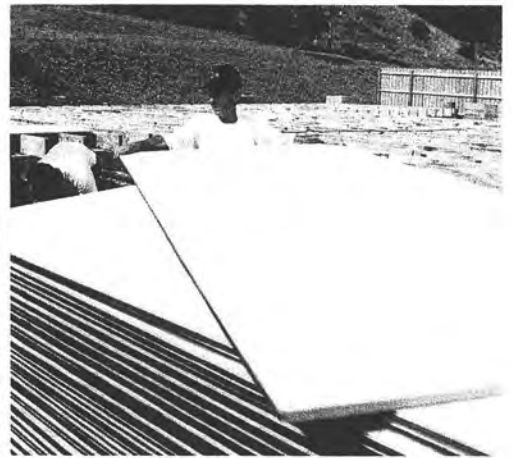
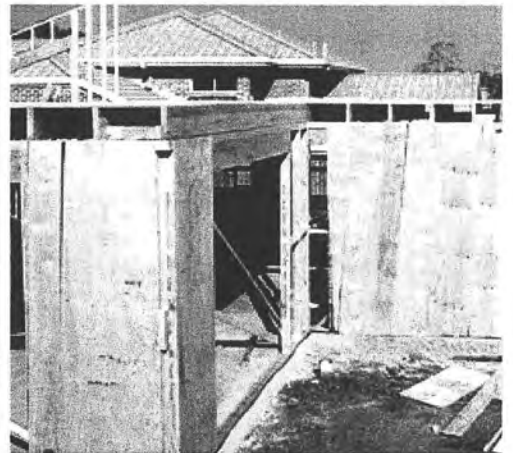
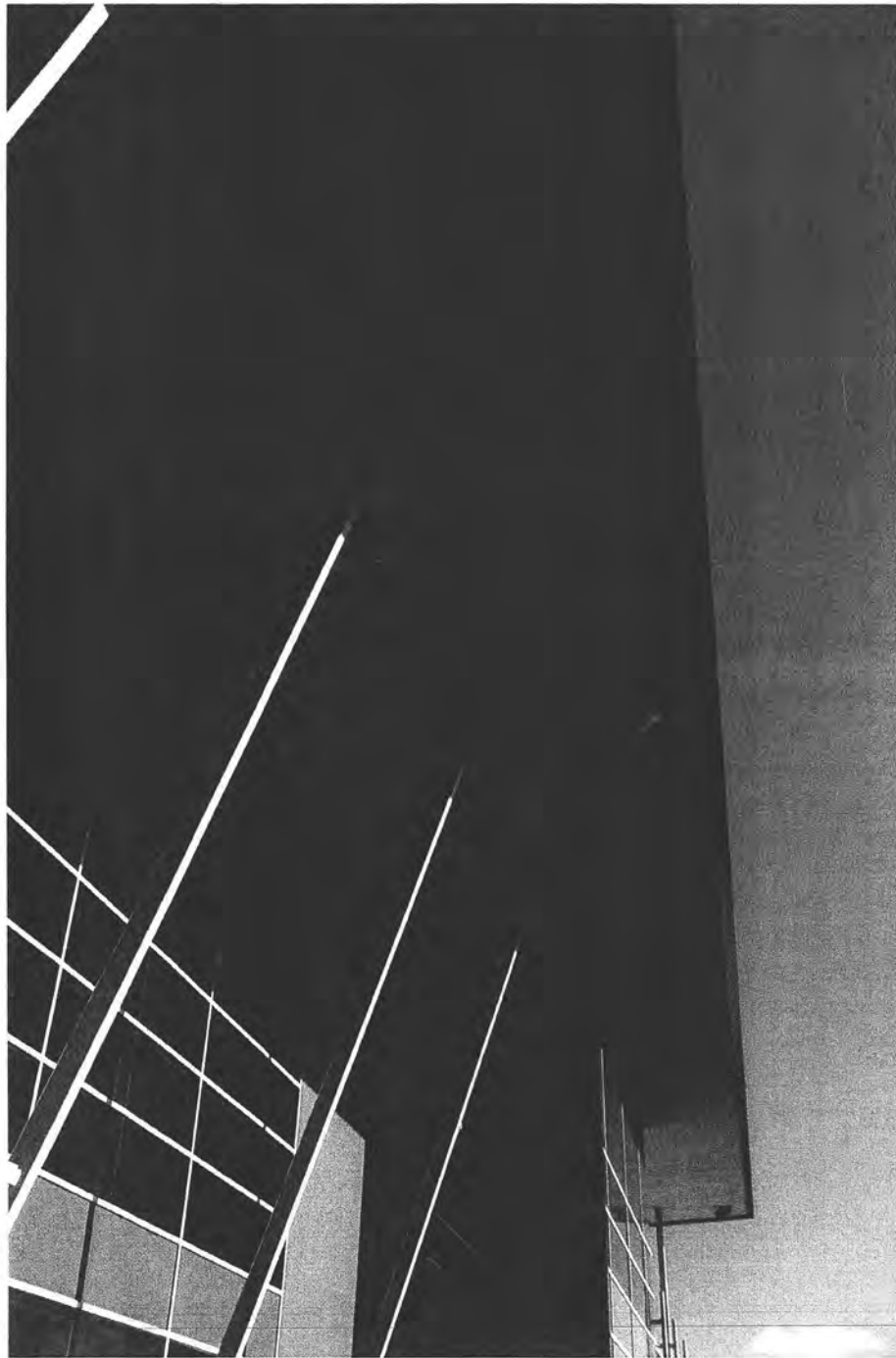




## Specification & Installation Guide

June 2011



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The information contained in this manual relates specifically to Ecoply and Shadowclad branded structural plywood manufactured by Carter Holt Harvey Woodproducts and cannot be used with any other plywood manufacturers product however similar they may appear.

Alternative plywood products can differ in a number of ways which may not be immediately obvious and substituting them for Ecoply products is not appropriate and could in extreme cases lead to premature failure and/or buildings which do not meet the requirements of the New Zealand Building Code.

## 1.0 ECOPLY® PRODUCT RANGE

Ecoply® is New Zealand's leading brand of structural plywood and is manufactured by Carter Holt Harvey® Woodproducts under a third party audited quality control programme to monitor compliance with AS/NZS 2269 Plywood Structural. As such these products carry Engineered Wood Products Association of Australasia (EWPAA) Joint Accreditation System - Australia and New Zealand (EWPAA/JAS-ANZ) certification.

For information relating to Shadowclad® and plywood used as an exterior cladding, refer to the Shadowclad Specification & Installation Guide.

### 1.1 THE ECOPLY® BRAND

The Ecoply brand represents a range of appearance and structurally rated plywood products which provide economy, durability, strength and design flexibility in a wide range of uses and applications.

### 1.2 PRODUCT DESCRIPTION AND RANGE

Ecoply structural plywood is a layered panel made from Pinus radiata wood veneers.

The veneers are bonded together with synthetic phenolic (PF) resin set and cured under heat and pressure in controlled conditions to form a strong and durable Type A bond. Adjacent layers (veneers) are at right angles to each other to deliver two way strength and stability. Ecoply strength is optimised for maximum performance parallel to the face grain with cross plies providing enhanced stability across the grain.

The Ecoply plywood range can be specified for its:

- Surface grade (e.g. CD) - where the first letter describes the face veneer appearance and the second letter describes the back veneer of the Ecoply sheet. Surface grades are fully defined in AS/NZS 2269 and summarised in Table 2
- Stress grade - utilises the symbol F and a suffix e.g. F8 as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. F8 is the standard stress grade for Ecoply products with the exception of Ecoply Longspan Flooring which has higher stiffness than F8 and I5. 17 mm Ecoply Roofing which are F11 (See Tables 1, 4 and 5). Ecoply Flooring products are also available in F11 on request
- Thickness - ranging from 7 mm to 25 mm
- Length - being 2400 mm and 2700 mm with a standard width of 1200 mm
- Preservative treatment - being untreated, H3.2 CCA or H3.1 LOSP Azole treated
- Edge finish - being square edge or for Ecoply Flooring, Roofing and Grooved Lining, routed on the long edges of the sheet with a polypropylene plastic tongue inserted into one side for a tongue-in-groove joint

For general installation advice refer to section 2.0: General installation guide.

For specification and installation advice for Ecoply used in typical applications refer to the following sections.

Typical Application	Section
Structural bracing and ceiling diaphragms	3.0
Internal linings, soffit and appearance plywood	4.0
Roofs and decks	5.0
Flooring	6.0
Structural packaging	7.0

Note: Technical notes referenced in this publication can be downloaded from [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz) or contact Carter Holt Harvey Woodproducts on 0800 326 759 for copies.

TABLE 1: ECOPLY® PRODUCT RANGE

Nominal Thickness (mm)		7		9 (3ply)		12		15		17		19		21		25	
Sheet length (x 1200 mm width)		2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700	2400	2700
Ecoply® Structural Square Edge	BB					✓				✓							
	BD			✓		✓	✓	✓		✓							
	CD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ecoply® Grooved Lining	Classic					✓pt	✓pt										
	Prime					✓pt	✓pt										
Ecoply® Flooring	BD											✓pt LS					
	CD							✓pt	✓pt	✓pt	✓pt	✓pt LS	✓pt LS	✓pt	✓pt	✓pt	✓pt
Ecoply® Roofing	DD							✓pt	✓pt	✓pt	✓pt						

Available untreated only	Available either untreated or H3.2 CCA	Available either untreated or H3.1 LOSP
--------------------------	--	---

pt Machine grooves on both long edges with a plastic polypropylene tongue in one groove. 1200 cover  
 LS Longspan Flooring, which has higher stiffness than F8 for superior spanning capabilities

- Full range may not always be available ex stock, check with Ecoply supplier to ensure availability
- Non standard specifications, including thicker sheets may be available to special order in significant quantities
- All products are F8 stress grades excepting Ecoply Roofing which is available in F8 and F11, and Ecoply Longspan Flooring which has a higher stiffness than F8. Ecoply Flooring products are also available in F11 on request
- BD Flooring available in 19 mm untreated for a superior surface finish to standard CD Flooring Grade

### 1.3 SURFACE GRADES

Table 2A summarises the surface appearance grades in which Ecoply® structural plywood is available with some typical applications for each surface grade. The surface grade specifications are fully defined in AS/NZS 2269. Table 2B details surface appearance grades for speciality Ecoply plywood and typical applications.

TABLE 2A: ECOPLY® STRUCTURAL SQUARE EDGE PRODUCTS



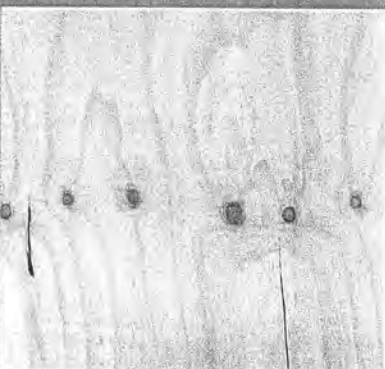
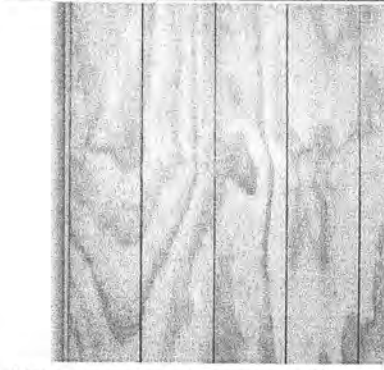
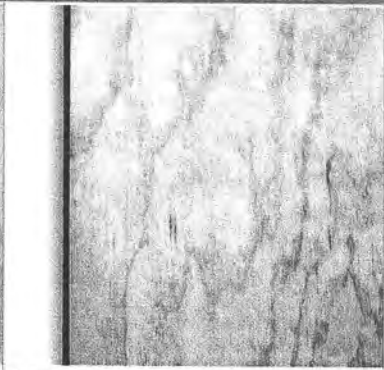
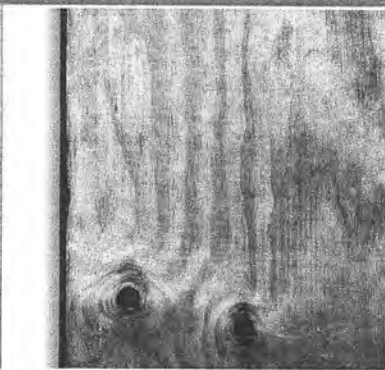
Ecoply Structural Square Edge Products		
Face Grade B	Face Grade C	Face Grade D
		
Appearance grade with a solid sanded surface. Suitable for a high quality paint, clear or stain finish.	Solid sanded surface with filled holes and splits, with intergrown knots. Suitable for a basic paint finish.	Non appearance grade allowing open imperfections up to 75 mm across the face veneer. Splits and knots allowable
Possible Uses:		
<ul style="list-style-type: none"> <li>• Furniture/Joinery/Signs</li> <li>• Interior Linings</li> <li>• Sheathing</li> <li>• Engineering components where a high visual finish is required</li> </ul>	<ul style="list-style-type: none"> <li>• Structural gussets</li> <li>• Stressed skin panels</li> <li>• Bins, boxes, crates</li> <li>• Concrete formwork</li> <li>• Hoardings</li> </ul>	<ul style="list-style-type: none"> <li>• Non visual bracing</li> <li>• Strength critical pallets</li> <li>• Structural components</li> <li>• Portal frame webs</li> </ul>

TABLE 2B: SPECIALITY ECOPLY® PRODUCTS

Speciality Ecoply Products		
Grooved Lining	Flooring CD	Roofing DD
		
High appearance smooth sanded face and V grooves at 100 mm centres. Available in 2 face grades with tongue and groove on long edges: <b>Classic</b> - for clear stain and paint finishes <b>Prime</b> - pre-primed surface for paint finishes	Solid sanded C grade surface with tongue and groove profile on long edges. Features second void free layer under the face veneer for increased protection against high point loads	Unfilled D grade surface with tongue and groove profile on long edges
Possible Uses:		
<ul style="list-style-type: none"> <li>• Internal linings</li> <li>• Partitions &amp; feature walls</li> <li>• Semi exposed soffits - (H3.1 LOSP treated product only)</li> </ul>	<ul style="list-style-type: none"> <li>• Substrate for flooring overlays such as linoleum, tiles and rigid coverings</li> <li>• Substrate for membrane roofing and decking where visible appearance is critical</li> </ul>	<ul style="list-style-type: none"> <li>• Substrate for asphalt shingles</li> <li>• Substrate for roof systems where a smooth substrate is not required</li> </ul>

Notes:

A higher visual grade may be substituted if required, e.g. Ecoply CD can be used anywhere DD is used. Pictures shown above are scaled down versions of typical Ecoply sheets. Grain pattern, colour may vary. If sheet appearance is critical select panels individually.

## 1.4 PRESERVATIVE TREATMENT

Ecoply® structural plywood is available untreated, or treated in accordance with AS/NZS 1604.3. If treated, Ecoply structural plywood is most often impregnated with CCA (Copper Chrome Arsenate) water borne treatment for use in the H3.2 hazard class. H3.1 LOSP Azole **clear** treatment is the standard preservative treatment available on selected BB and BD Square Edge, Grooved Lining products and on special request for other Ecoply products.

H3.2 CCA and H3.1 (Azole) treated plywood in accordance with AS/NZS 1604.3 is described as suitable for: "outside, above ground, subject to periodic moderate wetting and leaching."

All treated plywood is envelope treated. Where sheets are cut, exposed edges should be coated with a suitable brush on timber preservative such as Holdfast Metalex End Seal.

The characteristics of the treatments are shown in Table 3.

TABLE 3: PRESERVATIVE TREATMENT

	Untreated	H3.2 CCA	H3.1 LOSP (Azole)
<b>Preservative carrier</b>	N/A	Water	Light organic oil (white spirits)
<b>Colour</b>	Natural	Green	Clear (i.e. natural)
<b>Fungicide</b>	Heat treated dry wood	Copper	Propiconazole and Tebuconazole
<b>Insecticide</b>	Heat treated dry wood	Arsenate	Permethrin
<b>Other chemicals</b>	N/A	Chrome (to fix preservative in wood)	Butyl Oxitol (co-solvent to assist active stability)
<b>Mouldicide</b>	N/A	Copper (limited efficacy)	IPBC
<b>Notes</b>	Plywood for dry interior use, supplied ex mill at <15% moisture content	Dried after treatment to average 18% moisture content for use in service at higher moisture contents	Solvent does not affect dimensions, Solvent smell disappears over time
<b>Availability</b>	Readily available	Standard treatment except for BB, BD, Ecoply Grooved Lining and Shadowclad®	Treated to order for CD, DD, flooring and roofing products. Standard treatment for BB, BD, Ecoply Grooved Lining and Shadowclad
<b>Applications (Refer NZ3602)</b>	Interior dry protected	Exterior/Interior damp (service performance subject to detailing & coatings)	

### CCA

Ecoply structural plywood, which is H3.2 CCA treated (waterborne preservative with a green colour), is dried following treatment so that sheets may return to the correct dimensions. The moisture content after treatment with CCA and drying will be higher than the limits placed in AS/NZS 2269 on untreated product. The target is for an average moisture content of approximately 18% to provide a panel closer to the expected equilibrium moisture content for most H3.2 applications.

The fillets used to separate sheets in drying may leave marks on the sheet surface. These will fade over time as the plywood weathers, and can be disguised with paint but may be visible under stain. The process of treating with CCA and subsequent drying is likely to increase the 'face checking' of the panel. Refer Carter Holt Harvey's Woodproducts technical note *Preservative Treated Ecoply Plywood September 2008*.

### LOSP

H3.1 LOSP treated Ecoply retains the wood colour and does not contain moisture so the plywood remains at the same dimensions and moisture content during treatment. However, the plywood when freshly treated may contain more than 60 litres of organic fluid per cubic metre. When coating LOSP treated plywood trace amounts of residual solvent may be present on the sheet surface from the treatment process. Sheets feeling greasy to touch should be placed in a well ventilated area and allowed to flash off to ensure proper adhesion of paints and stains onto the sheet.

The LOSP solvent smell can be quite strong and venting is recommended until most of the solvent has evaporated if the product is to be used internally. Untreated plywood is recommended for internal applications where NZS3602 allows the use of untreated plywood.

Mechanical fasteners are recommended to fix LOSP treated Ecoply to framing. If adhesives are required, thorough venting is recommended and LOSP tolerant adhesives should be applied according to adhesive manufacturers' instructions. A suggested adhesive to fix LOSP treated Ecoply to framing, or to fix untreated panels to LOSP treated framing, is GIBFix® All-Bond or Bostik® Gold. See section 2.3 Adhesives.

## 1.5 SECTION PROPERTIES

TABLE 4A: SECTION PROPERTIES OF ECOPLY® STRUCTURAL PLYWOOD

Nominal plywood thickness (mm)	Actual thickness (mm)	ID code*	Mass (kg/m <sup>2</sup> )	Section properties per mm width							
				Parallel to the face grain				Perpendicular to the face grain			
				Moment of Inertia	Section Modulus	Shear Constant	Cross Section Area	Moment of Inertia	Section Modulus	Shear Constant	Cross Section Area
				I (mm <sup>4</sup> )	Z (mm <sup>3</sup> )	I/Q (mm <sup>3</sup> )	A (mm <sup>2</sup> )	I (mm <sup>4</sup> )	Z (mm <sup>3</sup> )	I/Q (mm <sup>3</sup> )	A (mm <sup>2</sup> )
7	7.2	7-24-3	4.0	30.0	8.33	5.19	4.87	2.05	1.71	2.30	2.54
9	9.0	9-30-3	5.0	58.6	13.0	6.48	6.09	4.01	2.67	2.87	3.18
12	12.0	12-24-5	6.6	115	19.2	9.26	7.34	33.4	9.27	5.45	5.02
15	15.0	15-30-5	8.3	225	29.9	11.6	9.18	65.2	14.5	6.81	6.27
17	16.8	17-24-7	9.2	285	33.9	12.2	9.82	122	20.4	9.47	7.49
17	16.8	17-24-6	9.2	273	32.5	12.3	11.0	134	22.3	9.50	6.30
19	19.2	19-30-7	10.6	451	46.9	13.7	12.2	157	23.8	10.7	7.60
19LS	19.2	19-30-7	10.5	476	50.1	13.3	13.8	113	18.5	10.4	5.80
21	21.0	21-30-7	11.6	556	52.9	15.2	12.3	239	31.9	11.8	9.36
25	24.6	25-30-9	13.5	897	72.9	17.8	15.3	381	41.0	13.9	10.1

TABLE 4B: NOMINAL STRENGTHS OF SECTIONS OF ECOPLY® STRUCTURAL PLYWOOD FOR LIMIT STATES DESIGN: F8 GRADE

Nominal plywood thickness (mm)	Actual thickness (mm)	ID code*	Mass (kPa)	Nominal strengths (Limit States) per mm width							
				Parallel to the face grain (F8)				Perpendicular to the face grain (F8)			
				Bending Stiffness EI	Bending Moment fZ	Rolling Shear f/Q	Axial Compression fA	Bending Stiffness EI	Bending Moment fZ	Rolling Shear f/Q	Axial Compression fA
				(1000 Nmm <sup>2</sup> )	(Nmm)	(N)	(N)	(1000 Nmm <sup>2</sup> )	(Nmm)	(N)	(N)
12	12.0	12-24-5	0.06	1046	479	15.74	147	304	232	9.26	100
15	15.0	15-30-5	0.08	2043	748	19.68	184	593	362	11.6	125
17	16.8	17-24-7	0.09	2589	847	20.66	196	1115	510	16.1	150
17	16.8	17-24-6	0.09	2484	813	20.91	220	1219	558	16.2	126
19	19.2	19-30-7	0.10	4104	1173	23.29	244	1429	595	18.2	152
19LS	19.0	19-30-7	0.10	4329	1252	22.68	275	1028	463	17.7	116
21	21.0	21-30-7	0.11	5057	1323	25.83	245	2177	797	20.1	187
25	24.6	25-30-9	0.13	8160	1823	30.26	306	3467	1025	23.6	202

TABLE 4C: NOMINAL STRENGTHS OF SECTIONS OF ECOPLY® STRUCTURAL PLYWOOD FOR LIMIT STATES DESIGN: F11 GRADE

Nominal plywood thickness (mm)	Actual thickness (mm)	ID code*	Mass (kPa)	Nominal strengths (Limit States) per mm width							
				Parallel to the face grain (F11)				Perpendicular to the face grain (F8)			
				Bending Stiffness EI	Bending Moment fZ	Rolling Shear f/Q	Axial Compression fA	Bending Stiffness EI	Bending Moment fZ	Rolling Shear f/Q	Axial Compression fA
				(1000 Nmm <sup>2</sup> )	(Nmm)	(N)	(N)	(1000 Nmm <sup>2</sup> )	(Nmm)	(N)	(N)
15	15.0	15-30-5	0.08	2362	1046	24.36	229	593	362	11.6	125
17	16.8	17-24-7	0.09	2992	1186	25.62	245	1115	510	16.1	150
17	16.8	17-24-6	0.09	2867	1137	25.83	275	1219	558	16.2	126
19	19.2	19-30-7	0.10	4736	1641	28.77	305	1429	595	18.2	152
21	21.0	21-30-7	0.11	5838	1851	31.92	307	2177	797	20.1	187
25	24.6	25-30-9	0.13	9418	2551	37.38	382	3467	1025	23.6	202

‡ For tension, multiply compression values by 0.75

- Use Tables 4A & B values for all F8 stress grade Ecoply products including Ecoply Longspan Flooring
- Use Tables 4A & C values for all F11 stress grade Ecoply
- Ecoply 19 mm Longspan Flooring as F8 strength properties but higher E of 10000 MPa
- The section properties in Tables 4A, B & C have been calculated in accordance with AS/NZS 2269
- For section properties for other thicknesses and Shadowclad<sup>®</sup> products contact Carter Holt Harvey<sup>®</sup> Woodproducts on 0800 326 759
- For 19LS (i.e. Longspan), EI parallel to the grain in Table 4B may be increased by 10%. These panels are manufactured with stiffer face and back veneers to improve flooring performance

### Structural properties of Ecoply® plywood

The majority of Ecoply® plywood is F8 grade (exceptions are identified in section 1.2: Product description & range) and the characteristic values may be used in conjunction with both NZS 3603 and AS 1720 for the design of timber components. The characteristic stress values in Table 5 have been used to provide nominal strengths in Tables 4B and 4C.

TABLE 5: STRUCTURAL PROPERTIES OF ECOPLY® PLYWOOD

	Characteristic stress value MPa	
	F8	F11
Bending ( $M_N$ )	25	35
Tension ( $T_N$ )	15	20
Panel shear ( $V_p$ )	4.7	5.3
Rolling shear ( $V_R$ )	1.9	2.1
Compression (in plane)	20	25
Bearing (normal) ( $N_N$ )	9.7	12
Modulus of elasticity (E)	9100	10500
Modulus of rigidity (R)	455	525

Source: AS/NZS 2269

Wood is strongest when stressed parallel to the grain and weakest across the grain, so the lay up or arrangement of veneers in the panel determines the properties. Because of its cross banded construction, plywood possesses significant strength and stiffness both parallel and perpendicular to the direction of the face grain, but is generally strongest and stiffest along the direction of the face grain.

The section properties of structural plywood in Table 4A are calculated in accordance with AS/NZS 2269 to allow for the reduced contribution of veneers perpendicular to the direction of stress. For engineering design to NZS 3603, the section properties are multiplied by stresses and 'k' factors to determine resistances for working stress design, or nominal strengths for limit states design.

Resistances and nominal strengths in Tables 4B and 4C assume all 'k' factors are equal to 1.0. Multiply tabled values by the strength reduction factor  $\phi$  and 'k' factors for specific in-service conditions for design to a structural code such as NZS 3603.

## 1.6 PRODUCT IDENTIFICATION

In accordance with AS/NZS 2269, every sheet of Ecoply structural plywood has the following information marked on the back:

- Brand name: e.g. ECOPLY
- Panel construction code: e.g. 15-30-5 (Thickness (mm)-Face veneer thickness (mm x 10)-Number of veneers)
- Face grade, back grade, glue bond: e.g. CD A BOND
- Intended application: e.g. STRUCTURAL
- Australasian Standard: e.g. AS/NZS 2269:2008
- Date and time of manufacture: e.g. 16/08/07 19:45:45
- Stress grade: e.g. F8
- Formaldehyde emission class: E<sub>0</sub> for A Bond Ecoply
- The Engineered Wood Products Association of Australasia (EWPPAA) brand and mill number: e.g. 911 (Tokoroa mill)

### For example:

**ECOPLY 15-30-5 CD A BOND STRUCTURAL  
AS/NZS 2269:2008 PAT 16/08/07 19:45:45 F8 E0**



If the plywood is treated, it will also be marked in accordance with the treatment standard AS/NZS 1604.3:2004 Specification for Preservative Treatment, Part 3: Plywood.

## 1.7 CODE COMPLIANCE

Ecoply® plywood manufacture is third-party audited through the product quality control programme of the Engineered Wood Products Association of Australasia (EWPAA) which is itself audited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

Carter Holt Harvey® Woodproducts is licensed by the EWPAA to stamp plywood with the PAA/JAS-ANZ Product Certification Mark. This certifies it has been manufactured under the third party audited Joint Product Certification programme to monitor compliance with Joint Australian/New Zealand Standard AS/NZS 2269 Plywood – Structural. Plywood to this standard is referenced in NZ Building Code Acceptable Solutions and Verification Methods through:

- NZS 3602 The Use of Timber and Wood-based products for Use in Building
- NZS 3603 Timber Structures
- NZS 3604 Timber Framed Buildings
- AS/NZS 1604.3 Specification for Preservative Treatment, Part 3: Plywood
- E2/AS1 External Moisture



**WARNING:** Plywood which is non-certified or is manufactured to standards other than AS/NZS 2269, such as US voluntary standard PS1-95 (replaced by PS1-07), is not referenced in the NZ Building Code. There are significant differences between the requirements of US voluntary standard PS1-95 and AS/NZS 2269 around bond durability, structural ratings and veneer quality which are fully explained in a technical note titled *Warning Notice re substituting imported PS1-95 industrial plywood for AS/NZS 2269 structural plywood* published by the EWPAA. This can be downloaded from the EWPAA website at [www.ewp.asn.au](http://www.ewp.asn.au)

### Structure B1

Design to NZS 3603 Timber Structures complies with the NZ Building Code in Verification Method B1/VM1 clause 6.0 Timber, Structural, Plywood is the only sheet material with properties listed in NZS 3603. Ecoply structural plywood is available in F8 stress grade with some specialty products available F11 or with specifically designed properties for specialised applications.

## 1.8 GENERAL DESIGN CONSIDERATIONS

### Durability and exterior moisture E2

Ecoply plywood is made from softwood solid Radiata Pine veneer. Designers should assess the level of exposure to biological, moisture, and other hazards and apply appropriate preservative treatment and detailing to minimise exposure to these hazards.

Information in this manual outlines suggested practices for detailing building components to exclude moisture to comply with the durability requirements of the NZ Building Code. For further information including guidelines for some environments and applications refer to technical note *Durability Statement: Structural Plywood*.

### Formaldehyde

Ecoply plywood is manufactured using phenol formaldehyde resins which are fully cured in the hot press. Cured resin is thermally and moisture stable and formaldehyde emissions for the glued plywood are similar to background levels for the wood by itself when tested to AS/NZS 2098.11 Determination of formaldehyde emissions for plywood. Accordingly every Ecoply panel is branded with the lowest emission class (less than 0.5 mg/litre for E<sub>0</sub>).

Actual formaldehyde emissions for Ecoply and Shadowclad® plywood have been tested and approved as having an actual formaldehyde emission level of less than 0.3 mg/ litre (equivalent to a Super E<sub>0</sub> emission level).

### Moisture content and dimensional change

At the time of leaving the factory, the moisture content of untreated Ecoply plywood should generally be in the range of 8% to 15% as required by AS/NZS 2269. All wood products including plywood respond to changes in ambient humidity so the eventual moisture content of plywood varies according to how dry or how wet the environment is. After manufacture, the moisture content will move to equilibrium with the environment, and the veneers swell or shrink across the grain in response. The total expansion both along and across a 2400x1200 mm panel can be in the order of 1.5 mm to 3 mm as the plywood changes from a dry to a saturated state.

Ecoply that is treated with waterborne salts (e.g. CCA) is expected to be used in applications that have higher humidity than interior dry use, so following treatment it is dried to a higher average moisture content of approximately 18%. This provides for a more stable panel in service than placing a dry (less than 15%) sheet in a higher moisture environment.

Detailing and construction must allow for movement if the plywood will be subject to cycles of moisture change. Seasonal and daily cycles can be significant depending on the end use.

### Temperature

Wood (and plywood) expand upon heating as do practically all solids. The thermal expansion of plywood is quite small and there is little effect on the structural performance or durability of plywood when used in temperatures below 54°C. The average co-efficient of thermal expansion of plywood is  $4.5 \times 10^{-6}$  mm/mm/°C. At temperatures above 55°C wood begins to deteriorate. Colours of coatings and finishes should be selected to reduce heat gain. For extreme conditions, further technical information is available by calling Carter Holt Harvey Woodproducts on 0800 326 759.

The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214, e.g. Plywood has a Conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance  $R = 0.012/0.13 = 0.09$ .

### Aesthetics

Ecoply® plywood products can be selected for decorative or weather protection functions as well as structural performance.

Acceptable Solution E2/AS1 External Moisture allows plywood manufactured to AS/NZS 2269, minimum CD appearance grade, minimum 12 mm thickness and treated as required by NZS 3602 to be used for exterior cladding. For exterior cladding applications Carter Holt Harvey Woodproducts strongly recommends Shadowclad® exterior cladding over smooth faced plywood such as Ecoply. Shadowclad features a bandsawn face to help reduce the incidence and appearance of face checking and other appearance related issues which can occur on smooth faced plywood if not regularly maintained by the homeowner. Shadowclad is available with or without vertical grooves and, in Carter Holt Harvey Woodproducts opinion, provides a superior long term aesthetic look in exposed cladding applications.

### Face checks on plywood exposed to weather

- Face checks (lengthwise separations of the wood fibre occurring in the face veneer) are the result of normal expansion and contraction of the wood fibre as it gains and loses moisture from the external environment
- Face checks occur naturally in all wood based products and their extent in plywood can vary depending on the length of exterior exposure, climate conditions and protection offered by the surface coating
- Face checks in plywood do not affect the structural integrity of the panel as they are confined to the surface veneer and are strictly aesthetic in nature
- As face checking occurs naturally Carter Holt Harvey Woodproducts does not consider them to be a manufacturing or product fault

### Durability

The durability of Ecoply structural plywood will depend on the application. Detailing, treatment and installation details need careful consideration to satisfy the requirements of the NZ Building Code.

Normally, 50 year durability can be achieved with untreated Ecoply in dry, interior exposure. For internal environments subject to high humidity or condensation H3 treated Ecoply should be used.

Unpainted H3 treated Ecoply in exterior applications will weather and oxidise but panels can be expected to perform structurally for approximately 15 years. However the lack of protection will lead to appearance related issues such as surface checking, mould growth and discolouration of the sheet surface which are not considered manufacturing faults by Carter Holt Harvey Woodproducts.

Ecoply should not be left unpainted if long term durability is required. Treatment can mitigate risk from fungal and insect organisms, but sun and rain can thermo-mechanically degrade the surface of panels and the surface veneer of plywood is often strength critical.

A light coloured, regularly maintained, flexible acrylic paint systems offer best results for long term durability.

To achieve the 50 year durability requirement of the NZ Building Code in accordance with NZS 3602, H3 treated exterior cladding used as a bracing element, must be coated with a regularly maintained flexible three coat acrylic latex coating system with a light reflectance value (LRV) of 40% or more. Shadowclad exterior cladding is strongly recommended for this application. For further information refer to section 1.7: Aesthetics.

For bracing in cavities behind another cladding system H3 treated Ecoply without coating is sufficient.

Fire, spread of flame and smoke development

The following early fire hazard properties of uncoated Ecoply® plywood are the result of tests carried out by Applied Physics Laboratory and are similar to results from extensive testing done in Australian Laboratories on uncoated radiata pine plywood.

For plywood with decorative finish coatings or intumescent coating, performances depend on spread rates of the coating. Advice and coating specifications should be sought from the coating manufacturer.

TABLE 6: EARLY FIRE HAZARD PROPERTIES OF 12MM ECOPLY® PLYWOOD

	Ignitability Index (Ig)	Spread of Flame Index (SFI)	Heat Evolved Index (HEI)	Smoke Developed Index (SDI)
<b>Ecoply® Structural Plywood, Untreated, Uncoated</b>	14	7	7	3
<b>Ecoply® Structural Plywood H3.2 CCA Treated</b>	14	6	4	3

1.9 SUSTAINABILITY

Ecoply is manufactured from radiata pine, a plantation grown medium density softwood. It is grown on tree farms which are tended and harvested to provide wood for plywood manufacture. The crop is managed on a sustainable basis to yield millable trees.

New Zealand plantations are managed in compliance with the New Zealand Forest Accord, a voluntary agreement signed in 1991 between NZ forest managers and environmental non-governmental organisations.

Ecoply is manufactured in New Zealand at Carter Holt Harvey® Woodproducts Tokoroa plywood mill.

Ecoply and Shadowclad® are available Forestry Stewardship Council (FSC) (SCS-COC-001316) certified upon request.

1.10 HEALTH & SAFETY

Ecoply should be handled in accordance with the Material Safety Data Sheets (MSDS) for untreated, H3.2 CCA and H3.1 LOSP treated Ecoply, which are available upon request.

Always wear safety glasses or non-fogging goggles when machining Ecoply panels.

If wood dust exposures are not controlled when machining (sawing, routing, planing, drilling etc) a class P1 or P2 replaceable filter or disposable face piece respirator should be worn.

Wear comfortable work gloves to avoid skin irritation and the risk of splinters. Wash hands with mild soap and water after handling panels.

1.11 STORAGE & HANDLING

Ecoply requires care in storage and handling. The following suggestions will help keep the plywood in good condition before use and after installation:

- The storage area should be protected from sun, rain and wind that would otherwise bring about rapid changes in temperature and humidity
- Support for the sheets should be provided at both ends and middle to avoid distortion. Ensure bearers in packs above are aligned over bearers below (to avoid inducing curves in sheets)
- The stack should be kept dry and clear of ground contact, and placed so that it will not be exposed to mechanical damage
- The sheets should be stacked flat, NOT on edge
- To avoid staining, fading and surface checking, the sheets should not be exposed to the weather while awaiting installation

1.12 LIMITATIONS

The information contained in this document is current as at May 2010 and is based on data available to Carter Holt Harvey® Woodproducts at the time of going to print.

This publication replaces all previous Carter Holt Harvey Woodproducts design information and literature relating to Ecoply Structural, Ecoply Bracing, Ecoply Flooring, Ecoply Roofing & Decking and Origin® plywood. Carter Holt Harvey Woodproducts reserves the right to change the information contained in this document without prior notice. It is important that you call 0800 326 759 to confirm that you have the most up to date information available or refer to [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz)

Carter Holt Harvey Woodproducts has used its reasonable endeavours to ensure the accuracy and reliability of the information contained in this document and, to the extent permitted by law, will not be liable for any inaccuracies, omissions or errors in this information nor for any actions taken in reliance on this information.

## 2.0 GENERAL INSTALLATION GUIDE

The following is a general guide to be followed unless otherwise specified. For additional installation instructions for typical applications refer to section 3.0: Typical applications.

### 2.1 FRAMING

Use kiln dried framing e.g. Laserframe<sup>®</sup> in accordance with timber framing manufacturers' specifications and treated in accordance with NZS 3602. All timber frame sizes and set out must comply with NZS 3604 (or be specifically designed to NZS 3603). Ecoply<sup>®</sup> may be specified for frame spacing determined by design, or using tables in section 3 for specific product applications such as bracing, internal linings, flooring and as a substrate for shingle roofs or membrane roofs and decks.

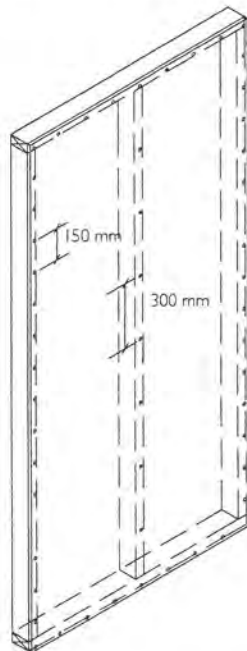
LOSP treated framing should be vented before fixing and if construction adhesives are required (for example to screw and glue floor panels) the adhesive must be compatible with LOSP. See section 1.4: Preservative treatment.

For plywood used as exterior cladding refer to the Shadowclad<sup>®</sup> Specification & Installation Guide.

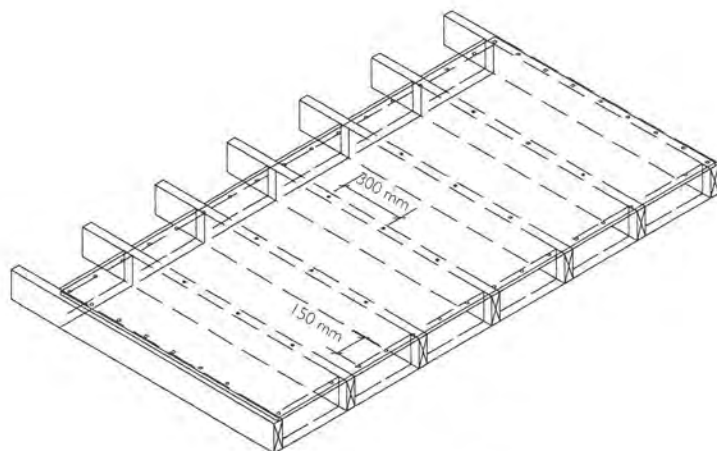
### 2.2 SHEET FASTENERS AND FIXING

- Where there is risk of size change due to moisture cycling, allow a 2 to 3 mm expansion gap between sheets
- Use only flathead nails or screws, with or without construction adhesives
- Fastener length should penetrate at least 10 nail diameters into the framing or be three times the sheet thickness, whichever is the greater. Longer or ring shank nails may be specified
- Fasteners must be at least 3 fastener diameters or 7 mm from the edge of the sheet. Because of its cross banded construction, fasteners can be placed close to the edge of the sheet to allow joining on narrow framing members
- For tongue and groove products such as flooring and roofing fasten 15 mm from tongue and groove edges
- Standard fixing pattern: unless otherwise specified fasten edges and ends of sheets at 150 mm centres, and within the panel at no more than 300 mm centres
- Use hot dipped galvanised fasteners or corrosion resistant fasteners (i.e. stainless steel) determined by design for specific hazards
- Where using stainless steel nails, nails must be annular grooved
- Refer to Table 6 page 12 for minimum fastener sizes
- Do not over-drive power driven nails

**Figure 1: Fastener spacings for Ecoply<sup>®</sup>**



**Ecoply<sup>®</sup> fastened in vertical plane**



**Ecoply<sup>®</sup> fastened in horizontal plane**

Figure 2: Fastener spacings from edges

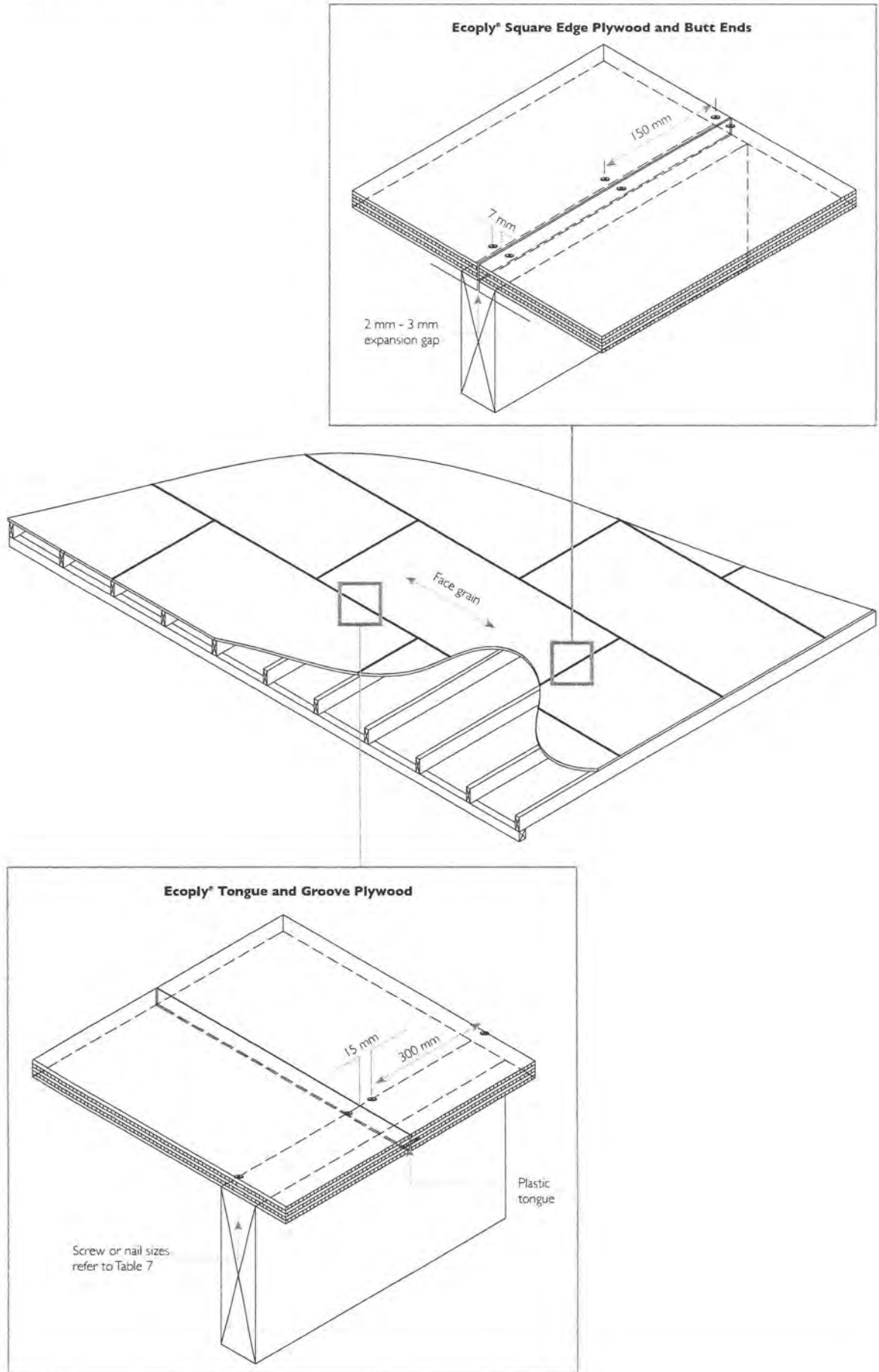


TABLE 7: FASTENERS AND CHARACTERISTIC SHEAR LOADS FOR ECOPLY®

Thickness (mm)	7 & 9 mm	12 & 15 mm	17 mm	19 to 21 mm	25 mm					
<b>Minimum nail size in timber studs</b>	40 x 2.5 mm	570	60 x 2.8 mm	710	60 x 2.8 mm	710	60 x 2.8 mm	710	75 x 3.15 mm	883
<b>Screw size in timber studs</b>	No.8 x 30 mm	1230	No.8 x 40 mm	1230	No.10 x 40 mm	1650	No.10 x 45 mm	1650	No.10 x 50 mm	1650
<b>Screw size in 1.15 mm steel studs*</b>	10-24-35‡	1300	10-24-40‡	2000	10-16-45‡	2100	10-16-45‡	2100	10-16-45‡	2100
<b>Screw size in 2.80 mm steel studs*</b>	10-24-35‡	1200	10-16-40‡	1200	14-20-45‡	3000	14-20-45‡	4000	14-20-45‡	5000

\* Self tapping, self countersinking screw

† Screw Numbers indicate: Gauge – Threads per inch – Length (mm)

‡ The load is the characteristic load (N) for one fastener in single shear

- Steel thickness, screw sizes, characteristic loads, refer to assemblies actually tested
- Other screw sizes may be used. Screw properties vary between screw suppliers and the suitability of a particular size should be verified by the designer for performance under changing physical conditions and cyclic loading
- Non-standard nailing may be specifically designed with NZS 3603 or similar

### Fasteners for H3,2 CCA treated Ecopy

Where fasteners are in contact with H3,2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS3604 for these circumstances.

Where stainless steel nails are required, annular grooved nails must be used.

## 2.3 ADHESIVES

### Tube applied construction adhesives

Site applied construction adhesives may be used together with nails and screws for non permanent loads, reduced fastener popping, and to lower the risk of squeaking in floors. Available types include polyurethane (e.g. Holdfast™ Gorilla Nailpower™) and elastomeric (e.g. Bostik® Wallboard Gold) based adhesives.

Elastomeric adhesives should meet the requirements of APA Performance specification AFG 01 *Adhesives for field gluing plywood to wood framing*. Other types should have appraisal from BRANZ or equivalent authorities for the specific applications proposed.

Follow manufacturers' recommendations as follows:

- Use a bead or dabs of adhesive as per manufacturers' recommendations
- Apply pressure using fastener patterns outlined in section 2.2: Sheet fasteners and fixing
- Work from the middle of the sheet outwards to develop glue line pressure
- Ensure adhesives are compatible with treatment in the framing timber; see section 1.4: Preservative treatment

### Structural adhesive joints

Structural bonds are generally only achievable in factory controlled conditions using approved structural adhesives in accordance approved standards for glue lamination, e.g. Resorcinol formaldehyde joints made to AS/NZS 1328 *Glued laminated structural timber*. Site gluing is not recommended for structural plywood components. Contact the Ecopy® help line on 0800 326 759 for further information.

## 3.0 STRUCTURAL BRACING & CEILING DIAPHRAGMS

The Ecoply® bracing system provides bracing resistance for walls and subfloor foundations for light timber framed buildings under wind and earthquake loading, to meet the requirements of the NZ Building Code - BI Structure, and NZS 3604 *Timber Framed Buildings* or specifically designed to NZS 3603 *Timber Structures Standard*.

