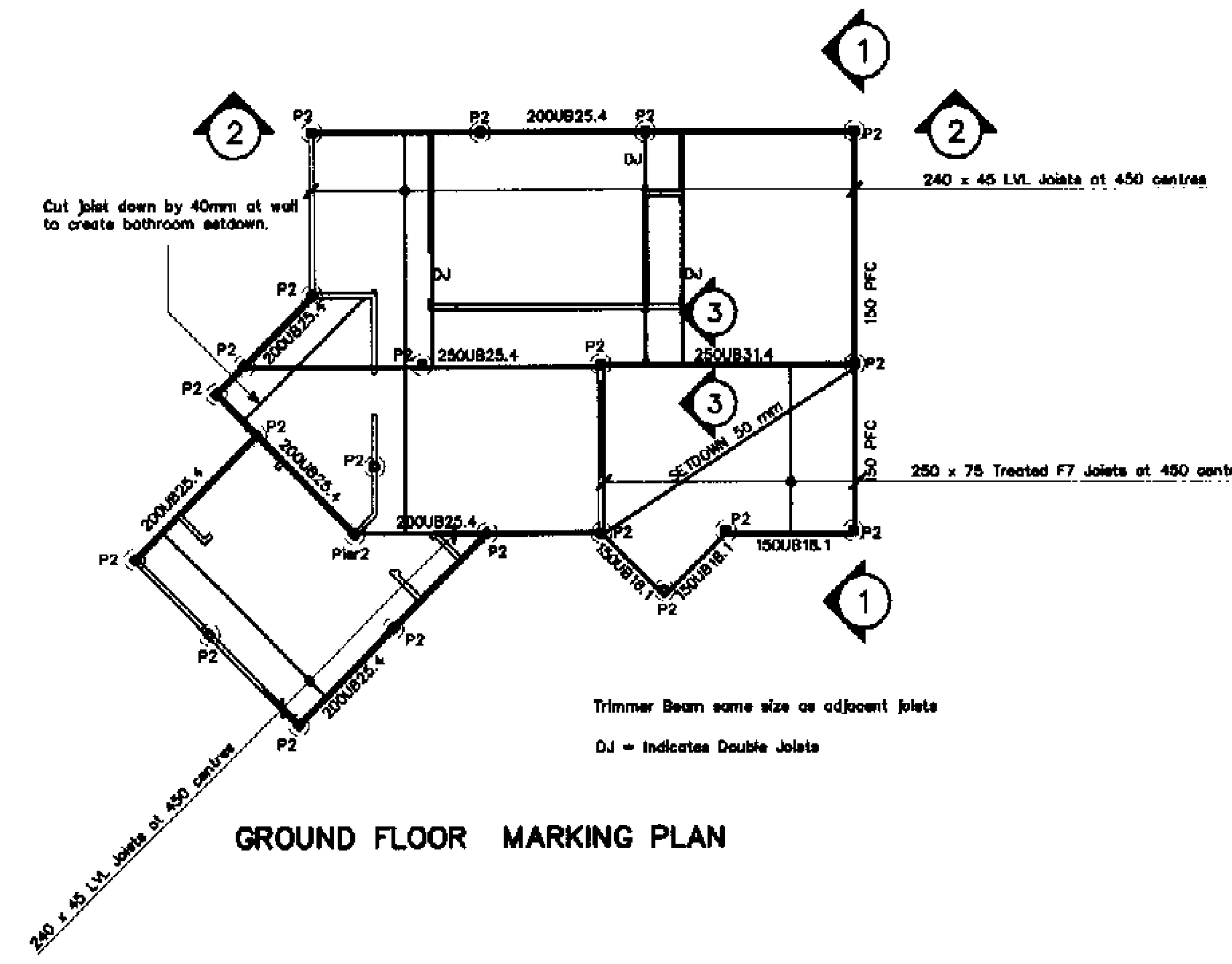
Landscape, Erosion Control & Ecological Sustainability Plan

RESIDENTIAL DEVELOPMENT
80 McCARRS CREEK RD,
CHURCH POINT

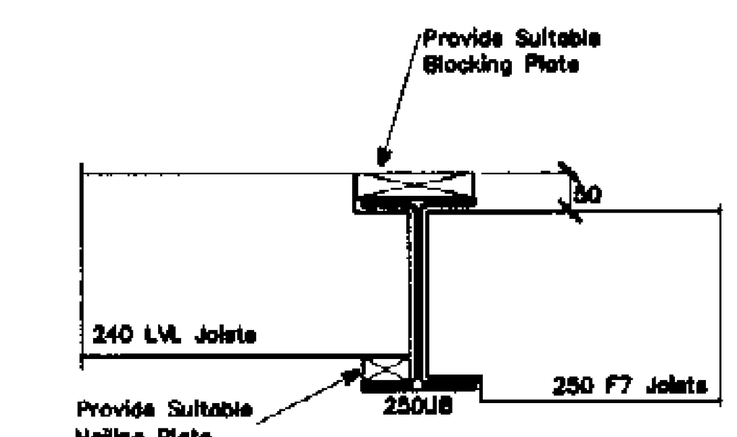
Architect: Pole Home Centre
Client: Mr & Mrs DUNCAN
Council: PITTWATER
Scale: 1:100 @ A1
Date: March 2005
Drawing # EDA 05 - 117 / 1



FOOTING PLAN

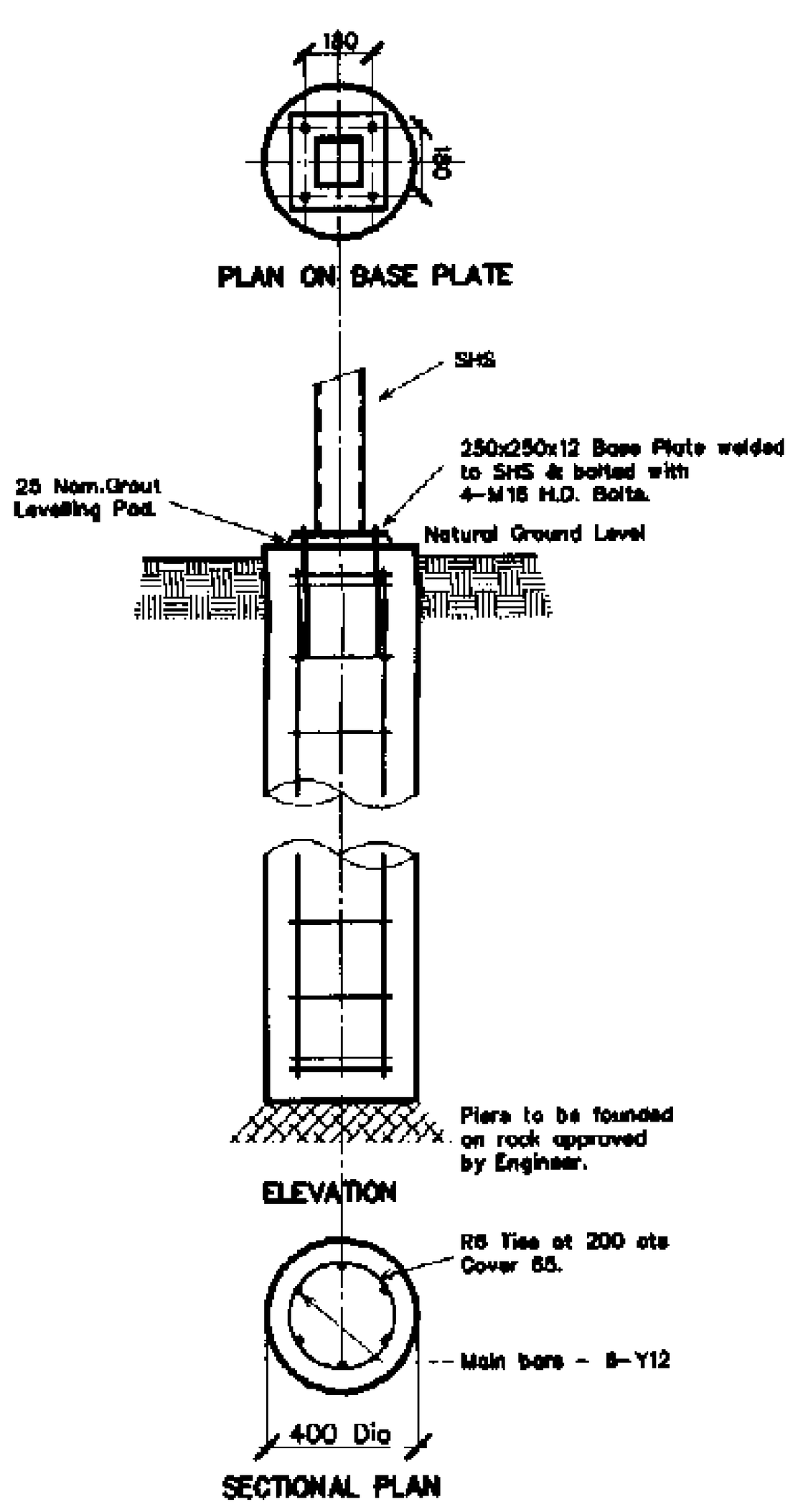


GROUND FLOOR MARKING PLAN



BALCONY SETDOWN

SECTION 3



TYPICAL PIER DETAIL
Scale 1:20

CONCRETE NOTES.
1. All concrete work to be in accordance with AS 3600.
2. F'c Refer to table.
3. Maximum aggregate size = 20 for footings,slabs & beams.
= 10 for block filling.
4. Slump = 80.
5. All concrete, including block filling,to be vibrated.
6. Slabs to be kept damp for at least 14 days after placing or to be protected by an approved curing membrane.
7. Bar Chairs to be no more than 800mm ctr to ctr spacing.
8. Reinforcing Steel to comply with AS/NZS 4671:2001, and to be D500N unless noted otherwise. (where 500 = strength grade in megapascals & N = Normal ductility class)
9. Reinforcement to be tied at every other intersection minimum.
10. Moisture Vapour Membrane to be 200 Microns thick. U.V. Resistant and to be in accordance with AS 2870-1996.

STEELWORK NOTES
1. Fabricate and erect all structural steelwork in accordance with AS 3680.1, AS 4100, AS 1554 and the Specification.
2. Do not obtain dimensions by scaling the structural elements.
3. Chip all welds free of slag.
4. All steelwork to be Hot Dipped Galvanised. Unless Otherwise Noted.
5. Unless otherwise noted use
a) 6mm continuous fillet weld
b) 10mm thick gusset, fin and end plates, weld all round.
c) 16mm dia. 8.8/s bolts
6. Minimum end bearing 150mm.

DJ - Indicates Double Joists
DS - Indicates Double Stud

Post are to be laterally restrained at each level
All posts to bear on adequate structural supports.

All windows spacing greater than 1.8m must have a lintel beam of 150UB18.0 unless specified otherwise on the plans.

All beams to bear on adequate support.