Any Ecoply structural panel may be used for bracing as long as it is equal to or greater than 7 mm thickness, has a minimum wall length as described in Table 9, treated for the specific application in accordance with NZS 3602 (summarised in Table 7) and fixed in accordance with Ecoply bracing specifications outlined in this publication.

Shadowclad® exterior cladding, direct-fixed to framing or installed over 20 mm cavity battens, may be used for bracing when installed in accordance with the Shadowclad Specification & Installation manual. When used as bracing as well as cladding, Shadowclad must be:

- coated with an acrylic latex coating system which is maintained through the life of the building and has a light reflectance value of 40% or more
- fixed with stainless steel or silicon bronze annular grooved nails

BRANZ Test Report STO593 (20 December 2004) covers the use of Shadowclad used as bracing when installed on a 20 mm drained ventilated cavity. The test report can be downloaded from [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz).

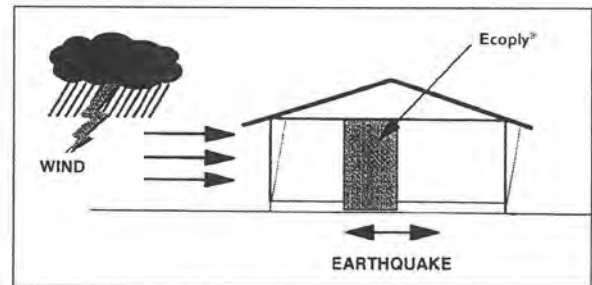
### 3.1 DESIGN TO COMPLY WITH THE NEW ZEALAND BUILDING CODE

#### Structure

##### Timber framed buildings to NZS 3604

NZS 3604 *Timber Framed Buildings* is listed as an Acceptable Solution under clause 3.0 Timber in Acceptable Solution BI/ASI Structure.

Carter Holt Harvey® Woodproducts have developed a range of wall bracing elements tested using P21 testing methods referenced in NZS3604.



#### Specific design

Because Ecoply is structural plywood manufactured to AS/NZS 2269, it is suitable for design and use in earthquake and wind bracing systems constructed in accordance with NZS 3603 and AS/NZS 1170.

Structural plywood to AS/NZS 2269 is the only sheet brace material with properties defined in a published New Zealand engineering design code, NZS 3603 *Timber Structures*, and so can be designed in compliance with Verification method BI/VM1 under clause 6.0 Timber for use in buildings over three storeys in height.

### Durability

Ecoply® plywood is manufactured to meet the requirements of NZS 3602 Timber and Wood based products for use in Buildings. If the product is used, handled and installed in accordance with Carter Holt Harvey™ Woodproducts product literature it will meet the durability clauses of the NZ Building Code.

Table 8 summarises the applications in which Ecoply and Shadowclad™ can be used as structural bracing together with the preservative treatment requirement and fastener material for corrosion resistance.

TABLE 8: ECOPLY AND SHADOWCLAD™ SUITABILITY FOR BRACING APPLICATIONS INCLUDING TREATMENT TYPE AND FASTENER MATERIAL

Application	Plywood Type	Fastener Description
Plywood bracing in enclosed spaces (protected from the weather) but with a risk of moisture penetration conducive to decay: e.g. plywood bracing and/or rigid underlay (air barrier), fixed to framing with/without building paper/wrap over, with/without cavity battens behind cladding	Ecoply H3 treated <sup>1</sup> , DD surface grade or better	Hot dipped galvanised or better
Plywood bracing exposed to exterior weather conditions and dampness but not in ground contact: e.g. plywood used as both cladding and bracing (direct fixed to framing or over a 20 mm drained ventilated cavity system) - For reasons of aesthetics Shadowclad is strongly recommended. See section 1.7: Aesthetics	Shadowclad <sup>1</sup> Ecoply H3 treated <sup>1</sup>	Stainless steel or silicone bronze (as per Table 4.3 of NZS 3604:1999)
Bracing on framing exposed to ground atmosphere (subfloor)	Ecoply H3 treated <sup>1</sup>	Stainless steel or silicone bronze
Bracing in wet process buildings	Ecoply H3 treated <sup>1</sup>	Stainless steel or silicone bronze

<sup>1</sup> Ecoply H3 is plywood that has been preservative treated to the H3.2 hazard rating with CCA type preservative or (upon request) has been treated to the H3.1 hazard rating with a LOSP azole system. Shadowclad exterior cladding products are also preservative treated to H3.1 hazard rating with a LOSP azole system.

### Rain wetting and construction bracing

Untreated Ecoply will withstand rain and exposure during construction for up to 3 months however aesthetically the sheet appearance will deteriorate as the level of exposure increases. Rain and exposure can cause thinner plywood panels to buckle. Plywood stability is related to the number of veneers and thickness of the panel. Where panel stability is critical, consider using thicker panels.

### Humidity and condensation

In uses where the moisture content may exceed 18% for prolonged periods, Ecoply must be H3 treated to resist decay or insect hazard.

### Subfloor sheet bracing

H3 treated Ecoply can be used as sheet bracing where dampness does not allow the use of untreated plywood or other sheet materials (clause 5.4.3 of NZS 3604). Where Ecoply subfloor sheet bracing is exposed to both rain and sun, it must be coated with a three coat, maintained acrylic exterior coating system with a light reflectance value of 40% or greater.

### Adjustments for wall height

Use clause 8.3.1.4 of NZS 3604 to calculate bracing values:

“Adjustment of bracing capacity of walls of different heights and walls with sloping top plates shall be obtained by the following method:

- For wall bracing elements of heights other than 2.4 m, the bracing rating determined by test or from Table 9 should be multiplied by 2.4 ÷ element height in metres, except that elements less than 2.4 m high shall be rated as if they are 2.4 m high.
- Walls of varying heights, should have their bracing capacity adjusted in accordance with 8.3.1.4(a) using the average height.”

### Joining panels for walls higher than maximum sheet length

Ecoply and Shadowclad bracing panels must be fixed from top plate to bottom plate (with the exception of bracing specification of EPGs). For wall heights over 2.4 m, Ecoply and Shadowclad is available in 2.7 m sheet lengths. Alternatively a part sheet can be stacked above a full sheet, butt joined on a single row of nogs with each sheet/part sheet independently nailed off as per the nail spacing in the Ecoply bracing specifications (e.g. 2.4 m × 1.2 m sheet with a 0.3 m × 1.2 m part sheet above it to give a 2.7 m × 1.2 m bracing element).

#### Cladding as bracing

Shadowclad<sup>®</sup> is recommended as a cladding which can be used for bracing as well. To achieve 50 year structural durability, it must be:

- Coated with a three coat acrylic coating system with a light reflectance value (LRV) of 40% or more
- Fixed with stainless steel or silicone bronze fasteners

12 mm Ecoply<sup>®</sup> (CD face grade or better) can be H3 treated to meet the requirements of Acceptable Solution E2/AS1 and will perform as a structural, durable and weather tight cladding and bracing element when correctly installed.

However smooth faced plywood may be prone to appearance related issues such as face checking which occurs naturally and is not considered by Carter Holt Harvey<sup>®</sup> Woodproducts to be a manufacturing or product fault. For more information refer to section 1.8: Face checks on plywood exposed to weather. H3.2 CCA treated Ecoply may also have a green tinge to the wood surface and may have fillet marks on the face of the sheet.

For exterior cladding applications where a high visual appearance is desired, Carter Holt Harvey Woodproducts strongly recommends the use of Shadowclad as an exterior cladding. Shadowclad has a bandsawn face which helps reduce the incidence and appearance of face checking and is H3.1 LOSP treated (clear preservative treatment) which does not leave fillet marks on the panel face.

For further information on Shadowclad and plywood as an exterior cladding refer to the Shadowclad Specification and Installation Guide.

#### Soil

Ecoply (untreated or H3 treated) and Shadowclad must not be allowed to come in contact with soil. The bottom edge of the plywood sheet must be a minimum of 100 mm above decks or paved ground and a minimum of 175 mm above unprotected ground.

#### Service penetrations in bracing elements

Small openings (e.g. power outlets) of 90 x 90 mm or less may be placed no closer than 90 mm to the edge of the braced element, or waste pipe outlets of max. 150 mm diameter placed at no closer than 150 mm to the edge of the braced element.

### 3.2 ECOPLY® & SHADOWCLAD® BRACING SPECIFICATIONS SUMMARY

Carter Holt Harvey® Woodproducts has a range of bracing specifications called the EP bracing series. The EP bracing series simplifies the design and construction of bracing elements using plywood, by itself or in conjunction with GIB® Plasterboard.

- Higher bracing performance per metre than historical SP elements
- Reduced number of element types and simplified naming system
- Single sided and double sided bracing elements
- Special EPGs bracing element design for where plywood cladding comes to soffit line within 300 mm of top plate
- High performance bracing element utilising GIB® Standard plasterboard
- A single type, GIB Handibrac®, hold-down for all bracing elements
- Direct fix or cavity construction
- Simplified construction
- Specifications for each bracing element type

TABLE 9: SUMMARY P21 RATINGS FOR 2.4 M HIGH ECOPLY® AND SHADOWCLAD® WALL ELEMENTS

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPI	0.6 m	7 mm Ecoply or 12 mm Shadowclad® one side	125	130
EP2	0.6 m	7 mm Ecoply or 12 mm Shadowclad each side	140	150
EPG	0.4 m	7 mm Ecoply or 12 mm Shadowclad one side and 10 mm GIB® Standard plasterboard other side	100	115
	1.2 m		150	150
EPGs	0.4 m	7 mm Ecoply or 12 mm Shadowclad one side* and 10 mm GIB® Standard plasterboard other side	100	115
	1.2 m		150	120

\* Plywood side of element must be a maximum of 300 mm below top plate

**Note:** Bracing and other technical information has been specifically tested using Ecoply and Shadowclad branded structural plywood. This information cannot be used with any other plywood brand and bracing data must be sought directly from the specific plywood manufacturer.

#### More information

The following pages provide a full specification of EP bracing elements. Copies of specifications can be downloaded from [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz)

NZS 3604 provides the method of calculating demand on a building and calculation sheets are available from BRANZ or GIB® EzyBrace™ software is available as a free download from [www.gib.co.nz](http://www.gib.co.nz). Information is available at [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz) which can be placed in the custom elements of GIB® EzyBrace™ for ease of calculation.

Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZ3604 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply, Shadowclad and Laserframe MSG8 timber framing manufactured by Carter Holt Harvey Limited trading as Carter Holt Harvey Woodproducts New Zealand, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB Handibrac® are registered trade marks of Fletcher Building Holdings Ltd.

### 3.3 ECOPLY® BRACING SPECIFICATION – EPI

#### SINGLE SIDED STRUCTURAL PLYWOOD BRACE

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPI	0.6 m	7 mm Ecoply® or 12 mm Shadowclad® one side	125	130

#### Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS3604)
- NZBC B2 - Durability: AS1 Clause 3.2 Timber (NZS3602)

Framing dimensions and height are as determined by the NZS3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe®, is recommended.

#### Bottom plate fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604:1999.

#### Lining

One layer 7 mm Ecoply structural plywood or 12 mm Shadowclad exterior wall cladding fixed directly to framing or over cavity battens. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

#### Fastening the Ecoply

##### Fasteners

Fasten with 50 x 2.8 mm galvanised or stainless steel flat head nails for direct fix or 60 x 2.8 mm over cavity battens. Place fasteners no less than 7 mm from sheet edges.

##### Fasteners for H3.2 CCA treated Ecoply

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS3604 for these circumstances.

Refer to Table 8 for further fastener selection advice.

Where stainless steel nails are required, annular grooved nails must be used.

##### Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs.

##### Fastening to cavity battens

The brace element may be fixed over cavity battens.

The cavity battens must be a minimum of 40 x 20 mm nailed staggered formation at 150 mm centres to studs around the perimeter of the brace element, and nailed to the intermediate studs within the element at 300 mm centres, with 50 mm x 2.8 mm flat head galvanised or annular grooved stainless steel nails.



Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZ3604 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply, Shadowclad and Laserframe MSG8 timber framing manufactured by Carter Holt Harvey Limited trading as Carter Holt Harvey Woodproducts New Zealand, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB Handibrac® are registered trade marks of Fletcher Building Holdings Ltd.

### 3.4 ECOPLY® BRACING SPECIFICATION – EP2

#### DOUBLE SIDED STRUCTURAL PLYWOOD BRACE

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EP2	0.6 m	7 mm Ecoply® or 12 mm Shadowclad® each side	140	150

#### Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS3604)
- NZBC B2 - Durability: AS1 Clause 3.2 Timber (NZS3602)

Framing dimensions and height are as determined by the NZS3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe®, is recommended.

#### Bottom plate fixing

Use GIB Handibrac® hold-down connections at each end of the bracing element. Refer to installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604:1999.

#### Lining

Each Side: One layer 7 mm Ecoply structural plywood or 12 mm Shadowclad exterior wall cladding fixed directly to framing or over cavity battens. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

#### Fastening the Ecoply

##### Fasteners

Fasten with 50 x 2.8 mm galvanised or stainless steel flat head nails for direct fix or 60 x 2.8 mm over cavity battens. Place fasteners no less than 7 mm from sheet edges.

##### Fasteners for H3.2 CCA treated Ecoply

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS3604 for these circumstances.

Refer to Table 8 for further fastener selection advice.

Where stainless steel nails are required, annular grooved nails must be used.

##### Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs.

##### Fastening to cavity battens

One side of the brace element may be fixed over cavity battens.

The cavity battens must be a minimum of 40 x 20 mm nailed staggered formation at 150 mm centres to studs around the perimeter of the brace element, and nailed to the intermediate studs within the element at 300 mm centres, with 50 mm x 2.8 mm flat head galvanised or annular grooved stainless steel nails.



Ecoply® Bracing Systems are designed to meet the requirements of the NZBC and have been tested and analysed using the P21 method referenced in NZ3604 listed as an acceptable solution B1/AS1 Structure. Testing was carried out using Ecoply, Shadowclad and Laserframe MSG8 timber framing manufactured by Carter Holt Harvey Limited trading as Carter Holt Harvey Woodproducts New Zealand, and GIB® products manufactured by Winstone Wallboards Ltd. Substituting materials may compromise performance of the system. GIB® and GIB Handibrac® are registered trade marks of Fletcher Building Holdings Ltd.

### 3.5 ECOPLY<sup>®</sup> BRACING SPECIFICATION – EPG

#### STRUCTURAL PLYWOOD BRACE WITH PLASTERBOARD OTHER SIDE

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPG	0.4 m	7 mm Ecoply <sup>®</sup> or 12 mm Shadowclad <sup>®</sup> one side and 10 mm GIB <sup>®</sup> Standard plasterboard other side	100	115
	1.2 m		150	150

#### Framing

Wall framing must comply with:

- NZBC B1 - Structure: AS1 Clause 3 Timber (NZS3604)
- NZBC B2 - Durability: AS1 Clause 3.2 Timber (NZS3602)

Framing dimensions and height are as determined by the NZS3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe<sup>®</sup>, is recommended.

#### Bottom plate fixing

Use GIB HandiBrac<sup>®</sup> hold-down connections at each end of the bracing element. Refer to installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604:1999.

#### Lining

Side 1: One layer 7 mm Ecoply structural plywood or 12 mm Shadowclad exterior wall cladding fixed directly to framing or over cavity battens. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets.

Side 2: One layer 10 or 13 mm GIB<sup>®</sup> Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB<sup>®</sup> Site Guide.

#### Fastening the Ecoply

##### Fasteners

Fasten with 50 x 2.8 mm galvanised or stainless steel flat head nails for direct fix or 60 x 2.8 mm over cavity battens. Place fasteners no less than 7 mm from sheet edges.

##### Fasteners for H3.2 CCA treated Ecoply

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS3604 for these circumstances.

Refer to Table 8 for further fastener selection advice.

Where stainless steel nails are required, annular grooved nails must be used.

##### Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs.

##### Fastening to cavity battens

The plywood side of the brace element may be fixed over cavity battens.

The cavity battens must be a minimum of 40 x 20 mm nailed staggered formation at 150 mm centres to studs around the perimeter of the brace element, and nailed to the intermediate studs within the element at 300 mm centres, with 50 mm x 2.8 mm flat head galvanised or annular grooved stainless steel nails.



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## Fastening the GIB® Plasterboard

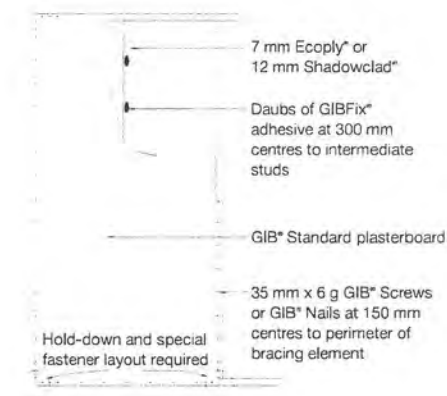
### Fasteners

32 mm x 6 g GIB® Grabber® Screws or 35 mm GIB® Nails

### Fastening centres

Fasten 50, 100 and 150 mm from each corner and 150 mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300 mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12 mm from paper bound edges and 18 mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.



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### 3.6 ECOPLY® BRACING SPECIFICATION – EPGs

A BRACING ELEMENT SPECIALLY DESIGNED FOR SHEETS TO TERMINATE AT SOFFIT HEIGHT

Specification No.	Minimum Wall Length	Lining Requirements	BU's/m Wind	BU's/m Earthquake
EPGs	0.4 m	7 mm Ecoply® or 12 mm Shadowclad® one side and 10 mm GIB® Standard plasterboard other side	100	115
	1.2 m		150	120

#### Framing

Wall framing must comply with:

- NZBC B1 – Structure: AS1 Clause 3 Timber (NZS3604)
- NZBC B2 – Durability: AS1 Clause 3.2 Timber (NZS3602)

Framing dimensions and height are as determined by the NZS3604 stud and top plate tables for load bearing and non load bearing walls. Kiln dried verified structural grade timber must be used. Machine stress graded timber, such as Laserframe®, is recommended.

#### Bottom plate fixing

Use GIB HandiBrac® hold-down connections at each end of the bracing element. Refer to installation instructions supplied with the connectors for correct installation instructions and bolt types to be used for either concrete or timber floors. Within the length of the bracing element, bottom plates are fixed in accordance with the requirements of NZS 3604:1999.

#### Lining

Side 1: One layer 7 mm Ecoply structural plywood or 12 mm Shadowclad exterior wall cladding fixed directly to framing or over cavity battens. If part sheets are used, ensure nailing at required centres is carried out around the perimeter of each sheet or part sheet. A 2-3 mm expansion gap should be left between sheets. The Ecoply may terminate within a maximum of 300 mm below the top of the top plate, e.g. at soffit line, where solid nogging must be provided for the full length of the bracing element to provide for fixing of the Ecoply.

Side 2: One layer 10 or 13 mm GIB® Standard plasterboard vertically or horizontally fixed. Sheet joints are touch fitted and fastener heads and joints stopped in accordance with the GIB® Site Guide.

#### Fastening the Ecoply

##### Fasteners

Fasten with 50 x 2.8 mm galvanised or stainless steel flat head nails for direct fix or 60 x 2.8 mm over cavity battens. Place fasteners no less than 7 mm from sheet edges.

##### Fasteners for H3.2 CCA treated Ecoply

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised.

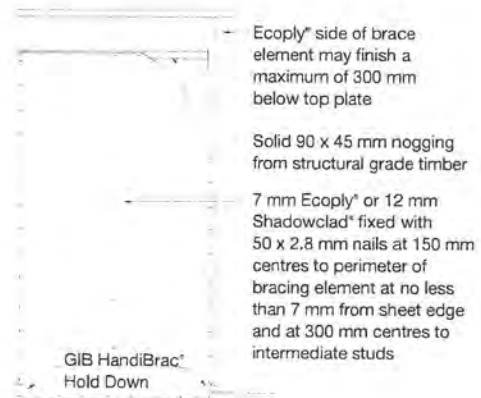
In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS3604 for these circumstances.

Refer to Table 8 for further fastener selection advice.

Where stainless steel nails are required, annular grooved nails must be used.

##### Fastening centres

Fasteners are placed at 150 mm centres around the perimeter of each sheet and 300 mm centres to intermediate studs.



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### Fastening to cavity battens

The plywood side of the brace element may be fixed over cavity battens.

The cavity battens must be a minimum of 40 x 2.0 mm nailed staggered formation at 150 mm centres to studs around the perimeter of the brace element, and nailed to the intermediate studs within the element at 300 mm centres, with 50 mm x 2.8 mm flat head galvanised or annular grooved stainless steel nails.

### Fastening the GIB® Plasterboard

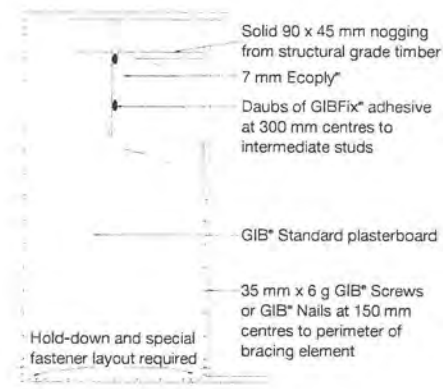
#### Fasteners

32 mm x 6 g GIB® Grabber® Screws or 35 mm GIB® Nails

#### Fastening centres

Fasten 50, 100 and 150 mm from each corner and 150 mm thereafter around the perimeter of the bracing element. For vertical fixing place fasteners at 300 mm centres at intermediate sheet joints. For horizontal fixing place single fasteners in the tapered edge where sheets cross studs.

Place fasteners 12 mm from paper bound edges and 18 mm from cut sheet edges. GIB® plasterboard must be treated in every respect in accordance with relevant GIB® literature.

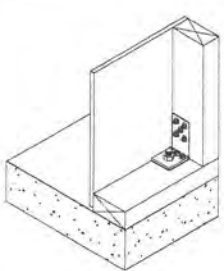
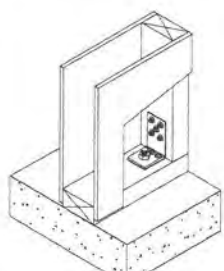
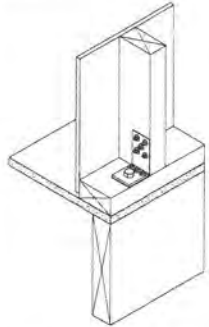
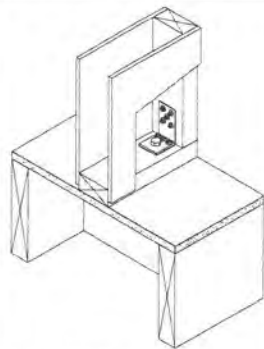


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### 3.7 GIB HANDIBRAC® - RECOMMENDED INSTALLATION METHOD

Developed in conjunction with MiTek™ NZ, the GIB HandiBrac® has been tested for use as a hold-down in all EP bracing elements.

- The GIB HandiBrac® registered design provides for quick and easy installation
- The GIB HandiBrac® provides a flush surface for the wall linings because it is fitted inside the framing. There is no need to check in the framing as recommended with conventional straps
- The GIB HandiBrac® is suitable for both new and retrofit construction
- The design also allows for installation and inspection at any stage prior to fitting internal linings

Concrete Floor		Timber Floor	
External walls	Internal walls	External walls	Internal walls
			
Position GIB HandiBrac® as close as practicable to the internal edge of the bottom plate		Position GIB HandiBrac® at the stud/plate junction	
Position GIB HandiBrac® in the centre of the perimeter joist or bearer		Position GIB HandiBrac® in the centre of the floor joist or full depth solid block	
<b>Hold-down fastener requirements</b>			
A mechanical fastening with a minimum characteristic uplift capacity of 15kN		12 x 150 mm galvanised coach screw	

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### 3.8 STRUCTURAL CEILING DIAPHRAGMS

Diaphragms are used to transfer lateral loads to braced walls and allow for greater spacing between bracing lines. Diaphragms do not have a BU rating themselves.

Plywood diaphragms are an acceptable solution as described in NZS 3604 13.5.2 and allows for plywood not less than 6 mm thick and a minimum of three ply for:

- Diaphragms not steeper than 25 degrees to the horizontal and not exceeding 10 metres long under light or heavy roofs and;
- Diaphragms not steeper than 45 degrees to the horizontal and not exceeding 7.5 metres long under light or heavy roofs

Ceiling Diaphragms are constructed as follows:

- The length of diaphragm shall not exceed twice its width measured between supporting walls
- The ceiling lining must consist of plywood over the entire area of the diaphragm
- Complete sheets with a minimum size of 1800 x 900 must be used
- Framing size and spacing must comply with NZS 3604
- Fastener size should comply with Table 7 of this publication. E.g. 40 mm x 2.5 mm flat head nails for 7 mm and 9 mm Ecoply
- Fastening is at 150 mm centres around the perimeter of each sheet and at 300 mm centres to intermediate framing
- Fixings are no closer than 10 mm from sheet edges
- Perimeter ceiling framing must be connected to wall framing by a perimeter 140 mm x 35 mm ribbon plate nailed to the top of the top plate or alternative such as a 0.55 mm thick steel angle or proprietary steel channel

## 4.0 INTERNAL LININGS, SOFFITS AND APPEARANCE PLYWOODS

The below section relates to the use of Ecoply® appearance plywoods in internal and soffit lining applications.

Appearance plywood (Ecoply Structural Square Edge BB and BD face grades and Ecoply Grooved Lining - often referred to as "Plygroove") are specifically referenced in this section however where a high visual face grade is not required the use of lower visual grades such as Ecoply CD and DD grades may be used.

For more information on Ecoply surface grades see section 1.3: Surface grades.

### Applications

- Interior wall and ceiling linings
- Feature walls and partitions
- Back lining to exposed rafters
- Commercial interiors and shop fitouts
- Soffit lining (where H3.1 LOSP treated)
- Furniture and cabinets

### Advantages

- Decorative real wood panelling
- Tough and impact resistant
- Strong, providing stiffness and rigidity
- No special tools required
- Easy to work and finish
- Ability to create slight curves
- Cost effective
- Water-resistant glue bond



## 4.1 PRODUCT RANGE

TABLE 10: ECOPLY® APPEARANCE PRODUCT RANGE

Thickness (mm)	No. of plies	Sheet Length x 1200 mm	Structural Square Edge		Grooved Lining
			BB	BD	Classic & Prime
9	3	2400		•	
12	5	2400	•	•	•
12	5	2700		•	•
15	5	2400		•	
17	7	2400	•	•	
Edge profile			Square edge		Tongue and Groove with 'V' aris

All appearance plywoods are available either untreated or H3.1 LOSP treated (9 mm BD - available untreated only). Other sizes and thicknesses may be available on request. Contact Carter Holt Harvey® Woodproducts on 0800 326 759.

### Structural square edge products

- BB grade features a solid sanded 'B' grade appearance on both sides. Suitable for applications where both sides of the panel will be visible and appearance is important
- BD grade features a solid sanded 'B' grade appearance face with an unsanded 'D' back. Suitable for applications where one side of the panel will be visible and appearance is important

### Grooved lining products

Grooved Lining is a 12 mm thick sheet with a solid sanded 'B' grade appearance face with an unsanded 'D' back. It features 4 mm wide by 2 mm wide deep 'V' grooves running the length of the sheet at 100 mm centres and is available untreated for internal dry applications or H3.1 LOSP treated for internal damp or semi exposed exterior applications (such as soffit linings).

Grooved Lining is not recommended for use as an exposed exterior cladding due to the potential of appearance issues such as face checking. For more information on face checking see section 1.8: Face checks on plywood exposed to weather.

Grooved Lining is available in two finishes,

**Classic Grade:** Featuring a B face with natural features for a refined wood appearance suitable for clear and stain finishes.

**Prime Grade:** Features a pre primed surface allowing time and labour savings when painting.

For more information on grooved lining prime refer to the *Grooved Lining Prime Information Bulletin September 2009* or contact Carter Holt Harvey Woodproducts on 0800 326 759.

**Note:** When using Grooved Lining Prime some coating manufacturers may require an additional wet primer coating for speciality top coat systems. Always refer to the coating manufacturer's specifications prior to coating.

The overall width of 12 mm grooved lining is 1207 mm (including plastic tongue). Cover width is 1200 mm.

## 4.2 INTERNAL LININGS AND SOFFITS - DESIGN CONSIDERATIONS

### Internal wall linings

- Use 2700 mm sheets where available for high stud walls
- Skirtings, dado mouldings, furniture trim, bookshelves, cornices and other trim can be used to hide mechanical fasteners
- Deep skirting and cornices can be used to extend the effective length of shorter sheets in longer applications
- Unsupported plywood sheets may twist with environmental changes or when coated, particularly if the coating is applied to one side only. Where on going sheet flatness is critical, plywood sheets must be supported by framing
- EcoPLY® appearance plywood may be used for structural bracing. Refer to section 3.0: Structural bracing and ceiling diaphragms

### Internal ceilings and soffits

- For internal ceilings and soffits (semi exposed to weather) which are visible from underneath use EcoPLY® Grooved Lining, B face grade Structural Square Edge or Shadowclad® installed with the face down

### Exterior soffits

- Use a minimum 12 mm thickness
- Use H3.1 LOSP treated product. Do not use water based preservative treatments
- Allow a 2-3 mm expansion gap between square edge sheets
- Use a good quality paint or stain to protect the plywood from intermittent wetting and wind blown moisture

### Appearance plywood in exposed exterior applications

- Appearance plywood is primarily designed for internal applications (untreated) but H3.1 treated product can be used for sheltered exterior applications such as soffit linings
- Appearance plywood is not recommended for use in exposed exterior applications such as cladding. For cladding Carter Holt Harvey Woodproducts recommends the use of Shadowclad exterior cladding
- If used in exposed exterior applications appearance products will meet the durability requirements of the NZ Building Code, however naturally occurring appearance issues (such as face checking and mould growth) may occur and are not considered a manufacturing fault by Carter Holt Harvey Woodproducts. For more information refer to section 1.8: Face checks on plywood exposed to weather

### Forming curves

- EcoPLY can be curved for applications such as ceilings and feature walls. Table 11 provides guidance for the minimum recommended radii

TABLE 11: BENDING RADII FOR ECOPLY PRODUCTS

Recommended minimum bending radii for EcoPLY products				
<b>Thickness (mm)</b>	9	12	15	17
<b>Along face (m)</b>	2.3	3.6	4.6	6.0
<b>Across face (m)</b>	1.3	2.4	3.0	4.4

### 4.3 INTERNAL LININGS AND SOFFITS - INSTALLATION

#### Framing

Framing centres are shown in Table 12. All edges of square edge Ecoply® appearance plywood should be supported. The plastic tongue & groove joint on 12 mm Ecoply grooved lining does not need support - all other edges do. Closer spacings are recommended in high impact areas e.g. bars, gyms, industrial or crowded spaces. In damp situations, allowance should be made for swelling.

#### Fixings for non-bracing walls

- Nails:** For 12 mm thick panels, use 40 x 2.0 mm panel pins at 150 mm centres at sheet edges and 300 mm centres on intermediate supports. If back nailing over rafters use galvanised flat head nails, 40 x 2.5 mm for 12 mm, 50 x 2.8 mm for 15 mm and 60 x 2.8 mm for 17 mm.
- Screws:** For 12 mm and 15 mm thick panels, use No. 8 gauge x 40 mm screws and for 17 mm, use No.10 gauge x 50 mm screws on timber framing. Select screw head to suit architectural details.
- Adhesives:** Panels may be fixed with a bead of polyurethane adhesive either by nailing at 150 mm centres on all glued surfaces, or by applying pressure and cure time in accordance with the glue manufacturers' instructions. Use glues to American Plywood Association Specification AFG 01 (eg Holdfast® Gorilla Grip, Maxbond, Sturdbond).

TABLE 12: FRAME SPACINGS FOR ECOPLY® APPEARANCE PLYWOOD

Application	Maximum frame centre (mm)				
	Ecoply® thickness (mm)				
	9	12	15	17	
<b>Walls</b>	1. Fixed vertically, max stud spacing without nogs or dwangs	400	600	600	600
	2. Fixed horizontally, maximum stud facing	600	1200	1200	1200
<b>Internal Ceilings or Soffits</b>	3. Face grain across framing, under or over frame	-	1200	1200	1200

#### Forming curves - installation

- Shaped top and bottom plates or nogs can be jigsaw cut from 17, 19, 21 or 25 mm thick Ecoply
- Fix covering plywood over the framework
- Attach the out edges with tack nails or clamps first to develop the curve and then fix sheets from the centre out
- For load bearing curves check capability using a structural designer
- Use recommended fastener size as detailed in Table 6 at 150 mm centres on all frames. Longer fasteners, ring shank or annular grooved nails will provide improved resistance to tension. Adhesives are not normally good in tension

### 4.4 INTERNAL LININGS AND SOFFITS - FINISHING

Punch nails before finishing and apply a first coat (clear, primer or sealer) before filling punched holes to minimise dryout or staining. High quality paints, stains or clear finishes are recommended for Ecoply appearance plywood. Tinted clear finishes can provide a full range of architectural options that show the warmth of wood while reducing yellowing and other ultraviolet effects. The use of high gloss finishes and paints tend to highlight naturally occurring and manufacturing characteristics of plywood such as changes in grain and beat marks from the sanding. Matt finishes and paints are recommended to provide a natural timber finish.

Appearance plywood are wood based and respond to changes in humidity. Avoid using inflexible coatings (such as epoxies) that may check on movement of the wood. For ceilings or similar applications it is an advantage to prefinish panels prior to installation. Always refer to the coating manufacturers' specifications.

## 5.0 ROOFS AND DECKS

The section below covers the use of Ecoply<sup>®</sup> plywood used as a substrate for flexible membrane and tile systems in roofing and decking applications. They should be considered as supplementary to system specifications from roofing and decking suppliers.

Ecoply is not recommended as a substrate for exterior decks without a properly detailed barrier material such as butyl rubber, vinyl or EPDM to protect the surface from weathering.

**Always refer to the roofing and decking system supplier for installation, plywood selection and surface preparation requirements for specific roofing and decking products.**

### 5.1 FLEXIBLE MEMBRANE SYSTEMS

- Roofing and decking membranes may comprise synthetic rubber sheeting glued to the Ecoply, or torch welded bitumen membranes
- Always ensure Ecoply is dry and free of imperfections such as surface dust and blemishes as membrane coatings will telegraph any substrate imperfections
- Use Ecoply Flooring or Structural Square Edge (CD Grade) where the use of Ecoply Flooring is not possible
- Use a minimum 17 mm thickness
- Use countersunk stainless steel screws and adhesive on framing to avoid head popping. Apply adhesive between screw locations
- Use kiln dry framing or dry engineered hyJOIST<sup>®</sup> framing to reduce head popping
- Tape over all joints to provide a bond break under the membrane to allow elongation with natural plywood movement
- Where treatment is required use only H3.2 CCA treated Ecoply. Do not use H3.1 LOSP treated Ecoply (solvent based carrier) which is not compatible with most membrane systems. If there is evidence of treatment salt crystals on the Ecoply surface remove by scrubbing with a small amount of water and allow the surface to dry prior to laying the membrane system
- Prepare surface with hot air or gas blow dryers to ensure wash, dew or rain water is driven off prior to laying membrane system

#### *Plywood substrates, face checking and flexible membrane systems*

All natural wood based products (including Ecoply) have the potential to develop natural surface face checks when exposed to external environmental conditions. The degree of potential face checking is dependent on a number of factors including the length of time and level of exposure to weather during construction which is outside the manufacturing control of Carter Holt Harvey<sup>®</sup> Woodproducts. For more information see section 1.8: Face checking in plywood exposed to weather.

Face checks while typically not present after manufacture, do not affect structural performance of the sheet and are acceptable under AS/ NZS 2269- Plywood Structural. They are not a manufacturing fault.

Designers and membrane suppliers must carefully consider the suitability of plywood as a substrate for the membrane system in question if the potential of telegraphing of face checks onto the membrane surface is not acceptable.

The risk of telegraphing can be reduced by protecting the plywood surface from weather and moisture during the construction process.

Where the potential of face checking in the plywood substrate is not acceptable designers should consult the membrane supplier for a more suitable membrane or an alternative substrate.

#### *Allowing for moisture expansion of plywood under roof and floor coverings*

Membrane suppliers have strongly held different views on the requirements for plywood substrates. The fixing instructions within this publication are the starting point but designers must detail joints that allow for expansion in accordance with practices recommended by the chosen membrane supplier.

Carter-Holt Harvey Woodproducts view, and the recommendation of a number of suppliers here and in North America, has been to allow for expansion and contraction at sheet edges by loosely butting tongue and grooved edges so that the tongues can absorb movement and providing a small gap (2 to 3 mm) between square sawn edges. Use a bond breaking tape over these joints to spread elongation in the membrane over a longer distance than the narrow gap in the joint itself. This tape can double as a rain seal over the sheet edges during construction.

Other membrane suppliers believe that sheets should be tightly butted and glued and screwed hard up to each other. This practice constrains movement at the small joint between sheets, but over a wider area requires significant allowance for movement around the perimeter of a roof segment. Junctions between the roof slopes and walls need careful detailing to allow for the potential movement, and movement control joints should be provided at regular intervals to the recommendation of the membrane manufacturer, especially if this method is adopted.

## 5.2 ROOFTILE SYSTEMS

Most fibreglass, asphalt or wooden shingle and tile systems will tolerate DD grade surface characteristics.

- Use unsanded Ecoply Roofing (DD grade) or sanded Ecoply of the required thickness in Table 13A
- The unsanded surface provides extra grip on steeper roofs for roofing crews
- A plywood substrate can avoid the cost of battens
- Fix tiles according to tile manufacturer's specification
- Under asphalt shingles use saturated felt underlay over the Ecoply

## 5.3 ROOFING & DECKING - PRODUCT SELECTION GUIDE

	Structural Square Edge (CD Grade)	Flooring (CD Grade)	Roofing (DD Grade)
<b>Product Description</b>	CD face grade sheets are available in a range of thicknesses and sizes	Solid sanded C grade surface with tongue and groove profile on long edges	Unfilled D grade surface with tongue and groove profile on long edges
<b>Recommended Applications</b>	Substrate for flexible coverings requiring a smooth substrate and where avoidance of visible surface indentations is critical. Use as a substrate for flexible roof and deck membranes and thin roofing tiles		Substrate for coverings with the ability to span holes in the D face grade (up to 75 mm in diameter) such as asphaltic roof tiles and torch welded polyester reinforce membranes  Do not use under flexible membrane coverings or where avoidance of visible surface indentation is critical
<b>Face Grades</b>	Front: C solid sanded Back: D unsanded		Front & Back: D unsanded
Refer to Table 1 for range and treatment options			
<b>Product Features</b>	Blocking required to support all edges	Second void free layer under surface veneer for increased protection against punching through the first veneer under high point loads & increased moisture resistance  Blocking not required to support tongue and groove edges (unless otherwise specified)	15mm thickness specifically designed for use under shingles and tiles that have a courser finish  Unsanded surface for extra strength and grip for installers on steep roofs  Blocking not required to support tongue and groove edges (unless otherwise specified)
<b>Thicknesses Available</b>	12, 15, 17, 19, 21, 25 mm	15, 17, 19, 21, 25 mm	15, 17 mm
<b>Sheet Sizes Available</b>		2400/2700 x 1200 mm	
<b>Stress Grades Available</b>	F8 (F11 available upon request)	F8 (F11 available upon request)  I9LS (Longspan) has a higher stiffness than F8 allowing increased span capabilities	F8 & F11
<b>Treatment</b>	Untreated, H3.2 CCA and H3.1 LOSP	Untreated, H3.2 CCA, (H3.1 LOSP available upon request)	
<b>Span Capabilities</b>	Refer to frame spacings in Tables 13A and 13C		

## 5.4 FRAME SPACINGS FOR ECOPLY® ROOFS AND DECKS

TABLE 13A: ROOFING - SHEATHING, NON TRAFFICABLE, ABOVE 1.5 DEGREE PITCH

Application	Roof Pitch	Plywood Stress Grade	Maximum Wind Zone	Maximum frame centres (mm) for Ecopyl® with face grain across framing					
				Ecopyl® thickness (mm)					
				12	15	17	19	21	25
Sheathing, non trafficable roof for all roof pitches above 1.5 degrees	>1.5°	F8	Very High	540	600	600	800	800	900
Suitable for roofing mass up to 30kg/m² (additional to plywood weight or 40kg/m² including plywood)	>1.5°	F11	High		900	900			
	>1.5°	F11	Very High		800	900			
	>20°	F11	Very High		900	900			

Suggested applications include substrates for Asphalt Single and Membrane type roofs.  
 The above suggested maximum framing spans are based on the following deflections criteria:

- Under a short term 1kN point load, deflection is less than Span/130
- Under a long term self weight load, deflection is less than Span/400
- Under a short term wind gust load, deflection is less than Span/150

TABLE 13B: SUB-SHEATHING

Application	Maximum frame centres (mm) for Ecopyl® with face grain across framing					
	Ecopyl® thickness (mm)					
	12	15	17	19	21	25
Under steel or self supporting cladding for support of building paper or lateral diaphragm action. Sag not critical	800	1200				

TABLE 13C: DECKING

Application	Maximum frame centres (mm) for Ecopyl® with face grain across framing				
	Ecopyl® thickness (mm)				
	15	17	19	21	25
<b>1. Trafficable roof decking</b> Limited by dynamic response of roof as floor	480	540	600	600	750
<b>2. Roof decking to clause 8.5.5.1 c) of E2/AS1*</b>		400	400	400	400

\* The current requirement in E2 AS1 is extremely conservative when compared with calculations determined for other applications using VM1 Clause 6 and calibrating the spans against codes of practice from North America and Australia. Carter Holt Harvey® Woodproducts recommends designers consider the alternative solution in row 1 of Table 13C for membrane decking.

Spans otherwise apply equally to square edge or tongue and groove panels.

Check Table 1 for availability of grades and lengths to match span multiples in Table 14

- Use the next lower recommended frame spacing or thicker Ecopyl® where appearance is critical
- To suit trusses at 900 centres, 2700 long sheets are available. See Table 14

TABLE 14: FRAME SET OUTS (MM) TO MATCH 2400 MM AND 2700 MM SHEET MODULES

2400 mm long	400	480	600	800
2700 mm long	450	540	675	900

### Limitation for the use of Table 14

Carter Holt Harvey® Woodproducts does not have access to information about designs for specific sites. Table 14 is a guide to estimate the initial selection of a span for design. Each site should be evaluated by qualified persons to ensure all loading parameters and site conditions have been considered, and appropriate changes should be made by the building designer.

## 5.5 ROOFING - DESIGN CONSIDERATIONS

### Durability

In general, H3.2 CCA treatment of the plywood with waterborne preservatives is recommended for roofing.

### Roofing materials

Various roofing materials used over Ecoply® plywood have different durability expectations, normally in excess of the 15 years required by the Building Code clause B2.3.1b. Durability of the roofing is subject to the specifications, installation and maintenance requirements of the roofing manufacturer. The durability of the Ecoply can only be assured as long as the overlying roofing and detailing excludes moisture. With good building practice and maintenance, roofing materials can be repaired or replaced at regular intervals to achieve life from the Ecoply in excess of the original roofing. With this proviso the durability of Ecoply structural plywood will be in excess of 50 years if installed in accordance with instructions and limitations in this brochure.

### High humidity, condensation and solar driven moisture

Where the moisture content of wood may exceed 18% for prolonged periods, Ecoply must be H3.2 CCA treated, to resist decay hazard. This includes Ecoply used under roof coverings that may be subject to condensation, or where rain moisture soaked in the roof covering can be driven into the Ecoply by the sun. Appropriate building detailing and ventilation is recommended which can reduce the need for treatment.

### Roof ventilation

Poorly ventilated spaces can develop very high temperature and moisture levels. The most likely source of moisture is the condensation of vapour from warm interior air on the underside of cold roofing. Good ventilation can remove the need for treatment by removing excess moisture vapour in warmer climates but in regions where winter nights are consistently colder, H3 treated Ecoply is recommended. However, the use of H3 treated Ecoply is not an excuse for poor ventilation design. Moisture induced decay is only one issue. If incorrectly detailed, roof spaces can be very tight and the dark colour of many roofing materials means that excessive heat can build up causing distortion in plywood or even framing members. Use the suggested details or alternatives to suit. Designers must consider roofing type, seasonal conditions, wind effects and the intended use of the building.

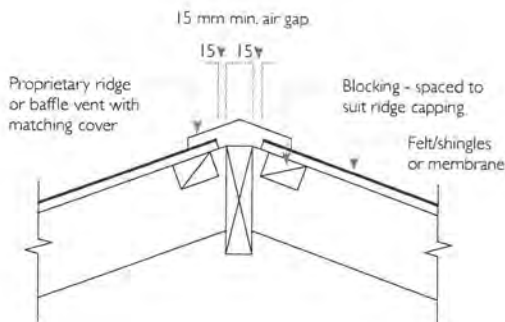
As a minimum, Carter Holt Harvey® Woodproducts recommends a vent area of 1/300th of the ceiling plan area (approx 3350 mm<sup>2</sup> per square metre of ceiling) equally distributed at the eaves and ridge to allow free flow under the Ecoply, up the roof slope, and out.

Roofing material suppliers should detail vent systems suited to their specific membrane or tile roofing. Proprietary ridge capping profiles or vents are available from roofing suppliers.

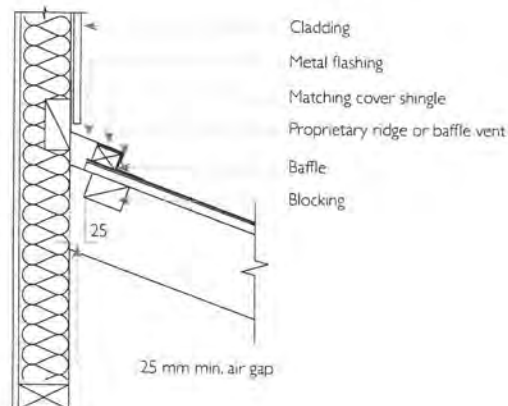
Detail gaps of 25 mm in the plywood at ridges, and at walls where a roof slopes up to an upper storey. For flat roofs, natural ventilation flows may be impeded. Use proprietary roof vents. Consider forced ventilation as appropriate.

**Figure 3: Ridge detail with ridgeboard**

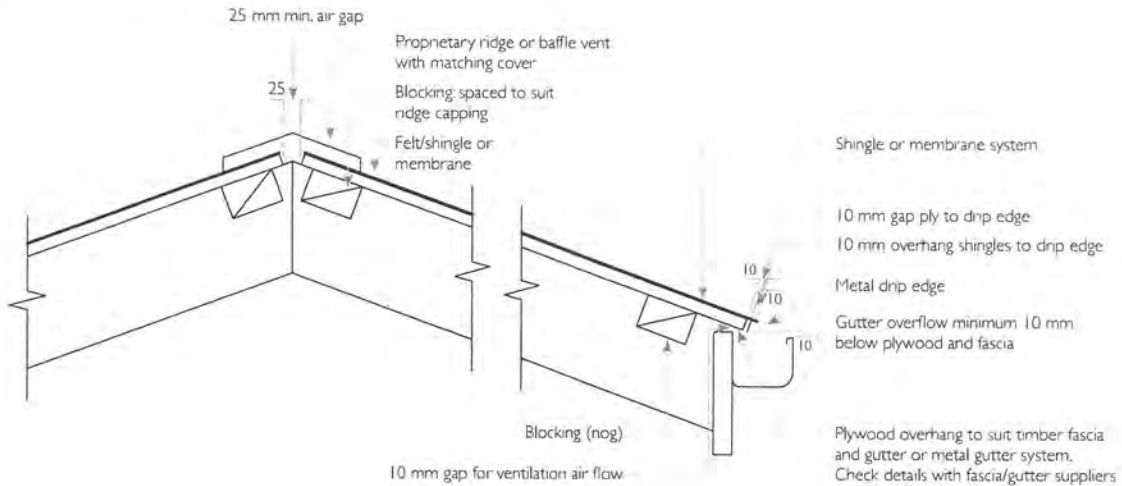
(use also with Hip Rafter if extra ventilation required)



**Figure 4: Roof to wall junction vent**



**Figure 5: Truss ridge detail**



**Bubbling**

Plywood bubbling occurs when moisture trapped in knot holes in inner veneers expands as the temperature rises. This moisture will dissipate through the face veneer and will not affect the structural integrity of the plywood panel. As membrane coverings can prevent moisture dissipation, Ecoply® Flooring and Structural Square Edge CD is recommended if the visual appearance of bubbles is not acceptable, or a high visual finish is required.

**Soil**

Ecoply plywood (untreated or H3 treated) must not be allowed to come in contact with soil. Surfaces, flashings and gutters should be detailed to avoid trapping detritus and moisture.

**Rain wetting and construction time**

Untreated Ecoply will withstand a reasonable amount of rain wetting and exposure during construction for up to three months. In extreme weather conditions of high temperature and/or high rainfall this period may be less. Appearance issues such as discolouration and checking of the sheet surface can be expected if Ecoply is exposed. For roofs uncovered for longer periods use H3 treated Ecoply to lower the risk of decay. Return Ecoply to below 18% moisture content before installing moisture sensitive materials, coverings, coatings or adhesives. Where a high visual finish is desired (such as membrane roofing and decking) protect Ecoply from exterior moisture during construction. For detailed information see section 5.1 Flexible Membrane Systems.

**Gutter details**

Where Ecoply structural plywood sub-sheathing supports roofing at gutters, a metal drip edge must be provided with appropriate gaps to shed water. Gutters should have a front edge overflow or ends lower than the back to shed water overflow away from framing and sub-sheathing Ecoply. H3 treatment is recommended for Ecoply sheets that protrude into gutters, with regular maintenance to avoid leaf mould (soil) development. Do not expose untreated Ecoply to gutter splash or moisture. For more information refer to technical note *Durability Statement: Structural Plywood*.

**Fire**

Plywood is combustible but may be used as a roof substrate for all purpose groups subject to the provisions of Department of Building and Housing Acceptable Solution C/AS1: clause 7.1 and 7.9. For purpose groups SC and SD a 19 mm Ecoply panel complies with the requirement of 7.11.1.

#### Fastener spacing for wind suction

Wind pressure applies withdrawal loads to nails holding plywood to purlins and trusses. For the frame spacing in Table 13A designers may use the following guidelines for frame spacing up to 900 mm throughout New Zealand for normal urban wind conditions.

#### The main body of the roof

2.8 mm nails spaced at 150 mm centres on all cross framing. Minimum nail length 60 x 2.8 mm.

#### Roof edges

All plywood at higher suction zones at the roof edges at gutters, eaves and gable ends must be supported on framing, and fixed at 100 mm centres with minimum 60 x 3.05 mm nail length. Suction zones are interpreted from AS 1170 as being within 20% building length or width of a gable end, or gutter or ridge.

Designers and builders should review site conditions to ensure adequate fixing is applied. Buildings in exposed sites and lee zones should be specifically designed using the loading standard (AS/NZS 1170) and the timber structures standard NZS 3603. In some wind conditions, the tiles themselves may be sucked from the plywood. Use a consulting engineer to assess site conditions, calculate wind pressures for the specific site, and determine the fastening and span requirements, and to check that the truss system can resist the loads being applied through the plywood.

#### Fixing of roofing

Fixing methods for tile, shingle and membrane systems must be designed for the expected wind and weather exposure to protect the Ecoply substrate. Some shingle systems may not be used in very high or cyclonic wind zones.

Follow the specifications of the roofing manufacturer and refer to the appropriate BRANZ Appraisals.

## 5.6 ROOFING - INSTALLATION

### Framing

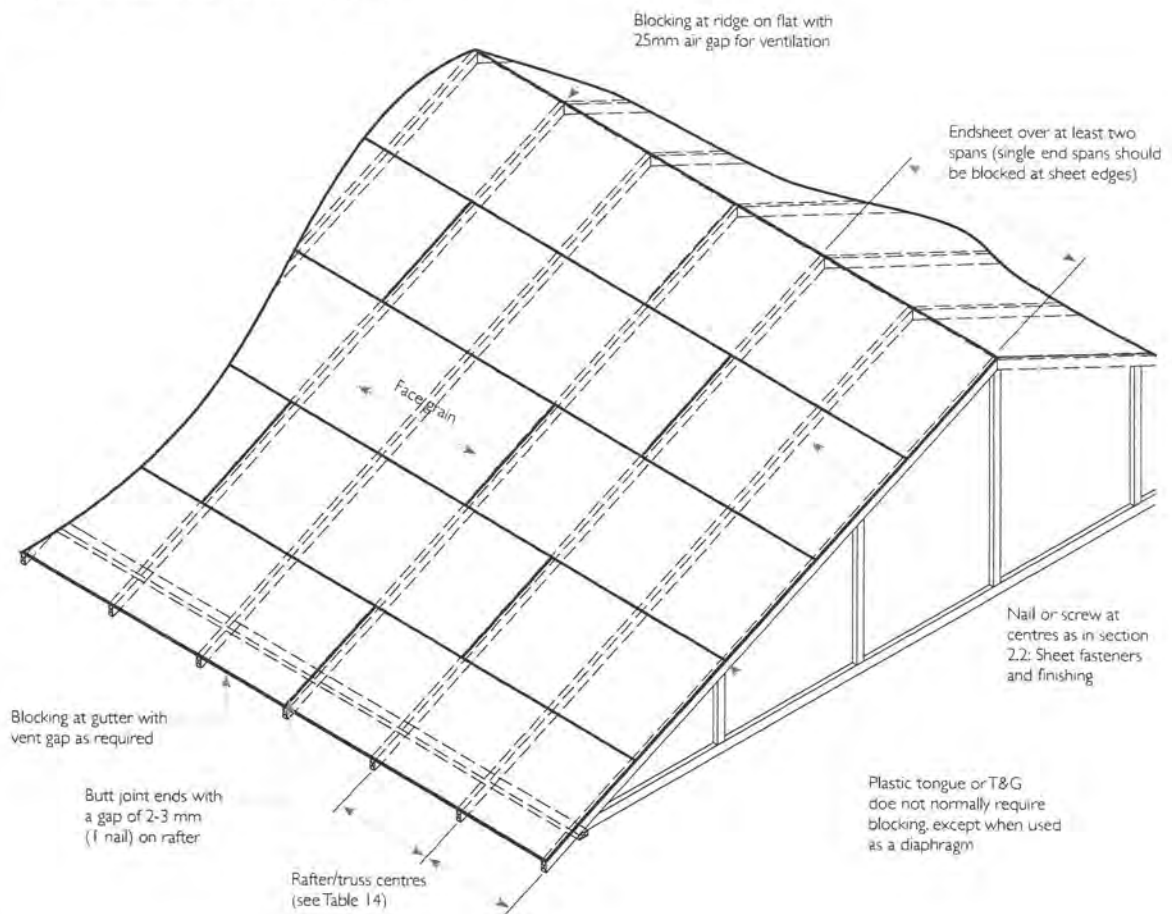
Frames should be at spacings to suit plywood thicknesses in Table 13A. Additional requirements for roof framing are:

- Ensure top edges of framing are properly aligned
- Use dry Laserframe™, hyJOIST™ or hySPAN™ framing to lower moisture level in roof spaces, second floor spaces, and reduce differential truss, rafter or joist deflections.

### Blocking (nogs, dwangs):

- Block all edges of Ecoply® Structural Square Edge plywood
- Block all edges at the ridge and gutter lines to prevent sag at capping or gutters
- Block for high face loads or under areas accessed for maintenance
- Blocking within the body of the roof is not required under tongue and grooved edges when using Ecoply Flooring & Roofing, unless required for framing stability or the plywood is being used as a diaphragm to resist horizontal wind or earthquake loads. In this case fixings transfer shear across the joints and details should be specified on drawings
- Use blocking on the flat to provide gaps where air flow is needed for ventilation
- Specific roofing suppliers may require blocking to suit their system

**Figure 6: Sheet and framing layout**



### Sheet layout

- Ensure Ecoply sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- Lay the sheets in a staggered pattern
- Allow sufficient clearance inside confining structure such as concrete or brick walls adjacent to the roof. Use extra allowances with large areas
- Allow clearance for ventilation as required

#### Fixing of sheets

Ecoply™ may be fixed to different types of framing with nails or screws or a combination of fasteners and construction adhesives.

Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture. Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

The integrity of a plywood based roof system is directly related to how well the panels are fixed to the framing. Ecoply must be fixed to resist wind suction loads, and to maintain surface qualities of the overlying roof covering. Minimum fastener specifications are in Table 7 and section 2.2: Sheet fasteners and fixing.

- Always refer to the roofing system supplier for system requirements
- For roofing, check the additional requirements according to wind exposure
- For high wind zones (over 44 m/s), very exposed sites, cyclonic conditions or roofs above 10 metres height, carry out specific structural design to the relevant standards
- Screw fixing must be used for membrane roofing, and is preferred for all systems because of increased holding power and avoidance of head popping

#### Fixing to timber frames

- Ring shank nails or annular grooved nails or screws are recommended for additional holding power
- Use flathead nails. Do not use jolt or bullet head nails
- Stainless steel nails must be annular grooved
- Ensure fastener is compatible with the roofing cover (consult roofing system supplier)
- Staples may be used provided that the withdrawal load is equivalent to the hand driven galvanised flathead nail. A suggested minimum is a 50 mm long staple with 12 mm crown and legs 1.8 mm diameter. Space staples 20% closer than nails. Refer manufacturer for corrosion resistance and durability

#### Fixing to steel frames

- Fix directly to roll formed steel (up to 2 mm thick) with self-drilling, self-tapping screws. If plywood gets damp and expands, screws in thicker steel may break. Keep Ecoply dry or use larger screws or;
- Bolt or screw battens to the steel and apply Ecoply as above for timber. Ensure that battens have adequate thickness for the minimum nail or screw length

## 6.0 FLOORING

The following section covers the use of Ecoply® Flooring plywood used as a flooring substrate with flexible and rigid overlays. Ecoply Flooring is ideal as a substrate for overlays such as carpet, linoleum, tiles and membranes.

### 6.1 FLOORING - RANGE

- Ecoply Flooring contains a second void free layer under the surface veneer for increased protection against moisture bubbles and punch through of the first veneer under high point loads than normal Ecoply Structural Square Edge plywood
- The tongue and grooved on long sheet edges does not require support blocking under the joint (unless otherwise specified)
- Supplied in F8 stress grade (F11 available upon request). 19 mm thick flooring is supplied in Longspan which has a higher stiffness than standard F8 products for increased span capabilities
- Supplied as standard with a sanded C grade surface with D grade back
- Sanded B grade surface is available in 19 mm thickness (untreated only) for clear finish applications. Designers must expect the surface to dent or mark more easily than hardwood flooring systems as Ecoply is manufactured from relatively soft radiata pine.
- Available untreated or H3.2 CCA treated, (H3.1 LOSP treated available upon request)
- Refer to Table 1 for range and treatment options

### 6.2 FLOORING - INSTALLATION

TABLE 15: FLOORING FRAME SPACINGS

Application	Maximum frame centres (mm) for Ecoply® Flooring with face grain across framing				
	Ecoply® Flooring thickness (mm)				
	15	17	19	21	25
<b>1. Domestic flooring 2kPa - 1.8kN</b>	480	540	600 F11 or Longspan	600	750
<b>2. Institutional and public assembly up to 4kPa - 2.7kN</b>		300	480	540	750
<b>3. Institutional and crowd assembly up to 5kPa - 3.6kN</b>			400	450	600
<b>4. Corridors, industrial up to 5kPa - 4.5kN</b>			300	400	540
<b>5. Domestic garage floor** 2.5kPa - 9kN</b>			300	400	480

\*\* Provide blocking to all edges of the sheet.

Check Table 1 for availability of grades and lengths to match span multiples in Table 14

- Use the next lower recommended frame spacing or thicker Ecoply where appearance is critical
- To suit frames at 900 centres, 2700 long sheets are available. See Table 14

#### Floor loads

Concentrated loads in AS/NZS1170 are applied to a 100 mm x 100 mm area (0.01 m<sup>2</sup>) to clause 3.2(b). The imposed actions in the table were checked by calculation for span/250 with 0.01 m<sup>2</sup>.

For domestic garage floors blocking is required under all edges to control wheel loads on the tongue. Testing with 113 mm diameter load head (0.01 m<sup>2</sup>) confirms commercial floor capabilities.

Refer to Table 14 to match frame set outs with 2400 mm and 2700 mm sheet modules.

#### Framing

- Joist spacings should be at spacings to suit plywood thicknesses in Table 15
- Use dry Laserframe®, hyJOIST® or hySPAN® framing to achieve a moisture content of 18% or less

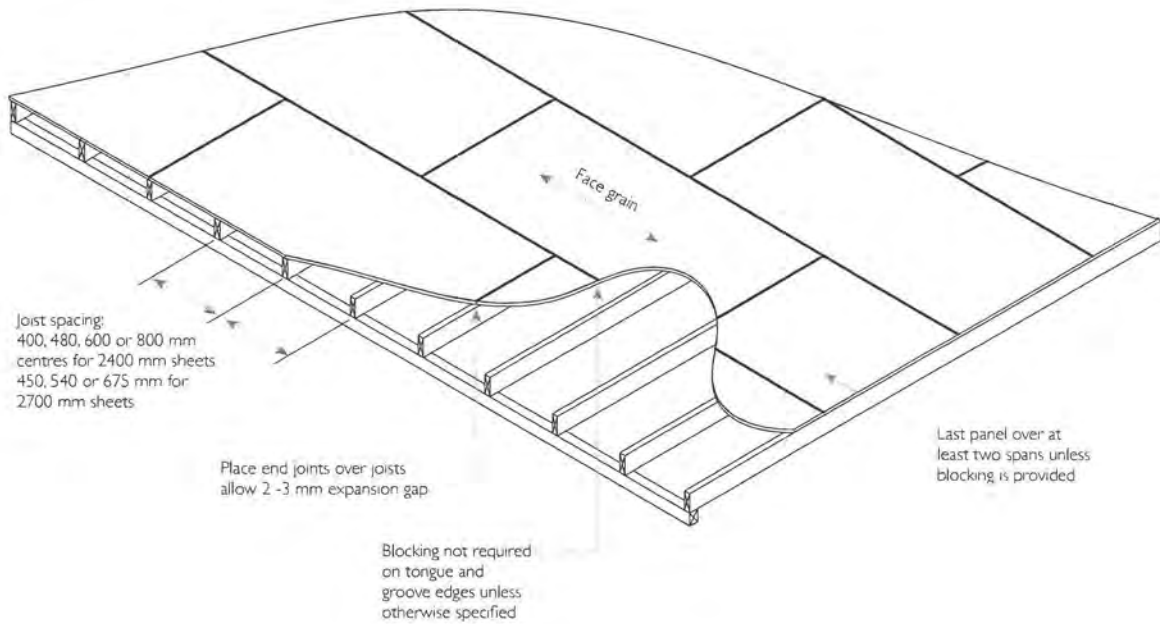
#### Blocking

- Blocking within the body of the floor is not required under tongue and groove edges unless otherwise specified, such as in domestic garage floors

#### Sheet layout

- Ensure Ecoply<sup>®</sup> sheets are dry before installation
- Place face grain at right angles to supports
- Sheets must be continuous over at least two spans (three framing members)
- For panels at floor edges where a continuous two span coverage is not possible sheet edges must be supported by blocking
- Lay sheets in a staggered pattern
- Allow clearance for ventilation as required

**Figure 7: Ecoply<sup>®</sup> Flooring layout**



#### Fastener selection and treatment

Fasteners should be corrosion resistant to a level appropriate to the end use, life expectancy (15 or 50 years) and expected exposure to moisture.

Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required. Refer to section 4 of NZS3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

#### Fasteners and fixing of sheets

- Ecoply Flooring may be fixed with nails or screws or a combination of mechanical fasteners and construction adhesives
- For fastener specifications (including lay out and sizes) refer to section 2.2: Sheet fasteners and fixing
- For construction adhesive specifications refer to section 2.3: Adhesives
- Ring shank or annular grooved nails, or screws are recommended for additional holding power
- To reduce the risk of fastener popping or floor squeak the use of construction adhesives is advised.
- Do not use jolt or bullet head nails

### 6.3 FLOORS - FINISHING

- Overlays and coatings should be applied following the manufacturer's specifications
- Avoid heavy sanding that may remove the critically important structural face veneer
- Adhesives must be compatible with CCA (Copper Chrome Arsenic) treatment salts in H3.2 treated sheets. Compatibility can often be improved by lightly washing, scrubbing and drying the plywood surface prior to fixing
- Where clear or stained finishes are desired, designers should select sheets and protect the floor during construction, or install after the floor is protected from the weather and construction activities
- Ecoply<sup>®</sup> Flooring is typically a CD face grade product (contains filled knot holes in the face veneer). If a superior face is required for clear or stain finishing the use of Ecoply Flooring BD face grade is recommended for an improved surface appearance. However Ecoply is made from relatively soft radiata pine and as such will dent or mark more easily than hardwood flooring systems. This is to be expected and designers must consider the long term appearance requirements of the project. Ecoply Flooring is a good substrate for harder wearing flooring overlays, and is not primarily intended for clear finishing, especially if it is exposed to moisture during construction
- For improved surface finish floors should be protected from weather during construction as soon as possible

## 7.0 STRUCTURAL PLYWOOD PACKAGING

Ecoply® is regularly used to manufacture boxes, bins, pallets and crates including packaging for export. Ecoply is relatively lightweight whilst providing excellent racking resistance and outstanding strength and durability. Ecoply is easily cut and can be drilled and slotted to manufacture ventilated bins.

International Standards for Phytosanitary Measures ISPM No. 15 *Guidelines for Regulating Wood Packaging Material in International Trade* does not regulate wood packaging made wholly of plywood, which is considered sufficiently processed to have eliminated the risk associated with the raw wood.

However, different countries do impose certain restrictions on plywood; for example, the Australian Quarantine Inspection Service (AQIS) requires certification that plywood packaging is newly manufactured and shipped within 90 days of manufacture. Exporters are able to provide their own certification based on the plywood date of manufacture which is printed on the back of Ecoply sheets.

For the individual requirements of countries to which Ecoply is being exported go to [www.biosecurity.govt.nz](http://www.biosecurity.govt.nz) and click on 'Commercial Exports' followed by 'Forestry Exports'.



Packaging

## 8.0 FREQUENTLY ASKED QUESTIONS

**Q: How much should be allowed for expansion?**

- A Allow 2 – 3 mm between square edges of Ecoply<sup>®</sup> sheets. If using Ecoply flooring, a 5 mm expansion gap is recommended at the perimeter of the floor or deck. Check by calculation for large areas.

**Q: Can power driven nails be used to fix Ecoply?**

- A Paslode power driven nails have been tested for fixing Ecoply and Shadowclad<sup>®</sup> products for particular bracing and cladding applications. For power driven nail specifications refer to technical note *Paslode nail matrix* downloadable from [www.ecoply.co.nz](http://www.ecoply.co.nz) or refer to the *Shadowclad Specification and Installation Manual*. Use the Paslode Impulse Compact Nailer fitted with a No Mar(k) work contact element to eliminate any contact marks on the plywood. Adjust the work contact element to the flush position and fire the nail at 90° to the work surface. Hammer any nails flush which are left proud.

**Q: How close to sheet edges can I nail?**

- A Fixings can be placed a minimum 7 mm from the sheet edge.

**Q: Do I have to use stainless steel nails when using Ecoply for bracing?**

- A Where fasteners are in contact with H3.2 CCA treated timber or plywood, fasteners shall be a minimum of hot dip galvanised. In certain circumstances stainless steel fasteners may be required, Refer to section 4 of NZS3604 for these circumstances. Where stainless steel nails are required, annular grooved nails must be used.

**Q: What is the weight of Ecoply?**

- A Refer to Table 4a for weight (kg/m<sup>3</sup>) of different Ecoply thicknesses.

**Q: What is the R-value of Ecoply?**

- A The thermal resistance or insulating effectiveness of plywood panels can be calculated using NZS 4214, e.g. plywood has a conductivity (k) of 0.13 W/mK so a 12 mm panel has a thermal resistance  $R = 0.012/0.13 = 0.09$ .

**Q: Are there any compatibility issues when using Ecoply with other materials?**

- A Adhesives for flexible rubber membranes may react with LOSP treatment and should therefore only be applied to H3.2 CCA treated Ecoply unless the membrane supplier advises differently. Check with the membrane manufacturer if in doubt. CCA treatment is also corrosive and this must be taken into account when specifying CCA treated plywood next to metals. For example, stainless steel flashings should be used in conjunction with H3.2 CCA treated plywood; other types of metal must be isolated to prevent corrosion. For further guidance, refer to Tables 21 and 22 in Acceptable Solution E2/AS1.

**Q: Can Ecoply be used as a rigid sheathing (air barrier)?**

- A Ecoply Barrier has been developed as a rigid air barrier. Refer to Ecoply Barrier Specification & Installation Guide for further information.

**Q: What is the relevance of AS/NZS 2269?**

- A Ecoply structural plywood is manufactured to AS/NZS 2269 Plywood Structural. This Standard is referenced by the New Zealand Building Code Compliance Documents including NZS 3602 *Timber and Wood-based Products for Use in Building*, NZS 3603 *Timber Structures*, NZS 3604 *Timber Framed Buildings*, AS/NZS 1604.3 *Specification for Preservative Treatment, Part 3: Plywood and Acceptable Solution E2/AS1 External Moisture*. Plywood not manufactured to AS/NZS 2269 does NOT meet the requirements of these NZ Building Code Compliance Documents.

**Q: What is the relevance of the PAA stamp?**

- A Ecoply is manufactured under a third party audited, product quality control programme by the Engineered Wood Products Association of Australasia (EWPAA) to monitor compliance with AS/NZS 2269. Given that compliance with Standards is not actively policed by Standards New Zealand, this third party auditing provides important peace of mind for users and consumers of Ecoply products.

**Q: What is marine ply?**

- A Marine plywood manufactured to AS/NZS 2272 Plywood Marine may contain species of low durability (source: BRANZ *Good Practice Guide – Timber Cladding*). Whilst marine plywood has a Type A glue bond, it is generally specified for its high surface appearance grade and lack of core knots as opposed to structural performance. AS/NZS 2272 limits marine plywood to a number of approved species that pass stringent property requirements for things like moisture permeability. These requirements are different from those in standards from other countries. Marine plywood is rarely treated as it is usually coated with resin or fibreglass or a paint finish for long term durability.

**Q: What should a specification for structural plywood include?**

**A:** A specification for structural plywood should include:

Specification check list	Example
<b>Quantity/size</b>	20 sheets of 2400 x 1200
<b>Thickness</b>	12 mm
<b>Edge finish</b>	Square edge
<b>Brand name</b>	Ecoply® structural plywood
<b>Reference to Standard</b>	To AS/NZS 2269
<b>Stress grade*/layup</b>	F8 (12-24-5)
<b>Surface grade/bond type</b>	CD A-Bond**
<b>Accreditation</b>	EWPAA product certified***

- \* Stress grades may vary between different manufacturers and products.
- \*\* Type A-bonds are suitable for permanent exposed applications and structural applications.
- \*\*\* The EWPAA JAS-ANZ Product Certification Mark certifies that Ecoply structural plywood products have been manufactured under a third party audited joint product certification programme to monitor compliance with AS/NZS 2269.

**Q: What are F-grades?**

**A:** The stress grading system is a ranking system which utilises the symbol F and a suffix 8, 11, 14 etc as a code to apply a full suite of strength and stiffness properties to plywood products of that stress grade. For plywood of a given thickness, the higher the F-grade, the further it will span. For load bearing applications (e.g. flooring, roofing) the required F-grade as well as the plywood thickness must be specified to achieve the required span. F8 is the most common structural plywood grade found in New Zealand. All Ecoply structural products are F8 with the exception of 15 mm Ecoply roofing which is F11 as standard and Ecoply Flooring which is available as F11 on request. Note, the standard Ecoply Flooring range is F8 for all thicknesses except 19 mm (Longspan), which has higher stiffness for superior spanning capability. The F-grade is printed on the back of all Ecoply products in accordance with AS/NZS 2269.

**Q: What are surface/appearance grades (eg CD)?**

**A:** Appearance grades (eg BB, BD, CD, DD) denote the appearance grade of the plywood including the number and size of knot holes as defined in AS/NZS 2269 and summarised in Table 2 of this manual. The first letter describes the appearance of the face veneer and the second letter describes the back face.

**Q: How long can Ecoply be left exposed to the weather?**

**A:** Untreated Ecoply will maintain its structural integrity when exposed to the weather during construction for up to 3 months. The surface colour will start to silver off and surface checking will become evident; where the finished appearance of the Ecoply is important, it should be protected during construction. Ecoply is also available H3 treated to resist decay or insect hazard. When used in accordance with this manual, it can be specified to meet the durability requirements of the NZ Building Code, however appearance issues such as surface checking may still occur dependent upon the degree of exposure to weather during construction.

**Q: What treatment levels and types are used for Ecoply?**

**A:** Ecoply is available untreated or preservative treated. Ecoply is treated to the H3 hazard class for above ground use. The standard Ecoply treatment type is H3.2 CCA (Copper Chrome Arsenate) although H3.1 LOSP Azole (Liquid Organic Solvent Preservative) may also be specified where a clear treatment is required. LOSP Azole is the standard treatment type for BB, BD, Ecoply Grooved Lining and Shadowclad®, CCA treatment gives the plywood sheets a green tinge and the drying process after CCA treatment may leave fillet marks on the face of the sheet.

**Q: Does Ecoply have to be treated when used as structural bracing?**

**A:** Ecoply used as bracing must be treated unless it is installed in an interior dry situation. Note, behind exterior cladding and in cavities (even if the Ecoply is covered with building wrap) are not considered to be an interior dry situation.

**Q: Do I have to re-treat cut edges of treated Ecoply?**

**A:** It is important to re-treat any cuts and holes with a brush on remedial treatment such as Metalex Clear End Seal.

**Q: What type of glue is used to manufacture Ecoply?**

**A:** Phenol formaldehyde (PF) resins are used to bond the plywood veneers. This forms a Type A (Marine) bond suitable for structural applications and exterior use. Phenol formaldehyde resins are dark red/brown in colour. Product details printed on the back of Ecoply sheets indicate the 'A Bond'.

**Q: Does Ecoply emit formaldehyde?**

**A:** Formaldehyde occurs naturally in the environment and is emitted by processes such as combustion, decay and naturally by all timber species. Ecoply and Shadowclad meets the lowest formaldehyde emission class (E<sub>0</sub> - less than 0.5 mg/litre). Actual formaldehyde emissions have been tested to be less than 0.3 mg/litre.

**Q: How should Ecoply be installed to maximise its stiffness properties?**

**A:** Structural plywood has greatest stiffness along the long grain of the sheet (i.e. along its length). Therefore, flooring/roofing should be laid across joists/rafters rather than parallel to them.

## 9.0 REFERENCES AND SOURCES OF INFORMATION

- New Zealand Building Code
- Carter Holt Harvey<sup>1</sup> Woodproducts technical notes - downloadable from [www.ecoply.co.nz](http://www.ecoply.co.nz) or [www.shadowclad.co.nz](http://www.shadowclad.co.nz)
- NZS 3640:2003 "Chemical Preservation of Round and Sawn Timber"
- NZS 3602:2003 "Timber and Wood-based products for use in Buildings"
- NZS 3603:1993 "Timber Structures Standard"
- NZS 3604:1999 "Timber Framed Buildings"
- NZS 3606:1987 "Specification for the Manufacture of Glue Laminated Lumber"
- NZS 4203:1992 "General Structural Design and Design Loadings for Buildings"
- NZS 4251.1: 2007 "Cement Plasters for walls, ceilings and soffits"
- AS/NZS 1170:2002 "Structural design actions"
- AS/NZS 2269:2008 "Plywood – Structural"
- AS/NZS 1604.3:2002 "Specification for Preservative Treatment, Part 3: Plywood"
- AS/NZS 4200.1:1994 "Pliable building membranes and underlays – Materials"
- AS/NZS 2272:2006 "Plywood Marine"
- AS 1684:1999 "Residential Timber Framed Construction"
- AS 1720:1997 "Timber Structures Code"
- US Product Standard PSI-95
- Acceptable Solution 'E2/AS1 – External Moisture'
- Acceptable Solution 'B2/AS1 – Durability'
- BRANZ P21, A wall bracing test and evaluation procedure. R C Cooney and M J Collins. 1979; Revised 1988.
- BRANZ TRI0, Supplement to P21. An evaluation method of P21 test results for use with NZS3604:1999.
- BRANZ Report STO449 - Nail slip and P21 rating of plywood bracing panels.
- BRANZ Report STO593 – Bracing Rating of timber framed walls sheathed with a 12 mm thick plywood over a cavity.
- BRANZ Bulletin 345: Flat membrane roofs – design and installation
- BRANZ Bulletin 346: Flat membrane roofs – materials
- BRANZ Bulletin 289: Asphalt shingle roofing
- BRANZ Appraisals 307, 404, 411
- Forest Research Institute (Ltd), Wood Products Division Reports; P21 wall brace tests with Shadowclad<sup>®</sup> plywood. HB94/2/1, FRI 1994. Performance of standard plywood clad wall panels in racking to P21 test WTC 1786/1, WTC 1786/2, WTC 1786/3, FRI 1991.
- Shadowclad Specification & Installation Manual
- Material Safety Data Sheets
- APA ([www.buildabetterhome.org](http://www.buildabetterhome.org))
- EWPA (www.ewp.asn.au)

Standards can be purchased online at [www.standards.co.nz](http://www.standards.co.nz)

Building Code Compliance Documents can be downloaded free of charge at [www.dbh.govt.nz](http://www.dbh.govt.nz)

Line drawings contained within this manual can be downloaded from [www.chhwoodproducts.co.nz](http://www.chhwoodproducts.co.nz)

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June 2011

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## Structural Calculations

For

**155 Field Way,  
Waikanae Beach**

These calculations are in accordance with:

AS/NZS1170:2004 Structural Design Actions  
NZS3101:2006 Design of Concrete Structures  
NZS3404:1998 Design of Steel Structures  
NZS3603:1993 Design of Timber Structures  
NZS3604:2011 Timber Framed Buildings

**Engineer:**

Stuart Preston  
Hugh Falkner  
John Butler

**Initials:**

SRNP  
HAF  
JFGB

**Preamble:**

Structural Beam Design and end connection details.  
Specific Structural Bracing Design.

**Date:**

5 September 2011


**Job No.**

24340



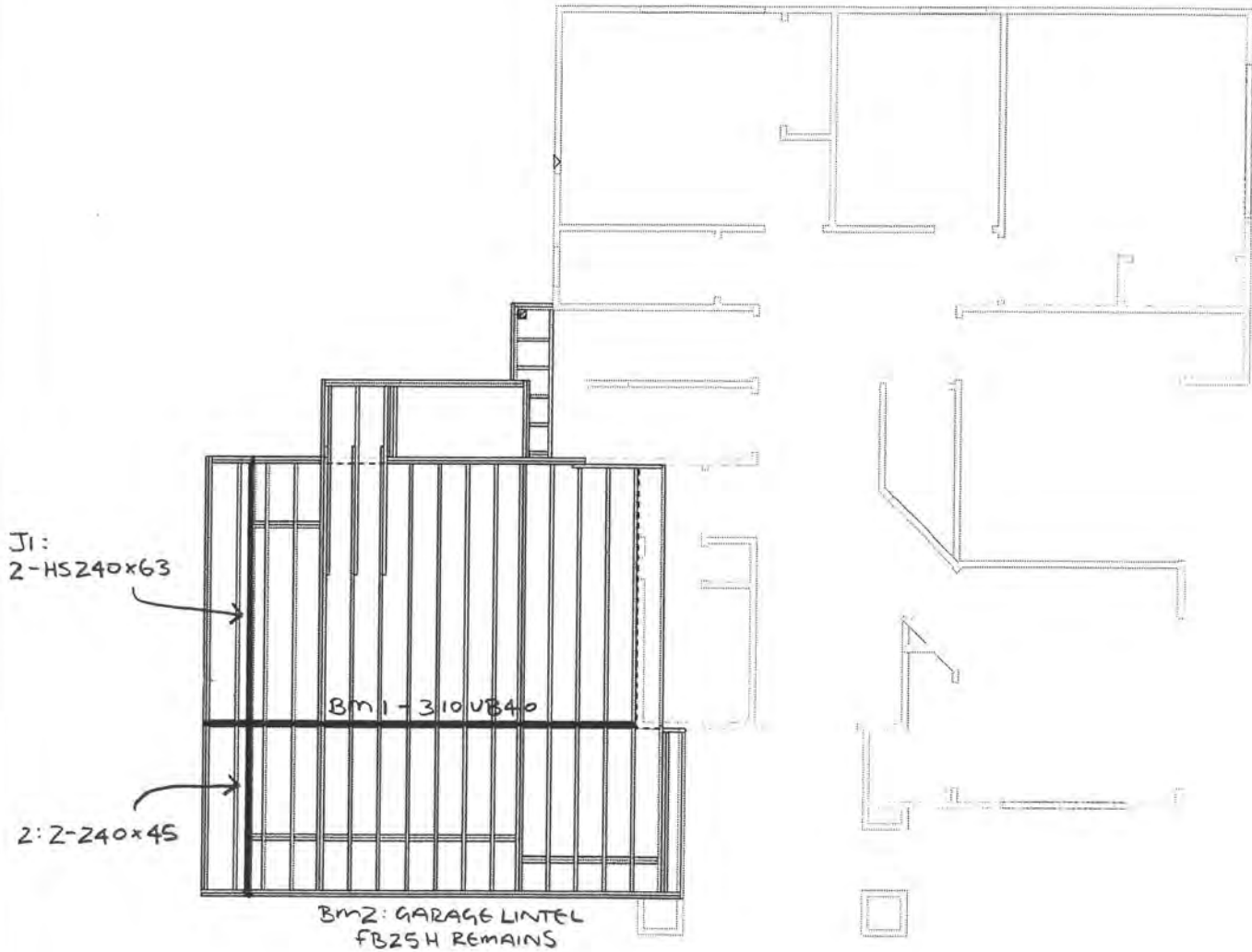
ISO 9001

F14-06/02

Date 5/9/11	Eng. JFGB	Job No. 24340	Sheet No.
Project 155 FIELD WAY, WAIKANAЕ			

DESIGN SUMMARY

SCALE 1:100



**JOIST LAYOUT PLAN**

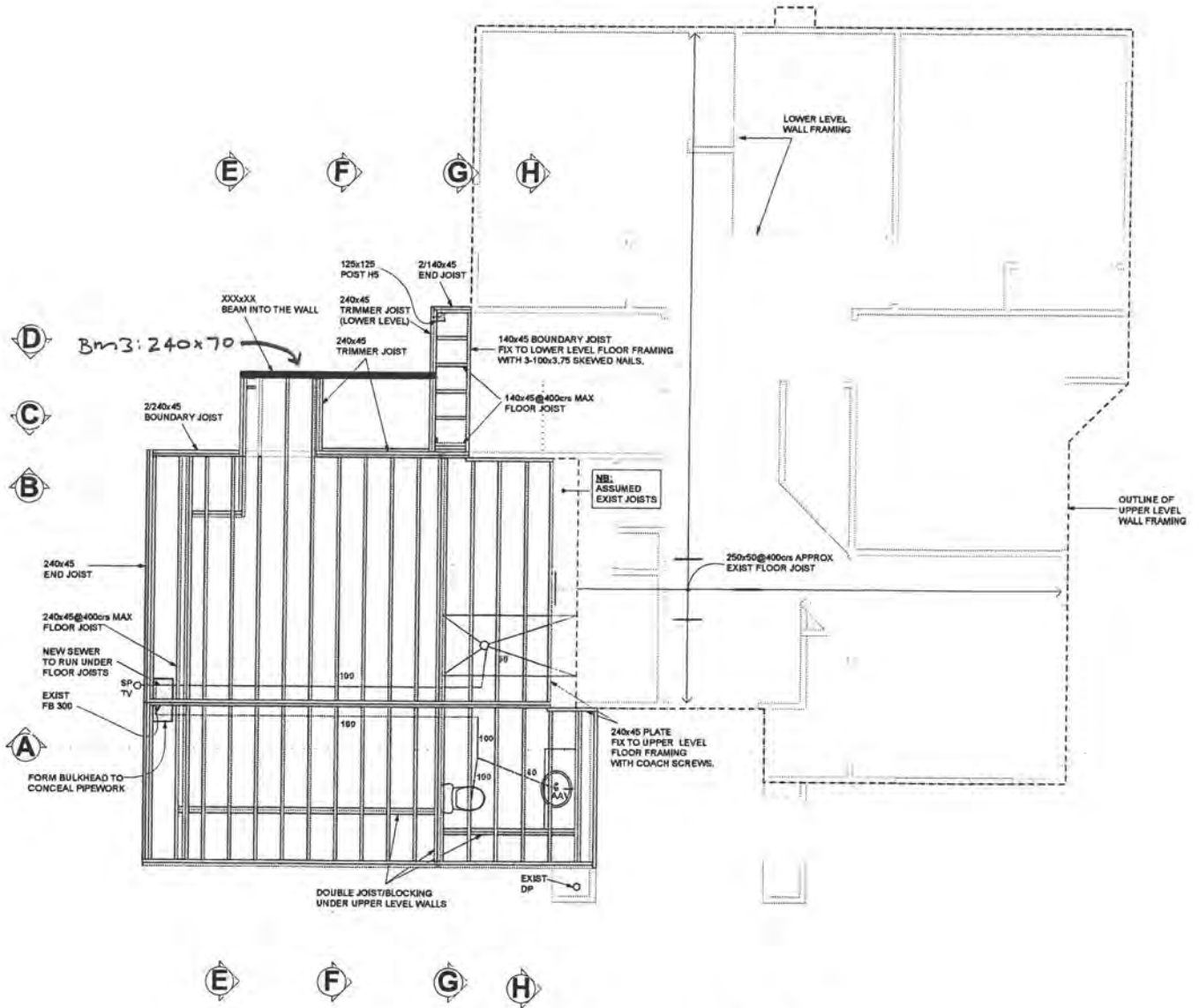
F14-06/02

Date 8/9/11	Eng. JFGB	Job No. 24363	Sheet No.
Project 155 FIELD WAY, WAIKANAE			

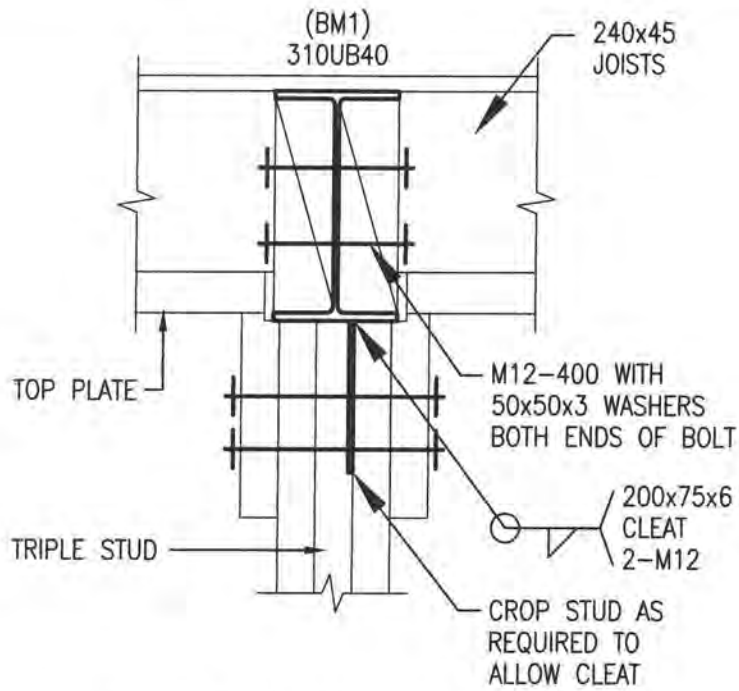


DESIGN SUMMARY

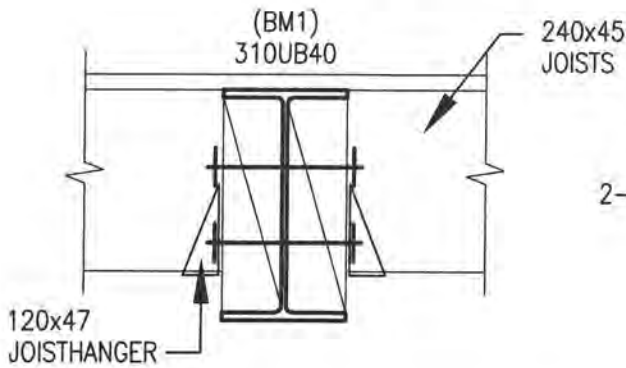
SCALE 1:100



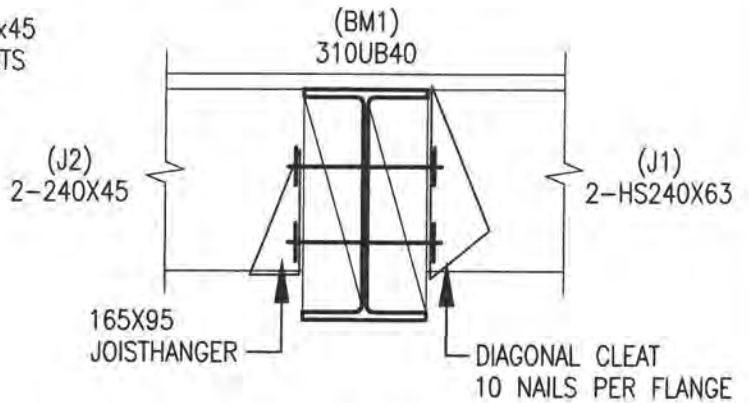
JOIST LAYOUT PLAN



**BM1 END CONNECTIONS**



**TYPICAL JOIST CONNECTIONS**



**J1/BM1/J2 CONNECTIONS**

NOTES:

1. DIMENSIONS TO BE ESTABLISHED ON SITE PRIOR TO STEEL FABRICATION.
2. M12 BOLTS TO BE GRADE 4.6
3. STEEL GRADES
  - PLATES 250MPa
  - HOT ROLLED SECTIONS 300MPa
4. ALL BOLTED TIMBER CONNECTIONS TO HAVE 50x3 GALV. WASHERS.
5. ALL INTERNAL STRUCTURAL STEEL TO HAVE ONE COAT IN ACCORDANCE WITH SYSTEM DESIGNATION AS/NZS 2312/ALK1 BEFORE DELIVERY TO SITE. ANY AREAS DAMAGED TO BE MADE GOOD UPON INSTALLATION.
6. TIMBER TREATMENT:
  - EXTERIOR TIMBER NOT IN CONTACT WITH GROUND TO BE TREATED TO TPC SPECIFICATION H3.1
  - EXTERIOR WALL FRAMING TO BE TREATED TO TPC SPECIFICATION H1.2

7. ENGINEER TO INSPECT ALL BEAMS PRIOR TO CLOSING IN.  
 CONTACT STUART PRESTON OR JOHN BUTLER 566 8004  
 (24 HOURS NOTICE REQUIRED)




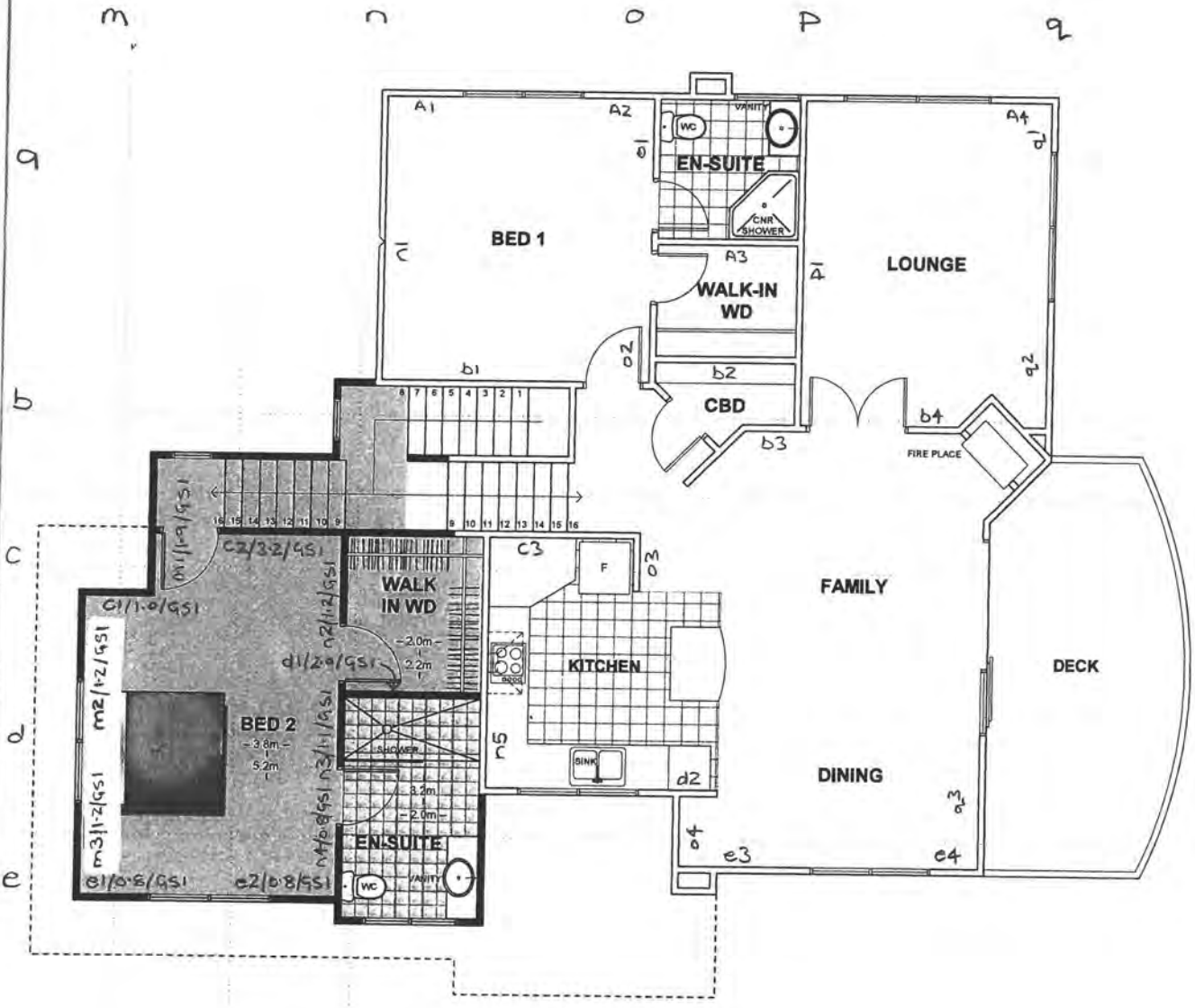
Lower Hutt Office  
 Tel: (04) 566-8004  
 Fax: (04) 566-8037

Paraparaumu Office  
 Tel: (04) 902 5750

CLIENT <b>WERNER NAEF</b> PROJECT <b>155 FIELD WAY</b> <b>WAIKANAE BEACH</b>	DATE 5/9/11 SCALE 1:10 DRAWN JFGB	DWG No. <b>S1</b> JOB No <b>24340</b>
--	---	--

F14-06/02


Date 5/9/11	Eng. JFGB	Job No. 24340	Sheet No.
Project 155 FIELD WAY, WAIKANAE			
<p>BRACING SUMMARY</p> <p>DETAILS OF EXISTING WALLS HAVE BEEN OMITTED FOR CLARITY</p>			



### UPPER LEVEL

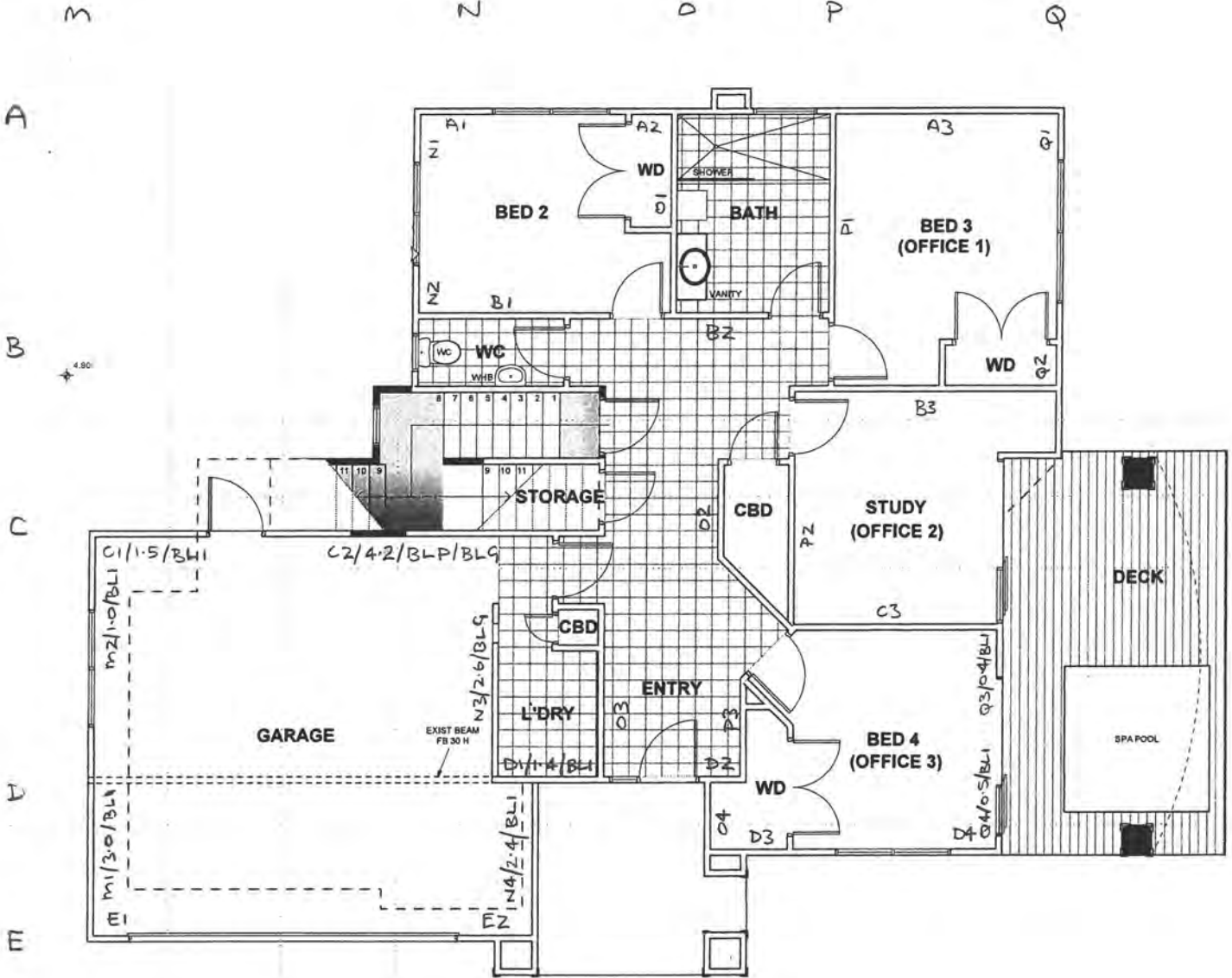
132.02m<sup>2</sup> (1419 sq.ft.)+ DECKS 36.58m<sup>2</sup>(394 sq.ft.)