P1 - 89 x 89 x 6.0 SHS Post
P2 - 125 x 125 x 9.0 SHS Post
P3 - 100 x 100 x 9.0 SHS Post

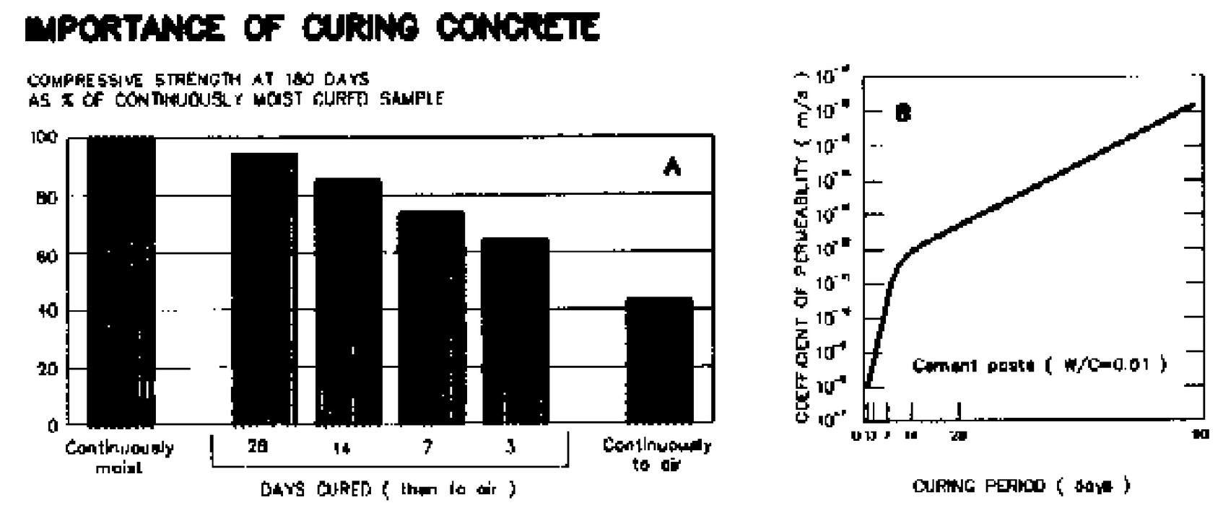
TIMBER NOTES :
1. All work (including bracing, wind bracing & tie downs) shall be carried out in accordance with AS 3660.1, AS 1684.2, AS 1720.1 and the specification.
2. Refer to the Architects Drawings and the specification for all timber sizes not shown on these drawings.
3. All timber shall be free of Gum veins, pockets, knots holes or splits within 255mm of any connection.
4. Refer to specification for preservatives and finishes to timbers.
5. All bolts, nuts, washers and timber connectors shall be hot dip galvanised unless noted otherwise.
6. All F7 timber shown are nominal sizes only.
7. All walls to bear on Double Joists.

All Rafters requiring support under Eaves are to use a 250 x 75 Treated F7 beam cantilevered out from the wall.