F14-06/02

Date 5/9/11	Eng. JFGB	Job No. 24340	Sheet No.
Project 155 FIELD WAY, WAIKANAE			

BRACING SUMMARY

DETAILS OF EXISTING WALLS  
HAVE BEEN OMITTED FOR  
CLARITY



**LOWER LEVEL**

151.51m<sup>2</sup> (1631 sq.ft.)+ DECKS 36.58m<sup>2</sup>(394 sq.ft.)

# JOIST J1

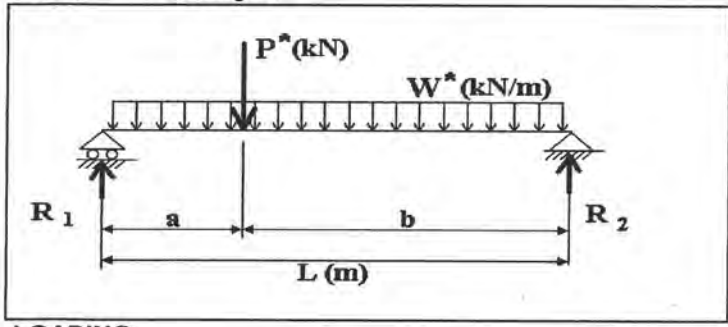
## AS/NZS 1170 LVL BEAM CALCULATION SHEET

Job Name: 155 Field Way  
Waikanae Beach

Job No. 24340  
Sheet No.

Date: 30-Aug-11

Engineer JFGB  
Beam No. J1



$L = 3.7$  m  
 $a =$  m  
 $b = 3.7$  m

**LOADING**

**1/. Uniformly Distributed Load**

		Amount	kN/m
<b>Dead</b>	Self Weight		0.19
	Roof	0.35kPa x 3m	1.05
	Walls		0.70
	Floor	0.4kPa x 0.2m	0.08
<b>Total Dead Load</b>		<b>G =</b>	<b>2.02 kN/m</b>

<b>Live</b>	Roof ( $\Psi_c = 0$ for $Q_f$ )	0.25kPa x 3m	0.75
	Floor	1.5kPa x 0.2m	0.30
	<b>Total Live Load</b>		<b>Q = 1.05 kN/m</b>

$W^* = 1.2 G + 1.5 Q = 4.00$  kN/m  
 $W_s = G + 0.4 Q_f = 2.14$  kN/m

**2/. Point Load**

<b>Dead</b>	<b>Total Dead Point Load</b>	<b>G = 0.00</b> kN
	<b>Live</b>	

<b>Total Live Point Load</b>	<b>Q = 0.00</b> kN
------------------------------	--------------------

$P^* = 1.2 G + 1.5 Q = 0.00$  kN  
 $P_s = G + 0.4 Q_f = 0.00$  kN

**Bending Moment**

$$M^* = W^* L^2 / 8 + P^* ab / L$$

**M\* = 6.84** kNm

**Section**

2/HS240x63 Hyspan

$k_1 = 0.8$   
 $k_g = 1.0$   
 $\phi M_b = 41.76$  kNm

$\phi M_b = \phi M_b \cdot k_1 \cdot k_g \quad \phi = 0.9$

**Serviceability Deflection**

(Under  $W_s + P_s$ )  
 $(k_2=1.5)\Delta = 4.1$ mm  
=Span/ 906

Under 1 kN Point Load  $\Delta = 0.6$  mm  
 $EI_{xx} = 1916.00 \times 10^9$  Nmm<sup>2</sup>

	Dead	Live	Ultimate
<b>Reaction R1</b>	3.73kN	1.94kN	7.39kN
<b>Reaction R2</b>	3.73kN	1.94kN	7.39kN

JOIST J2

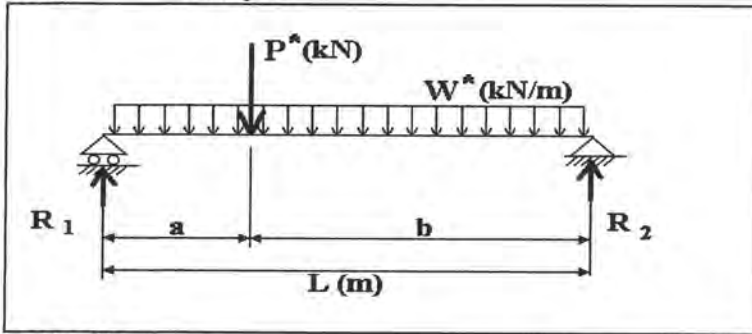
AS/NZS 1170 TIMBER BEAM CALCULATION SHEET - MSG8

Job Name: 155 Field Way  
Waikanae Beach

Job No. 24340  
Sheet No.

Date: 31-Aug-11

Engineer JFGB  
Beam No. J2



L = 2.4 m  
a = m  
b = 2.4 m

LOADING

1/. Uniformly Distributed Load

		Amount	kN/m
Dead	Self Weight		0.11
	Roof	0.35kPa x 3m	1.05
	Wall		0.70
	Floor	0.4kPa x 0.2m	0.08

Total Dead Load  $G = 1.94$  kN/m

Live	Roof ( $\Psi_c = 0$ for $Q_f$ )	0.25kPa x 3m	0.75
	Floor	1.5kPa x 0.2m	0.30

Total Live Load  $Q = 1.05$  kN/m

$W^* = 1.2 G + 1.5 Q = 3.90$  kN/m  
 $W_s = G + 0.4 Q_f = 2.06$  kN/m

2/. Point Load

Dead	Amount	kN
------	--------	----

Total Dead Point Load  $G = 0.00$  kN

Live

Total Live Point Load  $Q = 0.00$  kN

Le (m)   $P^* = 1.2 G + 1.5 Q = 0.00$  kN

$P_s = G + 0.4 Q_f = 0.00$  kN

Bending Moment  $M^* = W^* L^2 / 8 + P^* ab / L$

$M^* = 2.81$  kNm

Profile

$Z = 868.5 \times 10^3$  mm<sup>3</sup>

Section

(dry, fb=14Mpa)

D/B = 3

All Timber is MSG8 or VSG8

Le/B = 30

$k_8 = 0.96$

$\phi M_b = \phi k_1 k_8 f_b Z$   $\phi = k_1 = 0.8$

$\phi M_b = 7.47$  kNm

Serviceability Deflection

(Under  $W_s + P_s$ )  
( $k_2=2$ )  $\Delta = 2.2$ mm  
=Span/ 1115

$EI_{xx} = 826.85 \times 10^9$  Nmm<sup>2</sup>  
Under 1 kN Point Load  $\Delta = 0.3$  mm

Reaction	Dead	Live	Ultimate
R1	2.33kN	1.26kN	4.68kN

R2	2.33kN	1.26kN	4.68kN
----	--------	--------	--------

Bm 1

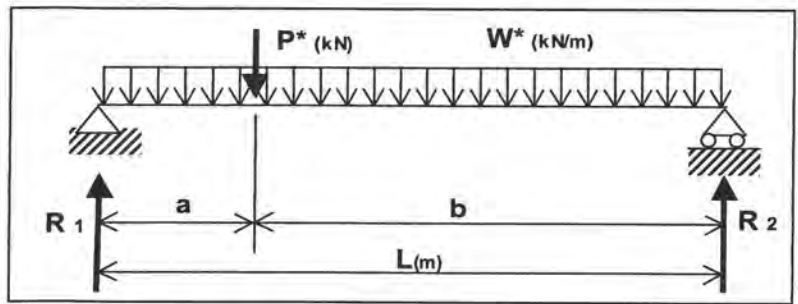
AS/NZS 1170 STEEL BEAM CALCULATION SHEET

Job Name: 155 Field Way  
Waikanae Beach

Job No. 24340  
Sheet No.

Date: 31-Aug-11

Engineer JFGB  
Beam No. BM1



L = 6.1 m  
a = 0.6 m  
b = 5.5 m

LOADING

1/. Uniformly Distributed Load

Dead	Self Weight	Amount	kN/m
	Floor	0.4kPa x 3.05m	1.22

Total Dead Load  $G = 1.62$  kN/m

Live	Roof ( $\Psi_c = 0$ for $Q_f$ )		
	Floor	1.5kPa x 3.05m	4.58

Total Live Load  $Q = 4.58$  kN/m

$W^* = 1.2 G + 1.5 Q = 8.81$  kN/m  
 $W_s = G + 0.4 Q_f = 3.45$  kN/m

2/. Point Load

Dead	Joist 1	Amount	kN
	Joist 2		2.33

Total Dead Point Load  $G = 6.06$  kN

Live	Joist 1	1.94
	Joist 2	1.26

Total Live Point Load  $Q = 3.20$  kN

Le (m) 6

$P^* = 1.2 G + 1.5 Q = 12.07$  kN  
 $P_s = G + 0.4 Q_f = 7.34$  kN

Bending Moment  $M^* = W^* L^2 / 8 + P^* ab / L$

Profile Universal Beam

All Steel is Grade 300

Section 310UB40.4

$M^* = 47.51$  kNm  
 $\phi M_b = 67.4$  kNm

okay

$I_{xx} = 85.20 \times 10^6$  mm<sup>4</sup>

Serviceability Deflection

(Under  $W_s + P_s$ )  $\Delta = 4.2$  mm  
= Span/ 1436  
(Under 1 kN Point Load)  $\Delta = 0.3$  mm

Reaction	Unfactored Dead & Live	Ultimate 1.2G+1.5Q	SLS G+0.4Q
R1	G=10.42kN Q=16.84kN	37.76kN	17.15kN
R2	G=5.55kN Q=14.27kN	28.06kN	11.26kN

### Timber Axial Capacity

Job Name 155 Field Way  
 Job Number 24340  
 Location Studs under BM1  
 Date 1-Sep 11  
 Engineer JFGB

Lx 2.4 m dx = 135 mm S2 = 18  
 Ly 2.4 m dy = 90 mm S3 = 27

Φ 0.8  
 k1 0.8  
 k4 1.2  
 k8 0.407  
 ft 6 MPa  
 fc 18 MPa  
 A 12150 mm<sup>2</sup>

**Load Duration**  
 Medium

**Type of Timber**  
 MSG8 dry

#### Euler Buckling

E 8 GPa  
 Ixx 1.85E+07 mm<sup>4</sup> N<sub>exx</sub> = 252.9 kN  
 Iyy 8.20E+06 mm<sup>4</sup> N<sub>eyy</sub> = 112.4 kN

#### k8 Calculation

Seff 27  
 k8 wet 0.446 k8 wet 0.441  
 k8 dry 0.420 k8 dry 0.407  
 S = 10-25 0.420 S > 25 0.407

#### Compression Load

N\* = 40 kN  
 ΦNc = 57.0 kN  
 ΦNe = 112.4 kN

#### Tension Load

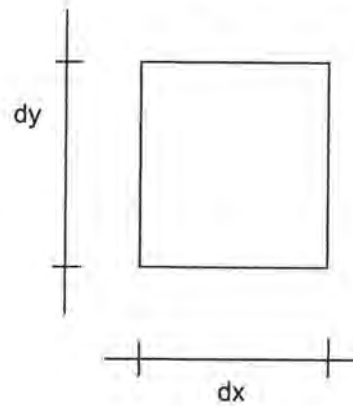
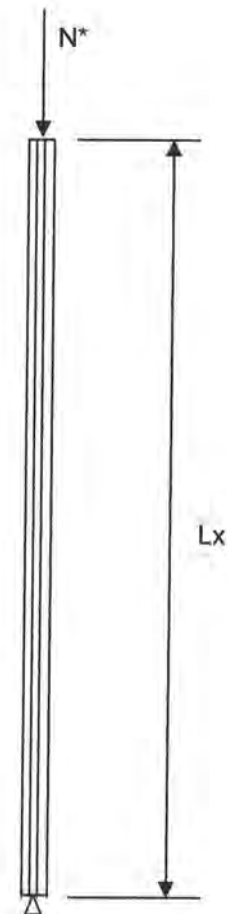
N\* = 1 kN  
 ΦNt = 56.0 kN

#### Rowbustness Check

Nr\* = 40.0 Mr\* = 0.35  
 ΦNr = 71.3 ΦMr = 3.67

Capacity = 66 %

Check is a 0.6kN load at 1m from end of the member in combination with long term axial load



⇒ TRIPLE STUD REQ<sup>d</sup> UNDER BM1  
 AT EACH END.

Date 5/9/11

Eng. JFGB

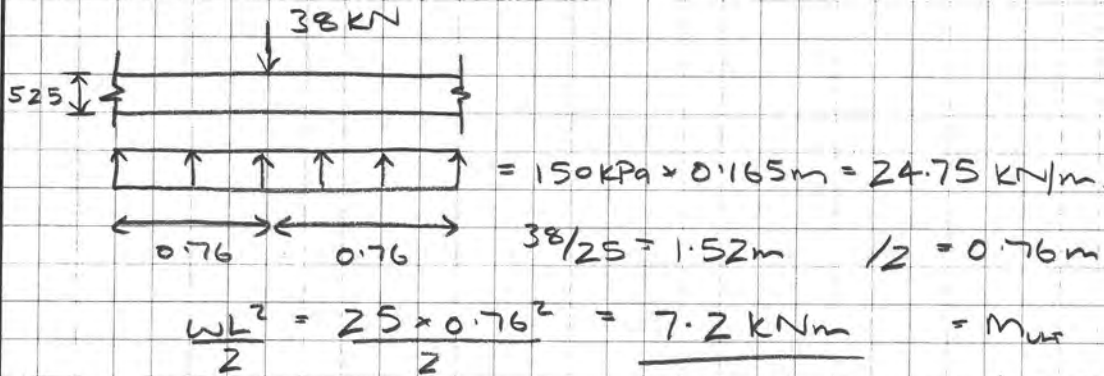
Job No. 24340

Sheet No.

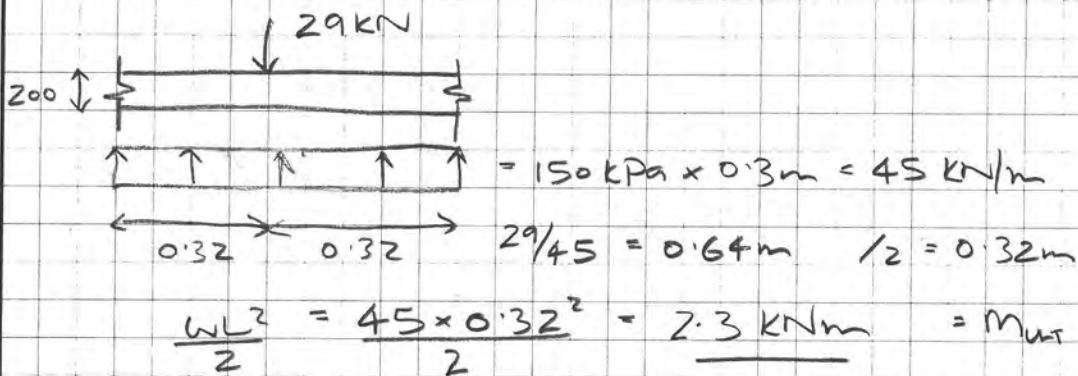
Project 155 FIELD WAY, WAIKANAHE BEACH



FOUNDATION UNDER Bm1 - S



GROUND BEAM UNDER Bm1 - N



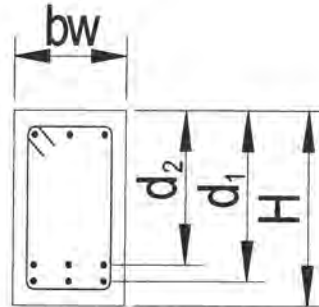
**CONCRETE BEAM DESIGN SHEET**

**Job Name:** 155 Field Way  
 Waikanae Beach  
**Beam:** Foundation under BM1  
**Date:** 1-Sep-11

**Job No.** 24340  
**Engineer** JFGB

**Beam Loads**

$M_{ult} = 7.2$  kNm  
 $V_{ult} = 19$  KN



**Concrete Details**

Depth 'H' = 525 mm  
 Width 'bw' = 165 mm

Exposure 

Against Ground	▼
----------------	---

  
 Conc 'f<sub>c</sub>' = 

25MPa	▼
-------	---

Cover min = 75 mm  
 Cover = 77 mm **Okay**

**Tension Reinforcement**

Tension Steel 'f<sub>y</sub>' = 

300 MPa	▼
---------	---

  
 Bar size = 

12	▼
----	---

  
 Bar size = 

0	▼
---	---

  
 Bar size = 

0	▼
---	---

No. = 1      d<sub>1</sub> = 436  
 No. =      d<sub>2</sub> =  
 No. =      d<sub>3</sub> =  
 A<sub>s</sub> = 114      d<sub>av</sub> = 436

**Bending Capacity**

Bending  $\phi = 0.85$        $\rho_w = 0.002$  *Below min steel*  
 $a = A_s \cdot f_y / 0.85 \cdot b_w \cdot f_c = 9.75$  mm **Okay**  
 $\phi M = \phi \cdot A_s \cdot f_y \cdot (d - a/2) = 12.53$  kNm **OKAY**

**Concrete Shear Capacity**

Shear  $\phi = 0.75$   
 $v_c = (0.07 + 10\rho_w) \cdot \sqrt{f_c} = 0.43$  MPa  
 $\phi V_c = \phi \cdot v_c \cdot d \cdot b_w = 23$  kN      *Stirrups not required*

**Combined Steel & Concrete Shear Capacity**

Shear Steel 'f<sub>ys</sub>' = 

300 MPa	▼
---------	---

*Spacing to great*  
 Bar size = 

6	▼
---	---

      Legs = 1      Spacing = 600 mm  
 $v_s = A_v \cdot f_{ys} / b_w \cdot s = 0.08$  MPa      *Below min*      A<sub>v</sub> = 28 mm<sup>2</sup>  
 $v_n = v_c + v_s = 0.51$  MPa      *Okay*  
 $\phi V = \phi v_n \cdot d \cdot b_w = 28$  kN      **OKAY**

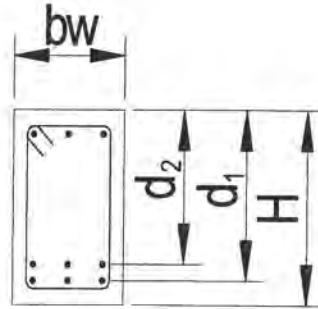
### CONCRETE BEAM DESIGN SHEET

**Job Name:** 155 Field Way  
 Waikanae Beach  
**Beam:** Ground Beam under BM1  
**Date:** 2-Sep-11

**Job No.** 24340  
**Engineer** JFGB

#### Beam Loads

$M_{ult} = 2.3$  kNm  
 $V_{ult} = 14$  KN



#### Concrete Details

Depth 'H' = 200 mm  
 Width 'bw' = 300 mm

Exposure 

Against Ground	▼
----------------	---

  
 Conc ' $f_c$ ' = 

25MPa	▼
-------	---

Cover min = 75 mm  
 Cover = 76 mm **Okay**

#### Tension Reinforcement

Tension Steel ' $f_y$ ' = 

300 MPa	▼
---------	---

  
 Bar size = 

12	▼
----	---

  
 Bar size = 

0	▼
---	---

  
 Bar size = 

0	▼
---	---

No. = 2  $d_1 = 108$   
 No. =  $d_2 =$   
 No. =  $d_3 =$   
 As = 228  $d_{av} = 108$

#### Bending Capacity

Bending  $\phi = 0.85$   $\rho_w = 0.007$  **Okay**

$a = A_s f_y / 0.85 b_w f_c = 10.73$  mm **Okay**

$\phi M = \phi A_s f_y (d - a/2) = 5.97$  kNm **OKAY**

#### Concrete Shear Capacity

Shear  $\phi = 0.75$

$v_c = (0.07 + 10\rho_w) \sqrt{f_c} = 0.70$  MPa

$\phi V_c = \phi v_c d b_w = 17$  kN *Stirrups not required*

#### Combined Steel & Concrete Shear Capacity

Shear Steel ' $f_{ys}$ ' = 

300 MPa	▼
---------	---

*Spacing to great*

Bar size = 

10	▼
----	---

Legs = 1 Spacing = 600 mm

$v_s = A_v f_{ys} / b_w s = 0.13$  MPa *Below min*  $A_v = 78$  mm<sup>2</sup>

$v_n = v_c + v_s = 0.83$  MPa **Okay**

$\phi V = \phi v_n d b_w = 20$  kN **OKAY**

UPON REVIEWING COUNCIL DOCUMENTS THEY INDICATE THE SOIL IS SLIGHTLY BETTER THAN THE 'GOOD GROUND' ALLOWED FOR ABOVE

Date 5/7/11

Eng. JFGB

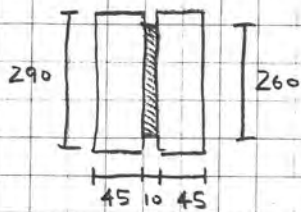
Job No. 24340

Sheet No.

Project 155 FIELD WAY, WAIKANAÉ



EXISTING BM1 = FB30H SPAN = 6.1m  
m\* = 47.51 kNm

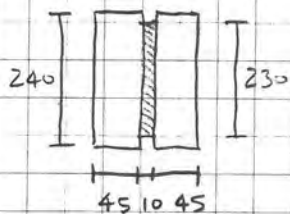


EQUIV STEEL FOR TIMBER =  $\frac{W E_t}{E_s} = 2.4 \text{ mm}$  EACH SIDE.

$$\phi m_b = \phi f_y Z$$
$$= 0.9 \times 300 \times \frac{0.015 \times 0.26^2}{6}$$
$$= 45.0 \text{ kNm}$$

m\* >  $\phi m_b \rightarrow$  NOT OK

EXISTING GARAGE LINTEL = FB25H  
SPAN = 4.9m m\* = 15.56 kNm



$$\phi m_b = \phi f_y Z$$
$$= 0.9 \times 300 \times \frac{0.015 \times 0.23^2}{6}$$
$$= 35.2 \text{ kNm}$$

m\* <  $\phi m_b \rightarrow$  OK

$$I = \frac{bd^3}{12} = \frac{14.8 \times 230^3}{12} = 15.01 \times 10^6 \text{ mm}^4$$

$$\Delta_w = \frac{5WL^4}{384EI} = 6.2 \text{ mm} \left( = \frac{\text{SPAN}}{790} \right) \rightarrow \text{OK}$$

$$\Delta_{kw} = \frac{PL^3}{48EI} = 0.82 \text{ mm} \rightarrow \text{OK}$$

# EXISTING GARAGE LINTEL

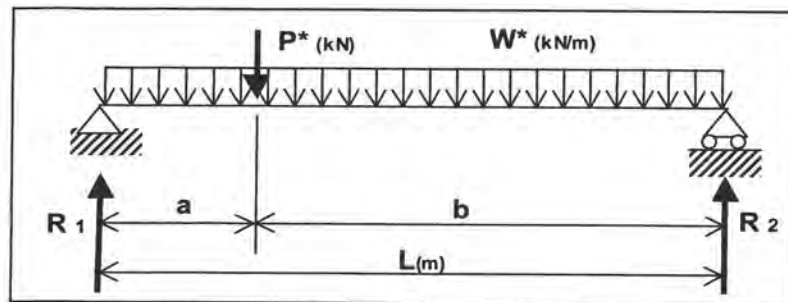
## AS/NZS 1170 STEEL BEAM CALCULATION SHEET

Job Name: 155 Field Way  
Waikanae Beach

Job No. 24340  
Sheet No.

Date: 31-Aug-11

Engineer JFGB  
Beam No. BM2



L = 4.9 m  
a = m  
b = 4.9 m

**LOADING**

**1/. Uniformly Distributed Load**

Dead	Self Weight		Amount kN/m
	Roof	0.35kPa x 1m	0.23
	Wall		0.70
	Floor	0.4kPa x 1.2m	0.48

**Total Dead Load**  $G = 1.76 \text{ kN/m}$

<b>Live</b>	Roof ( $\Psi_c = 0$ for $Q_f$ )	0.25kPa x 1m	0.25
	Floor	1.5kPa x 1.2m	1.80

**Total Live Load**  $Q = 2.05 \text{ kN/m}$

$$W^* = 1.2 G + 1.5 Q = 5.19 \text{ kN/m}$$

$$W_s = G + 0.4 Q_f = 2.48 \text{ kN/m}$$

**2/. Point Load**

Dead		Amount kN
<b>Total Dead Point Load</b>		$G = 0.00 \text{ kN}$

<b>Live</b>	<b>Total Live Point Load</b>	$Q = 0.00 \text{ kN}$
-------------	------------------------------	-----------------------

Le (m)

$$P^* = 1.2 G + 1.5 Q = 0.00 \text{ kN}$$

$$P_s = G + 0.4 Q_f = 0.00 \text{ kN}$$

Bending Moment

$$M^* = W^* L^2 / 8 + P^* ab / L$$

Profile

All Steel is Grade 300

$$M^* = 15.56 \text{ kNm}$$

$$\phi M_b = 35.2 \text{ kNm}$$

Section

okay

$$I_{xx} = 15.01 \times 10^6 \text{ mm}^4$$

**Serviceability Deflection**

(Under  $W_s + P_s$ )  $\Delta = 6.2 \text{ mm}$

= Span / 790

(Under 1 kN Point Load)  $\Delta = 0.8 \text{ mm}$

Reaction	Unfactored Dead & Live	Ultimate 1.2G+1.5Q	SLS G+0.4Q
R1	G=4.31kN Q=5.02kN	12.71kN	6.07kN
R2	G=4.31kN Q=5.02kN	12.71kN	6.07kN

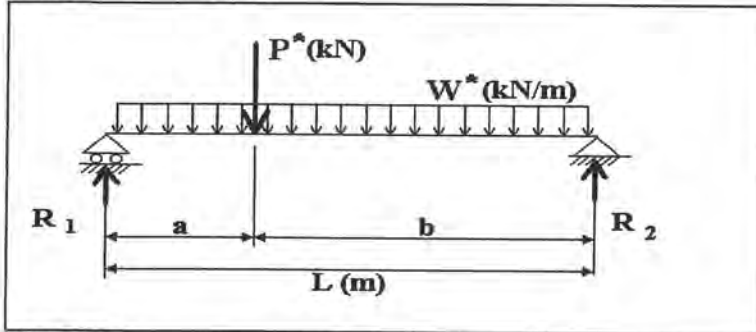
### AS/NZS 1170 TIMBER BEAM CALCULATION SHEET - MSG8

Job Name: 155 Field Way  
Waikanae Beach

Job No. 24340  
Sheet No.

Date: 8-Sep-11

Engineer JFGB  
Beam No. BM3



L = 2.9 m  
a = m  
b = 2.9 m

**LOADING**

**1/. Uniformly Distributed Load**

Dead	Self Weight	Amount	kN/m
	Roof	0.35kPa x 0.58m	0.08
	Wall		0.20
	Floor	0.4kPa x 0.58m	0.70
			0.23

**Total Dead Load**

G = 1.21 kN/m

Live	Roof ( $\Psi_c = 0$ for $Q_f$ )	Amount	kN/m
	Floor	0.25kPa x 0.58m	0.15
		1.5kPa x 0.58m	0.87

**Total Live Load**

Q = 1.02 kN/m

$W^* = 1.2 G + 1.5 Q = 2.98 \text{ kN/m}$   
 $W_s = G + 0.4 Q_f = 1.56 \text{ kN/m}$

**2/. Point Load**

Dead

Amount kN

**Total Dead Point Load**

G = 0.00 kN

Live

**Total Live Point Load**

Q = 0.00 kN

Le (m) 3.0

$P^* = 1.2 G + 1.5 Q = 0.00 \text{ kN}$

$P_s = G + 0.4 Q_f = 0.00 \text{ kN}$

Bending Moment

$$M^* = W^* L^2 / 8 + P^* ab / L$$

M\* = 3.13 kNm

Profile

Gauged

Z = 632.5 x 10<sup>3</sup> mm<sup>3</sup>

Section

240x70

D/B = 4

(dry, fb=14Mpa)

Le/B = 40

All Timber is MSG8 or VSG8

k<sub>s</sub> = 0.81

$\phi M_b = \phi k_1 k_8 f_b Z \quad \phi = k_1 = 0.8$

$\phi M_b = 4.59 \text{ kNm}$

**Serviceability Deflection**

(Under  $W_s + P_s$ )

( $k_2=2$ )  $\Delta = 4.8 \text{ mm}$

=Span/ 607

Elxx = 602.16 x 10<sup>9</sup> Nmm<sup>2</sup>

Under 1 kN Point Load  $\Delta = 0.8 \text{ mm}$

Reaction

R1

Dead 1.76kN

Live 1.47kN

Ultimate 4.32kN

R2

1.76kN

1.47kN

4.32kN

# GIB EzyBrace® 2011 Software



## Demand Calculation Sheet

two storey

V06/11

### Job Details

Street and Number	155 Field Way	 <p><b>BRANZ Appraised</b> Appraisal No.294 [2011]</p>	
Suburb	Waikanae Beach		
Lot and DP Number	Lot 8 DP 91324		
City/Town/District	Waikanae Beach		
Designer & Date	JFGB		2-Sep-11
Company Name	ISP Consulting Engineers Ltd		
Job Number	J24340		

### Building Specification

Select Lining Option

10 or 13 mm GIB® Plasterboard

Number of storeys	two																																																					
Floor Loading	2kPa																																																					
Foundation Type	slab																																																					
<table border="1"> <tr> <th colspan="2">Upper Floor</th> <th colspan="2">Lower Floor</th> </tr> <tr> <td>Cladding Weight</td> <td>light</td> <td>light</td> <td></td> </tr> <tr> <td>Roof Weight</td> <td>light</td> <td>light</td> <td></td> </tr> <tr> <td>Room in Roof Space</td> <td>no</td> <td>no</td> <td></td> </tr> <tr> <td>Roof Pitch (degrees)</td> <td>15</td> <td></td> <td>2</td> </tr> <tr> <td>Roof height above eaves (m)</td> <td>1.7</td> <td></td> <td></td> </tr> <tr> <td>Building height to apex (m)</td> <td>7.0</td> <td></td> <td></td> </tr> <tr> <td>Ground to lower floor level (m)</td> <td>0.2</td> <td></td> <td></td> </tr> <tr> <td>Lower to upper floor level (m)</td> <td></td> <td></td> <td>3.0</td> </tr> <tr> <td>Stud Height (m)</td> <td>2.4</td> <td></td> <td>2.4</td> </tr> <tr> <td>Building Length (m)</td> <td>14.3</td> <td></td> <td>14.8</td> </tr> <tr> <td>Building Width (m)</td> <td>12.3</td> <td></td> <td>12.6</td> </tr> <tr> <td>Building Plan Area (m2)</td> <td>132</td> <td></td> <td>152</td> </tr> </table>			Upper Floor		Lower Floor		Cladding Weight	light	light		Roof Weight	light	light		Room in Roof Space	no	no		Roof Pitch (degrees)	15		2	Roof height above eaves (m)	1.7			Building height to apex (m)	7.0			Ground to lower floor level (m)	0.2			Lower to upper floor level (m)			3.0	Stud Height (m)	2.4		2.4	Building Length (m)	14.3		14.8	Building Width (m)	12.3		12.6	Building Plan Area (m2)	132		152
Upper Floor		Lower Floor																																																				
Cladding Weight	light	light																																																				
Roof Weight	light	light																																																				
Room in Roof Space	no	no																																																				
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Building Length (m)	14.3		14.8																																																			
Building Width (m)	12.3		12.6																																																			
Building Plan Area (m2)	132		152																																																			

### Building Location

<b>Wind Zone</b>	<b>Very High</b>	<b>Earthquake Zone</b>	<b>Soil Type</b>
Select by Building Consent Authority Map or Preference	Very High	3	D&E (deep to very soft)
Wind Region	Preference selected	<b>Annual exceedance probability</b>	
Lee Zone	Preference selected	1/500 (NZS3604:2011 default)	
Ground Roughness	Preference selected		
Site Exposure	Preference selected		
Topographic Class	Preference selected		

### Bracing Units required for Wind

Demand W (BU)		lower	Walls upper
along	slab	1542	651
across	slab	1692	648

### Bracing Units required for Earthquake

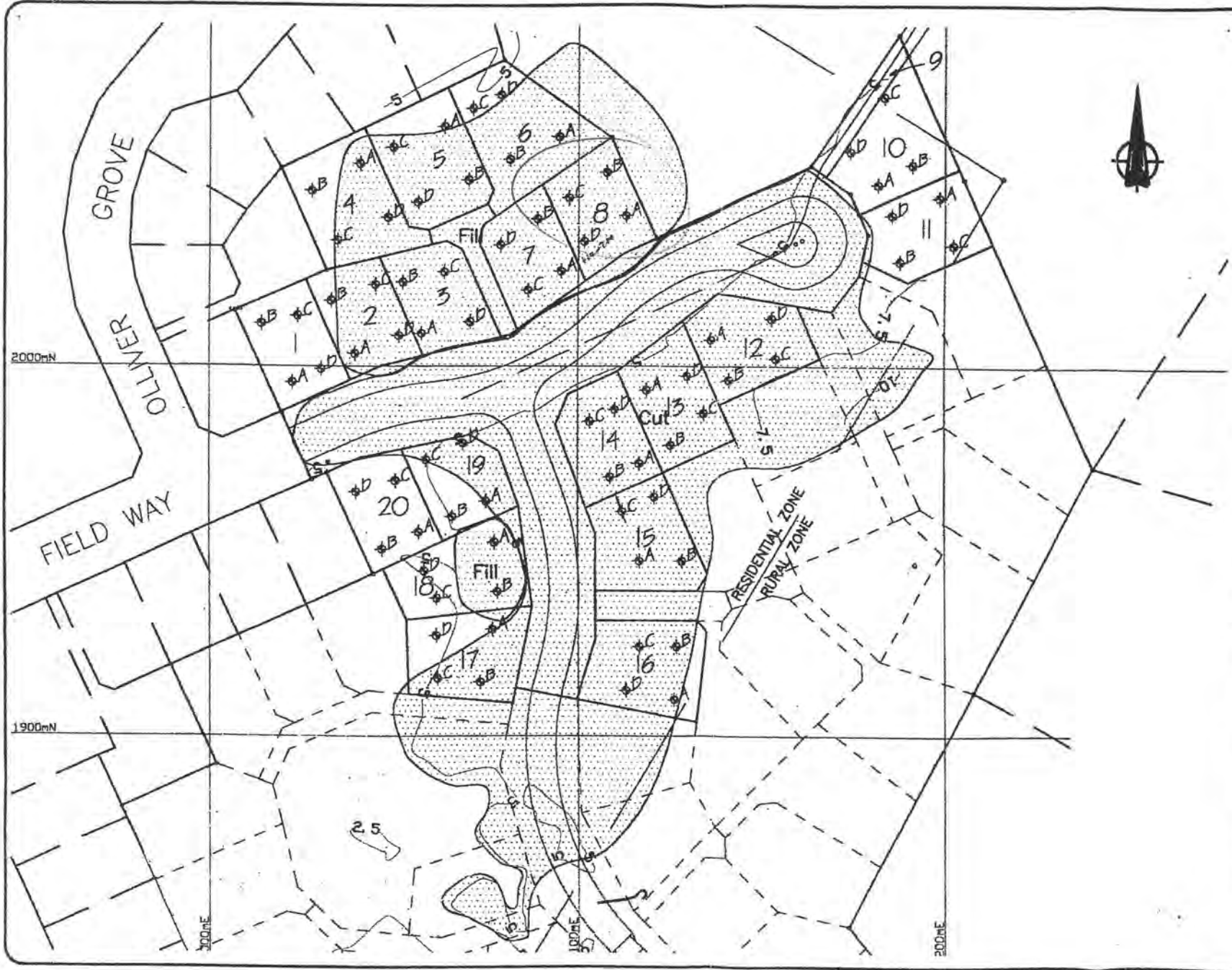
Demand along / across E (BU)		
	Walls	
	lower	upper
slab	2265	1007











ORIGINAL PROBE SITES

**PHARAZYN EST  
SUBDIVISION  
STAGE 5  
SOIL TEST  
PLAN**



DESIGNED		
DRAWN	BJE	June 2001
APPROVED	GDW	June 2001
SCALE	1:1000	
DATUM	M.S.L.	
CADFILE		

**ST 1**

# ORIGINAL PROBE RESULTS

Lot No	7	7	7	7	8	8	8	8
Test ID	A	B	C	D	A	B	C	D
Depth in mm								
000 - 100	P	P	P	P	P	P	P	P
100 - 200	1	1	1	2	1	P	2	3
200 - 300	5	6	5	5	5	2	5	6
300 - 400	8	12	7	8	11	5	8	8
400 - 500	12	15	12	12	13	7	12	12
500 - 600	13	17	16	15	16	11	15	15
600 - 700	17	18	16	14	20	15	18	17
700 - 800	17	22	19	14	22	18	20	20
800 - 900	15	21	22	17	19	22	24	18



**BRANZ Appraised**  
Appraisal No.427 [2007]

**BRANZ Appraisals**

Technical Assessments of products  
for building and construction

**BRANZ  
APPRAISAL  
CERTIFICATE  
No. 427 (2007)**

**GIB AQUALINE®  
WET AREA SYSTEMS**

**Winstone Wallboards Limited**  
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Auckland 1642

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Helpline Tel: 0800 100 442  
Helpline Fax: 0800 229 222  
Web: [www.gib.co.nz](http://www.gib.co.nz)  
Email: [info@gib.co.nz](mailto:info@gib.co.nz)

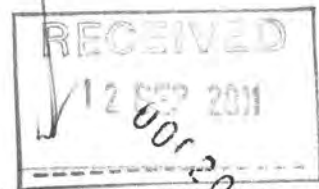


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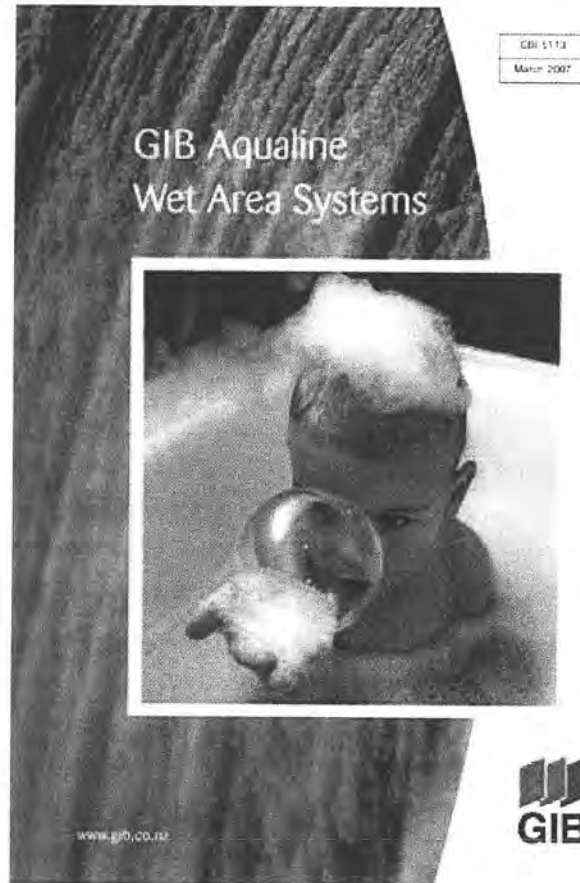


Readers are advised to check the validity of this Certificate by referring to the Valid Certificates listing on the BRANZ website, or by contacting BRANZ.



1.1 GIB Aqualine® Wet Area Systems are for the interior lining of timber and steel frame walls and ceilings in wet areas such as bathrooms, laundries, kitchens and toilets where a water resistant lining material is desirable.

1.2 GIB Aqualine® Wet Area Systems are based on 10 mm and 13 mm thick GIB Aqualine® water resistant plasterboard.



2.1 GIB Aqualine® Wet Area Systems have been appraised for use as a wet area wall and ceiling lining in buildings within the following scope:

- on framed walls and ceilings within the scope limitations on NZS 3604; and,
- on timber and light gauge steel framed walls and ceiling subject to specific design; and,

2.2 GIB Aqualine® may also be used to substitute for some other GIB® Plasterboards in fire-rated, sound-rated and bracing-rated wall and floor/ceiling constructions.

### New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the GIB Aqualine® Wet Area Systems, if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet or contribute to meeting the following provisions of the NZBC:

**Clause B1 STRUCTURE:** Performance B1.3.1, B1.3.2 and B1.3.4. GIB Aqualine® Wet Area Systems meet the requirements for loads arising from self-weight, earthquake, wind and impact [i.e. B1.3.3 (a), (f), (h) and (j)]. See Paragraphs 8.1 - 8.3.

**Clause B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years, B2.3.1 (b) 15 years and B2.3.1 (c) 5 years. GIB Aqualine® Wet Area Systems meet these requirements. See Paragraphs 9.1 - 9.5.

**Clause C3 SPREAD OF FIRE:** Performance C3.3.1, C3.3.2, and C3.3.5. GIB Aqualine® Wet Area Systems meet these requirements by providing passive fire and smoke protection.

**Clause E3 INTERNAL MOISTURE:** Performance E3.3.4, E3.3.5 and E3.3.6. GIB Aqualine® Wet Area Systems meet these requirements. See Paragraphs 13.1 - 13.3.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. GIB Aqualine® Wet Area Systems meet this requirement and will not present a health hazard to people.

**Clause G6 AIRBORNE AND IMPACT SOUND:** Performance G6.3.1 and G6.3.2. GIB Aqualine® Wet Area Systems meet the requirements. See Paragraph.

3.2 This Certificate appraises an Alternative Solution in terms of New Zealand Building Code compliance.

4.1 The GIB® plasterboards and accessories used in the GIB Aqualine® Wet Area System and supplied or specified by Winstone Wallboards Limited are as follows:

#### GIB Aqualine®

4.2 GIB Aqualine® is a paper-bound, modified water-resistant gypsum-plaster core sheet lining material. The sheets have a taper on the two long sheet edges. GIB Aqualine® is available in 10 mm and 13 mm sheet thicknesses, a sheet width of 1200 mm and in lengths of 2400 mm, 2700 mm, 3000 mm and 3600 mm. The maximum weights are 7.8 kg/m<sup>2</sup> and 10.2 kg/m<sup>2</sup> for 10 mm and 13 mm thick sheets respectively. GIB Aqualine® face paper is green in colour.

#### Fastenings

- GIB® Grabber® High Thread Drywall screws for fixing to timber:  
6g x 25 mm and 32 mm.
- GIB® Grabber® Self Tapping Drywall screws for fixing to light gauge steel:  
6g x 25 mm and 32 mm.
- GIB® Nails  
30 mm and 40 mm x 2.8 mm

#### Adhesive and Sealants

- GIBFix® Wood Bond (Acrylic)
- GIBFix® All-Bond (Solvent)

#### GIB® Accessories and GIB® Jointing Compounds

- As specified in the GIB Aqualine® Wet Area Systems and GIB® Site Guide Technical Literature.

#### Finishes

4.3 Finishes such as tiling, flexible sheet vinyl, paints and wallpapers have not been assessed and are outside the scope of this Certificate.

#### Handling and Storage

5.1 The best results are achieved when GIB Aqualine® is treated as a finishing material and protected from damage. Sheets must be stacked flat and kept dry at all times. For limits on stack heights see the GIB® Site Guide. Sheets must be carried on edge and not dragged.

5.2 All accessories must be kept dry.

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the GIB Aqualine® Wet Area System. The Technical Literature must be read in conjunction with this Certificate. All aspects of design,

use, installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

#### General

7.1 GIB Aqualine® provides a water-resistant lining as a base for finishing systems in wet areas such as bathrooms, toilets, laundries and kitchens. The typical finishes are ceramic tiles and flexible sheet vinyl to walls and paint, and wallpaper to walls and ceilings.

7.2 GIB Aqualine® must not be used in the following situations:

- For bracing applications in shower areas or adjacent baths (See Paragraphs 7.4 and 8.2).
- In areas of high humidity (above 90% RH) or continually wet such as group showers, steam rooms, or swimming pools.
- Installed over a vapour barrier.
- Applied directly to masonry, concrete or solid plaster.
- Applied over other sheet lining materials.
- Used externally of the building envelope.
- Exposed to temperatures of 52°C or greater for prolonged periods. (Refer to appliance and fitting manufacturer's for installation details.)

7.3 GIB Aqualine® may be substituted for some other GIB® Plasterboard products in specific GIB® Bracing Systems, GIB® Fire Rated Systems, GIB® Noise Control Systems and GIB UltraLine® PLUS Lining System.

#### Wet Areas

7.4 Wet areas are spaces where sanitary fixture and sanitary appliances are located such as bathrooms, toilets, laundries and kitchens. There are two general categories of wet areas as follows:

1. Water Splash – These are areas subject to intermittent splashing of water such as around baths, vanities, tubs and sinks.
2. Shower Areas – These are areas subject to frequent and heavy water splash such as enclosed showers, unenclosed shower zones and showers over baths.