All Trimmers to be the same size as adjacent joists

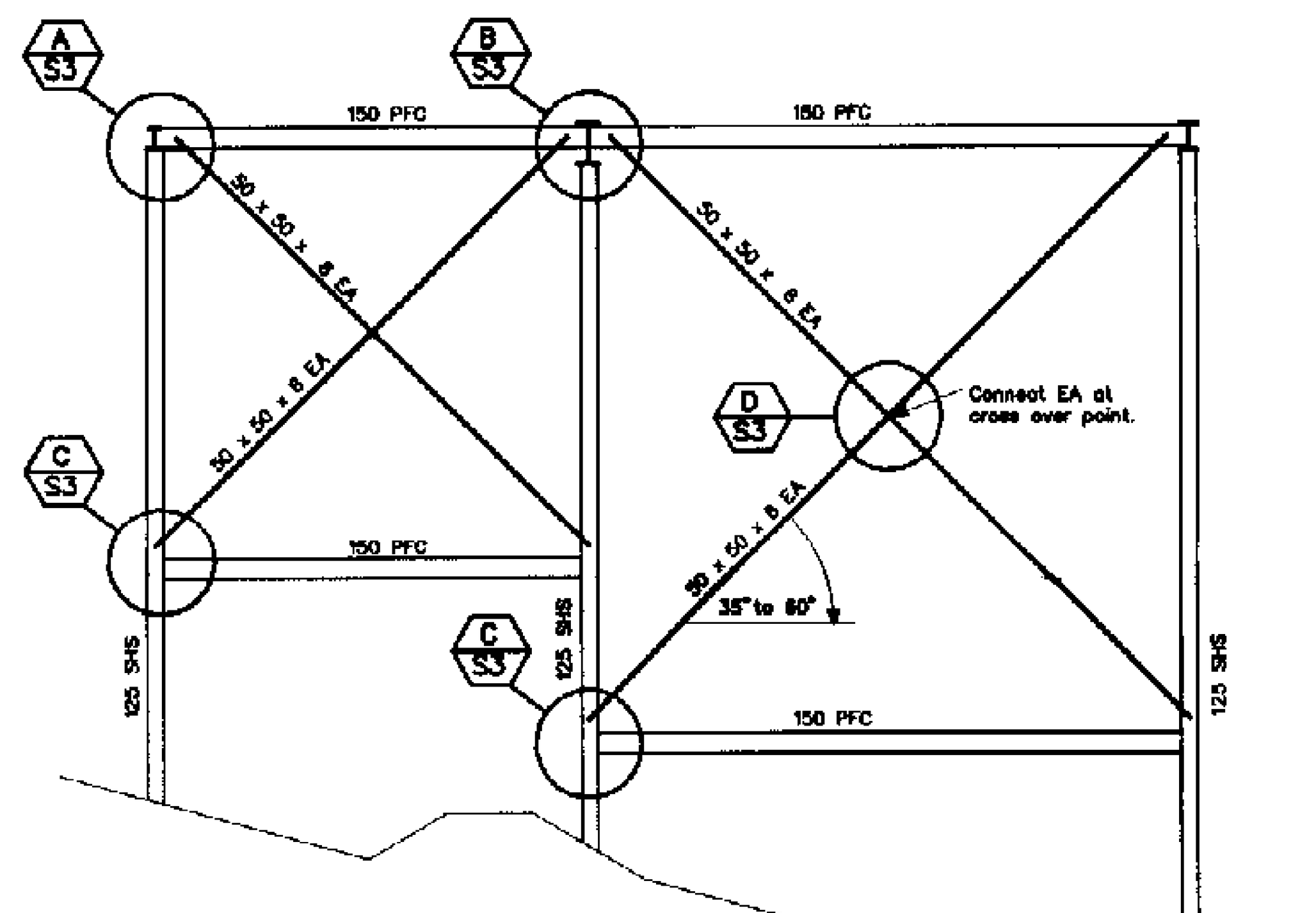
P4 - 90 x 90 F7 Post

IMPORTANCE OF CURING CONCRETE



Effect of curing duration on : (A) compressive strength; and (B) concrete permeability

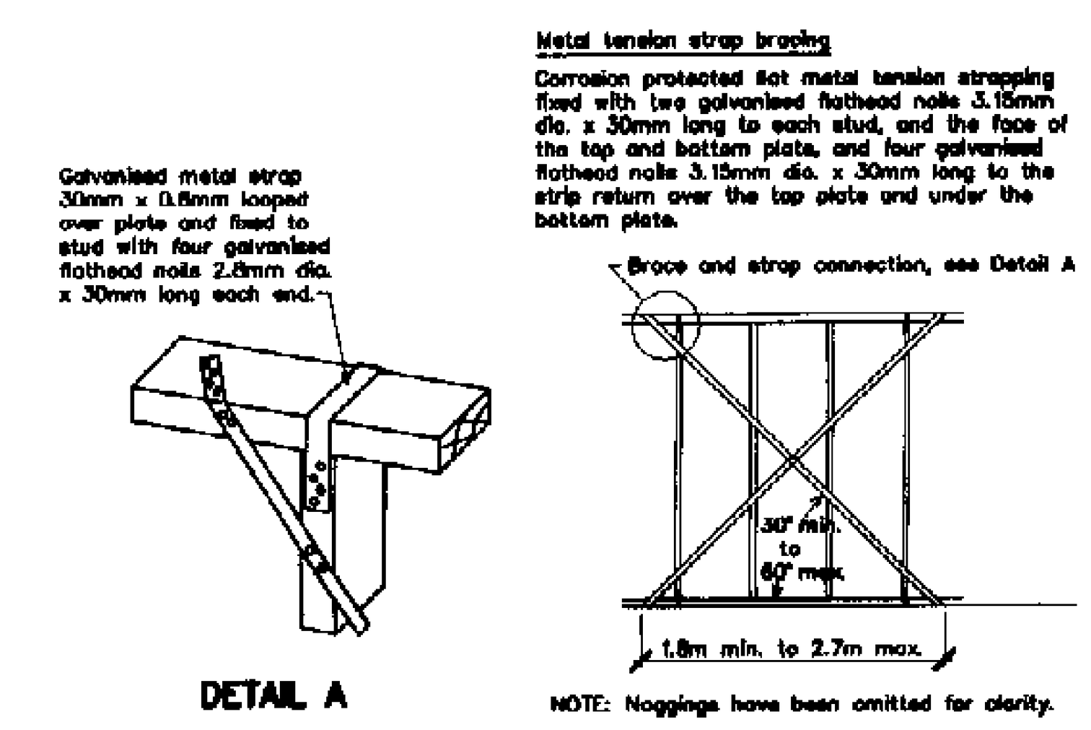
Acknowledgement : Diagram is based on fig 1.2 of Guide to Concrete Repair & Protection (SAA/HB84:1996)



SECTION 1

CROSS BRACING
In accordance with Steel Code AS 4100
Scale 1:50

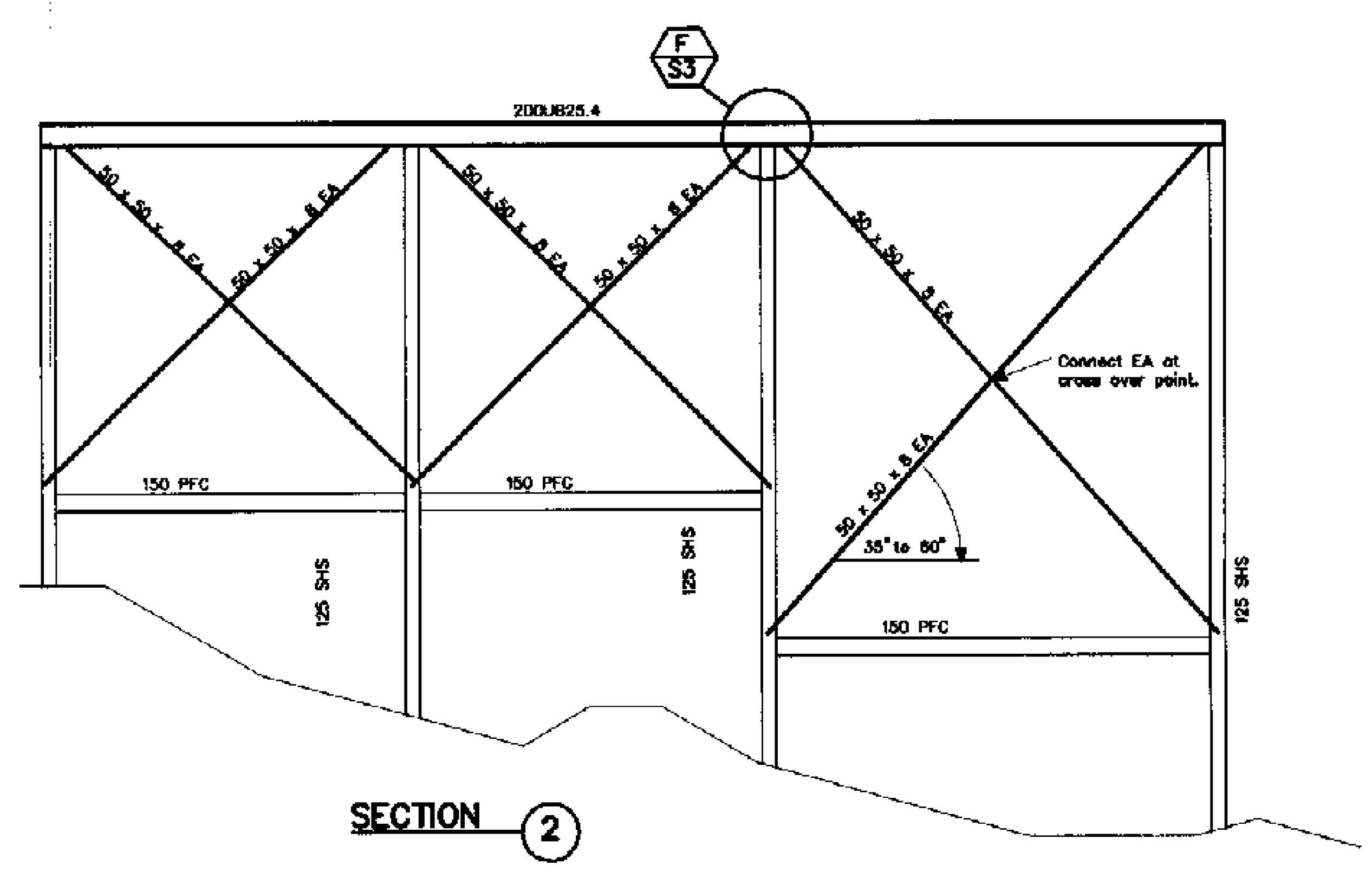
Bracing required on all balcony piers, below Level 1



DETAIL A

NOTE: Noggings have been omitted for clarity.

TYPE B BRACING UNIT
PAIR OF DIAGONAL METAL TENSION STRAPS
In accordance with Timber Framing Code AS 1684
Not to scale



SECTION 2

CROSS BRACING
In accordance with Steel Code AS 4100
Scale 1:50

Bracing required on all balcony piers, below Level 1

INSIGHT DEVELOPMENT CONSULTANTS PTY LTD
Structural Details C.C. No. 2005/156
PLEASE NOTE: The stamping of this plan by Insight Development Consultants Pty Ltd does not relieve the Structural Engineer of their responsibility to ensure the adequacy of this project.

WARNING
PLEASE NOTE: The stamping of this plan by Insight Development Consultants Pty Ltd does not relieve the Applicants responsibility to obtain approval from Sydney Water or other utilities prior to the commencement of any works.
Dial Before You Dig 1100

PLAN OR DOCUMENT CERTIFICATION
I am a qualified....CIVIL, GEOTECHNICAL & STRUCTURAL ENGINEER...
I hold the following qualifications or licence No......M.Eng.Sc..........
.....F.I.E.Aust....Nper3....Struct.Civil.No.149788.........
Further I am appropriately qualified to certify this component of the project.
I hereby state that these plans or details comply with the conditions of development consent, the provisions of the Building Code of Australia. A.S.1170., A.S.1170.1, A.S.1170.2, A.S.1684., A.S.2870.1.,A.S.3600., A.S.3700 A.S.4100 & A.S. 1163
Jack D. Hodgson 4/3/05 J Hodgson
Name Date Signature

No.	Amendment	Drawn	Date
	Pier change	KLC	1/3

Unless this company carries out the inspections of all the structural elements and approves them, NO responsibility will be taken for the structural integrity of the completed work.

STRUCTURAL DESIGN AND DETAILS

PROPOSED RESIDENTIAL DEVELOPMENT
80 McCARRS CREEK ROAD
CHURCH POINT

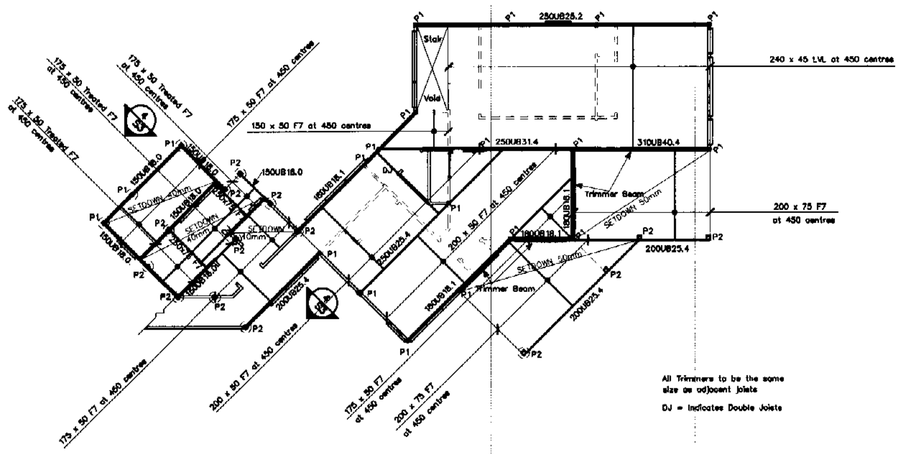
Our drawings are based on the information provided by:-
THE POLE HOME CENTRE
Drawing No: 019 04 Sheet: 1 to 11 Date: 25th October 2004
Amendment:- Date:-

The Structural Details shown on this Drawing are NOT to change under any circumstance. NO Certificate will be issued for work NOT in accordance with this Drawing.