7.5 Both the above wet area categories must be finished with surfaces and joints that are impervious and easily cleaned. Shower areas must additionally be waterproof. This can be achieved using proprietary rigid shower lining systems, flexible vinyl shower wall finish, or tiling. Tiled shower areas must include a wet area waterproofing membrane system under the tiles.

#### Intertency Walls – Wet Areas

7.6 Intertency drywall constructions that incorporate fire resistance and noise control must be protected from water splash. In shower areas GIB Aqualine® must not be substituted for other GIB® Plasterboards but must be an extra lining layer. Refer to the GIB Aqualine® Wet Area Systems Technical Literature.

#### Tiling

7.7 GIB Aqualine® is suitable as a substrate for tiling up to the following weights:

- 10 mm GIB Aqualine® up to 20kg/m<sup>2</sup>
- 13 mm GIB Aqualine® up to 32kg/m<sup>2</sup>.

*Note: Most ceramic and porcelain wall tiles weigh less than 20kg/m<sup>2</sup>. For further information on tiling consult the BRANZ Good Practice Guide – Tiling.*

#### Framing

7.8 Supporting framing must comprise one of the following subject to the minimum sizes, dwang centres and all other frame requirements of GIB Aqualine® Wet Area Systems Technical

#### Literature:

- Timber framing must be designed and constructed in accordance with NZS 3604, or to a specific design using NZS 3603 and NZS 4203 (AS/NZS 1170).
- Steel framing must be designed to withstand loads in accordance with NZS 4203 (AS/NZS 1170).

## Structure

### Bracing

8.1 GIB Aqualine® can be used in place of GIB® Standard plasterboard in GIB® bracing elements. GIB Aqualine® can be used in place of GIB Braceline® in GIB® bracing elements 900 mm or longer, provided the perimeter of the element is fixed with GIB Braceline® Nails or GIB Braceline® screws at 100 mm centres, using the GIB Braceline® corner fixing pattern.

8.2 GIB Aqualine® must not be used for bracing in shower areas or behind baths.

### Impact Resistance

8.3 GIB® plasterboards provide adequate resistance to soft body impact, based upon experience of use in domestic and light commercial applications.

## Durability

### Serviceable Life

9.1 GIB Aqualine® has a serviceable life of at least 15 years as a fully protected shower or water splash lining. As a general wall and ceiling lining GIB Aqualine® will have a serviceable life in excess of 50 years. The ability of GIB Aqualine® to remain durable is dependent on being protected and remaining dry in service, and being maintained in accordance with this Certificate.

### Maintenance

9.2 The building must be maintained weathertight and all lining systems protected from internal and external moisture.

9.3 Finishes to water splash and shower areas, including tiles, grout, waterproof membranes, sealants and flexible sheet vinyl must be checked to ensure the integrity of the system is maintained. They must be repaired or replaced if necessary. When repairing or replacing finishes, the GIB Aqualine® substrate must be checked for defects and repaired or replaced, as required.

9.4 For flexible sheet vinyl, particular attention must be paid to joints especially at corners. Checks should be made to ensure the vinyl has not been punctured. Where damage has occurred, repairs must be made immediately.

9.5 Impact damage to GIB Aqualine® plasterboard, resulting in small holes and cracks, may be patched, stopped and finished. For larger areas of damage, expert advice on repair must be sought from Winstone Wallboards Ltd.

## Outbreak of Fire

10.1 Separation or protection must be provided to GIB Aqualine® Wet Area Systems from heat sources such as stoves, heaters, flues and chimneys.

10.2 NZBC Acceptable Solution C/AS1, Part 9 and Verification Method C/MM1 provide methods for separation and protection of combustible materials from heat sources.

## Spread of Fire

11.1 When 10 mm GIB Aqualine® is substituted into fire rated systems in place of 10 mm GIB Fyreline®, the FRR of that system will be maintained. Similarly, the FRR is maintained when 13 mm GIB Aqualine® is substituted for 13 mm GIB Fyreline®.

## Flame Barrier

12.1 Where flame barriers are required by Acceptable Solution C/AS1 Table 6.3, GIB Aqualine® is a suitable material to provide a 10 minute flame barrier, provided all sheet joints are formed over framing, or backblocked with GIB® plasterboard.

## Internal Moisture

13.1 When installed in accordance with this Certificate, GIB Aqualine® Wet Area Systems will provide wall surfaces adjacent to sanitary fixtures and sanitary appliances that are impervious and easily cleaned.

13.2 The construction methods meet with the internal moisture requirements of the NZBC Acceptable Solution E3/AS1.

13.3 To minimise internal condensation, adequate levels of ventilation and thermal resistance must be provided to all spaces where moisture may be generated.

## Airborne and Impact Sound

14.1 When GIB Aqualine® is substituted into GIB® Noise Control systems in place of the equivalent thickness GIB® Standard plasterboard or GIB Fyreline®, the STC and IIC rating of that system will be maintained. When GIB Aqualine® is substituted in place of the equivalent thickness GIB Noiseline®, a small performance loss may occur.

## Installation Skill Level Requirement

15.1 Installation of GIB Aqualine® Wet Area Systems can be carried out by any competent building contractor.

## General

16.1 GIB Aqualine® Wet Area Systems must be installed in accordance with the Technical Literature. For inspection, reference must be made to the Technical Literature.

### Cutting

16.2 GIB Aqualine® is easily cut by scoring the face paper with a sharp short-bladed trimming knife, and then snapping the plasterboard away from the cut face and cutting the back paper or by sawing. Use of a metal straightedge facilitates clean straight cuts. Cut edges can be tidied up by using a knife. Paper dags should be removed.

### Health and Safety

16.3 Dust resulting from the sanding of stopping and finishing compounds may be a respiratory irritant, and the use of a suitable facemask is recommended.

### Framing

16.4 To achieve an acceptable decorative finish, GIB Aqualine® Wet Area Systems and the GIB® Site Guide specifies that walls must not be lined unless the moisture content of timber framing is less than 18%. Winstone Wallboards Limited recommend a moisture content of 8–12% where buildings are to be air conditioned or centrally heated.

## Fixing Sheets

### Non-Tiled Areas

17.1 GIB Aqualine® sheets may be installed vertically or horizontally. Sheets are fixed with GIB® Grabber® screws or GIB® Nails at 300 mm centres around the perimeter of the

sheet, and with GIBFix® adhesive on all intermediate studs and dwangs. Adhesive must not be used under fasteners. A 5-10 mm gap must be left between the floor and the bottom of the sheet.

#### **Tiled Areas**

17.2 Control joints must be provided at maximum 4 m centres.

Internal corners in shower areas must be reinforced with a minimum 32 x 32 x 0.55 mm galvanised metal angle prior to lining the walls.

17.3 GIB Aqualine® sheets may be installed vertically or horizontally. Sheets are fixed with GIB® Grabber® screws at 100 mm centres to perimeter of wall and to all intermediate studs. Adhesive must not be used in place of screws.

#### **Ceilings**

17.4 Supports of timber or steel battens or ceiling joists must be 450 centres for 10 mm GIB Aqualine®, or 600 mm centres for 13 mm GIB Aqualine®.

17.5 GIB Aqualine® sheets must be fixed with GIB® Grabber® screws at 600 mm centres around perimeter and at 200 mm centre along supports. Alternatively, sheets are screw fixed at 600 mm centres along the supports and GIBFix® adhesive fixed at 200 mm centre between.

#### **Penetrations and Sealants**

18.1 All cut-outs for pipe penetrations must be made neatly using a hole saw. Cut-outs should be made approximately 12 mm diameter greater than the pipe.

18.2 A bead of silicone sealant must be placed to the full thickness of the GIB Aqualine® sheet around all pipe penetrations, at bath rims and preformed shower bases and where an impervious junction is required at the floor/wall line.

18.3 In tiled areas, a bead of silicone sealant 6 mm wide must also be placed to the full thickness of the tiles where the above situation occurs. The sealant manufacturer's technical literature must be followed for installation.

#### **Jointing and Finishing**

19.1 Jointing must be carried out in accordance with GIB® Site Guide Technical Literature.

19.2 Tiled shower areas must incorporate a waterproofing membrane over GIB Aqualine®. Waterproofing membranes are outside the scope of this Certificate and must otherwise be specified and approved.

#### **Investigations**

20.1 The GIB Aqualine® Wet Area Systems and GIB® Site Guide Technical Literature have been examined by BRANZ and found to be satisfactory.

20.2 Site visits were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.

20.3 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.

20.4 Winstone Wallboards Limited GIB® plasterboards have been assessed for the following properties: MOR, MOE, paper tensile strength, paper shear strength, nail pull resistance, Hunter hardness, inspection for fungal spores, hard and soft body impact tests.

#### **Quality**

21.1 Winstone Wallboards Limited's manufacturing process and details of the quality and composition of the materials, have been examined by BRANZ and found to be satisfactory.

The quality management systems of Winstone Wallboards Limited have been assessed and registered by TELARC as meeting the requirements of ISO 9001, Registration No. 581. Winstone Wallboards Limited is responsible for the quality of the product supplied.

21.2 The quality of the application and finish on site is the responsibility of the installation, stopping and finishing contractors.

21.3 Designers are responsible for the design of buildings.

21.4 Building owners are responsible for the maintenance in accordance with the instructions of Winstone Wallboards Limited.

#### **Sources of Information**

- AS/NZS 1170: 2002 Structural design actions.
- AS/NZS 2588: 1998 Gypsum Plasterboard.
- NZS 3602: 2003 Timber and wood-based products for use in building.
- NZS 3603: 1993 Timber structures standard.
- NZS 3604: 1999 Timber and framed buildings.
- NZS 4203: 1992 Code of practice for general structural design and design loadings of buildings.
- BRANZ Good Practice Guide - Tiling, March 2004.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.



**BRANZ**

In the opinion of BRANZ, GIB Aqualine® Wet Area Systems are fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided they are used, designed, installed and maintained as set out in this Certificate.

The Appraisal Certificate is issued only to the Certificate Holder, Winstone Wallboards Limited, and is valid until further notice, subject to the Conditions of Certification.

**Conditions of Certification**

1. This Certificate:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the technical literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. The Certificate Holder:
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

P Robertson  
Chief Executive

Date of issue: 4 April 2007

# SKELLERUP Bituclad

Branz Appraisal No. 567



BRANZ Appraised  
Appraisal No. 567 [2007]

masterspec  
Ref No. 4421 SB



BRANZ Appraised  
Appraisal No. 567 [2007]

BRANZ Appraisals

Technical Assessments of products  
for building and construction

BRANZ  
APPRAISAL  
No. 567 (2007)

Amended 13 November 2009

## SKELLERUP BITUCLAD WATERPROOFING MEMBRANES

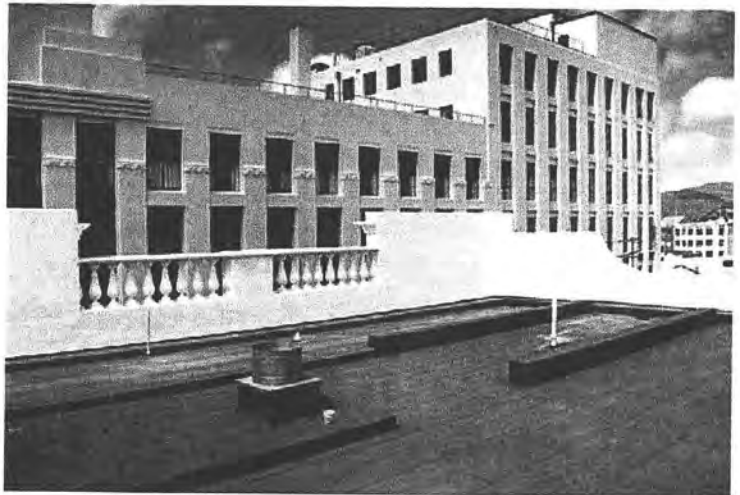
Viking Roofspec  
A Division of Viking Group Ltd  
P O Box 14 541  
Panmure  
Auckland  
Freephone: 0800 729 799  
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Email:  
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BRANZ Limited  
Private Bag 50 908  
Porirua City  
New Zealand  
Tel: +64 4 237 1170  
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- 1.1 Skellerup Bituclad Waterproofing Membranes are waterproofing membranes for nominally flat, pitched and curved roofs, gutters and parapets. They are installed as a multi-layer system with a mineral chip finished product or as a single layer system onto a concrete substrate under heavy protection such as paving slabs or a topping screed.
- 1.2 The products are supplied as torch-on, reinforced, polymer-modified bitumen sheets in roll form.



Roofspec  
Viking

2.1 Skellerup Bituclad Waterproofing Membranes have been appraised as roof waterproofing membranes on buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 with respect to building height and maximum floor plan areas; and,
- with building structures designed and constructed to meet the requirements of the NZBC; and,
- with roof supporting structures of timber framing with substrates of plywood; and,
- with substrates of suspended concrete slabs; and,
- situated in NZS 3604 Building Wind Zones, up to, and including 'Very High'.

2.2 Skellerup Bituclad Waterproofing Membranes have also been appraised for use as roof waterproofing membranes on specifically designed buildings within the following scope:

- with building structures designed and constructed to comply with the NZBC; and,
- with roof supporting structures of timber framing with substrates of plywood; and,
- with substrates of suspended concrete slab; and,
- subjected to maximum wind pressures (Refer Paragraph 8.1); and,
- with the weathertightness design of all junctions being the subject of specific design by the designer.

*Note: The design of these junctions has not been appraised by BRANZ and is outside the scope of this Appraisal.*

2.3 Roofs waterproofed with Skellerup Bituclad Waterproofing Membranes must be designed and constructed in accordance with the following limitations:

- nominally flat, curved or pitched roofs constructed to drain water to gutters and drainage outlets complying with the NZBC; and,
- constructed to suitable falls (Refer Paragraph 14.3 and 14.4); and,
- with no integral roof gardens.

Readers are advised to check the validity of this Appraisal by referring to the Valid Appraisals listing on the BRANZ website, or by contacting BRANZ.

2.4 The design and construction of the substrate and movement and control joints is specific to each building, and therefore is the responsibility of the building designer and building contractor and is outside the scope of this Appraisal.

2.5 The membranes must be installed by Viking Roofspec Licensed and Trained Installers.

### New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Skellerup Bituclad Waterproofing Membranes, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

**Clause B2 DURABILITY:** Performance B2.3.1 (b), 15 years. Skellerup Bituclad Waterproofing Membranes meet this requirement. See Paragraph 10.1.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.1 and E2.3.2. Skellerup Bituclad Waterproofing Membranes meet these requirements. See Paragraphs 14.1 – 14.9.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Skellerup Bituclad Waterproofing Membranes meet this requirement and will not present a health hazard to people.

3.2 This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance. The membranes are an alternative to the membranes specified in NZBC Acceptable Solution E2/AS1, and an **Alternative Solution** subject to specific design for other buildings not covered within E2/AS1.

4.1 Materials supplied by Viking Roofspec are as follows:

#### Bituclad Plain Sheet

- 3 mm thick modified bitumen, torch applied sheet waterproofing membrane with a sanded upper surface primarily used as a base layer in a double layer system. It is supplied in 1 m x 10 m rolls.

#### Bituclad Mineral Sheet

- 4 mm thick modified bitumen, torch applied sheet waterproofing membrane with an upper layer of mineral chip. The mineral chip finished membrane is used as a cap sheet in a double layer system. It is supplied in 1 m x 10 m rolls.

#### Skellerup Bitumen Primer

- Solvent-based bitumen primer for all substrates prior to the installation of the membrane. It is available in 20 litre containers.

#### Bituclad Vent Sheet

- Perforated (199 holes/m<sup>2</sup>), modified bitumen sheet membrane for use when a partially bonded waterproofing system is required. This system allows equalising of pressure in order to avoid blisters, dimensional stability of the waterproofing system and reduction of possible fatigue in the completed membrane caused by cyclic movement or microcracking. It is supplied in 1 m x 30 m rolls.

### Handling and Storage

5.1 Handling and storage of all materials whether on or off site is under the control of the Viking Roofspec Licensed and Trained Installers. Dry storage must be provided for all products and the rolls of membrane must be stored in an upright position.

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Skellerup Bituclad Waterproofing Membranes. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

### General

7.1 Skellerup Bituclad Waterproofing Membranes are for use on roofs, gutters and parapets where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas. The products can be used on new or existing buildings. Viking Roofspec should be consulted as to the suitability of any existing substrates prior to using Skellerup Bituclad Waterproofing Membranes.

7.2 The effective control of internal moisture must be considered at the design stage due to the impermeability of the membranes. Refer to BRANZ publication "Good Practice Guide – Membrane Roofing".

7.3 The 3.0 mm Bituclad Plain Sheet membrane is designed for use on roofs and gutters as the first layer of a double layer system and all areas requiring detailing such as upstands, protrusions, rainwater heads and outlets. The Bituclad Mineral Sheet membrane is used as the top layer of a double layer system.

### Structure

8.1 Skellerup Bituclad Waterproofing Membranes fully bonded double layer systems are suitable for use in areas subject to maximum wind pressures of 10 kPa Ultimate Limit State.

### Substrates

#### Plywood

9.1 Plywood must be treated to H3 (CCA treated). **LOSP treated plywood must not be used.** Plywood must comply with NZBC Acceptable Solution E2/AS1 Paragraph 8.5.3 and 8.5.5. Where specific design is used (i.e. outside the scope of E2/AS1) the plywood thickness and fixing size may increase and centres may decrease to meet specific wind loadings. Timber framing must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of AS/NZS 1170. In all cases, framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and all sheet edges are fully supported.

#### Concrete

9.2 Concrete substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101.

## Existing Construction

9.3 A thorough inspection of the substrate must be made to ensure it is in fit condition and does not contain any materials that will adversely affect the performance of the membrane.

9.4 Repairs must be undertaken, where applicable, to ensure the substrate is sound, the joints are sealed, and the flashings are sound. Plywood substrates must be checked for screw fixings, and if necessary refixed as for new plywood.

## Durability

### Serviceable Life

10.1 Skellerup Bituclad Waterproofing Membranes are expected to have a serviceable life of at least 15 years, provided they are designed, used, installed and maintained in accordance with this Appraisal and the Technical Literature.

### Chemical Resistance

10.2 Industrial air pollutants and windborne salt deposits should not significantly affect the durability of the membranes. However, the long term properties of the material may be affected by contact with petroleum-based products such as oils, greases and solvents.

## Maintenance

11.1 The membrane roof system, including any areas with a UV coating applied, must be regularly (at least annually) checked for damage, rubbish, debris or coating breakdown. Damage, such as small punctures and tears must be repaired and coatings reapplied as recommended by Viking Roofspec.

11.2 Special care must be taken when inspecting the membrane roof systems to ensure the continuing prevention of moisture ingress, and repairs must be undertaken where required.

11.3 Drainage outlets must be maintained to operate effectively.

## Outbreak of Fire

12.1 Separation or protection must be provided to the membranes and plywood substrate from heat sources such as flues and chimneys.

12.2 NZBC Acceptable Solution C/AS1 Part 9 and Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources.

## Spread of Fire

13.1 The membranes may be used on roofs of buildings intended for all Purpose Groups, including SC and SD, subject to the requirements of NZBC Acceptable Solution C/AS1 Part 7, Paragraph 7.11.1.

13.2 The membranes may be used for cladding fire-rated roof construction, providing the roof construction complies with the requirements of NZBC Acceptable Solution C/AS1 Part 7.

## External Moisture

14.1 Roofs must be designed and constructed to shed precipitated moisture. They must also take account of snowfalls in snow prone areas. A means of meeting code compliance with NZBC Clause E2.3.1 is given by the Technical Literature which aligns with details in NZBC Acceptable Solution E2/AS1.

14.2 When installed in accordance with this Appraisal and the Technical Literature, Skellerup Bituclad Waterproofing Membranes will prevent the penetration of water and will therefore meet code compliance with Clause E2.3.2. The membranes are impervious to water and will give a weathertight roof.

14.3 Roof falls must be built into the substrate and not created with mortar screeds applied over the membrane.

14.4 The minimum fall to roofs is 1 in 40 and gutters are 1 in 60. All falls must slope to an outlet. Inadequate falls will allow moisture to collect and increase the risk of deterioration of the membrane.

14.5 Allowance for deflection and settlement of the substrate must be made in the design of the roof to ensure falls are maintained and no ponding of water can occur.

14.6 Skellerup Bituclad Waterproofing Membranes are impermeable; therefore a means of dissipating construction moisture must be provided in the building design and construction to meet code compliance with Clause E2.3.6.

14.7 Drainage flanges must be used for any outlet and must be fitted with a grate or cage to reduce potential sources of blockages. An overflow must be provided where the roof does not drain to an external gutter or spouting.

14.8 Penetrations and upstands of the membranes must be raised above the level of any possible flooding caused by the blockage of roof drainage.

14.9 The design of details not covered by the Technical Literature is subject to specific weathertightness design and is outside the scope of this Appraisal.

## Water Supplies

15.1 Skellerup Bituclad Waterproofing Membranes have not been assessed for roofs used for the collection of potable water.

## Installation Skill Level Requirement

16.1 Installation of the membranes must be completed by Viking Roofspec Licensed and Trained Installers.

16.2 Installation of substrates must be completed by tradespersons with an understanding of roof construction, in accordance with instructions given within the Viking Roofspec Technical Literature and this Appraisal.

## Preparation of Substrates

17.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from ribs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents. All surface defects must be filled to achieve an even and uniform surface.

17.2 The relative humidity of concrete substrates must be 75% or less before membrane application. The concrete can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No. 424.

17.3 The moisture content of the plywood and timber substructure must be a maximum of 20% and the plywood sheets must be dry at time of membrane application. This will generally require plywood sheets to be covered until just before the membrane is laid, to prevent rain wetting.

17.4 Substrates must be primed with Skellerup Bitumen Primer and left to dry (4-5 hours) before the membrane is installed.

## Membrane Installation

18.1 The membranes must be installed in accordance with the Technical Literature.

18.2 All roof and wall junctions must have a 20 mm x 20 mm wooden fillet installed at the junction. Concrete substrate junctions must have a 20 mm x 20 mm cement mortar fillet installed. All external edges must be chamfered to a 5 mm radius to remove sharp edges.

18.3 The membrane must be unrolled without tension onto the prepared substrate and allowed to 'relax' for at least 30 minutes prior to installation.

18.4 The membrane is installed from the lowest point and each layer is installed across the roof fall allowing a 75 mm side overlap and a 150 mm end overlap. The cap sheet layer must be offset against the base sheet layer.

## Inspections

19.1 Critical areas of inspection for waterproofing systems are:

- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
- Moisture content of the substrate prior to the application of the membrane.
- Acceptance of the substrate by the membrane installer prior to application of the membrane.
- Installation of the membrane to the manufacturer's instructions.

## Health and Safety

20.1 Safe use and handling procedures for Skellerup Bituclad Waterproofing Membranes are provided in the Technical Literature. The products must be used in conjunction with the relevant Material Safety Data Sheets for each membrane.

The following is a summary of the technical investigations carried out:

## Tests

21.1 The following is a summary of the testing and test reports on Skellerup Bituclad Waterproofing Membranes:

- Istituto per le Tecnologie della Costruzione (ITC) for Tensile and elongation, flexibility at low temperature, resistance to static loading, resistance to dynamic loading, dimensional stability, flow resistance at elevated temperatures, adhesion of granules and nail resistance.
- ICITE for polyester reinforcement, coating mass, tensile strength, elongation, tear strength, dimensional stability, low temperature flexibility, heat resistance, unrolling at low temperatures slip resistance, water pressure, static and dynamic indentation, fatigue cycling, peel resistance, air pressure and tensile strength of joints.

The above test methods and results have been reviewed by BRANZ and found to be satisfactory.

## Other Investigations

22.1 A durability opinion has been provided by BRANZ technical experts.

22.2 Installation of the membranes has been assessed by BRANZ for practicability of installation and found to be satisfactory.

22.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

## Quality

23.1 The manufacture of the membranes has not been examined by BRANZ, but details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. The manufacturer of Skellerup Bituclad Waterproofing Membranes has been assessed and registered as meeting the requirements of ISO 9001/UNI EN ISO 9001.

23.2 The quality of the supply of products to the New Zealand market is the responsibility of Viking Roofspec.

23.3 Quality on site is the responsibility of the Viking Roofspec Licensed and Trained Installers.

23.4 Designers are responsible for the building design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of Viking Roofspec and this Appraisal.

23.5 Building owners are responsible for the maintenance of the membrane systems in accordance with the instructions of Viking Roofspec and this Appraisal.

## Sources of Information

- AS/NZS 1170 Structural design actions.
- AS/NZS 2269: 1994 Plywood – structural.
- BRANZ Good Practice Guide – Membrane Roofing, reprint October 2003.
- NZS 3101: 1995 The design of concrete structures.
- NZS 3604: 1999 Timber framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook Department of Building and Housing, Third Edition May 2007.
- The Building Regulations 1992, up to, and including June 2007 Amendment.



In the opinion of BRANZ, Skellerup Bituclad Waterproofing Membranes are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to Viking Roofspec A division of Viking Group Ltd, and is valid until further notice, subject to the Conditions of Appraisal.

#### Conditions of Appraisal

1. This Appraisal:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the technical literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. Viking Roofspec:
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
4. BRANZ makes no representation or warranty as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by Viking Roofspec.
5. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
6. BRANZ provides no certification, guarantee, indemnity or warranty, to Viking Roofspec or any third party.

For BRANZ

C Preston  
Chief Executive

Date of issue: 25 September 2007

**Amendment No. 1, dated 16 July 2008.**

This Appraisal has been amended to update the Appraisal Holder details.

**Amendment No. 2, dated 4 June 2009.**

This Appraisal has been amended to update the reference from NZS 4203 to AS/NZS 1170.

**Amendment No. 3, dated 13 November 2009.**

This Appraisal has been amended to update the Appraisal Holder and Product name.

Roofspec  
**Viking**



LEON

27 OCT 2011

26 OCTOBER 2011

KCDC  
PRIVATE BAG 60 601  
PARAPARAUMU 5254

ATTENTION: LEON SMITH

Dear Leon

RE: 155 FIELD WAY, WAIKANAE BEACH

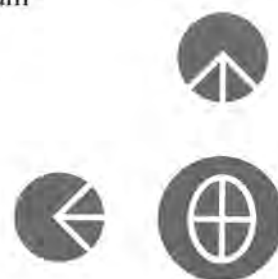
BC: 110554

REPLY TO REQUEST FOR FURTHER INFORMATION No. 1

ORIGINAL SHEETS SUPERSEDED: 4, 7, 13, 15 + Cover (Please destroy)  
AMENDED SHEETS: 4A, 7A, 13A, 15A + Cover A (1 A1 copy enclosed)  
FULL SET: 1, 2, 3, 4A, 5, 6, 7A, 8, 9, 10, 11, 12, 13A, 14, 15A + Cover A

Further to your letter dated 7 October 2011, we clarify the following:

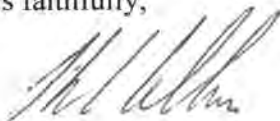
1. **Attached** is a copy of an email from ISP Consulting Engineers Ltd which confirms the suitability of the existing foundations to carry the new loads and points out that the engineer will confirm the capacity of the foundations in accordance with the original PS1.
2. Refer point 1 above.
3. **Sheet 4A** contains a box of notes entitled '*Single or Upper Level Studs*'. This duplicates information for stud sizes and centres found in NZS 3604:2011. We have expanded this box slightly to include information for 3.0m high studs.
4. Refer point 3 above.
5. A note has been added to **Sheet 4A** indicating the presence of a 2/140x45 lintel under the joists over the garage exit door. The outline of this wall can be seen under the joists on the '*Joist Layout Plan*' on **Sheet 6**.
6. As per NZS 3604:2011 Table 10.1, 240x45 rafters have a maximum span of 3.85m @ 600crs in High and Very High wind zones. Given that the maximum span is 3.67m it is considered that the rafter choice is suitable.
7. Refer **Sheet 15A**.



8. **Attached** are updated sheets from the Building Consent Application indicating method of compliance with F4 and F7.
9. It is acknowledge that the use of a membrane system as a cladding is outside the scope of NZBC E2/AS1. It is considered however, that the system shown is an acceptable 'alternative solution' which is common practice. As evidence of this we point out that the existing building was consented with the same method of extending the roof membrane up the back of the parapet.  
**Attached** is a copy of typical details from Skellerup demonstrating similar principles. Their website also offers images of membranes installed vertically up the full height of parapets.
10. We have revised the parapet details to replace the previously specified 7mm plywood substrate with 12mm plywood. It is our understanding that a reduced thickness of plywood (ie. 12mm vs. 17mm) is acceptable as a wall substrate due to it being non-structural and carrying significantly less load than a roof substrate.
11. While we acknowledge that the new E2/AS1 has slightly increased the required fall for membrane roofs and decks, we would point out that the previous E2/AS1 is still considered an 'acceptable solution' until January 2012. All literature we have read from the DBH refers to there being *two* acceptable solutions until that time (eg. <http://dbh.govt.nz/bc-update-116>). Furthermore we point out that the existing building has performed satisfactorily with a pitch of 1:40, and that this pitch is supported by manufacturer's literature and BRANZ appraisals.
12. Details showing a parapet capping have been modified to replace the birds beak drip edge with a 10mm kickout drip edge, to avoid any potential damage to the membrane from the edge of the flashing.
13. Additional details/sections through the internal gutter have been shown to better indicate the internal gutter construction and associated falls. Refer **Sheet 15A**.
14. We confirm that the membrane system to the lower level has been designed as an internal gutter. A minimum fall of 1:100 has now been indicated on **Sheet 7A**.

We trust the above information clarifies your concerns and processing of our application can continue.

Yours faithfully,



**KEVIN COLLINS**

6604

**Encls**

C.C. MR & MRS NAEF, 155 FIELD WAY, WAIKANAE BEACH 5036



9 September 2011

**KAPITI CITY COUNCIL  
PRIVATE BAG 60601  
PARAPARAUMU 5254**



**ATTENTION: CHIEF BUILDING INSPECTOR**

Dear Sir/Madam

**RE: 155 FIELDWAY, WAIKANAE BEACH REF: 6604-K SHEETS 1-14**  
**+ COVER SHEET**

Please find attached our application for '**Building Consent**' at the above address.

The documentation which formulates this application is:

- i) This letter
- ii) A cheque being the application fee
- iii) Council's application form
- iv) Council's check sheet
- v) Council's building calculation fee
- vi) One A1 set and one A3 set of Working Drawing Plans
- vii) One Certificate of Title with diagram
- viii) Two Specifications
- ix) Two Engineers details, calculations and producer statement
- x) Skellerup Bituclad waterproofing membranes BRANZ appraisal No.567(2007)
- xi) Ecoply plywood cladding manufacturers information
- xii) Gib Aqualine wet area systems BRANZ appraisal No.427(2007)

The timeframe for this application is important and it would be appreciated if this can be processed within the required statutory time period.

If you require any further information regarding this application please do not hesitate to contact us as soon as possible.

Yours faithfully

**KEVIN C COLLINS**  
6604-K



**KAPITI COAST DISTRICT COUNCIL**  
**CONSENT NOTICE PURSUANT TO SECTION 221**  
**OF THE RESOURCE MANAGEMENT ACT 1991**  
**FOR THE DEPOSIT OF LAND TRANSFER PLAN 91324**  
**BEING THE PROPOSED SUBDIVISION OF LOT 34 DP 85461,**  
**FIELD WAY, WAIKANAЕ,**  
**FOR THE PHARAZYN CHARITABLE TRUST**

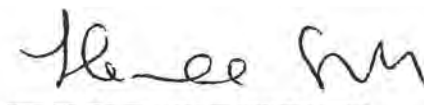
**The District Land Registrar at Wellington**

PURSUANT to Section 221 of the Resource Management Act 1991 the Kapiti Coast District Council hereby gives notice that it has consented to the proposed subdivision and the following condition is to be complied with on a continuing basis:

1. That specific foundation design by a registered engineer may be required for any new dwelling or additions and alterations to a dwelling within lots 1 – 8, and lots 10 - 20 land transfer plan 91324 in accordance with the recommendations within the soil test report prepared by Samcon Ltd. submitted with application No. RM 000117 a copy of which is available in Council's Resource Consents Office.

Issued in respect of application No. RM 000117 on this 28<sup>th</sup> day of August 2001.

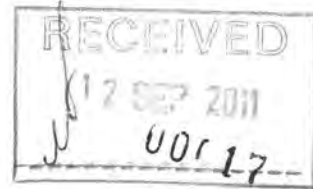
  
AUTHORISED OFFICER

  
AUTHORISED OFFICER



**Design Network**  
architecture limited

44 Queens Drive, Lower Hutt 5010  
PO Box 30614, Lower Hutt 5040  
office@designnetwork.co.nz  
T 04 569 6109 F 04 569 1186



PROPOSED

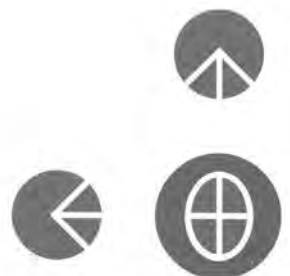
ALTERATIONS & ADDITIONS

AT

155 FIELD WAY

WAIKANAE BEACH

**SPECIFICATION**



**'Your Partner in Successful Development'**

NEW-development - NEW-design - NEW-trends - NEW-concepts

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# Conditions of Tender

1. **Tenderers Price:** Tenderers are requested to list their prices in the format of a pricing schedule.
2. Tenders are to be submitted to the owner.
3. **Validity of Tender:** Each tender shall remain available for acceptance for 30 days. If no tender is accepted within 30 days of the closing date then the owner may negotiate an extension of time with one or more of the tenderers.
4. **Contingency:** A contingency sum of 8% (eight percent) shall be allowed for in the tender.
5. **Retentions:** 5% retention held and released after the 60 day maintenance period.
6. **Scope of work tendered for:** Tenderers to tender to carry out the whole of the contract works. Tenderers may be asked to provide additional information during the tender evaluation period to clarify this requirement.
7. **Tags:** Should there be any discrepancy, omission, or obscurity in the tender documents, the tenderer to notify the owner within a reasonable time prior to tenders closing. An addenda will then be issued to all tenderers, setting out any amendment necessary to ensure an equal basis for all tenderers.

Where the tenderer does not notify the owner concerning any discrepancy, obscurity or omission which could affect the tender and the tenderer includes a tag or proviso, the tag will be considered valid, provided the tenderer clarifies the discrepancy, obscurity or omission and includes a monetary or time allowance to quality the tag as part of the tender.

Other additional conditions of tender included by the tenderer are deemed invalid.

8. **Check the site:** Tenderers to inspect the site and ascertain site conditions, including the effects of adjoining private and public properties. Tenderers to allow in their tender for all site or existing building conditions affecting the completion of the contract.

ACCESS to the site to be by prior arrangement with the owner.

9. **Time:** The owner requires the contract to be completed as soon as possible after access to the site is available. Tenderers to state in their tender the time they require to complete the contract. Time is of the essence of the contract and this will be taken into account when awarding the contract.

In stating the time required to complete the contract, tenderers to make due allowance for all statutory and annual holidays occurring during the contract period. Allowance to also be made for normal seasonal weather conditions and for the importation or supply of materials and components.

10. **Lump sum:** Tenderers to tender on a lump sum basis. Where a TENDER SUMMARY is required, tenders to submit an itemised breakdown of their tender in the form provided.
11. **Acceptance:** The owner reserves the right to reject any tender. The lowest tender or any tender will not necessarily be accepted.
12. **Return of documents:** Tenderers to return documents with their tender.

# Statutory and General Conditions

## 1. BUILDING CODE

Notify the Building Consent Authority (BCA) of all inspections required and listed on the Building Consent. Keep a written record of all visits to site of the BCA, listing the inspection undertaken and countersigned by the BCA.

Pay all costs for inspections not listed on the list of required inspections. Pay all costs for re-inspections of work.

## 2. CODE COMPLIANCE CERTIFICATE

Notify the BCA on completion of the work and obtain the Code Compliance Certificate. A clear Code Compliance Certificate is a prerequisite of practical completion.

## 3. DURABILITY

Provide a "Producer Statement" at the completion of the contract stating that all products and materials have been installed in accordance with the manufacturer's instructions to meet the durability requirement set out in the Building Act or Building Code.

The "Producer Statement" shall be in the form set out in the Building Act.

## 4. HEALTH AND SAFETY

The Contractor shall be in full control of the site, their employees and their subcontractors and is therefore deemed responsible for compliance with the Health and Safety in Employment Act 1992.

The Contractor shall furnish a copy to the client and have a copy on site of a health and safety plan that identifies but is not limited to:

- Company's safety policy
- Company's safety training procedures
- Company's recent safety record
- Site safety management organisation
- Site safety personnel
- Procedure for identifying and assessing hazards
- Procedure for recording accidents
- Procedure for dealing with emergencies that may arise while employees are at work
- Procedure for monitoring health and safety performance
- Procedure for monitoring the health of employees where they are exposed to hazards
- The Contractor will erect a netting barrier around the construction site.

## Preliminary & General

- 1.1 This specification is general and all relevant clauses to apply. The contract is to construct, completely finish the various works described and indicated on the plans. The following applies to all trades.
- 1.2 The contractor shall visit the site and ascertain the nature and extent of the work, the rights and interests which may be affected, the foundation levels and any other matter which may influence the contract.  
  
The contract price tendered shall be deemed to be all-inclusive and shall not be subject to adjustment without approval of the owner.
- 1.3 The contractor and all sub-contractors shall comply with the requirements of supply authorities, and as a minimum, the requirements of the New Zealand Building Code (NZBC), **NZS 3604:2011**, the relevant New Zealand Standards and subsequent amendments.
- 1.4 The contractor shall secure all necessary permits, arrange all necessary inspections and tests, and meet all charges in connection therewith.
- 1.5 The time for completion and other details for the General Conditions will be arranged with the successful tenderer and made binding in the contract
- 1.6 The contractor shall supply everything for the due and proper completion of the contract and everything desirable in accordance with the usual customs of the various trades concerned. All materials shall be new and shall be the best of the various kinds specified or implied.
- 1.7 The contractor shall set out the work accurately, supply and remove all temporary work, protect all shrubs, trees, hedges and other property that could possibly be damaged by the work; make good any damage to fences, grounds and other property; remove from site all rubbish as it accumulates; and attend on and make good after all sub-contractors.

### 1.8 **DOCUMENT CLARITY**

All aspects of this project are to comply with **NZS3604:2011** and the **NZBC**.

All aspects of this project are to be inspected by the Building Consent Authority. The BCA may request certain inspections to be carried out by a Chartered Engineer. A CCC is to be issued at completion of project.

The addendum takes precedence over the specification.

The drawings take precedence over the addendum and specification.

## 1.9 SITE

The contract is based upon the site conforming with:

- (a) Levels and/or contours as shown on the drawings together with specific foundation details drawn or specified.
- or
- (b) Level site.

The sub soil is of sufficient strength as to necessitate only the minimum foundations requirement of the Local authority or Lending institution, unless otherwise drawn or specified.

## 1.10 DRAWINGS AND SPECIFICATIONS

This specification is to be read in conjunction with the plans, working drawings and any other detail drawing which may be issued. All figured dimensions shall be taken in preference to those scaled. All detailed drawings shall supersede those to smaller scale.

If any error or inconsistency should appear in or between the drawings and specifications, the drawings shall take precedence and such differences are to be referred to the designer for interpretation.

## 1.11 INSURANCES

Prior to commencing construction of the contract, the contractor shall purchase the following insurance for the period of the contract (excluding maintenance).

- (a) Broadform Public Liability insurance providing insurance protection against legal liability arising from accidental physical damage to others property.
- (b) Contract Works insurance insuring against accidental physical loss or damage to the project or building during the course of construction, ie the contract period.

## 1.12 MAINTENANCE

Where required by the Agreement between the owner and the contractor the contractor shall undertake to remedy any defects in the dwelling within 31 days after completion.

The owner will notify the contractor in writing of any items which require rectifying within 31 days.

## 1.13 VARIATIONS

No variations shall be considered unless the contractor prepares a separate estimate for such work.

The contractor shall not be obliged to undertake any variation until the owner has given approval by signing and returning the variation to the contractor.

## 1.14 MONETARY ALLOWANCES

A prime cost (P.C.) sum shall be varied by the substitution for the prime cost sum of the actual price paid by the contractor for the particular work or materials supplied and the contract price shall be increased or decreased (as the

case may be) by the amount by which such sum is varied. These shall be added to or deducted as the case may be, a sum representing such percentage as is normally charged by the contractor, but in no case shall such percentage exceed ten percent of such variation.

**1.15 TEMPORARY SERVICES**

The contractors shall provide and maintain all temporary services necessary for the work, and give notices and pay all dues in connection therewith.

**1.16 SETTING OUT**

The contractor/or his employees shall be responsible for setting out the works as shown on the drawings and to maintain set out level pegs and control pegs during the currency of the contract. It is the contractor's responsibility to arrange a surveyor for set-out. All costs associated with surveyor set-out shall be included in the contract.

**1.17 COMPLETION**

The contractor or his employees shall remove all rubbish and equipment accumulated during construction, remove all temporary work and leave all services in good order, rake out all rubbish, leave floors broom clean and windows whole and clear.

**1.18 MATERIALS SUBSTITUTION**

Where the use of Brand names are used in this specification, substitution may be made, provided the substitute materials used are of equal or better quality than the item being replaced.

**1.19 SCAFFOLDING**

The contractor is required to provide the necessary scaffolding, lifting equipment and protective measures required by the contractors, to the satisfaction of the Scaffolding Inspector and in accordance with the OSH requirements.

**1.20. SPECIALIST PRODUCTS**

The insertion of the name of any firm or proprietary article in this specification is to be read merely as an indication of the class or quality required, such goods may be obtained from any other firm subject to the approval of the Designer.

# Carpentry

## PRELIMINARY

The whole of the works shall be carried out in accordance with and shall conform to the NZBC and Regulations of the Local Authority and Mortgage Institution.

The contractor shall obtain all permits and pay all inspections and prepay other fees necessary for the carrying out of this contract. This work includes provision of all labour, materials and equipment necessary to complete the job.

Allow for proper completion of work not detailed, but reasonably inferred or intended by the drawings and specification.

Complete work according to best trade practices and to the satisfaction of Local Authorities, current Building Codes and Standards, in particular **NZS 3604:2011**

Moisture content: Maximum allowable equilibrium moisture content (EMC) in accordance with BRANZ Bulletin 343 for:

1. Framing at erection 24%
2. Framing at enclosure 20%
3. Framing at lining 16%
4. Timber strip flooring 10% (at time of laying)

Sub-floor framing: Frame up off foundation walls and piles, all fabricated, fastened and braced to **NZS 3604:2011 section 6**.

Wall framing: Frame to required loading and bracing complete with lintels, sills and nogs, all fabricated and fastened to **NZS 3604:2011 section 8**.

Roof framing: Frame to required loading and bracing complete with ridge boards and purlins.

Insulation: Fit insulation as specified on the working drawing plans to **NZS 4246:2006** and to the manufacturer's recommendations.

## EXTENT OF WORK

Comprises the supply and fixing of all timberwork, lining, sheathing, fittings, finishings and hardware specified or otherwise required as shown to the best trade practice.

Co-ordinate with all trades to assure most time effective completion of the job. Ensure all blocking, fixings, trims etc. are in place for Plumber, Electrician and other trades. Maintain a clean and tidy site at all times during construction.

Provide and fix all necessary beads, stops, fillets, etc as may be required to leave work in a tidy and complete manner. Leave all working parts in good working order.

## **MATERIALS**

All materials shall be new unless otherwise specified and the best of their respective kinds.

All timbers shall be as specified and graded according to **NZS 3602:2003** and shall be straight and in as long lengths as procurable. All treated timbers shall be in accordance with the timber preservation Council regulations. Framing timbers to which linings are to be fixed should be gauged to eliminate variations in sizing. Exposed exterior and interior finishing is to be machine dressed to a constant thickness and width.

## **WORKMANSHIP**

Workmanship of the best shall be employed in thoroughly securing and framing together spiking or bolting down as may be required.

All nails in exposed work are to be punched below the surface.

The contractor is to install all materials as detailed on the plans or if not shown strictly in accordance with the manufacturers details.

## **PAINT PRIMING**

All exposed exterior woodwork including laps, rebates mitred joints, etc. where paint finished shall be primed and where stain finished shall have one coat of stain prior to fixing.

## **BUILDING PAPER**

Provide breather-type building paper wrap complying with **NZS 4200:1994** and secure to the exterior face of stud framing or sheet bracing material. Run building paper horizontally with upper sheets lapping over lower not less than 75mm. Adequately secure to plates, bearers and studs, extending from upper side of top plate to the underside of the bearers of wall plates supporting the ground floor joists. Replace or adequately repair immediately before fixing exterior sheathing if punched or torn.

## **TIMBER GRADES AND TREATMENTS**

The builder shall allow for all timber to be in accordance with **NZBC B2/AS1**, **NZS 3602:2003**, **NZS 3603:1993** and **NZS 3604:2011**. Refer to working drawing plans for specific items.

## **FLOOR JOISTS**

Floor joists shall be of the sizes, and at the centres indicated on the drawings. Gauge joists level and in straight lines. Provide minimum landing of 32mm on their supports except for cantilever joists. Joists may be butted over supports except joists to which diagonal bracing is attached. These joists and every third joist shall be lapped 300mm over the centre of a support or shall be 300mm timber flitch plate centre on the joint and connected to each joists with 4/100mm nails to each joists. Alternatively 2 connectors each having a capacity of 3 kN each may be used.

Provide double joists under all load-bearing walls. Double joists may be separated by 50mm packings at not more than 600mm centres. Non load-bearings walls shall be

over joists or may be supported by 100x50mm blocking between parallel joists at each end of the wall, at each side of door openings and at not more than 1.2m centres.

Provide full depth blocking or herring-bone strutting at the mid span of all joists exceeding 2.40m span or as indicated on the drawings. All joists shall be fixed to supporting bearers, beams or plates as required by the nailing schedule in **NZS 3604:2011 – Table 7.5** with additional fixings as required.

#### **PROPRIETARY FLOOR JOISTS**

Proprietary joists are to be as per size and location indicated on the drawings. Penetrations and installation of joists are to be in accordance with the manufacturer's details and specification

Follow all details from the manufacturer in regards to transportation, storage and handling to avoid damage.

#### **WALL FRAMING**

All wall framing is to be fabricated by a recognized and approved pre-nailer. It is the pre-nailers responsibility to allow for, install and provide all necessary fixings to prevent uplift to all frames, joints and connections.

Frame up for walls and partitions as required. Studs shall be cut square at ends or true to angles of gable or sloped frames. All studs shall be continuous for their full length from top to bottom plates including plates at roof level on gable frames. Fix ribbon plate to studs for fixing ceiling joists at gable and frames. Stud spacings to be 600centres maximum or less as required for loadings and linings.

Cuts or notches in framing to allow a pipe, waste or vent to pass through must be sized and located in accordance with **NZS 3604:2011 – Figure 8.4 (Studs) & Figures 8.19 & 8.20 (Top plates)**. Where holes or face notches exceed 50% of the width of the bottom plate, fix the plate against sideways movement on each side of the hole or notch, with one 100mm x 3.75mm nail.

Framing shall generally be out of 100x50mm No 1 framing grade H1.2 treated pinus radiata or MSG kiln dried.

Top and bottom plates shall be sizes complying with **NZS 3604:2011 Tables 8.16 & 8.17** and as required. Studs shall be of sizes and at the centres shown on the drawings and comply with **NZS 3604:2011 – Table 8.2**. Provide two rows of dwangs in the height of each wall to provide stiffness to framing and support for linings.

It is the pre-nailers responsibility to ensure that all studs and plates are of the required dimensions and spacings to suit their purpose. Contact the designer to clarify any loadings etc. if necessary before fabrication.