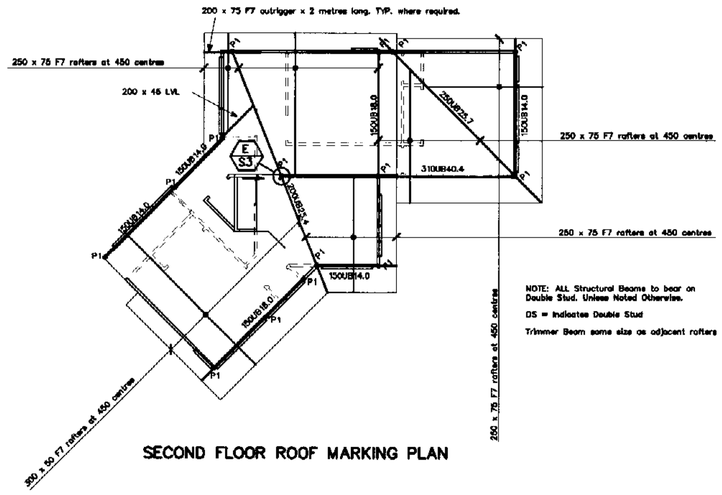
COUNCIL COPY

JACK HODGSON CONSULTANTS PTY. LIMITED.
Consulting Civil, Geotechnical and Structural Engineers.
11 Bungan Street, MONA VALE 2103. P.O. Box 389. Postcode 1660.
Telephone (02) 9979 6733. Facsimile (02) 9979 6926. A.C.N. 053 405 011

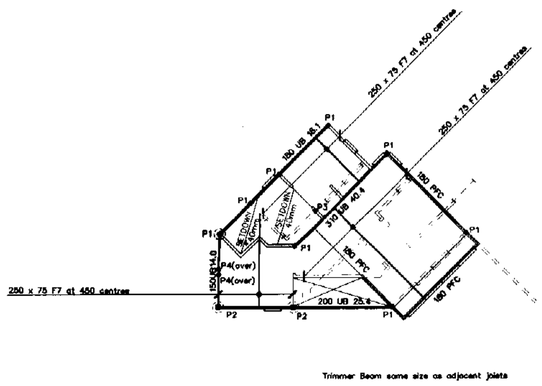
Designed JDH	Drawn KLC	Job No.	Drawing No.
Checked JDH	Scale 1:100,20, 50	21834-S1 /A	
Date 21st DECEMBER 2004			



SECOND FLOOR MARKING PLAN

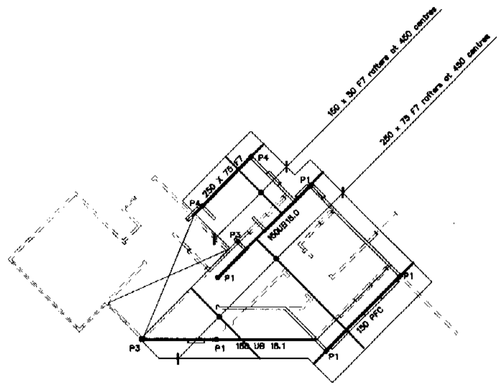


SECOND FLOOR ROOF MARKING PLAN



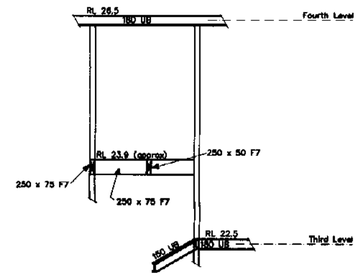
Trimmer Beam same size as adjacent joists

THIRD FLOOR MARKING PLAN

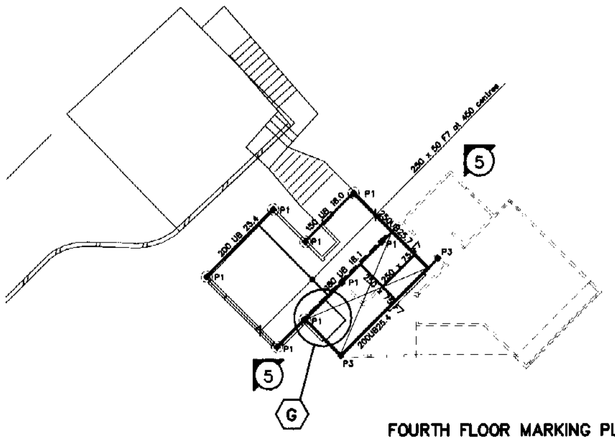


Trimmer Beam same size as adjacent joists

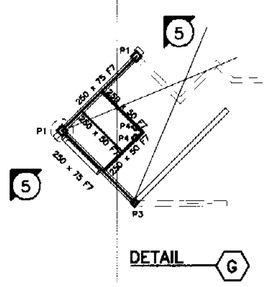
THIRD FLOOR ROOF MARKING PLAN



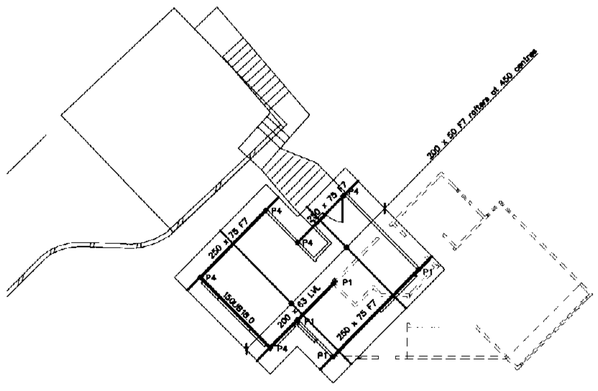
SECTION 5



FOURTH FLOOR MARKING PLAN



LANDING LEVEL MARKING PLAN



FOURTH FLOOR ROOF MARKING PLAN

PLAN OR DOCUMENT CERTIFICATION

I am a qualified....CIVIL, GEOTECHNICAL & STRUCTURAL ENGINEER...
I hold the following qualifications or licence No.....M.Eng.Sc.....
.....F.I.E.Aust....Nper3....Struct.Civil.No.149788.....
Further I am appropriately qualified to certify this component of the project.
I hereby state that these plans or details comply with the conditions of development consent, the provisions of the Building Code of Australia.
A.S.1170., A.S.1170.1, A.S.1170.2, A.S.1684., A.S.2870.1,A.S.3600., A.S.3700, A.S.4100 & A.S. 1163

Jack D. Hodgson 4/3/05 J.Hodgson
Name Date Signature

No.	Amendment	Drawn	Date
A	Pier change	KLC	1/3

Unless this company carries out the inspections of all the structural elements and approves them, NO responsibility will be taken for the structural integrity of the completed work.

STRUCTURAL DESIGN AND DETAILS

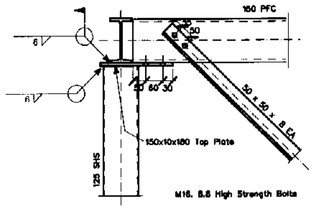
PROPOSED RESIDENTIAL DEVELOPMENT
80 McCARRS CREEK ROAD
CHURCH POINT

Our drawings are based on the information provided by:-
THE HOLE HOME CENTRE
Drawing No: Q19 04 Sheet: 1 to 11 Date: 25th October 2004
Amendment::- Date:-

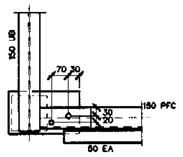
The Structural Details shown on this Drawing are NOT to change under any circumstances. NO Certificate will be issued for work NOT in accordance with this Drawing.

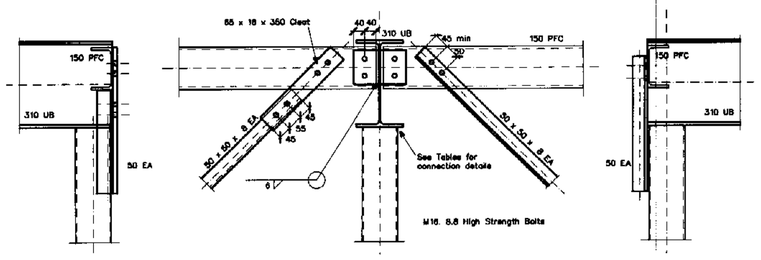
JACK HODGSON CONSULTANTS PTY. LIMITED.
Consulting Civil, Geotechnical, and Structural Engineers.
11 Bungan Street, MONA VALE 2103. P.O. Box 380, Post Code 1660.
Telephone (02) 9979 8733. Facsimile (02) 9979 6828. A.C.N. 053 160 011

Designed	JDH	Drawn	KLC	Job No.	Drawing No.
Checked	JDH	Scale	1:100,20. una.	21834	S2/A
Date	21st DECEMBER 2004				



DETAIL (A)





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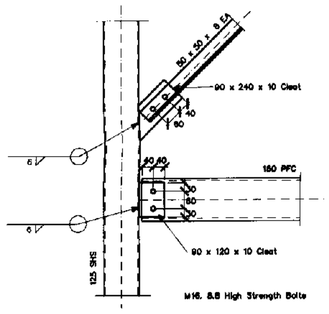
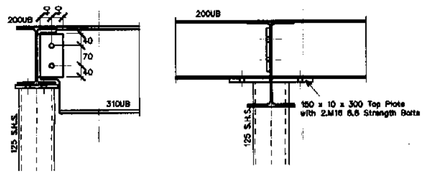
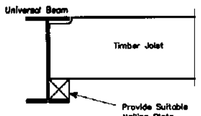
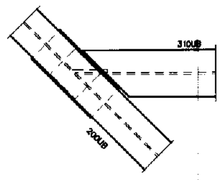


DETAIL (C)



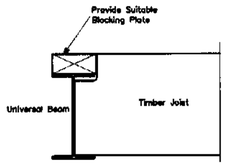


JOIST CONNECTION
SCALE 1: 10

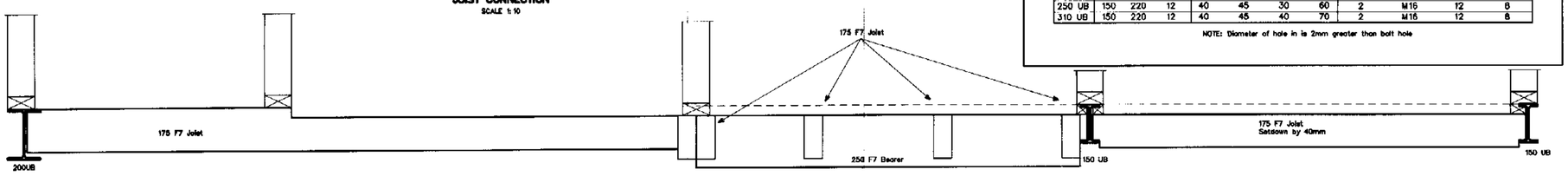


UB TO SHS CONNECTION
SCALE 1: 10

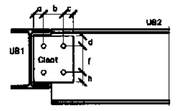
DETAIL (E)



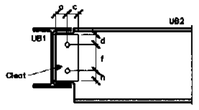
JOIST CONNECTION
SCALE 1: 10



SECTION (3)