#### **LINTELS**

Lintels shall be of sizes shown on the drawings and complying with **NZS 3604:2011 – Tables 8.9 to 8.13**.

Lintels not exceeding 250mm deep shall be supported by 45mm thick doubling studs in accordance with NZS 3604:2011 - **Figure 8.5**. Lintels shall be fixed to trimmer studs and trimmer studs to floor joists at the bottom with 25mm galv. straps or other similar fixings as required by NZS 3604:2011 – **Figure 8.12 & Table 8.14**.

All nailing of treated framing shall be as shown in the nailing schedule in NZS 3604:2011 – **Tables 8.19 & 4.3**.

### **BRACING**

All bracing elements shall be located strictly in the positions shown.

Bracing shown on the drawings is required to satisfy the requirements of NZS 3604:2011. The contractor may provide additional bracing to hold frames square and true during erection.

The plan lengths of bracing elements shall not be less than that shown on the drawings or in the bracing schedule.

Cladding or linings forming part of the bracing element shall be fixed to the framing **ALL ROUND** with fixings at centres set out strictly in accordance with the manufacturers details. Refer to the corrosion zone on the plans to determine the required treatment of all fixings.

### **ROOF AND CEILING FRAMING**

Frame up for roof as required.

### **PURLINS**

Securely fix purlins as required. Purlins shall be set out equally along the length of the rafter at centres not greater than shown on the drawings. Fix purlins to rafters with nailing as required by NZS 3604:2011 – **Tables 10.10 & 10.11** plus any additional fixings as required.

### **EXTERIOR CLADDING**

Exterior cladding shall be as shown on the drawings. All materials shall be fixed according to the manufacturer's instructions and details according to the best accepted trade practices. All linings shall be fixed over breather-type building paper. All fixing nails shall be galvanized or other non-corrodible metal as noted on the drawings. Refer drawings for corrosion zone requirements.

### **SOFFITS**

Where required line soffits with 4.75mm Hardiflex. Lining shall fit close to wall framing. Joints in sheets shall be set into extruded PVC mouldings. Fix with galvanised shear-point nails.

### **FLOORING**

Lay 20mm ply flooring as shown on the drawings. Joints in sheet flooring shall be made over supports. Where necessary provide 75x50mm dwangs between joists to provide this. Fix flooring to joists not less than 10mm from edges around all edges of the sheets and at each intermediate joist at centres shown in the nailing schedule. All joints to be nailed and glued.

### **INTERIOR LININGS**

All interior linings shall be fixed strictly in accordance with the manufacturer's recommendations. All lining material shall be carefully stacked and handled on site to prevent damage.

### **PLASTER BOARD**

Where required line walls with standard 10mm plaster board or other types specified on drawings.

Sheets may be fixed horizontally or vertically according to details provided by the manufacturer except that where the lining forms part of a wall bracing element or ceiling diaphragm nailing shall comply with the manufacturers nailing schedule and each sheet shall be fixed on **ALL EDGES**. Where plaster board forms part of a wall bracing element or ceiling diaphragms, they shall be fixed to framing all round and at intermediate framing as set out in the manufacturers nailing schedule.

Except at bracing elements or ceiling diaphragms, linings may be fixed to framing using manufacturer approved adhesive with supplementary nailing.

Leave 3mm min. gaps between sheets at joints. Where wallpaper is to be applied stop joints and nails with 4F stopping plaster or approved stopping compound feathered out approximately 100mm on each side of the joint and trowelled to a smooth, even surface. Where walls are to be painted joints and corners shall be finished using approved bedding compound with stopping feathered out at edges. After stopping has set sand lightly to a smooth surface using 120 grit abrasive paper. Fix timber or expand metal strips at external corners of linings before stopping.

### **INTERIOR FINISHING TIMBERS**

Provide and fix all skirtings, architraves, scotias, sill boards and others mouldings and beadings required to complete the works. If not shown on drawings, mouldings are as follows or to match existing.

Where finishing timbers are specified to be clear finished they shall be heart rimu unless otherwise specified. Elsewhere they may be finger jointed pinus radiata, MDF or other approved.

Skirtings shall generally be out of 100x25mm timber, bullnosed with grooved back. Mitre corners and glue joint when fixing.

Architraves where required shall be out of 50x25mm timber with grooved back. Mitre corners and glue joint when fixing.

Drill holes for fixings at ends of all finishing timbers and fix with 40mm long panel pins. Any splits which occur through failure to drill holes or the use of excessively large nails shall be glued to prevent later opening up. Split timbers will be rejected.

Before fixing in place all finishing timbers shall be hand sanded to a surface satisfactory and acceptable for the proposed method of finishing.

**HARDWARE**

The contractor shall allow in their tender a PC sum for hardware. Allow for taking delivery of and fixing of all items supplied from the PC sums (see P & G ). Items to be charged against PC sums shall include door latches, locks and towel rail, and other similar items; but shall not include nails, bolts, screws, hinges or similar miscellaneous connecting devices or fixings.

**FLASHINGS**

Ensure the delivery of machine folded flashings for exterior doors and windows (0.6mm powder coated aluminium) and install above and around as detailed or otherwise required.

# Plasterboard Linings

## GENERAL

**SCOPE:** This section deals with the supply, fixing, stopping and repair of plasterboard sheets and accessories to walls and ceilings as shown on the drawings.

**NZ BUILDING CODE:** Refer to the following NZ Building Code clauses and Approved Document paragraphs for the criteria and/or methods that must be used in this section to establish compliance with the Code.

- E3/AS1 Internal Moisture: 3.1 Lining Materials

**DOCUMENTS** referred to in this section are:

- AS/2589:1:1997 Gypsum Linings in Residential & Light Commercial Construction - Application and Finishing
- NZS 3604:2011 Timber-framed Buildings
- NZS 4221 Specification for Fibrous Plaster Sheet
- ISO 6308 Gypsum Plasterboard
- ASTM C 630.78 Water Resistant Backing Board
- Interior Systems Association Document - Levels of Finish

Documents listed above and cited in the clauses which follow are deemed to form part of this specification. However this specification takes precedence in the event of it being of a higher standard than the cited documents.

**LEVELS OF FINISH:** Stop with approved stopping compound and finishing compound and sand all in accordance with manufacturer's recommendations to provide levels of finish to standards laid down in the manufacturer's installation manual as follows:

- Level 4: Surfaces receiving light texture/wall covering finishes.
- Level 5: Surfaces receiving thin coating finishes.

**EXTERNAL ANGLE:** Slim type 0.5mm galvanised steel.

**CASING BEAD:** Slim type 0.5 galvanised steel/pvc.

**CORNICE:** Plasterboard scotia type or timber to match existing or new as detailed.

**STANDARD SHEET:** Plasterboard 10mm and 13mm thick, tapered edge, to ISO 6308.

**FIXINGS:** Screws and glue as specified as per product manufacturer instructions.

**JOINTING:** Compound and tape to board manufacturer's recommendation.

**ADHESIVE:** Multi-purpose water based wallboard adhesive.

**SUBSTRATE:** To **NZS 3604:2011** and standard required by manufacturer's recommendations. Starting work means acceptance by the sub-contractor.

**PROTECT** all joinery, fittings and finishes already in place from water staining or damage. Make good immediately any damage that occurs.

**LEVELS OF FINISH:** Before commencing work, agree finishes with contractors and sub-contractors, upon the surface finish assessment procedures necessary to ensure that the levels of finish specified are obtained. Commencement of work will be deemed to constitute acceptance of previous finish.

**PLASTERBOARD REPAIRS:**

- Cut out damaged areas back to studs and nogs in gypsum or fibrous plaster wall or ceiling (nominal 600 x 600) and repair with new plaster board including stopping. Provide continuous support to all edges and joints. Install and fix sheets to manufacturer's instructions.
- Re-stop defective gypsum or fibrous plaster lining, including renailing as required.
- Re-stop defective joints in gypsum or fibrous plaster, including renailing as required.

Lightly sand off all repairs to match existing and in accordance with manufacturers' recommendations.

**LINE CEILINGS** and fasten with adhesive/screw system to manufacturer's recommendation. Refer plans for sheet thickness.

**LINE ALL WALLS** by method specified on the plans, with tapered edge sheets and fasten with adhesive/nail system to manufacturer's recommendations. Standard, bracing, wet-area or other types of plaster board are to be installed in locations as shown on the working drawing plans.

**LINE WET AREA WALLS** with Aqualine tapered edge sheet using adhesive/nail fixing to studs at centres all to suit the surface finish and to manufacturer's details. Seal all edge joints.

**EXTERNAL ANGLES:** Fix full length to all external corners with clouts at 100mm each side staggered.

**CORNICE:** Fix with adhesive and all joints scribe fitted to manufacturer's recommendation.

**JOINTS:** Fill recess with bedding compound, centre the tape, apply second coat of bedding compound followed by a coat of finishing compound, allow to dry and lightly sand off, all to manufacturer's recommendations.

**STOPPING:** Fill nail holes and flush up external angles with two successive coats of bedding compound followed by a coat of finishing compound, allow to dry and lightly sand off, all to manufacturer's recommendations.

LEVELS OF FINISH shall be as follows:

- Wet Areas            Paint Finish                            Level 5
- Dry Areas            Wallpaper                                    Level 4
- Paint Finish                                Level 5

All plaster board to be installed to AS/2589:1:1997.

	LEVEL 3	LEVEL 4	LEVEL 5
Framing requirements Maximum deviation from a 1800mm long straight edge along or across adjacent framing members.	90% of measured points must be less than 5mm. 10% may be less than 6mm.	90% of measured points must be less than 4mm. 10% may be less than 5mm.	90% of measured points must be less than 3mm. 10% may be less than 4mm.
Moisture content of timber framing at the time of lining	12-16% Recommended lower moisture content (8-10%) if air conditioning or central heating is to be installed.		
Installation requirements Wall joints	Sheets must be set out to minimise joints. Generally this requires horizontal fixing.		
Joints round openings	Vertical joints must not coincide with the edge of windows or door. If a joint needs to be made in this area it must be made above the opening no closer than 200mm to the edge of the opening		
Control joints	At 9.0m centres in either direction.		
Sheet end butt joints in ceilings	Must be made centrally between ceiling battens and back-blocked. Butt joints must be staggered by 600mm min.		
Tapered edge joints in ceilings	Back-blocking not required but procedures for Level 4 is recommended.	Must be back-blocked in any area containing 3 or more edge joints, ie areas greater than 4.8m wide. This can be increased by 6 joints (>8.4m) if steel ceiling battens have been used.	All joints to be back- blocked.
Finishing requirements	All joints must have paper joint tape embedded in joint compound plus one additional coat of joint compound applied over all joints, angles, accessories and fastener heads.	All joints must have paper joint tape embedded in joint compound plus two additional coats of joint compound applied over all joints angles, accessories and fastener head.	
	All joints must be finished smooth with minor tool marks and ridges acceptable	All joints must be finished smooth with no tool marks or ridges acceptable.	
			Skim coat all surfaces to remove differential surface textures and porosity.

CLEAR away rubbish, clean and make good any soiled or damaged surfaces arising out of the work of this section.

# Electrical Installations

## SCOPE

This section deals with the wiring for power and lighting complete with all componentry and electrical fittings and connected back to the electrical authorities supply.

## NZ BUILDING CODE

Refer to the following NZ Building Code clauses and Approved Document paragraphs for the criteria and/or methods that must be used in this section to establish compliance with the Code.

G9/VM1 ..... Electricity.

**COMPLY** with Electricity Regulations 1997 for listed and prescribed work and with the utility network operator's requirements. Apply for the service connection. Arrange for the required inspections of listed work. Pay all fees.

**ALL WORK** shall be carried out in by or under the direct supervision of a holder of a practising certificate under the Electricity Regulations 1993.

## CERTIFICATE OF COMPLIANCE

Carry out the prescribed electrical work, test and compete a certificate of compliance, as required by Electricity Regulations 1997 and particularly clauses 16, 34 and 35. Allow utility network operator to sight before meter installation, listed work inspection, polarity check and livening of supply. Supply the certificate to owner.

## MATERIALS

Mains underground, single phase: Tough plastic sheathed neutral screeded cable to NZS 6401 with a minimum rating of 60 amps per phase.

Cables: Tough plastic sheathed copper conductors t NZS 6401

Lighting Circuits	1.5mm <sup>2</sup> on 10amp MCB's
Power Circuits (domestic)	1.5mm <sup>2</sup> on 16amp MCB's
Power circuits (commercial)	2.5mm <sup>2</sup> on 20amp MCB's

Meter box: Rust protected metal case (glass panel door), all powder coated and completed with meter mounting, main switch and fuse.

Distribution board: Compete with neutral and earth busbars, MCB's and 60 amp main switch, complete with removable insulated panel. Include 2 spare MCB's labelled as "spare". All protective devices to be 6kA MCB's of the appropriate rating.

Wall boxes: Standard size in plastic, with 2 or more gang size in metal, all screw fixed.

Switch units: 16 amp, 230V flush polycarbonate units. For number of switches per unit, dimmer units, neon (indicator or toggle) units.

Hot water system switch: One way 20 amp switch complete with clamp for flexible PVC tubing.

Switched socket units: 10 amp, 230V flush polycarbonate 3 pin combined switch units. For the number of single and double socket units and inbuilt earth leakage socket units refer to the drawings.

Shaver and protected socket outlets: Earth leakage protected 110/230V multiple plug configuration and residual current protected socket outlets, tripping at 30 mA.

Shaver and protected socket outlets: Isolating transformer-protected units to AS/NZS 3194.

Ceiling: White plastic mounting base with screwed cover and to be terminal type.

Batten holders: Standard white plastic with angled cap and brass liners.

Light fittings: As required and to be confirmed by the client.

Bell system: Supply a bell transformer as part of the distribution board.

TV aerial: Selected aerial, co-axial cable and outlets, suitable for both VHF and UHF reception.

Wall heaters: As required and to be confirmed by the client.

Electric-powered fittings and equipment: As detailed on the working drawings or as directed by the owner.

Selections: Confirm all selections and locations with the owner in writing before ordering.

### **PREPARATION**

Lay underground mains to the utility network operator's requirements. Allow for trench excavation and backfill.

Meter box: Fit to the manufacturer's recommendations, level and plumb where shown on the plan. Recess into the external wall; flash to weatherproof.

Distribution board: Fit to the manufacturer's recommendations, level and plumb where shown on the plan or as directed by power supplier. Recess into the wall. All labelling to be completed and include a warning notice if light dimmers are used in the installation.

### **EXECUTION**

Cabling: Design layout with a maximum of 8 light outlet units or 4 switched socket units on any circuit. All cabling to be run concealed. No TPS cable to be laid directly in concrete and all holes in timber framing for the passage of cables to be at the centre line of the timber member.

Switch and socket units: Fit all single and double switch units and socket units level and plumb where shown on the drawings or as directed by the owner. Install at the following heights (to the centre of the unit) unless shown otherwise on the electrical drawings.

Switch Units:	1000mm
Socket Units:	150mm above work benches 400mm elsewhere

Label all switch units which control electrical equipment by engraving on the rocker switch.

Light fittings: Install selected light fittings in the locations and /or heights shown on the drawings and in accordance with the manufacturer's recommendations.

Emergency/Exit light fittings: Install selected fittings in the location and heights shown on the drawings and in accordance with the manufacturer's recommendations.

Hot water system: Wire as a separate circuit through a wall-mounted isolating switch, with the cable from switch to element encased in flexible PVC hose, clamp fixed at each end. Hot water cylinders, thermostats and 3000 watt element supplied and fitted under 7001 water supply.

Plumbing fittings: Wire for all fittings to the Electricity Regulations 1993 and to the manufacturer's recommendations.

Electric-powered fittings and equipment: Provide, install and wire all selected fittings and equipment to the Electricity Regulations and the manufacturer's recommendations. Refer to the drawings for required layouts and locations for equipment.

Siteworks: Provide circuits and connections for site installations, including 12 volt path lighting and electronic irrigation systems. Refer to the drawings for required connection points. High current capacity wiring to be used for all 12 volt system wiring.

Earthing: Provide a plastic toby box or UPVC tube to contain and protect the earth pin. Fix the connecting earth wiring closely and securely against wall surfaces.

# Painting and Paperhanging

## GENERAL

Painter qualification: All work to be carried out by competent and experienced painters and paperhangers.

Health and safety: Refer to the requirements of the Health and Safety in Employment Act 1992 and if elimination or isolation is not possible, then minimize the hazards in this work.

Refer to AS/NZS 2311:2000 for the recommended procedure and precautions when:

Treating/removing lead based paint

Burning off paint

Sanding off paint

Using solvent-based paint removers

## MATERIALS

Paint types: To AS/NZS 2311:2000 for exterior / interior primers, undercoats, sealers, stains, clear coatings, solvent-borne paints.

Wallpaper: To be selected and confirmed by client.

## PREPARATION

Gap fillers: To be linseed oil, putty, plastic wood, wood filler or plastic filler, to suit and to match the surface being prepared.

Inspect all surfaces to be painted and report to the owner any that will not, after the preparatory work laid down in AS/NZS 2311:2000, allow work of the required standard. Confirm that all areas have adequate lighting and are sufficiently free of other constrictive activities to enable painting and / or paperhanging work to proceed.

Cover up all adjoining surfaces and areas liable to damage or over-painting.

Remove all hardware liable to damage or over-painting and replace on completion.

Where necessary to prime or seal surfaces before or while other materials are being built in, arrange with those concerned to inform the painter when this work is required.

Wallpaper: Confirm that all rolls of each pattern are from the same batch.

## EXECUTION

Painting systems – exterior: To the manufacturer's recommendations and AS/NZS 2311:2000

Painting systems – interior: To the manufacturer's recommendations and AS/NZS 2311:2000.

Carry out all work within acceptable temperature and humidity limits and with all timber dry and in the equilibrium moisture content range required by AS/NZS 2311:2000.

Prepare surfaces to be coated by making good all damage and defects. Gap filler to be linseed oil putty, plastic wood, wood filler or plaster filler as appropriate to the surface and to the paint manufacturer's recommendations.

Apply paint by brush and / or roller to suit the location of the coating to AS/NZS 2311:2000. Do not spray on site without express permission.

Refer to the paint manufacturer's manuals for and follow their preparation, sequence and application recommendations applying to each system. Correct defective work immediately, with recoating to follow the systems recommendation.

All paint coats in any system to be supplied by the same manufacturer.

Scuff between all coats to remove any dust pick-up, protruding fibres and coarse particles.

All finished paint surfaces to show uniformity of gloss and colour, to have the correct thickness for each coat and freedom from painting defects such as tackiness and conspicuous brush marks. Finished work to be clean and free of any disfigurement.

Wallpaper: Seal or size walls. All drops to be full-length, completely glued, pattern matched and hung vertically without bubbles or visible butt joints. Scribe cut paper 2mm onto surrounding trim.

Selections: Confirm all selections, colours and finishes for both paint and wallpaper with the owner, before commencing work.

### **COMPLETION**

Clean all adjoining surfaces, glass and fittings of any paint contamination.

Replace all hardware without damage to the hardware or the adjoining surfaces.

Take away from the site all unused painting materials and equipment.

# Aluminium Windows and Doors

## GENERAL

SCOPE: This specification covers all aluminium windows and exterior doors.

Submit full size section samples, with the selected finish through all profiles offered. Provide evidence from a IANZ (formerly TELARC) registered laboratory that the windows offered comply with the requirements of NZS 3504:1979 & Amend:1:1988 and the required site and building design wind pressure, air leakage and water leakage levels to NZS 4211:1985.

## MATERIALS

Aluminium windows and doors: To be fabricated by a member of the WANZ. Nominate brand and type for approval. The owner reserves the right to reject any nominated brand and request the nomination of alternatives.

SECTIONS: All aluminium members to be formed from extruded sections. Folded sections restricted to flashings and concealed members only.

JAMB REVEALS: Pine, Rimu or as specified on plan. Check with owner before fabrication.

Organic powder coating finish: To BRANZ Bulletin 349 "Finishes for Aluminium" and the Window Association of New Zealand's "Specification for powder coatings on architectural aluminium products". All finished surfaces to show uniformity of gloss and colour (to match approved sample), free of all coating defects.

Minimum thickness (microns): As specified by manufacturer to comply with corrosion zone

Colour: to be selected and approved by owner

Anodising: To BRANZ Bulletin 349 "Finishes for aluminium" and AS 1231:2000

Hardware: To be selected and confirmed by the owner

Glass, Float: To NZS 4223:1985, part 1, 101.2.2. Thickness as required by NZS 4223:1985, part 1 and AS/NZS 2208:1996

Glass, Patterned: Translucent, annealed, rolled glass with a decorative pattern on one surface

Glass, laminated: To Grade A safety glazing material requirements with PVB (poly vinyl butylenes) or CIP (cast in place) resin interlayer

Glass, toughened: To Grade A safety glazing material requirements

Glass units, sealed insulating". To the performance requirements of NZS 4223:1985, part 2, clause 209.

Glass, float solar: Float glass, body-tinted or coated, single glazing

Sealant: To the window manufacturer's recommendations

Glazing tape/gaskets: To the window manufacturer's recommendations

### **PREPARATION**

Site Measure: All window frame measurements to be verified on site prior to fabrication. All measurements on drawings are rough openings only. Refer to drawings.

### **EXECUTION**

Generally: Execution to be in accordance with the requirements of NZS 4211:1985 and the Window Association of New Zealand's "Aluminium Window Handbook" and "Installation Code for Aluminium Windows".

Glazing: Glazing and infill panels to be the responsibility of the window manufacturer for structural and weather-tight performance. All glass to be held in aluminium beads and black PVC gaskets.

Safety glass: Use in all doors, sidelight panels, low level windows and all other locations to comply with NZS 4223:1999, part 3, as modified by NZBC acceptable solution F2/AS1 clause 1.2.1. Glass to comply with AS/NZS 1996.

Drainage: All sills to incorporate anti-condensation channels. All sills to sashes and fixed lights to incorporate positive drainage to the exterior.

Avoid distortion of components during transit, handling and storage. Prevent pre-finished surfaces from rubbing together. Prevent contact with mud, plaster and cement. Do not deliver to site and components, which cannot be immediately unloaded into suitable conditions of storage.

Corrosion protection: Before fixing, apply bituminous coatings, slips or underlays between dissimilar metals in contact, or aluminium in contact with concrete.

Flashings: Install flashings to heads, jambs and sills of frames as supplied and recommended by the window manufacturer and as detailed on the drawings. Head and sill flashings to be finished to match window finish.

Fix frames rigidly in place without distortion, to the manufacturers and the Window Association of New Zealand's "Aluminium Window Handbook" recommendations, plumb, true to line and face, weathertight and with all openings operating freely.

Seal frames to each other and to adjoining structure and finishes, as recommended by the manufacturer and as shown on all details to make the installation weathertight.

Retain protective coverings and coatings in place during fixing wherever possible. Provide additional protection to prevent marking of surfaces, which will be visible in the completed work. Remove protection on completion.

**COMPLETION**

On completion remove temporary protection and clean down both sides of all aluminium and glass, using the method recommended by the manufacturer.

Indicate the glass in place with inert whitening.

Clean off whitening at completion of the works. Clean all glass inside and out to a shining finish.

# Iron Roofing - Cladding

## **Profiled Metal Roofing/Cladding**

The New Zealand Building Code requires roofing and cladding elements of any building to have a durability of 15 years, with maintenance. It also requires that buildings be constructed to 'provide adequate resistance to penetration by and accumulation of moisture from the outside.

Carry out all roofing work using experienced, competent roofers familiar with the materials and techniques specified. Take care to avoid damage to the pre-finished roofing both during and after fixing. Wear only soft-soled shoes on the finished surface.

Purlins to be No. 1 framing pinus radiata to **NZS 3604:2011**, treated to H1.2. Fix the purlin to the roofing manufacturer's recommendations and with all joints fully supported and staggered.

**Building paper:** Breather type self supporting kraft paper laminates to NZS 2295. Lay and fix to NZBC acceptable solution E2/AS1 and the manufacturer's recommendations.

**Profiled metal roofing:** Steel galvanized to NZS 3403, aluminium/zinc-coated to NZS/AS 1397. Finish as specified. Accessories, cappings, flashings and fixings to match and to the manufacturer's recommendations. Use fixings and methods identified by the manufacturer as capable of sustaining the loads appropriate to the area (ie. main or periphery) and wind zone.

Lay profiled metal roofing and fix completed with all matching accessories, flashed to all roof features and penetrations, and in accordance with the recommendations in the New Zealand Metal Roofing and Cladding Manufacturers' Association Inc. publication "Profiled metal roofing design and installation handbook." Cut profiled metal roofing with recommended tools, fold ends and seal cut edges all to the manufacturer's recommendations.

## **Flashings**

Covers and flashings: To comply with NZBC acceptable solution E2/AS1:

- Install and fixed as detailed and to the roofing manufacturer's details.
- Penetrations: Flash and overflash all penetrations through the roof.
- Sealants: Selection and use of sealants to follow BRANZ Bulletin 284 "Sealed joints in external claddings – 2. Sealants."

Flashings and ridge capping should be manufactured from the same coating system as used for the main roof area to ensure equal durability

Where penetration flashings are required, neoprene or silicone rubber, EPDM aluminium or soft zinc all give excellent performance.

Every effort must be made to prevent the overflow of water from copper pipes on to the roofing and guttering material.

The use of lead is not recommended with ZINCALUME steel or COLORSTEEL G2z material.

### **Coloursteel VP**

Product is designed for Very Severe Environments and its performance relies on maintaining the integrity of the coating. Where COLORSTEEL VP product is cut, the cut edge must be sealed in order to retain the protective envelope. All cut edges of sheets and accessories such as ridging, flashings and guttering should be treated.

- A coat of "Cut Edge Protection Lacquer" should be applied using a brush or a foam roller.
- Failure to apply an approved edge sealer to cut edges will invalidate the warranty.

### **Fasteners**

Ensure the appropriate fasteners are selected for the environment.

- Anyone walking on the roof should wear flat rubber-soled footwear to prevent marking.
- Where present, strippable film normally remains on the colorsteel prepainted steel product through roll-forming, transportation and installation but should be removed within a maximum of two weeks after fixing.

The fastener durability should equal or exceed that of the roofing or cladding product.

- Stainless steel and stainless steel capped fasteners are not recommended for use with ZINCALUME steel and COLORSTEEL G2z in all environments due to incompatibility.
- Low carbon, non conducting sealing washers are required for use with COLORSTEEL G2z and ZINCALUME steel products.
- Use the nailing pattern recommended by the rollformer for the building design and roofing profile.
- Overdriving, over-tightening or using too many fasteners can cause purlin marking and other damage.

All fasteners for New Zealand Steel roofing products should have low carbon, non-conducting sealing washers.

- Use only a neutral cure silicone rubber sealant.
- Thoroughly clean off surplus sealant using a dry, lint-free cloth or plastic scraper.
- End laps in profiled metal roofing should be avoided where possible. When unavoidable, the end lap of ZINCALUME steel and painted profiles should be sealed with a double bead of sealant.
- Unpainted galvanized corrugated profile end laps MUST be primed on both overlapping surfaces with an appropriate paint system.
- Edge laps on unpainted galvanized corrugated profiles do not require lap priming.
- End or edge laps of unpainted ZINCALUME steel do not require lap priming.
- Black lead pencils must never be used for marking GALVSTEEL, ZINCALUME steel or COLORSTEEL prepainted steel products.
- Cut and drill COLORSTEEL prepainted steel material with care to avoid marring the high quality finish.
- Use nibblers or hand shears instead of a friction blade.

- All debris must be swept off the job as soon as possible.
- Fixing systems used must allow for expansion and accommodate the longitudinal movement.

### **Swarf**

Prevention of swarf staining is the responsibility of the installer.

- Metal friction blades produce fine hot particles, which can imbed easily into the coating surface and corrode rapidly.

Swarf should be swept or hosed from the job progressively, and certainly at the end of each day.

When sweeping or hosing into a gutter, lean out the gutter before leaving the job in order to prevent premature corrosion. On completion of the job, give a final wash or sweep down.

For critical applications, inspection of the job should be made after two weeks when rain or condensation will have caused any remaining swarf to rust and will highlight affected areas. Brush the surface with a stiff bristle (not metallic wire) brush to dislodge particles, which must then be completely removed, not just swept into the guttering.

It is the responsibility of the installer to prevent & rectify swarf stains.

### **Colour**

- Colour-matching paint must not be applied to COLORSTEEL prepainted steel material.
- Minor scratches are best left alone. They become less evident as the coating weathers.
- Widespread coating damage to any COLORSTEEL prepainted steel product can only be rectified by replacement of the affected sheets.
- Colour-matching paint may be used to paint roof accessories prior to installation.
- Colour-matched fasteners are available.

### **Drinking Water**

Rainwater collected from roofs clad with products made from GALVSTEEL, ZINCALUME steel and COLORSTEEL prepainted steel, will comply with the provisions of NZBC G 12.3.1, provided the water is not contaminated from other sources.

The first 25mm of rainfall from a newly installed roof must be discarded before drinking water collection starts.

Where a paint or paint system is applied to the roof, its suitability for the collection of drinking water must be established and verified.

### **Completion**

Leave the work complete with all flashings, undercloaks, valleys, ridges and hips properly installed so the finished roof is completely weathertight. Clear all trade rubbish and unused materials from the roof and surrounds regularly during the work

and at completion. Sweep down the completed roof and flush out all spouting, gutters and rainwater pipes, ensuring that loose fixings are removed. Replace damaged or marked elements. Remove unused materials from the site.

# Membrane Roofing

## GENERAL

Scope: This specification cover the preparation of the substrate, laying of membrane and application of any finishes.

Documents referred to in this section are:

BRANZ Bulletin 345: Flat membrane roofs – design and installation

BRANZ Bulletin 346: Flat membrane roofs – materials

Application qualification: Applicator to be licensed and recommended by the membrane system manufacturer. Use only competent, experienced applicators.

## MATERIALS

Tapes: Lap and moulding tapes to the sheet manufacturer's recommendations for each location.

Edge trim: Metal to the sheet manufacturer's details to suit the specific location.

Outlets: As supplied and recommended by the sheet manufacturer.

Clouts: As supplied and recommended by the sheet manufacturer, to suit the corrosion zone.

Adhesives, primers, sealants and solvents to be compatible with the membrane and approved by the sheet manufacturer.

Cappings and flashings: As detailed in the architectural plans and recommended by the roofing manufacturer.

## PREPARATION

Storage: Take delivery of sheet in packs/rolls undamaged and allow for site handling facilities where required. Stack off the ground on a level surface and with accessories secured against damage adverse weather conditions.

Sheet layout: Determine the layout of sheets to best suit roof topography.

Weather: Apply coverings in dry atmospheric conditions and only when the temperature is above 7 degrees centigrade and the atmosphere is not frosty.

Preliminary work: Before laying coverings ensure all preliminary work, including surface finish, formation of falls, provision of suitable flashing chases and fillets, fixing of vents and roof outlets to correct levels, is complete and formed to allow the system to work as intended.

Concrete substrate: Prepare surface, including vacuum cleaning and acid etching as necessary to leave the smooth, clean, dry and free of all debris. Ensure concrete is

fully cured. Old concrete should be cleaned of any mould or fungi. All joints or cracks should be covered with 35mm or wider PVC self adhesive tape.

Plywood substrate: Confirm that all sheets are rigid, with joints flush, no loose or protruding fixings, no lumps or hollows, smooth, clean, dry and free of all debris. All plywood substrate should be C.P.D. (construct ply, plugged and sanded on the upper face). Ply should be H3 treated, with a water based treatment. Light oil solvent-based preservative must not be used. Fix ply with 3mm space between sheets to allow for expansion and contraction (butynol only). Fix ply with self-drilling countersunk screws, with protection to suit corrosion zone.

Penetrations: Form and finish to all upstands, downturns penetrations, sumps and vents to sheet manufacturer's and architectural details.

Acceptance of substrate: Commencement of this work means the substrate, including levels and falls, is accepted by the applicator as satisfactory for the required standard of work.

### **EXECUTION**

Generally: All work and materials to BRANZ Bulletins 345 "Flat membrane roofs – design and installation" and 346 "Flat membrane roofs – materials."

Access: Soft-soled shoes only to be worn on the finished roof surface. Do not place any materials on, or support any ladders or scaffolding off the finished surface. Never leave any debris of any kind on the surface.

Expansion joints: Finish and seal all expansion, construction and control joints to the sheet manufacturer's details and recommendations.

General installation recommendations for corners, upstands, drainage points and pipes:

Lay horizontal roof surfaces first, but do not adhere within about 30cms of any obstacles; this ensures that the sheet can be folded back to enable work around the obstacle to be carried out.

Corners of upstands should be rounded; right-angled bends in sheeting should be softened using lap tape.

Care should be taken to ensure that no sheet is laid under tension. Release roll before cutting.

As far as possible, all membrane sheeting joints should face drainage points, in order that water does not tend to collect between sheet and lap tape in join. This applies to vertical or near vertical flashings as well as other areas.

In general try not to cut lap tape to shape but stretch and mould edges and into corners, if thin spots develop use double thicknesses fold if necessary. Cut sheeting at corners etc. in order to avoid folds in which water can collect. Cuts should always be the minimum length practicable and should always be well backed by lap tape.

Allow ample time for adhesive to lose all solvents. Solvent that does not evaporate from adhesive will swell sheeting and particularly lap tape. This could be a source of weakness later.

Work slowly and methodically on upstands, as these are the points on a roof where leakages may occur.

Whenever possible work from obstacles towards the edge of the roof. This will facilitate the laying of the sheeting near the obstacle. It will frequently be found more convenient for installation if there is a join in the sheeting near the obstacle.

Penetrations: Seal flash and overflash all penetrations through the roof as per manufacturer's and architectural details.

Finishes: When tiles are applied to the membrane a polythene slip-sheet must be used between the membrane and the tile grout. This allows for any movement. Lap tape is to be used in all tiled areas as they usually have a low fall and do not shed water easily. When using duckboards for decking allow for a polythene slip-sheet under the duckboard furring strips laid directly on the membrane.

Surface coating: Surface coating system to be approved as compatible by the manufacturer of the membrane roofing system.

### **COMPLETION**

Inspect and test all joints on completion.

Test: Flood test all horizontal applications with a minimum of 50mm depth of water for 24 hours. Make good any lack of watertightness after it is completely dry.

Remove all surplus materials and trade waste from the roof leaving the roof surfaces soft-broom cleaned.

# Plumbing

## GENERAL

This trade comprises the supply and fixing of flashings, spouting, downpipes, sanitary fittings, wastes, hot and cold water reticulation and associated wastes.

## MATERIALS AND WORKMANSHIP

All work shall be carried out in accordance with G13/AS1 as an acceptable solution to the NZBC 1992. All materials shall be the best of their respective kinds. Water pipes and tubes shall be set out in straight runs of even gradients, avoiding all places where air locks are likely to occur. All piping including water, waste and vents shall be concealed as far as possible and secured in position.

## NOTICES

The plumber shall give all necessary notices to Local Territorial Authority for the inspection of work and testing.

## FLASHINGS

Generally all flashings are shown on the working drawing plans. (Refer corrosion zone notes). Flash as necessary to render building watertight. All flashings shall accurately fit the work and shall be machine bent and cut in as long lengths as possible with all joints well lapped and soldered, beaded edges and fixed with flat head nails. Flash and over flash all vents and other projections through roofing and leave in a water tight condition.

## SPOUTING AND DOWNPIPES

Shall be "Marley" uPVC fixed to manufacturers instructions complete with all fittings, bends etc as required, unless stated otherwise on working drawing plans.

## TERMINAL VENT

Erect uPVC terminal vent pipe extending 450mm above roof level finished with balloon ventilated cap. Refer working drawings for size.

## PIPES

All pipes for hot reticulation shall be "Dux-Secura Gold" polybutylene well strapped to framework to prevent water hammer, excluding commencement branch from hot water system. All pipes for cold-water reticulation shall be "Dux-Secura Gold" flexible polybutylene well strapped to joists. All joints to be "Dux-Secura Gold" brass fittings.

## COLD WATER RETICULATION

From main take 15mm diameter branches to all fittings and to exterior hose taps.

## WC PAN

Supply and fit where shown on working drawings a standard white vitreous china WC pan to be caulked into soil pipe with approved sleeve properly installed. Supply and fit double flap standard quality plastic seat.

### **CISTERN**

Supply and fit WC pan 6/3 litre dual flush cistern complete with ballcock silencer tube, float, overflow extension handle and tripper. Cold water connection to be of 15mm tube controlled with tap to match.

### **VANITY**

Supply and fit where shown on working drawings a standard white acrylic basin set in formica top and melteca cabinet and connect waste. Vanity supplied by Joiner.

### **SHOWER**

Supply and fit where shown on working drawings a standard shower cubicle of a size shown and mounted on wooden undercarriage to manufacturers installation details. Install safety glass screen and hinged door with stainless steel hardware. Connect to waste and fit a standard shower rose controlled with mixer unit.

### **TAPS**

Provide two exterior hose. All fittings to have hot and cold tapware.

### **MISCELLANEOUS**

Temperature valve to be fitted to hot water supply to vanity and shower

Water Supply shall comply with AS/NZS 3500.5:2000 Section 2. Sanitary Plumbing shall comply with G13/AS1.

All work covering waste disposal and plumbing fittings to be carried out by or under the direct supervision of a person registered under the Plumbers, Gasfitters and Drainlayers Act 2006.

### **MATERIALS**

Copper tube to NZS 3501:1976

Waste, soil and vent pipes, UPVC pipe to AS/NZS 1260:2002 complete with fittings brand – matched to the manufacturer's specifications.

Sanitary fixtures: As detailed on the working drawings.

### **PREPARATION**

Carry out the whole of this work and tests to G13/AS1.

Avoid electrolytic action by eliminating actual contact or continuity of water between dissimilar metals.

### **EXECUTION**

Sanitary fixtures: Fit and install all sanitary fittings and associated screens, components and hardware, plumb, true to line and rigid, all to the manufacturer's recommendations. Standard chrome-plated wastes and plastic plugs on chrome-plated chains to be supplied with basin.

Traps, waste and vent pipes: Connect waste outlets to traps and run waste pipes and back vents concealed, all sized and fixed to G13/AS1.

Discharge wastes into the existing drainage system as shown.

Test all soil and waste disposal systems to ensure no leakage exists and leave all in working order.

Cleanup: Remove labels and clean all fittings. Remove all unused materials from the site.

# Drainage

## GENERAL

Excavate for, provide, lay and backfill sewage and stormwater drains from connection to fittings in accordance with reticulation to the Building Act 2004.

Carry out drainage work and tests to G13/AS2.

Supply a scale 'as-laid' plan of drains and fittings to the territorial authority and to the designer on completion.

All work to be carried out by or under the direct supervision of a Craftsman Plumber/Drainlayer registered under the Plumbers, Gasfitters and Drainlayers Act 2006.

## LAWS AND CONSENTS

Obtain and pay all fees necessary for the above work. All drainage work shall be carried out in accordance with the drainage regulations under G13/AS2. The work shall be in strict conformity with the specific clauses in this specification and all work must be approved by the Local Territorial Authority Inspector.

## MATERIALS

All pipes shall be of sizes indicated on the working drawing plans. All pipes shall be "Marley" uPVC and all joints and connections shall be "Marley" rubber ring seals. All pipes should be true to shape and free from cracks and other defects.

uPVC pipes, bends, junctions, fittings and joints to AS/NZ 1260:2002 & AS/NZ 1254:2002.

Plastic piping for field drains perforated and coiled with filter fabric over.

Fittings: Comply with manufacturer's specification for joints. Every junction and direction change has removable inspection cover plate.

## LAYING DRAINS

The drains shall be commenced at the point of outfall and worked back to the highest point with adequate cover. The whole of the drains shall be laid in a true and even grade.

Excavate for drains to a firm even base with correct gradients in straight runs.

## BACKFILLING

All drains shall be tested and the excavations can only be filled after the work has been passed. When filling in trenches, care must be taken to ram carefully the first portion around the drains. The whole trench is then to be well filled, rammed and consolidated with water. The surface of the ground must be returned to its original condition.

Fill: Scoria or rock of general all complying with bedding materials to G13/AS2.

### **FOUL WATER DRAINS**

Lay drains in straight runs to correct gradients, to discharge into the existing sewer. Set all inspection fittings on a concrete base.

### **STORMWATER DRAINS**

Confirm the required location of all downpipes and all finished ground levels before commencing pipe work. Set downpipes bends in concrete brought up to protect the top of the fitting from damage. Trowel off and fit a cast iron grating. Lay drains in straight runs to correct gradients to discharge into the existing stormwater system.

**Building Consent Application — use this Checksheet for:  
Single Residential Dwelling and Accessory Buildings**

— including single stand-alone dwellings, dwelling additions and/or alterations, re-piling, garages, decks, gazebos, sheds, retaining walls etc

— An Application Form is attached to this checksheet —

(Please include this checksheet with your application)



**Address of project:** ISS FIELD WAY, WAIKANAHI BEACH

This checksheet shows you the information that has to be supplied with your building consent application. Please attach **2 copies** of the following information (unless otherwise specified) with your completed Building Consent Application form.

Please tick relevant box in the Customer Use column as you attach the information. If the box is not relevant to your application, write NA across the box. Please check each section carefully and complete those sections that are relevant to your project.

**Once you have attached all the required information, please check for completeness as an incomplete application or lack of any supporting information will mean that your application cannot be accepted for processing.**

CUSTOMER USE

COUNCIL USE



**1. GENERAL**

Complete this section for all applications

- |                                     |   |                                     |
|-------------------------------------|---|-------------------------------------|
| <input checked="" type="checkbox"/> | <p><b>a. <u>Building Consent Application Form</u> (1 copy)</b><br/>Completed and signed by the owner or by an agent on behalf of the owner.</p>   | <input type="checkbox"/>            |
| <input checked="" type="checkbox"/> | <p><b>b. <u>Proof of ownership</u> (1 copy)</b><br/>One recent copy of current certificates/s of title (i.e. not older than 3 months) or where applicable one copy of purchase agreement (if recently purchased) or one copy of relevant portions of current lease</p>  | <input checked="" type="checkbox"/> |
| <input type="checkbox"/>            | <p><b>c. <u>Locality Plan (1:500) showing:</u></b><br/>Physical location of the subject building in relation to streets or landmarks, north point, name of building and lot and DP number.</p>  | <input type="checkbox"/>            |
| <input checked="" type="checkbox"/> | <p><b>d. <u>Site Plan (1:100) showing:</u></b><br/>Dimensions of all boundaries, north point, finished floor levels, ground contours (extended to boundaries) and/or levels, site area, street name and number, lot and DP number, outline of building, distance to boundaries and the position of swimming or spa pools. Include on the site plan the designated wind zone of the site (e.g. specific design, very high, high, medium or low).</p> | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> | <p><b>e. <u>Application Fee</u></b><br/>Applications will not be accepted without payment of the appropriate fees. Fees payable are set out in the published fee schedule of the council that has jurisdiction over the project site.</p>   | <input type="checkbox"/>            |

**For office use only** Receiving Officer:

*Relevant info received ok to accept B.C Application*

*12/9/14*

**2. CHANGE OF USE**

Complete for all existing buildings where the proposal involves forming a household unit where one did not exist before

*Example: the conversion of a garage or shed into a residential unit*

N/A

**a. Assessment of the building for compliance with the building code**

Section 115(a) of the Building Act 2004 requires that the building, in its new use, complies fully with all clauses of the building code.

N/A

**b. Reasonably practicable**

The above assessment must relate to all building code clauses. If the proposal is for the project to meet anything less than full compliance with any clauses, your application must clearly state your reasoning, with supporting documentation, and show how you will meet the highest level of compliance that can be considered reasonably practicable.

**3. FOUNDATIONS / FLOOR**

Complete for all new buildings, for existing buildings where the footprint of the building will change or where an additional storey is being added.

**a. Foundation Plan (1:100 / 1:50) showing:**

- Dimensions of all new foundations
- Sub-floor, including bracing
- Footing details
- If a concrete slab, show basic details including reinforcing and contractions joints
- Piles and footing
- If the addition is an upper storey show details on upgrading existing foundations, joints, piles etc
- Indicate ventilation to sub floor spaces

N/A

**b. Subfloor bracing**

Provide subfloor bracing plan and calculations for all piled structures. Where the structure is specifically engineered, this should be included with the structural calculations.

Subfloor bracing plan and calculations are required where an additional storey is to be added.

**4. CONSTRUCTION**

Complete for all new structures or alterations to existing structures.

**a. Existing floor plan (1:100 / 1:50) showing:**

(For additions and alterations only)

- All levels
- All designated spaces
- All removals
- Sanitary fixtures
- Smoke detectors

**b. Proposed floor plans (1:100 / 1:50) showing:**

- Room dimensions
- Location of partitions
- All designated spaces
- All floors (new or altered)
- Location of sanitary fixtures
- Stairs, barriers, handrails, floor joists and beams
- Floor joist layout for each level with timber floors
- Smoke detectors
- Note where wall will form part of the swimming pool fence

**c. Pre-nail Truss and Frames:**

- Specific design wall framing requires clarification
- Truss layout must be supported by design certification and design of fixing details, including consideration of load paths to ground
- Lintels carrying point loads, such as from girder trusses, require specific engineering design

**d. Wall bracing plan (1:100 / 1:50) showing:**

- Bracing details and calculations for wall bracing (also required for existing lower storeys where an additional storey is being added)
- Sub-floor bracing for decks projecting more than 2m from the house
- Location, type and number of bracing elements to indicate compliance with NZS 3604:1999 (include calculations)
- If the bracing was specifically designed by a structural engineer, provide calculations (required for specific design wind zones and lateral distribution of upper floor loads where lower storey bracing is provided in walls beyond the upper storey footprint)

**e. Sections and details (1:50 / 1:20 / 1:10) showing:**

- Foundation details involving reinforcing and connections
- Stairs, handrails, decks and decking
- Insulation systems and materials to floors, walls and roof
- Barriers providing safety from falling. Specific engineering design required where detail does not comply with NZBC B1/AS2
- Framing sizes, beams, lintels
- Roof cladding, eaves, fascias, gutters
- Flashings to openings
- Fire rated systems on all walls – closer than 1 metre to boundary
- Stud heights of rooms and total height from lowest ground floor level to top of ridge
- Window and door installation details
- Retaining wall details e.g. type, height of retained ground, relationship to boundary, waterproof membrane and proposed drainage

**f. Fire Report:**

For domestic dwellings of 4 storeys or more, or buildings providing more than one household unit



## 5. EXTERNAL

Complete for new buildings or existing buildings with alternations to the external shell



### a. Elevations (1:100 / 1:50) showing:

Accurate lines form boundary to boundary on each elevation, relevant District Plan daylight control lines, the maximum height on each elevation, location of door and window openings, fixed and opening sashes, sill heights, floor levels in relation to ground levels, exterior cladding nominated to all elevations, down pipes and spouting, ventilators to sub-floor area (suspended floors only)



### b. Risk assessment

*(Risk matrix in E2/AS1 may be used for buildings within scope)*

Consider exposure, design and detailing to support appropriate selection of cladding



### c. Cladding details (1:50 / 1:20 / 1:10)

Provide details around all penetrations, joinery and other junctions at a level appropriate to the level of risk e.g. roof/wall, balcony/wall, junction of different types of cladding, back flashing details for cavity systems



### d. Production certification

Supply copies of product certificates relied on as compliance documents



### e. Alternative solutions

If the proposal uses products or systems that are not covered in the Acceptable Solutions of clause E2 of the building code provide supporting current information including test results (fully signed reports), case studies, expert opinion (including evidence of experience/qualification, basis for forming opinion and statement of independence) etc to demonstrate compliance.