4 BOLT COPING CONNECTION
SCALE 1: 10

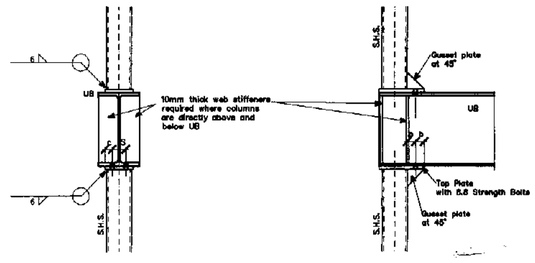


2 BOLT COPING CONNECTION
SCALE 1: 10

PLATE CONNECTION FOR UB TO UB DOUBLE COPED TABLE

Beam UB1	Beam UB2	Cleat (mm) Depth	Width	Thickness	Dimensions (mm) a	b	c	d	f	h	No. of Bolts	Bolt Size	Weld Size
200 UB	310 UB	140	>80	12	40	70	40	40	70	30	4	M16	8
200 UB	250 UB	140	>80	10	40	70	40	40	70	30	4	M16	8
150 UB	150 UB	115	>80	10	40	–	40	40	55	20	2	M16	8
180 UB	180 UB	130	>80	10	40	–	40	40	60	30	2	M16	8
150 UB	200 UB	120	>80	10	40	–	40	30	60	30	2	M16	8
250 UB	150 UB	120	>80	10	40	–	40	40	80	20	2	M16	8
200 UB	150 UB	120	>80	10	40	–	40	40	80	20	2	M16	8
200 UB	180 UB	140	>80	10	40	–	40	40	70	30	2	M16	8
360 UB	150 UB	120	>80	10	40	–	40	40	55	20	2	M16	8

NOTE: Diameter of hole to be 2mm greater than bolt hole



UB TO SHS CONNECTIONS FOR TABLES
SCALE 1: 10

PLATE CONNECTION FOR UB TO 89SHS TABLE

Beam Size	Plate (mm) Depth	Width	Thickness	Dimensions (mm) a	b	c	S	No. of Bolts	Bolt Size	Gusset Thickness	Weld Size
150 UB	110	110	10								8
180 UB	110	110	10								8
200 UB	130	170	10	30	40	35	55	2	M16	12	8
250 UB	130	170	12	30	40	30	60	2	M16	12	8
310 UB	180	180	12	35	40	30	100	2	M16	12	8

NOTE: Diameter of hole in is 2mm greater than bolt hole

PLATE CONNECTION FOR UB TO 100SHS TABLE

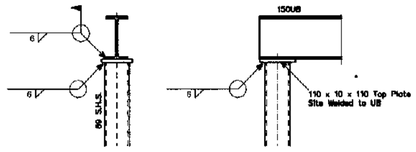
Beam Size	Plate (mm) Depth	Width	Thickness	Dimensions (mm) a	b	c	S	No. of Bolts	Bolt Size	Gusset Thickness	Weld Size
200 UB	130	200	10	40	45	30	50	2	M16	12	8

NOTE: Diameter of hole in is 2mm greater than bolt hole

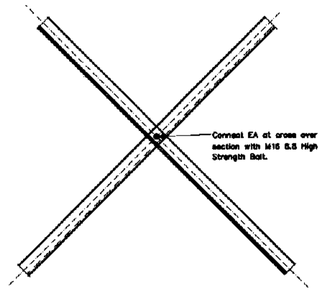
PLATE CONNECTION FOR UB TO 125SHS TABLE

Beam Size	Plate (mm) Depth	Width	Thickness	Dimensions (mm) a	b	c	S	No. of Bolts	Bolt Size	Gusset Thickness	Weld Size
150 UB	150	150	12								8
200 UB	150	220	12	40	45	40	50	2	M16	12	8
250 UB	150	220	12	40	45	30	60	2	M16	12	8
310 UB	150	220	12	40	45	40	70	2	M16	12	8

NOTE: Diameter of hole in is 2mm greater than bolt hole



150UB TO 89SHS CONNECTION
SCALE 1: 10



DETAIL (D)

P1 – 89 SHS Post
P2 – 125 SHS Post
P3 – 100 SHS Post

PLAN OR DOCUMENT CERTIFICATION

I am a qualified....CIVIL, GEOTECHNICAL & STRUCTURAL ENGINEER...
I hold the following qualifications or licence No.....M.Eng.Sc.....
.....F.I.E.Aust....Nper3....Struct.Civil.No.149788.....
Further I am appropriately qualified to certify this component of the project.
I hereby state that these plans or details comply with the conditions of development consent, the provisions of the Building Code of Australia, A.S.1170., A.S.1170.1, A.S.1170.2, A.S.1684., A.S.2870.1.,A.S.3600., A.S.3700, A.S.4100 & A.S. 1163

Jack D. Hodgson 2/12/05 J.Hodgson
Name Date Signature

No.	Amendment	Drawn	Date

Unless this company carries out the inspections of all the structural elements and approves them, NO responsibility will be taken for the structural integrity of the completed work.

STRUCTURAL DESIGN AND DETAILS

PROPOSED RESIDENTIAL DEVELOPMENT
80 McCARRS CREEK ROAD
CHURCH POINT

Our drawings are based on the information provided by :-
THE POLE HOME CENTRE
Drawing No: 019 04 Sheet: 1 to 11 Date: 25th October 2004
Amendments:- Date:-

The Structural Details shown on this Drawing are NOT to change under any circumstance. NO Certificate will be issued for work NOT in accordance with this Drawing.

JACK HODGSON CONSULTANTS PTY. LIMITED.
Consulting Civil, Geotechnical, and Structural Engineers.
11 Bungan Street, MONA VALE 2103. P.O. Box 368. Post Code 1660.
Telephone (02) 9979 8733. Facsimile (02) 9979 6826. A.C.N. 063 405 011

Designed	JDH	Drawn	KLC	Job No.	Drawing No.
Checked	JDH	Scale	1: 100,20. una.	21834	S3
Date	21st DECEMBER 2004				