## 6. SERVICES

Complete for all projects with new installations or alteration of plumbing or drainage services



### a. Plumbing and Drainage plan 1:100 / 1:50) showing:

*Note: if you have supplied drainage details for surface water disposal on the site plan, no drainage plan is required.*



- Sizes of pipe work and drains
- Fixtures and fittings, hot water system(s)
- If the building is more than one storey with sanitary fittings on upper floors, provide an isometric layout showing wastes, pipes and falls
- Drainage layout with inspection bends and junctions indicated for both sewer and storm water
- Any other drainage on site including council mains and retaining wall field drains
- Ventilation of sanitary rooms
- Calculations for sizing of down pipes
- Gully traps including overflow relief gullies



**7. STRUCTURAL**

Complete for all projects incorporating specific structural design

**a. Structural calculations**

If any design work required the services of a structural engineer, attach 2 copies of the calculations with this. The calculations must be prefaced with information explaining the design philosophy and justification of assumptions and methodologies used in analysis



**b. Expert Opinion (Producer Statements):**

If this application for consent relies on any expert opinion including producer statements certifying compliance with the New Zealand Building Code, a copy must be attached with this application. (Note all structural producer statements are required to have accompanying calculations)

**8. SPECIFICATIONS**

Complete for all applications

*Note: the specification must be specific to the project and cover all aspects of the proposed work.*

**a. Specification: General**

- Elements of structure (size, spacing, timber treatment)
- Finish or fixings to meet durability requirements
- Plumbing and drainage materials and design that installation is to comply with
- Wet area surfaces
- Ventilation systems
- Flooring slip resistance for access routes
- Glazing
- Type of smoke detectors (including existing smoke detectors where they will remain)



**b. External claddings**

For each of the following claddings provide details of the product name, manufacturer, maintenance requirements and warranties offered

- Building wraps
- Wall claddings
- Roof claddings
- Membranes (roof and decks)
- Tanking
- Joinery

**9. DEMOLITION / REMOVAL**

Complete for all projects involving demolition of significant parts of buildings or the demolition or removal of whole buildings.

**a. Means of barricading the site**

Provide details of temporary barriers, gates which swing inwards or other means of restricting public access to the area



N/A

b. **Proposed tipping location for demolition materials (address/landfill)**

N/A

c. **Hazardous building material**

Provide safety plan detailing the safe handling and disposal of hazardous materials

N/A

d. **Site management plan covering**

Management to control silt runoff, noise and dust

N/A

e. **Proposed destination for relocate building**

N/A

f. **Access to and from the site including (use of kerb crossings)**

N/A

g. **Specify termination of existing services**

- Water
- Sewer
- Storm water

✓

h. **Details about the building such as:**

Number of storeys, type of materials the building is constructed (Photographs of the building would be useful)

**Note**

You will need to contact the relevant service authorities specified below to advise them of the extent of your work:

Electricity, gas, drainage, water, transport, telecommunications, cable television or any other services that may be affected.

**Transportation of relocated building**

You will be required to contact and provide details to Councils Transportation and Traffic Department.

**10. OTHER APPROVALS**

Please check territorial authority regarding the requirement for other approvals required and fees payable. These may include:

- Consents under the Resource Management Act
- Approvals under bylaws including earthworks, vehicle crossings, road openings and water connections.

Show the location of swimming or spa pools on the property and describe how compliance with the fencing of Swimming Pools Act will be achieved.

**The issuing of a building consent does not relieve the owner of any duty or responsibility under any other act.**

The following Councils developed this checksheet in partnership: Kāpiti Coast District, Porirua City, Wellington City, Hutt City, and Upper Hutt City.

# Planning Processing Check Sheet

RECEIVED  
12 SEP 2011

Building Consent Number : BC 110554

Property Information				
Property Address	155 Field Way Waikanae Beach			
Legal Description	LOT 8 DP 91324			
Planning Zone	RURAL			
Building Project	Addition to existing garage			
	Yes	No	Action reqd	Action
Certificate of Title	✓			
Easements		✓		
Section 221	✓		Include copy REFER ATTACHED.	
District Plan Items to Check				
	Yes	No	Action Reqd	Actioned
Designations	✓		COASTAL CORROSION ZONE VERY HIGH WIND ZONE	
Heritage Register		✓		
Flood Hazards		✓		
Min Floor Level		✓		
Other Hazards		✓		
EQ Faults		✓		
Services	✓			
Eco-site/Native Veg		✓		
	Complies?		Action Reqd	Actioned
Yards (+water bodies)	✓		Neighbours Approval??	
HIRB		✓	RM 110142 granted 3-10-11	
Max Height	✓			
Site Coverage	✓			
Permeable Surface	✓			
Earthworks	✓			
Water Tank / Siting	N/A			
Parking				

Fences/Retaining Wall	N/A			
Airport Noise 45dbI	N/A			
Other Provisions				
	Yes	No	Action reqd	Actioned
Does the building straddle Title/crosslease boundary		✓		
Existing Resource Consent?	✓		RM 110142 (HIRB 3/10/11)	
Resource Consent Required?		✓	Apply Section 37 and advise Plan Vetting Team.	
Section 72 or 77 Required?		✓	Advise Plan Vetting Team and send letters out.	\$118.00
Section 221 Consent Notice	✓		Advise Plan Vetting Team	
DIF Required?		✓	Advise Plan Vetting Team and send letter out.	
Calculate DIF Fees				Amount
			2 <sup>nd</sup> Comm / Ind Floor area X \$12.65	
			Non-residential 0.002 X area	
Invoice codes	RM		Water Supply	
	RM		Sewage	
	RM	79	Community Facilities	
	RM		Roads	
	RM		Flood Mitigation	
	RM		Reserves	
Send DIF letter out			<b>TOTAL</b>	

**Additional Comments**

\* ALL WORK TO BE IN ~~CONJUN~~ ACCORDANCE WITH RM 110142 AND RM000117 - SEC 221 CONSENT NOTICE \*

**Decision: (delete item that does not apply)**

- Application complies with District Plan requirements
- Application does not comply with District Plan – BC to be issued subject to s37

Officer's Name & Signature: J Burke

Date: 3-10-11.

**KAPITI COAST DISTRICT COUNCIL**  
**CONSENT NOTICE PURSUANT TO SECTION 221**  
**OF THE RESOURCE MANAGEMENT ACT 1991**  
**FOR THE DEPOSIT OF LAND TRANSFER PLAN 91324**  
**BEING THE PROPOSED SUBDIVISION OF LOT 34 DP 85461,**  
**FIELD WAY, WAIKANAE,**  
**FOR THE PHARAZYN CHARITABLE TRUST**

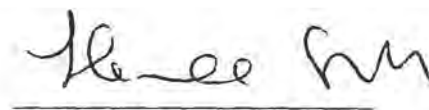
**The District Land Registrar at Wellington**

PURSUANT to Section 221 of the Resource Management Act 1991 the Kapiti Coast District Council hereby gives notice that it has consented to the proposed subdivision and the following condition is to be complied with on a continuing basis:

1. That specific foundation design by a registered engineer may be required for any new dwelling or additions and alterations to a dwelling within lots 1 – 8, and lots 10 - 20 land transfer plan 91324 in accordance with the recommendations within the soil test report prepared by Samcon Ltd. submitted with application No. RM 000117 a copy of which is available in Council's Resource Consents Office.

Issued in respect of application No. RM 000117 on this 28<sup>th</sup> day of August 2001.

  
AUTHORISED OFFICER

  
AUTHORISED OFFICER



**COMPUTER FREEHOLD REGISTER  
UNDER LAND TRANSFER ACT 1952**



Search Copy



**Identifier** WN59A/824  
**Land Registration District** Wellington  
**Date Issued** 03 September 2001

**Prior References**  
WN53D/345

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**Estate** Fee Simple  
**Area** 632 square metres more or less  
**Legal Description** Lot 8 Deposited Plan 91324

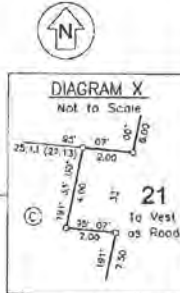
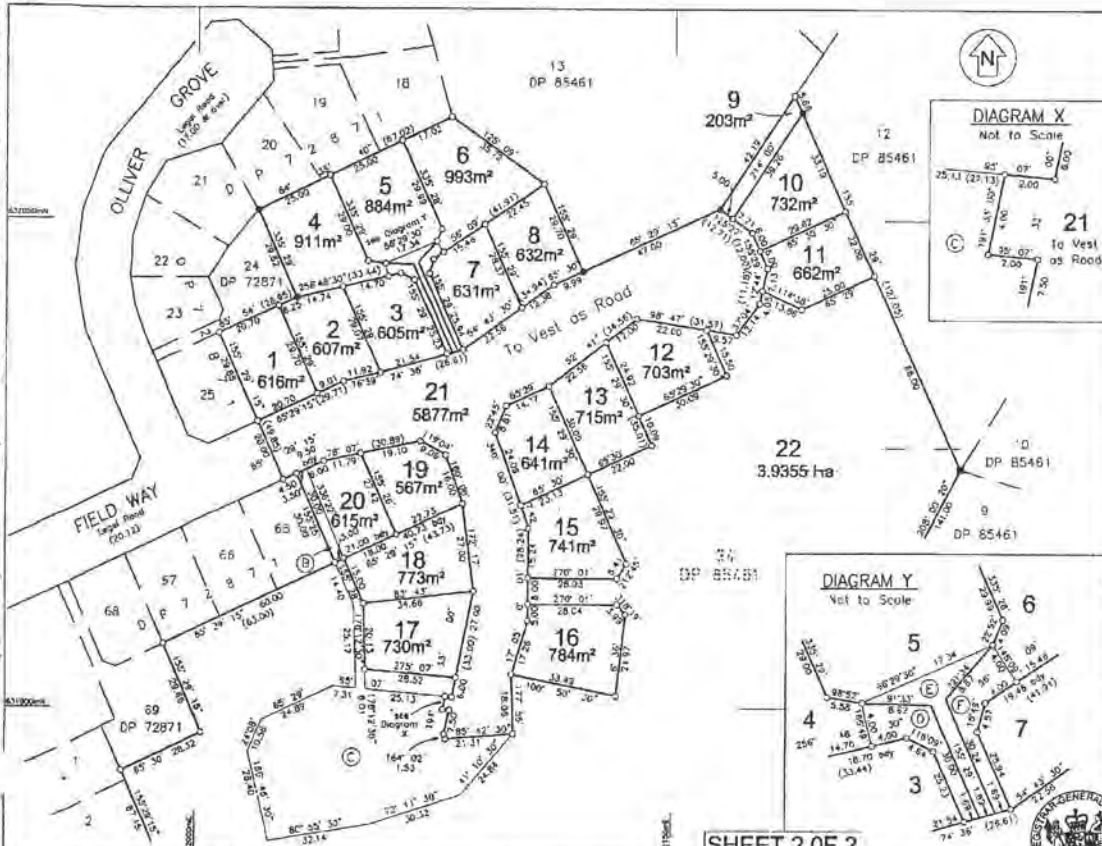
**Proprietors**

Trustee Advisors Limited, Andrea Cornelia Naef-Wittwer and Werner Richard Naef

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**Interests**

5078774.5 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 3.9.2001 at 3:33 pm  
Land Covenant in Transfer 5164464.1 - 1.3.2002 at 9:00 am  
Fencing Covenant in Transfer 5164464.1 - 1.3.2002 at 9:00 am



Approvals

New Class Allocation			
Lot 1	99A/117	Lot 12	99A/123
Lot 2	99A/118	Lot 13	99A/124
Lot 3	99A/119	Lot 14	99A/125
Lot 4	99A/120	Lot 15	99A/126
Lot 5	99A/121	Lot 16	99A/127
Lot 6	99A/122	Lot 17	99A/128
Lot 7	99A/123	Lot 18	99A/129
Lot 8	99A/124	Lot 19	99A/130
Lot 9	99A/125	Lot 20	99A/131
Lot 10	99A/126	Lot 21	99A/132
Lot 11	99A/127	Lot 22	99A/133

CLASS I SURVEY

Total Area 5.8977ha

Comprised in CT 530/345 A1

I, Kerry Gray, holder of Midland being a duly qualified and registered surveyor certify that -  
 (a) the survey to which this document relates is accurate, and  
 every instrument by me or under my direction in accordance with the Survey Act 1986 and the Survey Regulations 1996;  
 (b) this document is accurate and has been created in accordance with the Act and the Regulations.

Signature: *[Signature]* Date: 11-05-01

Full name: KERRY GRAY of 1111 North Bay, S.W. 2, 1990  
 Reference: Plans DP's 50301, 52458, 55575, 72871 & 85461

Examined: ..... Correct: *[Signature]*

Approved as to Survey: *[Signature]* DP 1/6/2001  
 Proposed this 3 day of Sept 2001  
 for Registrar-General of Land

107 57  
 Registrar-General  
 91324

LAND DISTRICT WELLINGTON  
 Survey Blk & Dist V, Kaitawa  
 NZMS 261 Sht Record Map No. SD1

**LOTS 1-22 BEING A SUBDIVISION OF LOT 34 DP 85461**

Local Authority Kopiti Coast District  
 Surveyed by LATTY CONSULTANTS LTD  
 Scale 1: 750 March 2001

SHEET 2 OF 2

FOR COUNCIL USE:

DEPARTMENT	TICK FOR REFERRAL	COMMENTS	APPROVING OFFICER/ DATE
Planning			
Plumbing and Drainage	✓		17/2/2012
Building	✓	Approved on reasonable grounds	8/3/2012
Fire Design			
Compliance Schedule			
Structural			
Hazardous Substances			
Environmental Health			
NOTES:			



Amended BC Application

Building Consent No. 110554 A

Building Project... 155 Field Way, Waikanae  
Roof membrane changed to Butyl

## CONSENT DATA INPUT REQUIREMENTS

REQUIRED INSPECTIONS		32		Lapse and cancellation after 12mths of consent	23		Installation of solid fuel appliance (wood burner) comply and secured
	Foundation/Piles						
	Block	2		Engineer design specific components	23A		Second hand wood burner certified
	Pre-Slab (Plumbing)	3		Foundations to solid bearing of 200mm	25		Contractor to leave site clean and clear
	Pre-Slab (Building)	4		NZS3604 as acceptable solution in terms of NZ Building Code	30		To comply with Food Hygiene Regulations 1974
	Sub-Floor						
	Drainage	6		Not approved as Habitable Room	31		As in CCZ, all fixings need to be stainless steel
	Pre-Wrap	9		Note and comply with all endorsements on approved plans	33		Approval only given for relocation purposes
	Pre-Clad	10		Names and Registration of plumber and drain-layer required	34		If cladding to have pre-finished colour coating, to be appropriate for coastal conditions
	Weathertightness						
	Pre-lining (Building)	11		Concealed soil and TV pipes and gas flues only allowed in ducts or minimum framed	38		Window sashes on upper levels less than 760mm above floor to have stays fixed
	Pre-lining (Plumbing)						
	Wet areas - membrane	12		Hot & Cold water pipes tested to 1500kPa	39		Construction of playground to comply with NZS5828
	Post Lining						
	Brick Veneer	13		Roof stormwater to be connected to existing	40		Fencing, gates, doors directly leading to swimming pool to comply with Pool Act 1987
	Retaining Wall						
	Final (Dwelling)	14		Copper water pipes not permitted	43		Textured systems should be applied by licensed, trained applicators – supply warranty
	Final (Commercial & Multi-resd)						
		15		Owner/builder to ensure prop foundation height will allow satisfactory connection	44		Exterior cladding system to be completed and inspected prior to internal lining
		21		Minimum FFL to comply with NZS3604			

STANDARD CONSENT CONDITIONS	
37	
72	
80	

NON-STANDARD ADDENDA

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OGST 51-860-608

Received with thanks by 3/01  
KAPITI COAST DISTRICT COUNCIL

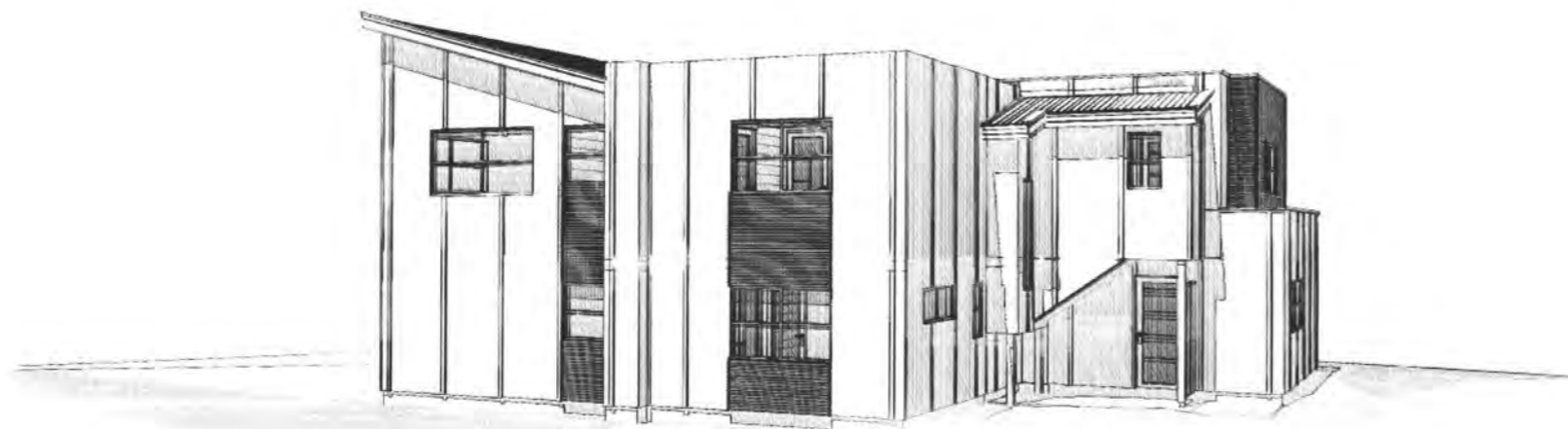
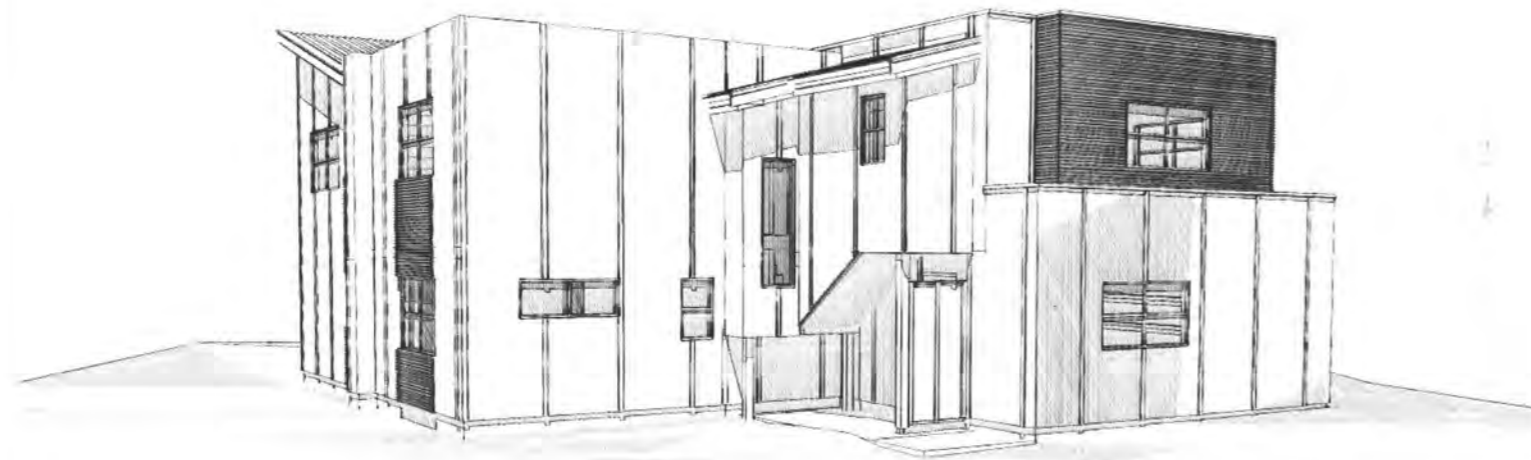
16-02-12 10:05 Receipt no.402280

\*COPY\* \*COPY\* \*COPY\*

DR BC110554A

DESIGN NETWORK ARCHI 199.00-  
Design Network Architecture Ltd::44 Que  
CQ W

Design Network Archi 199.00



INDICATIVE PERSPECTIVE ONLY

THIS TIMBER FRAMED ADDITION HAS BEEN DESIGNED  
IN ACCORDANCE WITH NZS 3604:2011

**INDEX:**

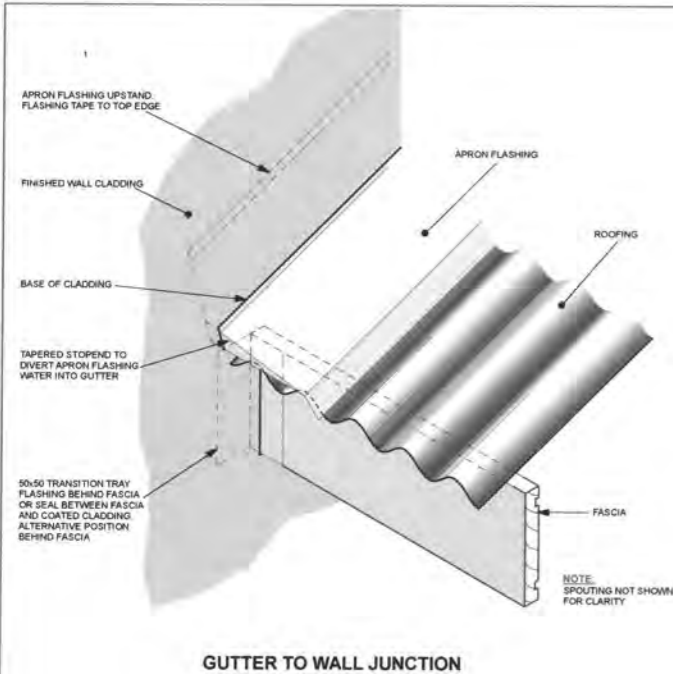
DRAWING	SHEET	26/10/11
INDICATIVE PERSPECTIVE & INDEX	COVER	A
SITE PLAN, EXISTING FLOOR PLANS, NOTES	1	
ELEVATIONS, RISK MATRIX, H1 CALCULATIONS, GLAZING RATIO, VENTILATION & LIGHT RATIO, WINDOW AND DOOR SCHEDULE, NOTES	2	
FOUNDATION PLAN, POST TO BEAM CONNECTION AND POST UPLIFT FIXING DETAILS	3	
LOWER LEVEL FLOOR PLAN, NOTES	4	A
UPPER LEVEL FLOOR PLAN, BRACING DETAILS	5	
JOIST LAYOUT PLAN, NOTES, WINDOW INSTALLATION SEQUENCE	6	
RAFTER PLAN, ROOF PLAN, ROOF DETAILS	7	A
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SECTIONS CC, DD, EE, FF.	9	
SECTION GG, HH, FRAMING DETAILS	10	
WINDOWS DETAILS	11	
WALL DETAILS	12	
PARAPET DETAILS	13	A
JUNCTION DETAILS	14	
GUTTER SECTIONS AND KEY PLAN	15	A

**BUILDING CONSENT APPLICATION**  
**PROPOSED ALTERATIONS & ADDITIONS**  
**155 FIELD WAY, WAIKANAI BEACH**  
REFERENCE - 6604K

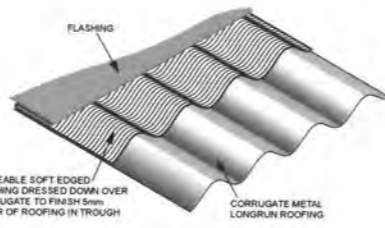
**Design Network**  
ARCHITECTURE LTD

P.O. BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT: (04) 5696-109, KAPITI (04) 9025-505

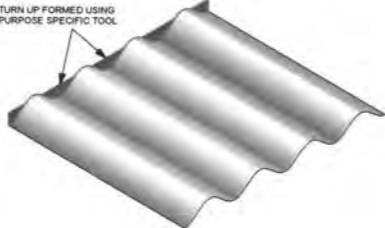




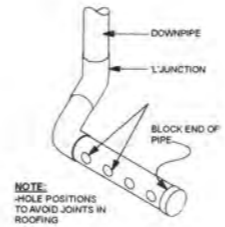
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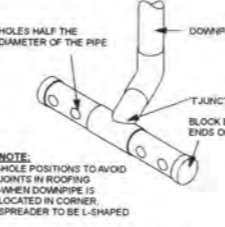
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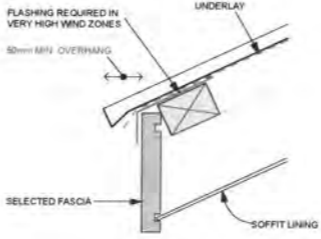
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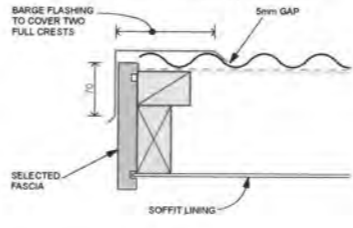
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'T' SPREADER



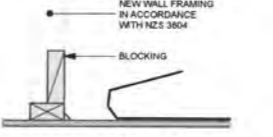
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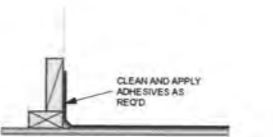
BARGE



1. FOLD BACK EXISTING MEMBRANE

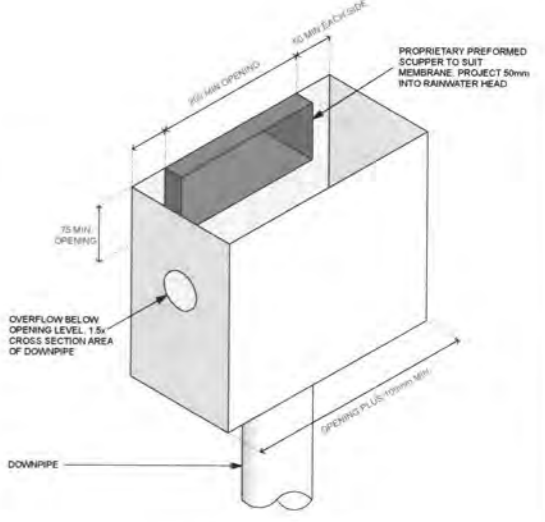


2. CONSTRUCT NEW FRAMING



3. RE-LAY EXIST MEMBRANE

EXISTING MEMBRANE TO NEW WALL

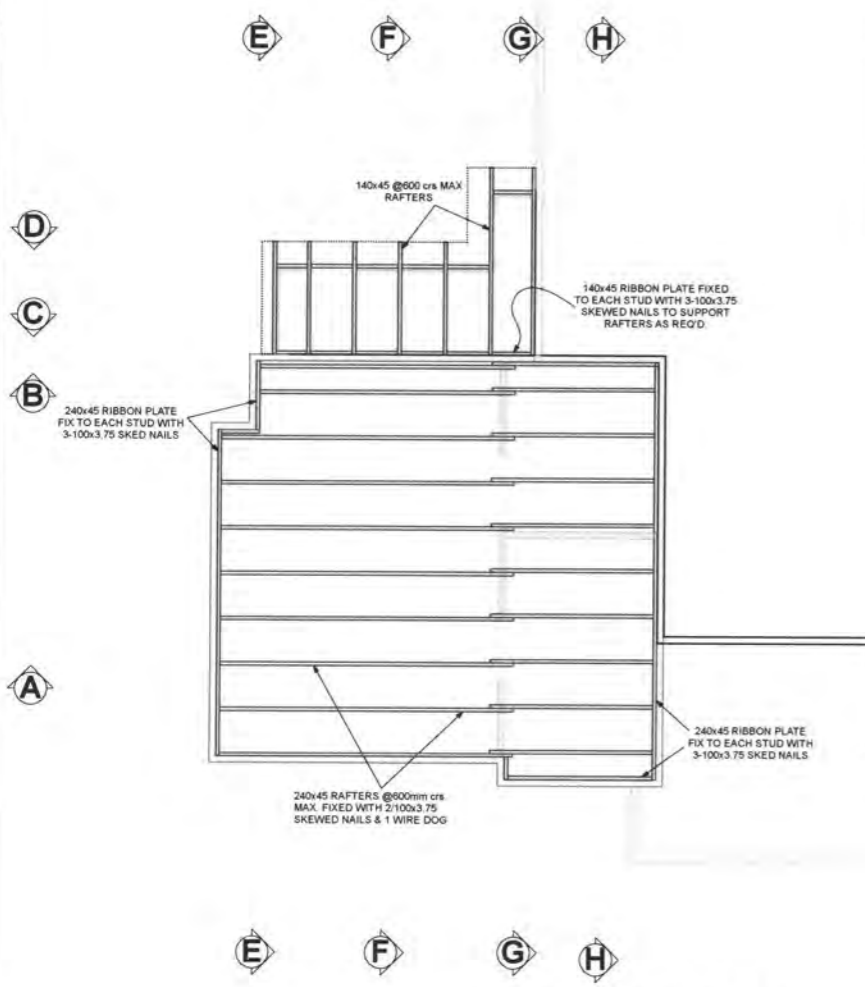


RAINWATER HEAD

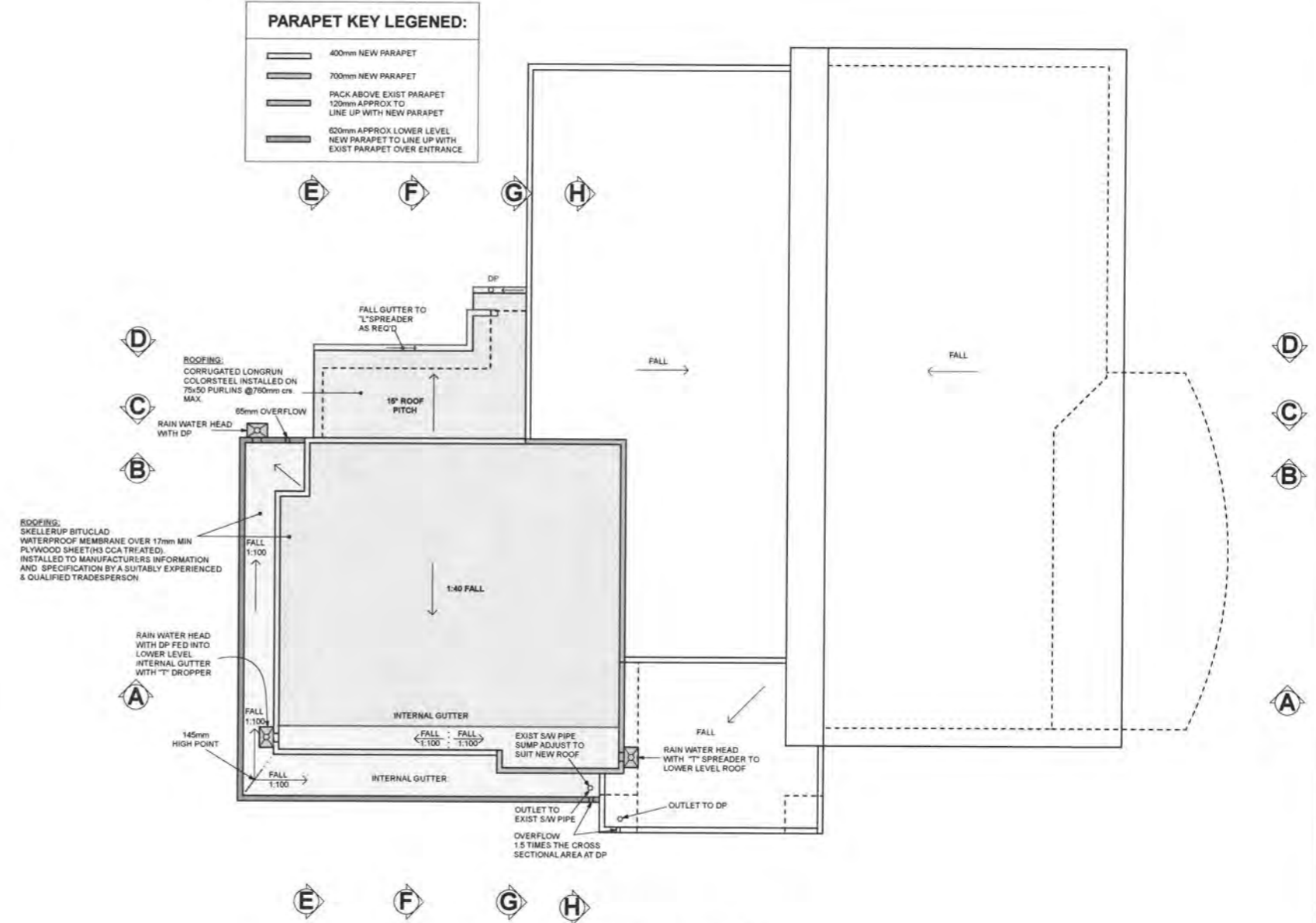
ROOF DETAILS

PARAPET KEY LEGENED:

- 400mm NEW PARAPET
- 700mm NEW PARAPET
- PACK ABOVE EXIST PARAPET 120mm APPROX TO LINE UP WITH NEW PARAPET
- 620mm APPROX LOWER LEVEL NEW PARAPET TO LINE UP WITH EXIST PARAPET OVER ENTRANCE



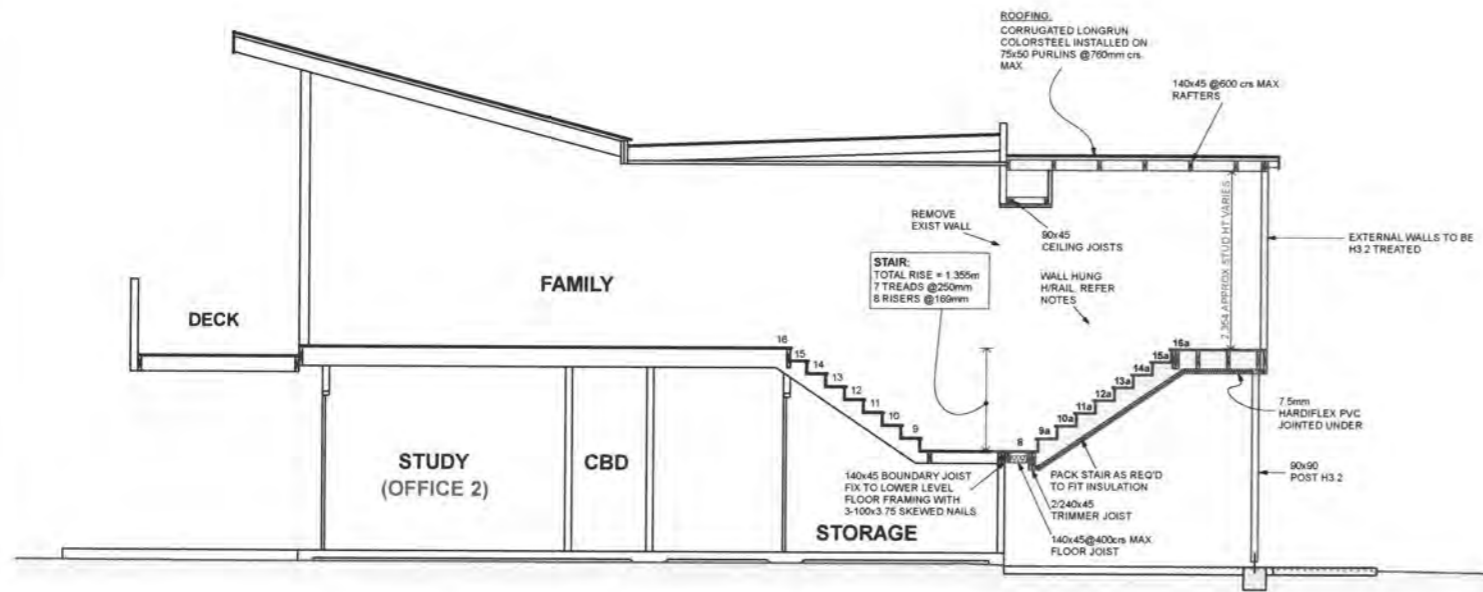
RAFTER PLAN



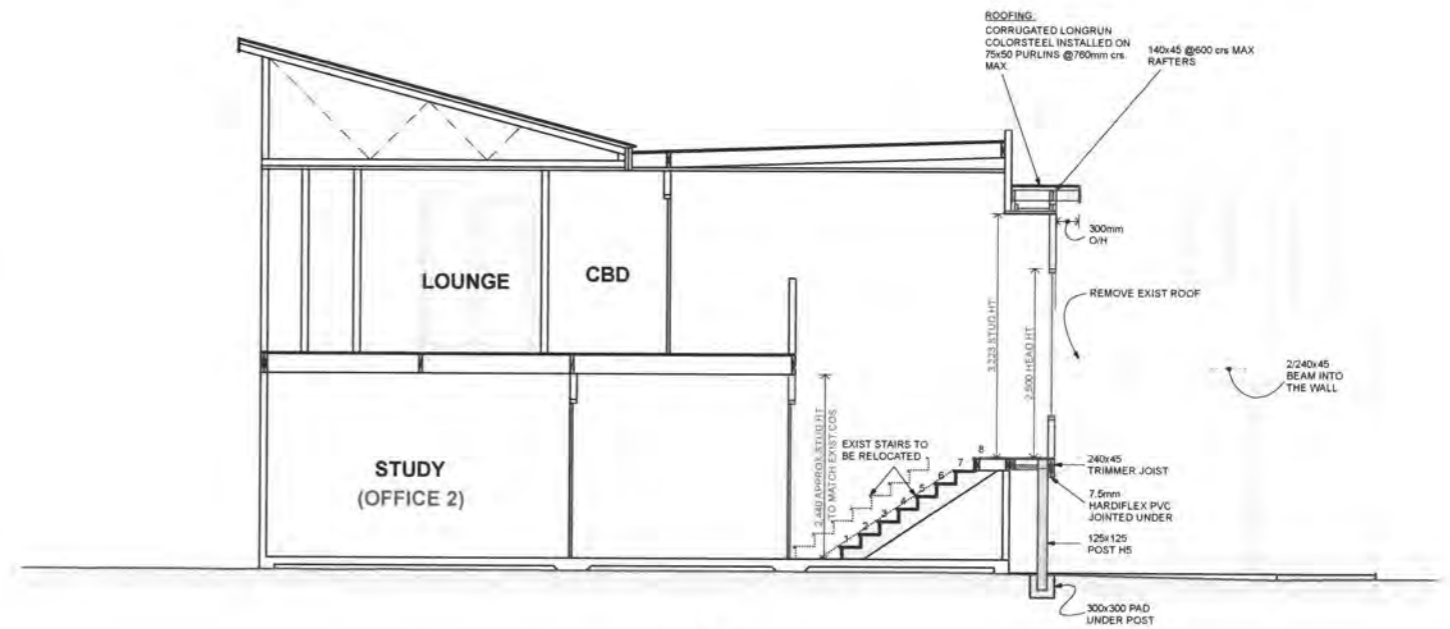
ROOF PLAN

REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	BUILDING CONSENT APPLICATION	SHEET No.
A	26-10-11	GUTTER FALLS	18-07-2011	BUILDING CONSENT APPLICATION	7A
			30-08-2011		
			FINISH DATE 09-09-2011	SCALES FOR A1 SIZE PAPER 1:50 1:5	CODE P20N
			COPYRIGHT RETAINED BY DESIGN NETWORK ARCHITECTURE LTD. DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED		REF 6604K

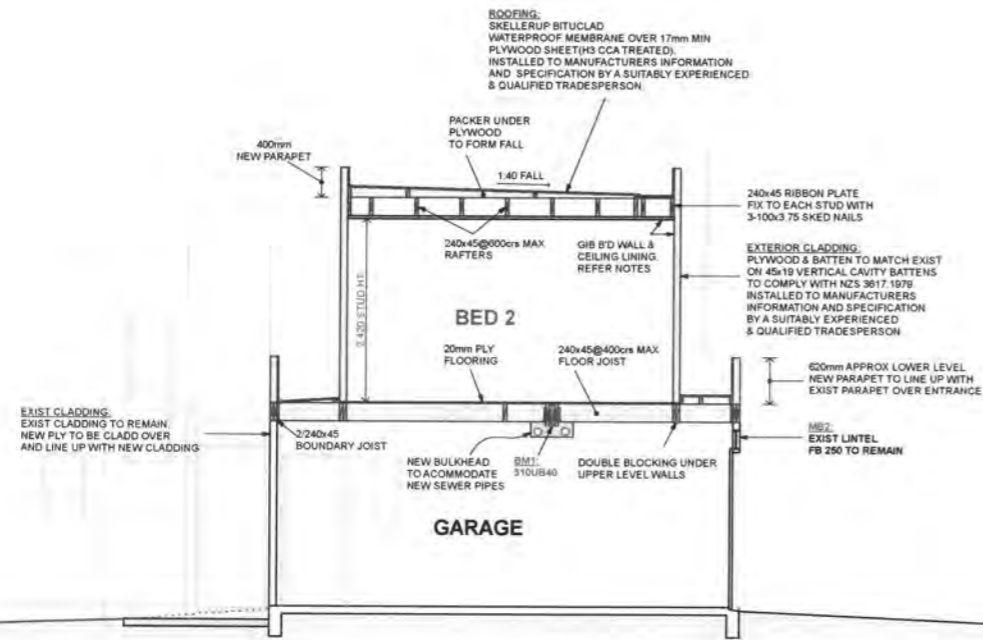




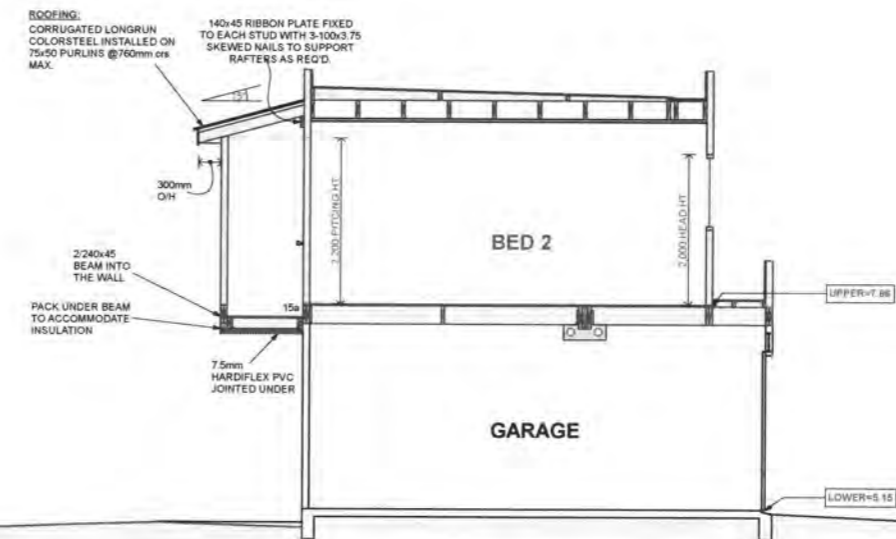
C-C



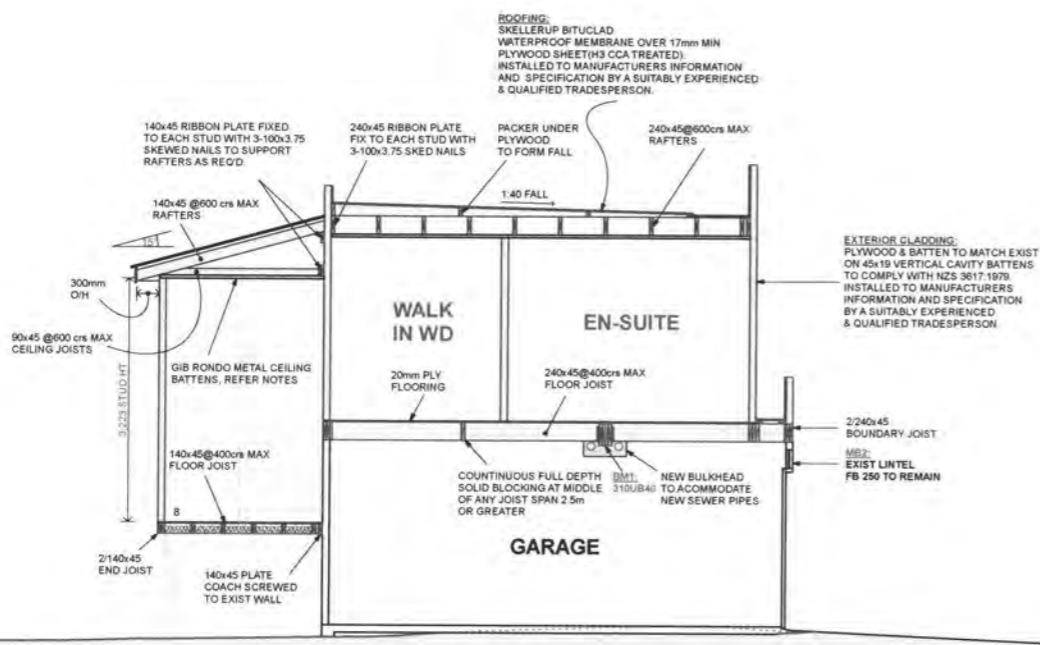
D-D



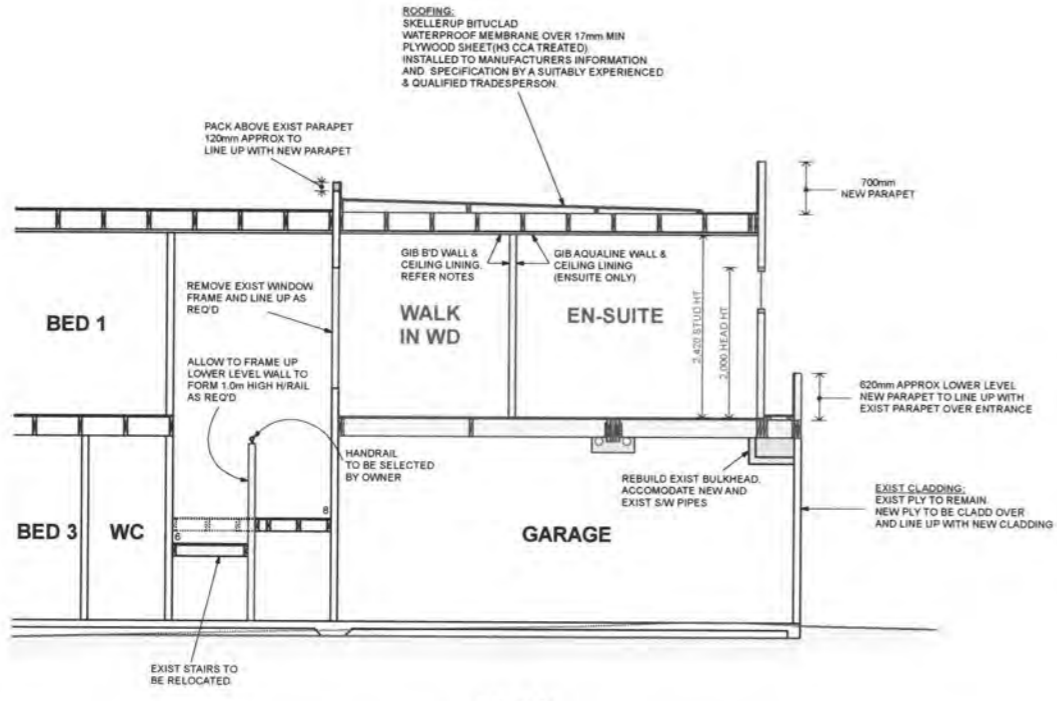
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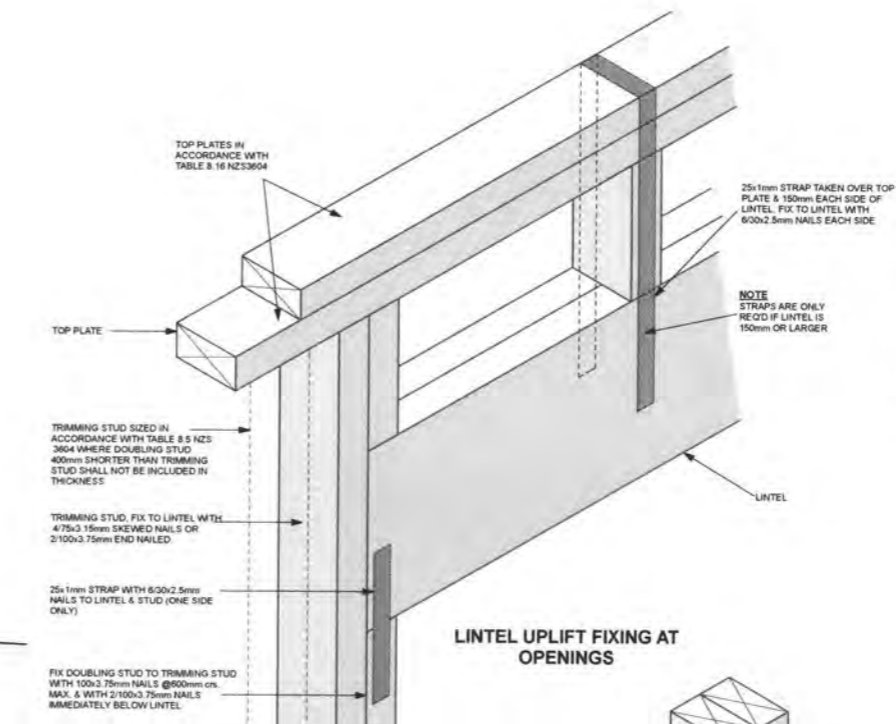
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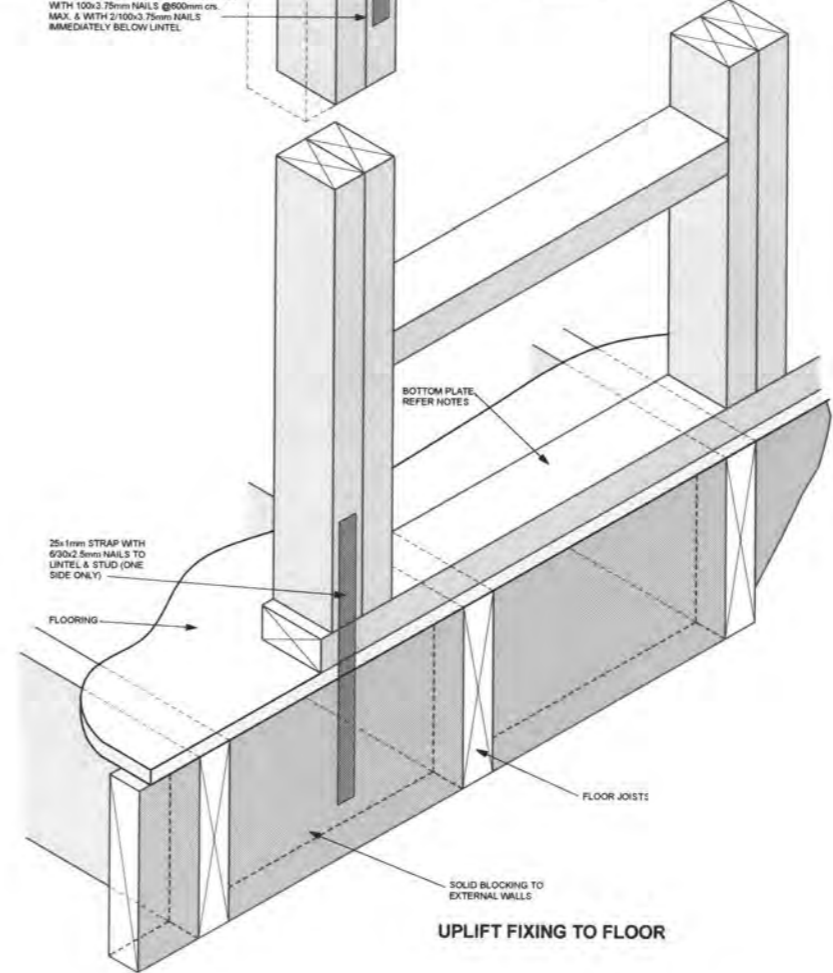
G-G



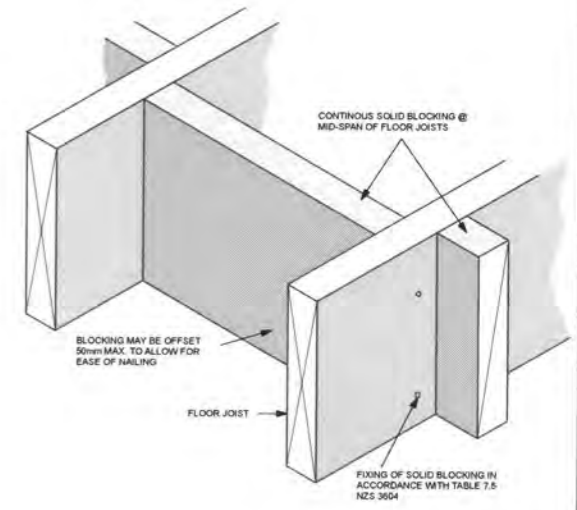
H-H



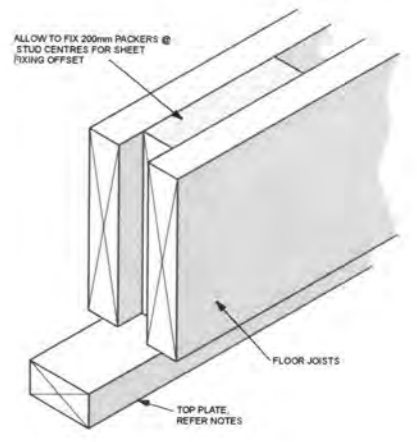
LINTEL UPLIFT FIXING AT OPENINGS



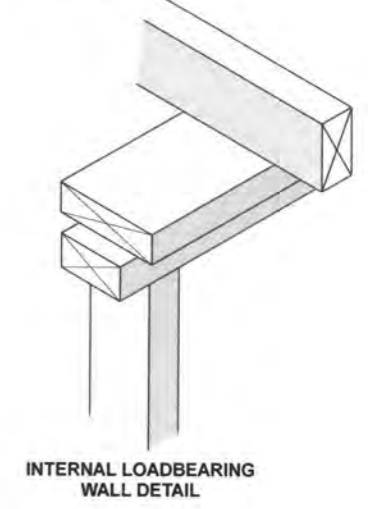
UPLIFT FIXING TO FLOOR



SOLID BLOCKING @ MID-SPAN



INTERNAL WALL



REV. No	REV. DATE	DRAWING AMENDMENT

START DATE	18-07-2011	BUILDING CONSENT APPLICATION	SHEET No.	10
REV DATE	30-08-2011		CODE	
FINISH DATE	09-09-2011	SCALES FOR A1 SIZE PAPER	1:50	1:5
DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED		REF	6604K	

RECEIVED  
15 FEB 2012  
BY:

# BUTYLINOL & EPDM MEMBRANES





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## About ARDEX

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ARDEX specialises in high-quality construction materials for substrate preparation, levelling floors, waterproofing, the fixing of natural stones & ceramic tiles and other surfacing materials. ARDEX offers innovative products of outstanding quality and optimal environmental friendliness, as well as providing training and support services for their application. The ARDEX Group comprises of 28 subsidiaries and some 1,400 employees active in offices and branches in more than 50 countries.

The history of ARDEX can be traced back over 50 years to Witten, Germany where ARDEX Chemie GmbH was founded by Herr and Frau Fortmann and Dr. Kraft. Products such as **Ardurit Z8** and **Ardur K15** are firmly established as benchmarks for flooring products worldwide.

In December 2001 ARDEX acquired Norcros Building Products (NBP). The latter has a similar heritage in the Australasian market with **Butynol waterproofing membranes, ABA tile adhesives** – renowned for their quality and technical excellence, a reputation built over 30 years. Innovations such as Abaflex are unique in the market until this day. Other brands offered by NBP include **Superflex** under-tile waterproofing systems, **Shelter (previously Dunlop)** sheet membrane systems and **HydrEpoxy** coatings. In 2002 **Vibro Products Pty Ltd**, manufacturers under licence of ARDEX floor levelling and adhesives, was acquired and integrated into ARDEX.

These brands, leaders in their respective fields, come together under the ARDEX umbrella, offering you expert solutions. In addition, sharing of resources and technology within our extensive network enables us to provide you with a broader range of world benchmarked products and services.

Make ARDEX your single point of contact for all your waterproofing, flooring and tiling needs.

### The Ardex Vision

*The vision of the ARDEX Group is to be one of the world's leading solution providers of high-performance speciality building materials.*



masterspec



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**THIS PRODUCT MANUAL TAKES EFFECT FROM 1ST MARCH 2008 AND REPLACES ALL PREVIOUS PRODUCT MANUALS ISSUED BY ARDEX NEW ZEALAND LTD**

*® Butynol, Shelterbit, Shelterseal, Sheltercoat, Episeal and Fibrepol are registered tradenames.*

**ALSO AVAILABLE FROM ARDEX**



Technical data on Ardex Bituminous Membranes - torch-on, self adhesive and accessories.



Technical data on the extensive range of Ardex Liquid Membranes.



Comprehensive range of tiling solutions for various internal and external applications including: kitchens, bathrooms, floors, walls, balconies etc. Encompasses adhesives, grouts, soundproofing and silicones.



Comprehensive range of specialist, fast track substrate preparation solutions with a focus on patch and repair mortars and self levelling compounds including ARDEX K15.



A dual-format CD-ROM of Ardex Waterproofing Solutions for on-screen viewing and for cutting and pasting into your specification documents.

# ARDEX Butynol Colour Range



Colours shown may vary from actual material samples.  
Please check actual colour of material before ordering.



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# ARDEX Butynol

**BRANZ Appraised,  
E2/AS1 Acceptable Solution**

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**BRANZ Appraised**  
Appraisal No.436 [2005]

BRANZ Appraisals

Technical Assessments of products  
for building and construction

**BRANZ  
APPRAISAL  
CERTIFICATE  
No. 436 (2005)**

**BUTYNOL®  
ROOFING  
MEMBRANE**

**Ardex NZ Ltd**  
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Woolston  
Christchurch

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## Product

1.1 Butynol® Roofing Membrane is a synthetic rubber waterproofing membrane designed to be used on roofs and decks.

1.2 The product is supplied as single-ply, flexible synthetic rubber sheet in roll form. The product is installed as a single layer system.



Current View of Christchurch Town Hall.  
1 mm Butynol® Roof Membrane laid 1972.

## Scope

2.1 Butynol® Roofing Membrane has been appraised for use as waterproofing membrane for buildings within the following scope:

- scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- with timber supporting structures designed and constructed in accordance with the NZBC; and,
- with nominally flat or pitched roofs constructed to drain water to gutters and drain outlets complying with NZBC; and,
- with substrates of plywood sheet; and,
- with decks that have a maximum size of 40m<sup>2</sup>.

2.2 Butynol® Roofing Membrane has also been appraised for use as waterproofing membrane for external reinforced concrete and plywood roofs, pedestrian decks and balconies for buildings within the following scope:

- up to 3 storeys with a maximum height from ground to eaves of 10m and with a floor plan area limited only by seismic and structural control joints; and,
- with the reinforced concrete structure designed and constructed in accordance with the NZBC; and,
- with timber supporting structures designed and constructed in accordance with the NZBC; and,
- with nominally flat, curved or pitched roofs constructed to drain water to gutters and drain outlets complying with NZBC.

2.3 This Appraisal is limited to roofs, decks and balconies within the following scope:

- constructed to suitable falls (Refer Paragraph 13.1 – 13.9); and,
- with no steps within the deck level, no integral roof gardens and no down pipe discharging directly onto the deck.

2.4 The design and construction of the substrate and movement and control joints is specific to each building, and therefore the responsibility of the building designer and building contractor and is outside the scope of this Certificate.

2.5 The membrane must be installed by Ardex NZ Ltd approved applicators.

## New Zealand Building Code (NZBC)

**3.1** In the opinion of BRANZ, Butynol® Roof Membrane, if designed, used, installed and maintained in accordance with the statements and conditions of this Certificate, will meet or contribute to meeting the following provisions of the NZBC:

**Clause B2 DURABILITY:** Performance B2.3.1 (b) 15 years. Butynol® Roof Membrane meets this requirement. See Paragraph 9.1.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.1 and E2.3.2. Roofs, Decks and balconies incorporating Butynol® Roof Membrane meets these requirements. See Paragraphs 12.1 – 12.9.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. Butynol® Roof Membrane meets this requirement and will not present a health hazard to people.

**3.2** This Certificate appraises an Acceptable Solution in terms of New Zealand Building Code compliance and the product complies with NZBC Acceptable Solution E2/AS1 Paragraph 8.5. This product is also appraised as an Alternative Solution as outlined in Paragraph 2.2

**4.1** Materials supplied by Ardex NZ Ltd are as follows:

### Butynol® Membranes

- All membranes are single-ply, flexible synthetic rubber membranes. They are supplied in rolls nominally 1.4 metres wide by 17.9 metres long. Each roll is packed in polythene wrapper trademarked 'Butynol®' with thickness identified. Gauges available are 1.0, 1.5 and 2.25mm in black and 1.5mm in six colours.

### Adhesive WA98

- A specially formulated solvent-based adhesive for all Butynol® applications. Supplied in 1, 4 and 20 litre containers.

### Seam Primer

- A water resistant primer adhesive, used with seam tape for general lap bonding.

### Seam Tape

- Uncured cold gum tape used for general lap bonding and laps likely to be subject to periodic ponding. Supplied in 50mm x 30.5 metre rolls.

### Flashing Tape

- A malleable tape for moulding gussets, pipe flashings and awkward situations. Supplied in widths of 50-100mm x 5 metres long.

### Butynol Sealant

- A specially designed and formulated sealant for sealing Butynol® flashings into chases. Supplied in 375mm tubes.

## Handling and Storage

**5.1** Handling and storage of all materials whether on or off site is under the control of the Ardex NZ Ltd trained installers. Dry storage must be provided for all products and the rolls of membrane must be stored in an upright position.

**6.1** Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for the Butynol® Roofing Membrane. The Technical Literature must be read in conjunction with this Certificate. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Certificate must be followed.

## General

**7.1** Butynol® Roofing Membrane is for use on roofs, decks and balconies where an impervious waterproof membrane is required to prevent damage to building elements and adjoining areas.

**7.2** The 1.0mm thickness product is designed for use on roofs and gutters, and will accommodate light traffic; the 1.5mm is for walk out decks and high maintenance areas; and the 2.25mm is a heavy duty product that is custom made on request.

**7.3** The effective control of internal moisture must be considered at the design stage due to the impermeability of the membrane. Refer to BRANZ publication "Good Practice Guide to Membrane Roofing".

**7.4** Timber framing systems must comply with NZS 3604, or where specific engineering design is used, the framing shall be of at least equivalent stiffness to the framing provisions of NZS 3604, or comply with the serviceability criteria of NZS 4203. In all cases framing must be provided so that the maximum span of the substrate as specified by the substrate manufacturer is met and that all sheet edges are fully supported.

### Building to NZBC Acceptable Solution E2/AS1

**7.5** NZBC Acceptable Solution E2/AS1 limits the size of decks to 40 m<sup>2</sup> as covered by the scope of this Appraisal. Butynol® Roofing Membrane is suitable for use on decks larger than 40 m<sup>2</sup>. These decks are the subject of specific design and are outside the scope of this Appraisal.

## Substrates

### Plywood

**8.1** Plywood must be treated to H3 (CCA treated). LOSP treated plywood must not be used. Plywood must comply with NZBC Acceptable Solution E2/AS1 Paragraph 8.5.3 and 8.5.5. Where specific design is used (i.e. outside the scope of E2/AS1), the plywood thickness and fixing size may increase and centres may decrease to meet specific wind loadings.

### Concrete

**8.2** Concrete substrates must be to a specific engineering design meeting the requirements of the NZBC, such as concrete construction to NZS 3101.

## Durability

### Serviceable Life

**9.1** Butynol® Roofing Membrane when subjected to normal conditions of environment and with proper maintenance can expect to have a serviceable life of at least 20 years.

## Maintenance

10.1 No maintenance of the membrane is normally required provided significant substrate movement does not occur.

10.2 In the event of damage to the membrane, the membrane must be repaired by removing the damaged portion and applying a patch as for new work.

10.3 Drainage outlets must be maintained to operate effectively.

## Outbreak of Fire

11.1 The membrane must be protected from heat sources such as flues and chimneys in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 9 for the protection of combustible materials.

## External Moisture

12.1 Roofs, decks and balconies must be designed and constructed to shed precipitated moisture. They must also take account of snowfalls in snow prone areas. A means of meeting code compliance with NZBC Clause E2.3.1 is given by the Technical Literature which matches details in NZBC Acceptable Solution E2/AS1.

12.2 When installed in accordance with this Certificate and the Technical Literature, Butynol® Roofing Membrane will prevent the penetration of water and will therefore meet code compliance with Clause E2.3.2. The membrane is impervious to water and will give a weathertight roof, roof deck or balcony.

12.3 The minimum fall to roofs is 1 in 40 and to decks, balconies and gutters are 1 in 60. All falls must slope to an outlet. Inadequate falls will allow moisture to collect and increase the risk of deterioration of the membrane.

12.4 Butynol® Roofing Membrane is impermeable; therefore a means of dissipating construction moisture must be provided in the building design and construction to meet code compliance with Clause E2.3.6.

12.5 Roof, deck and balcony falls must be built into the substrate and not created with mortar screeds applied over the membrane.

12.6 Allowance for deflection and settlement of the substrate must be made in the design of the deck or balcony to ensure falls are maintained and no ponding of water can occur.

12.7 Drainage flanges must be used for any outlet and must be fitted with a grate or cage to reduce potential sources of blockages. An overflow must be provided where the deck or balcony does not drain to an external gutter or spouting.

12.8 Penetrations and upstands of the membrane must be raised above the level of any possible flooding caused by blockage of deck and balcony drainage.

12.9 The design of details not covered by the Technical Literature is subject to specific weathertightness design and is outside the scope of this certificate.

## Water Supplies

13.1 Butynol® Roofing Membrane is suitable for roofs used for the collection of water supplies in compliance with the provisions of NZBC G12.3.1. Water collection systems are the subject of specific design and are outside the scope of this Certificate.

## Installation Skill Level Requirement

14.1 Installation of the membrane must be completed by trained applicators, approved by Ardex NZ Ltd.

14.2 Installation of substrates must be completed by tradespersons with an understanding of roof, deck and balcony construction, in accordance with instructions given within the Ardex NZ Ltd Technical Literature and this Certificate.

## Preparation of Substrates

15.1 Substrates must be dry, clean and stable before installation commences. Surfaces must be smooth and free from nibs, sharp edges, dust, dirt or other materials such as oil, grease or concrete formwork release agents. All surface defects must be filled to achieve an even and uniform surface.

15.2 Concrete substrates can be checked for dryness by using a hygrometer, as set out in BRANZ Bulletin No. 424. The relative humidity of the concrete must be 75% or less before membrane application.

15.3 The moisture content of a timber substructure must be a maximum of 20% and plywood sheet must be dry at time of membrane application. This will generally require plywood sheets to be covered until just before the membrane is laid, to prevent rain wetting.

15.4 Substrates must be primed with a 50/50 solution of WA98 and adhesive solvent and left to dry before membrane is installed.

## Membrane Installation

16.1 The membrane must be installed in accordance with the Technical Literature.

16.2 Plywood joints must be taped with 25mm wide PVC pressure sensitive tape.

16.3 The membrane must be unrolled without tension onto the prepared substrate and allowed to 'relax' for at least 20 minutes prior to installation.

16.4 Adhesive must be applied to both the membrane and the substrate, one half at a time. When the adhesive is tack dry, the sheet is rolled onto the substrate. The process is then repeated for the other half of the sheet. Joints in substrates with a pitch of 5° or less, all coloured membranes irrespective of pitch, all guttering and areas subjected to periodic ponding require lap bonding using Ardex seam tape. Joints in substrates with a pitch above 5° can be sealed using WA98 adhesive. This applies to the black Butynol® only.

## Inspections

17.1 The Technical Literature must be referred to during the inspection of membrane installations by Building Consent Authorities and Territorial Authorities.

17.2 Critical areas of inspection for waterproofing systems are:

- Construction of substrates, including crack control and installation of bond breakers and movement control joints.
- Moisture content of the substrate prior to the application of the membrane.
- Acceptance of the substrate by the membrane installer prior to application of the membrane.
- Installation of the membrane to the manufacturer's instructions.

## Health and Safety

18.1 Safe use and handling procedures for the membrane system is provided in the Technical Literature.

The products must be used in conjunction with the relevant Materials Safety Data Sheet for each membrane.

The following is a summary of the technical investigations carried out:

### Tests

19.1 Tests have been carried out on the membrane by Materials and Quality Consultancy Ltd. This testing covered specific gravity, shore hardness, tensile strength, modulus of elongation, elongation at break, tensile and elongation retention after heat aging, tear strength, ozone resistance and water absorption as detailed in NZBC Acceptable Solution E2/AS1 Paragraph 8.5.4(b). Results and test methods have been reviewed by BRANZ and found to be satisfactory.

19.2 Water vapour permeability tests have been undertaken by BRANZ in accordance with ASTM E96.

19.3 Tests have been carried out on the membrane to assess its suitability for use with potable water supplies. This testing showed the product was satisfactory.

19.4 The adhesives, primers and seam tapes used with Butynol® Roofing Membrane meet the intended performance requirements of NZBC Acceptable Solution E2/AS1 Paragraph 8.5.4(c). *Note: At the time of this Certificate's issue BRANZ EM5 as outlined on Paragraph 8.5.4(c)(i) was not published.*

### Other Investigations

20.1 An assessment was made of the durability of the Butynol® Roofing Membrane by BRANZ technical experts using NZBC B2/VM1 History of Use.

20.2 Site visits have been carried out by BRANZ to assess the practicability of installation, and to examine completed installations.

20.3 The Technical Literature has been examined by BRANZ and found to be satisfactory.

### Quality

21.1 The manufacture of the Butynol® Roofing membrane has been examined by BRANZ, and details regarding the quality and composition of the materials used were obtained by BRANZ and found to be satisfactory. The membrane manufacturer is the subject of AS/NZS ISO 9001 Certificate by Telarc Limited, Registration No. 621.

21.2 The quality of manufacture of the product is the responsibility of Ardex NZ Ltd.

21.4 The quality of supply of the product to the market is the responsibility of Ardex NZ Ltd.

21.5 Quality on site is the responsibility of the Ardex NZ Ltd approved applicators.

21.6 Designers are responsible for the substrate design, and building contractors are responsible for the quality of construction of substrate systems in accordance with the instructions of the substrate manufacturer, Ardex NZ Ltd and this Certificate.

### Sources of Information

- AS/NZS 2269:1994 Plywood – Structural
- ASTM E 96-02 Water vapour transmission of materials in sheet form, American Society of Testing Materials, Philadelphia, 1992.
- NZS 3101: 1995 The design of concrete structures.
- NZS 3604: 1999 Timber framed buildings.
- Compliance Document for New Zealand Building Code External Moisture Clause E2, Department of Building and Housing, Third Edition July 2005.
- New Zealand Building Code Handbook and Approved Documents, Building Industry Authority, 1992.
- The Building Regulations 1992, up to, and including October 2004 Amendment.
- Membrane Roofing Good Practice Guide, BRANZ, November 1999



**BRANZ**

**In the opinion of BRANZ, Butynol® Roofing Membrane is fit for purpose and will comply with the Building Code to the extent specified in this Certificate provided it is used, designed, installed and maintained as set out in this Certificate. The Appraisal Certificate is issued only to the Certificate Holder, Ardex NZ Ltd, and is valid until further notice, subject to the Conditions of Certification.**

### Conditions of Certification

1. This Certificate:
  - a) relates only to the product as described herein;
  - b) must be read, considered and used in full together with the technical literature;
  - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
  - d) is copyright of BRANZ.
2. The Certificate Holder:
  - a) continues to have the product reviewed by BRANZ;
  - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
  - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. The product and the manufacture are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ.
4. BRANZ makes no representation as to:
  - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
  - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
  - c) any guarantee or warranty offered by the Certificate Holder.
5. Any reference in this Certificate to any other publication shall be read as a reference to the version of the publication specified in this Certificate.

For BRANZ

P Robertson  
Chief Executive

Date of issue: 11 July 2005

# ARDEX Butynol

## BRANZ Appraised, E2/AS1 Acceptable Solution



Copy available on request.

### BUTYNOL SYSTEM SPECIFICATION

A synthetic rubber with properties which resist ageing from heat, sunlight and ozone. It has excellent gas impermeability and toughness and remains flexible at low temperatures.

Butynol is manufactured by combining the petroleum gases isobutylene and isoprene at the extremely low temperature of  $-100^{\circ}\text{C}$ . (Rubber Technology-Morton)

Butynol is marketed by Ardex as a warranted roofing and tanking product and fixed by their trained and experienced approved Applicators.

### BUTYNOL MATERIAL SPECIFICATIONS

Our requirements for long term warranty necessitate that Butynol meets these typical technical requirements:

Specific Gravity to ASTM D297	1.20±0.05
Hardness IRHD to ASTM D1415	65±5
Tensile Strength to ASTM D412	8.3 MPa min
Modulus at 300% elongation to ASTM D412	4.15 MPa min
Elongation at break to ASTM D412	300% min
Heat Ageing (7 days at $115^{\circ}\text{C}$ )	
Tensile Retention to ASTM D412	70% min
Elongation Retention to ASTM D412	70% min
Tear Strength to ASTM D624	26kN/m
Ozone Resistance to ASTM D1149 (7 days at $40^{\circ}\text{C}$ in 50pphm ozone)	No visible cracks
Water Absorption to ASTM D471	
1.65% (by mass)	0.72% (by volume)
Water Permeability to ASTM E96-92	
Vapour Flow Resistance (MNs/g)	12414
Vapour Flow Rate ( $\text{g}/\text{m}^2\text{d}$ )	0.013

Note: Interesting comparable figures for water permeability are –

Polythene 156, Asphalt 1830, P.V.C. 4900.

K Values on 1mm Butynol sheeting

K Value (Thermal Conductivity)  $7.4 \times 10^3$   
 $\text{Cal}/\text{cm}/\text{sec}/\text{deg C}$ .

Conductivity Data on 1mm Butynol sheeting

Resistance/ $\text{m}^2$   $\Omega / \text{m}^2 = 0.6816$  on 9.3 volts.

### SEAM TAPE PERFORMANCE

Tests on the seam tape bonding method, by an independent testing laboratory, have shown average

values equivalent to 90% of unwelded material. It is considered impossible for the test methods used to be duplicated in normal service ie. 400% elongation.

### BUTYNOL PROTECTION

Butynol protects against water, moisture vapour, gases, sun, ozone, frost, acids, chemicals and bacteria.

### BUTYNOL RESISTANCE

Butynol resists tearing, flex cracking, bubbling and abrasion. It is extremely strong, has a long life and is versatile.

### STAINING OF LIGHT COLOURED BUTYNOL

To avoid staining care must be taken during design stage to ensure that water running off unpainted treated timber and some metals (eg copper) do not run over light coloured Butynol.

### BUTYNOL GAUGES

Standard 1.0mm—For roofs, gutters and decks with protection.

1.2mm—For roofs.

1.5mm—For roofs and walk out decks.

2.25mm Heavy Duty

Factory welded panels in all gauges can be custom made.

### BUTYNOL IS PACKAGED

In rolls of nominal 1.4m width and 17.86m long. Each roll is packed in polythene wrapper trademarked Butynol with thickness identified. Coverage  $25\text{m}^2$  except 2.25mm gauge which is  $12\text{m}^2$

Gauges available are:

1.0mm black.	Weight: nominal 30kg
1.5mm black.	Weight: nominal 45kg
2.25mm black.	Weight: nominal 32kg
1.2mm dove grey.	Weight: nominal 32kg
1.5mm all colours.	Weight: nominal 47kg

### ADHESIVES AND SOLVENTS

Specially formulated for all Butynol applications. Supplied in 20L steel/plastic pails (approx. 20kg). 4 and 1 litre cans.

### BUTYNOL SEALANT

Available in tubes for caulking guns.

### **SEAM PRIMER**

Seam Primer is specially formulated for use with Seam Tape. Applied with scrubber pads. Available in 4 and 1 litre cans.

### **SEAM TAPE**

Supplied by Ardex in 50mm x 30.5m rolls (6 to a carton). Roofs with a pitch of less than 5°, all coloured membranes and all guttering and areas subjected to periodic ponding require special lap bonding. All coloured membranes, irrespective of pitch require special lap bonding.

### **DETAIL TAPE (uncured)**

A malleable exterior tape for flashing exterior corners etc. 150mm x 30.5m rolls.

### **FLASHING TAPE**

A malleable tape for moulding in gussets, pipe flashings and awkward situations. Supplied in 100mm x 5m rolls. Flashing tape must not be left exposed. A cover strip of Butynol or detail tape must be applied over flashing tape to finish.

### **SUBSTRATE VENTILATION**

Substrate ventilation should be used to release moisture trapped under the Butynol on concrete surfaces. Substrate ventilators are used in conjunction with vent tapes. Tapes should be laid in a grid pattern spaced at 600mm venting to the roof perimeter. On plywood substrates ventilators are used at the junction of the ply. Ventilators are not required in most applications for cavity ventilation - seek advice from an Ardex Representative. One way substrate ventilators prevent moisture vapour build up and if required can be installed every 90 square metres. Not designed to ventilate roof cavities. (Refer Diagram page 23).

### **PLYWOOD TREATMENT**

To be in accordance with Acceptable Solution E2/AS1 plywood substrate must be treated to H3.2 with Waterborne CCA treatment and kiln dried after treatment.

**Plywood must not be LOSP treated.**

### **DURABILITY**

Butynol when fixed according to Ardex instruction will meet the NZBC requirements of B2.3.1(b) 15 years. Refer BRANZ Appraisal Certificate No 436 (2005).

### **EXTERNAL MOISTURE**

New Zealand Building Code Acceptable Solution E2/AS1 requirements recommend membrane clad roofs have a minimum pitch of 1.5°.

### **BUILDING TO NZBC ACCEPTABLE SOLUTION E2/AS1**

NZBC Acceptable Solution E2/AS1 limits the size of decks to 40m<sup>2</sup> as covered by the scope of Appraisal No. 436 (2005). Butynol Roofing Membrane is suitable for use on decks larger than 40m<sup>2</sup>. These decks are the subject of specific design and are outside the scope of the Appraisal.

### **CLEANING WEATHERED BUTYNOL**

Use sugar soap to remove oxidation and restore surface.

### **DAMP AND WEATHERPROOFING**

The Building Code of Australia Deemed-to-Satisfy Provisions F1.9 and F1.10 are met by Butynol as an acceptable damp-proof course.

Butynol when used as described in ABSAC Technical Opinion 188 August 1994 complies with the Building Code of Australia Deemed-to-Satisfy Provision F1.7(b) and Acceptable Construction Manual Part 3.8.1.0, or AS 3740 for "Water Proofing of Wet Areas in Buildings".

### **PAINTING OVER BUTYNOL**

Use Roof Acrylic paint with Ardex Seam Primer on non ponding areas. Wash with Sugar Soap. Beware of using non Ardex primers as this may effect your Butynol Warranty.

### **FIRE RATING**

The Butynol roofing system must be considered combustible but may be used on buildings for all purpose groups, subject to the requirements of NZBC Acceptable Solution C/AS1 Part 7, Paragraph 7.11.1.

When used for roofs in Purpose Groups SC and SD a non-combustible substrate or timber 18mm thick is acceptable. Refer 7.11.1.

Building Code of Australia allows use in all building types under Specification C1.10, Clause 7(e), except in bush fire prone areas.

### **PRODUCT WARRANTY**

When laid by an approved Applicator in accordance with Ardex's specifications, a material warranty for up to 20 years (covering the Membrane, adhesive and tape) is available. Ardex is not responsible for any costs arising from installation of the Membrane and does not provide any warranty other than where a written Ardex material warranty has been issued.

### **WORKMANSHIP**

A warranty for workmanship shall be provided directly by the approved Applicator. The period and terms of the workmanship warranty shall be determined by the conditions of contract or the approved Applicator.

# ARDEX Butynol

## BRANZ Appraised, E2/AS1 Acceptable Solution

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### ADHESIVES AND SOLVENTS FOR USE WITH BUTYNOL

WA98 - The Standard contact brushing, spray grade and rolling adhesive for fixing to the substrate and for laps not subject to periodic ponding.  
(Pitch 5° and above)

Seam Primer - A water resistant primer, used with seam tape for general lap bonding.

Roofs with a pitch of less than 5°, all coloured membranes and all guttering and areas subjected to periodic ponding require special lap bonding. All coloured membranes, irrespective of pitch require special lap bonding.

Note: Temperature and Humidity

The evaporation of any solvent adhesive system causes a drop in temperature at the interface. At times of high humidity this can result in a micro molecular water layer at the interface which will result in a failure to bond, falsely attributed to Adhesive failure. Fixing should not proceed under these circumstances.

### NOTES

1. In cases of extreme absorbency, a priming coat of 50/50 WA98 adhesive and solvent may assist water shedding and absorption. However, a follow up of full strength adhesive for full bonding should not be proceeded with under four hours, thus allowing full evaporation of solvents absorbed into the substrate. Primers must be time dried not touch dried.
2. As new substrate materials continually appear on the market, consult Ardex for approval of their use with Butynol.
3. Where periodic ponding is likely and on roofs with a slope of less than 5°, Ardex Seam Tape and Seam Primer must be used on all joints.
4. Black Butynol and roofs with pitch of 5° or greater and sufficient fall to prevent periodic ponding may be formed using the sheet bonding adhesive WA98. All laps must be wiped with WA98 solvent prior to bonding.

Roofs with a pitch of less than 5°, all **coloured membranes** and all guttering and areas subjected to periodic ponding require special lap bonding.

Refer Acceptable Solution E2/AS1 8.5.5.2a.

All **coloured membranes**, irrespective of pitch require special lap bonding.

5. Do not use in temperatures less than 6°C.

### CAUTION

All Adhesives and Solvents are

**HIGHLY FLAMMABLE**

### **SUBSTRATE SPECIFICATION (Plywood)**

To conform with Acceptable Solution E2/AS1 plywood shall be:

A minimum of 17mm complying with AS/NZS 2269, at least CD Structural Grade plywood with the sanded C face upwards, and H3.2 with Waterborne CCA treatment and kiln dried after treatment.

Substrates must be dry when Butynol is applied. The plywood and the timber substructure shall have a maximum moisture content of 20% when Butynol is adhered.

Plywood panels shall be laid with staggered joints (brick bond), the edge of sheets shall be supported with dwangs or framing, unless a structurally tested tongue-in-groove edge provides equivalent support. The maximum recommended span in E2/AS1 is 400mm in each direction. However specific design may allow 17.5mm plywood or greater to be laid on 400mm purlins with nogs or dwangs at 600mm or even 1200mm centres. Plywood shall be laid with the face grain at right angles to the supports. A 20mm triangular fillet shall be used at the base of any 90° upstand. External edges shall be chamfered with a minimum radius of 5mm.

Plywood shall be fixed with 10 gauge x 50mm stainless steel countersunk head screws eg Hylton Parker No 24639 or No 12923 for Steel Purlins, with 3mm gaps between all sheets, at 150mm centres on edges, and 200mm in the body of the sheets.

All joints in the plywood and junctions of plywood with other materials shall have 25mm polyethylene release tape applied before application of Butynol.

Closed-in construction spaces under Butynol roofs and decks shall have adequate ventilation to prevent the accumulation of moisture under Butynol. There should be a minimum gap of 20mm between the underside of the substrate and any insulation.

**NOTE: The use of LOSP (Light Organic Solvent Preservative) treated plywood must NOT be used under Butynol in any circumstances or conditions.**

### **SUBSTRATE SPECIFICATION (Concrete)**

#### **New concrete**

Must be cured for a minimum of 28 days and all curing compounds removed prior to application.

A reduction in cure time can be achieved by utilising the Ardex HydrEpoxy System (consult Ardex Technical Department for details).

#### **Old concrete**

Must be clean from any contaminants prior to application.

For further substrate types please consult Ardex Technical Department.

# ARDEX Butynol

## BRANZ Appraised, E2/AS1 Acceptable Solution

### TYPICAL ARCHITECTURAL BUTYNOL RUBBER ROOFING SPECIFICATION

#### 1. Preliminary

Refer to the Preliminary and General Clauses of this specification and to the General Conditions of Contract which are equally binding on all trades. This section of the specification shall be read in conjunction with all other sections.

#### 2. Scope

This section of the contract consists in general of the provision and laying of all the Butynol rubber, for the roofs, decks, gutters and flashings on the buildings. Refer to Clause 12 hereafter for Extent of Work.

#### 3. Workmanship

The whole of the work shall be carried out by skilled tradesmen using adequate and proper equipment and methods in accordance with best trade practice, and following the specifications methods and recommendations as laid down by the manufacturers.

#### 4. Sub-contractors

The work included in this section of the contract shall be carried out by a firm of roofing experts conversant with and specialising in the supply and fixing of this material and shall be a firm approved by Ardex.

#### 5. Warranty

When laid by an approved Applicator in accordance with Ardex's specifications, a written material warranty of up to 20 years is available. It is the responsibility of the approved Applicator to confirm proper installation and to request Ardex to issue a material warranty on behalf of the customer following completion of installation. Ardex is not responsible for any costs arising from installation and does not provide any warranty other than where a written Ardex material warranty has been issued.

#### 6. Materials

##### 6.1 Butynol Rubber

(a) Shall be 1.0mm thick standard Black Butynol rubber to all roof surfaces, gutters and fascias and walk out decks where membrane is to be overlaid with tiles.

(b) Shall be 1.5mm thick Butynol to all walk out decks.

##### 6.2 Adhesives

Shall be as recommended by Ardex specially formulated for Butynol rubber and suitable for the particular application and the relevant temperature and conditions applicable.

Generally Ardex WA98 adhesive is used for substrate and lap bonding (5° and above).

Ardex seam primer shall be used in conjunction with Ardex seam tapes.

When conditions are experienced that are outside the temperature and/or moisture ranges recom-

mended by the manufacturers for the above standard adhesives work will cease.

##### 6.3 Seam Tapes

Shall be 50mm wide seam tape provided by Ardex.

##### 6.4 Substrate Joint Tape

All Plywood joints shall be taped with a 25mm wide pressure sensitive Ardex approved self adhesive tape.

#### 7. Roof Deckings

Shall be 1.5mm Butynol or 1mm with a protective covering for all deck surfaces.

All decks to which Butynol is to be fixed shall be clean, smooth, dry and free from dirt, grit or sharp objects.

Deck substrates may be primed with 50/50 WA98 adhesive/solvent.

The Butynol roofer shall co-operate with the other trades laying the decking to ensure that the final surface is in first class condition for the laying of the Butynol rubber roofing.

The Butynol roofer shall check the deck before laying any Butynol to ensure that the surface is completely sound, screw fixed to specifications: screw heads flush, sheets spaced to provide for thermal movement or shock.

NZBC Acceptable Solution E2/AS1 limits the size of decks to 40m<sup>2</sup> as covered by the scope of Appraisal No. 436 (2005). Butynol Roofing Membrane is suitable for use on decks larger than 40m<sup>2</sup>. These decks are the subject of specific design and are outside the scope of the Appraisal.

## 8. Laying of Butynol Roofing

It is the responsibility of the Applicator to ensure that the substrate surface to be covered by the Butynol is in fit and proper condition, suitable for the laying of the material.

Tape all joints in substrate sheets with 25mm wide pressure sensitive tape approved by Ardex.

All Butynol sheeting shall be laid out on the roof to "relax" the sheeting before fixing. A period of at least 20 minutes is usually required. Do not finally position sheeting with a tension exceeding 2%.

Apply adhesive to the substrate and the underside of the Butynol rubber sheeting by brush, spray or an approved type roller at a spreading rate of generally not less than 2.5 square metres per litre. Leave to tack dry before bonding the two surfaces together.

Lay sheeting by drawing back halfway either longitudinally or transversely. Thoroughly roll or work over the surface of the sheet to exclude all air and to obtain a full bond.

All Butynol shall be "lap bonded" as detailed below.

### Bonding Laps with Ardex Seam Tape and Seam Primer

Following laying of the Butynol the laps must be sealed. Roofs with a pitch of less than 5°, all coloured membranes irrespective of pitch and all guttering and areas subjected to periodic ponding require special lap bonding using Ardex seam primer and Ardex seam tape. Laps with pitch 5° and above (on black Butynol only) can be sealed using WA98 adhesive. (Lap areas must be wiped using WA98 solvent prior to applying adhesive.)

1. The top lap is positioned and the bottom sheet marked to indicate the edge of the top sheet.
2. The top sheet is folded back.
3. The Ardex Seam Primer is then applied to the Butynol in the area marked on the bottom sheet and 50mm in from the edge on the top sheet. The Ardex Seam Primer is applied to the mating surfaces using a synthetic scrubbing pad. Scrubbing pads should be replaced as they become dirty. Allow the primer to become 'dry to the touch'.
4. Position and unroll the 50mm Ardex Seam Tape along the seam. The edge of the release paper should be aligned to the mark on the bottom membrane sheet.
5. Roll the length of the seam with the release paper still in place.
6. Remove the release paper from the Ardex Seam Tape by pulling at a 45° angle away from the seam. Keep the release paper low to the roof surface as it is removed.

7. Fold into place the primed edge of the top sheet.

8. Roll the completed seam.

## 9. Tiling Over Butynol

To direct fix tiles to Butynol, ABA Optima two part adhesive should be used. Ensure the Butynol surface is clean and dry before applying the adhesive. All laps must have seam tape.

(Refer Optima page 43)

## 10. Protection of Laid Butynol Sheeting

The Butynol roofing contractor shall ensure that his fixers only work on the Butynol roofing with soft sole shoes.

The Butynol roofer shall co-ordinate with the main contractor who shall ensure that any other trades who work over the completed roof wear soft sole shoes.

Upon completion of each area the roofer shall get the main contractor to inspect the area and the main contractor will sign off that the area was free from any defects or damage. It is then the responsibility of the main contractor to ensure the Butynol roofing is in no way damaged by other trades.

## 11. Completion

On completion carefully and thoroughly clean off and remove all scraps and other rubbish from finished surfaces and leave in tidy order.

## 12. Extent of Work

Observe the foregoing specification and supply and lay Butynol rubber sheeting to all roofs, decks, gutters and flashings as shown and detailed in the Ardex specification.

Failure to comply with the above specifications will result in all warranties being null and void.

# ARDEX Butynol

## BRANZ Appraised, E2/AS1 Acceptable Solution

### LAYING SPECIFICATION

The Sub contractor for the work called for in this trade will be a Company or Person approved by Ardex.

The approved Applicator (hereafter called the Applicator) shall examine all drawings and provide for the flashing, caulking and sealing of all vents, stacks and pipes penetrating the roofing membrane. Also all flashings at walls, parapets, verges, gutters etc., unless otherwise instructed in the specifications.

The surface to which Butynol is to be fixed shall be clean, smooth, dry and free from sawdust, grit or sharp objects. Membrane laying shall not start until defects have been corrected.

To avoid staining care should be taken to avoid water runoff from copper downpipes or guttering on to light coloured Butynol.

When CCA plywood is used in conjunction with a light coloured membrane it is advisable to prime any plywood that will not be covered the same day.

It is the responsibility of the Applicator to ensure that the surface to be covered by the Butynol is in fit and proper condition, suitable in all respects for the laying of the material.

On completion the Applicator will provide the owner with a Workmanship Warranty and obtain from Ardex a Materials Warranty.

Failure to comply with the above specifications will result in all warranties being null and void.

### LAYING THE BUTYNOL

Before applying the Butynol, it shall be unrolled for twenty minutes to relieve stresses induced by manufacture and storage. The Butynol sheet shall be set out in the exact position in which it will be finally required and while it is held in place, it shall be folded back lengthwise to expose half the underside. To the now exposed underside and the area of roof also left exposed, apply an even coat of WA98 Adhesive. When the adhesive has become touch dry, work the sheet back into its original position avoiding wrinkles and the inclusion of air bubbles.

Repeat the process with the other half of the sheet and when completed, roll the whole sheet with hand press rollers or the like.

When applying the next sheet, it shall be lapped over the first sheet by 50mm. All turn ups and downs shall be neatly formed and cut to a straight line if required.

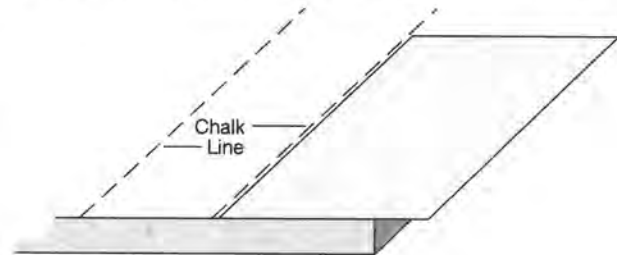
Butynol shall not be laid under tension.

When the whole area has been covered or as work progresses, the applicator has to seal the laps.

### BUTYNOL LAYING METHOD

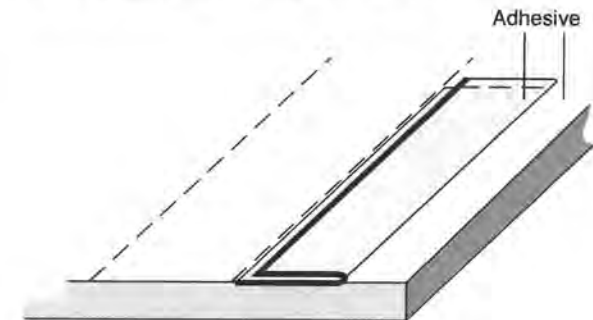
#### STEP 1

Accurately place sheet. Mark spacing with chalk line.



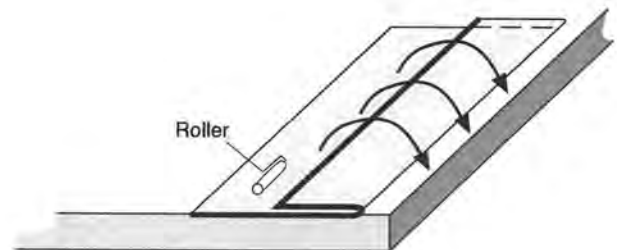
#### STEP 2

Fold back half sheet. Apply adhesive to both faces.



#### STEP 3

After flash off, fold membrane into place. Roll thoroughly.



#### STEP 4

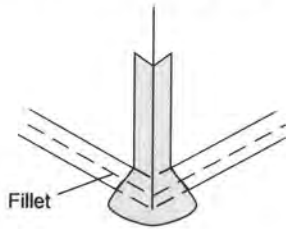
Treat 2nd half of Butynol similarly.

## EXTERNAL CORNERS

To comply with Acceptable Solution E2/AS1 Figure 57.

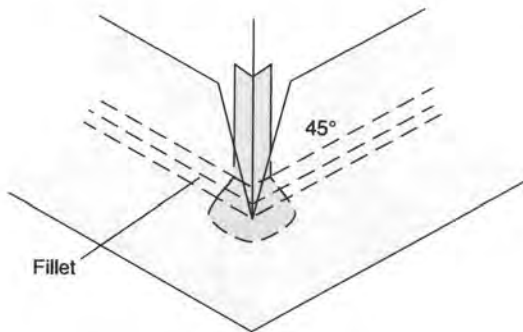
### STEP 1

Bond 100mm flashing to corner as shown.



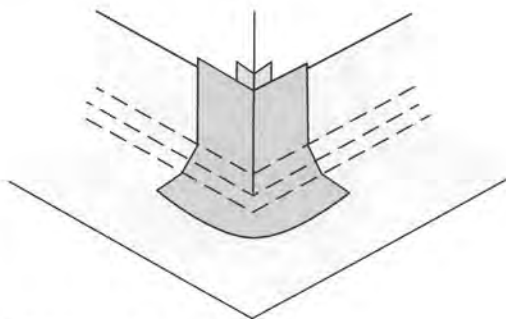
### STEP 2

Bond Butynol to deck and up wall 150mm minimum. Cut sheet from corner at 45° as shown.



### STEP 3

Cover corner point with layer of detail tape.

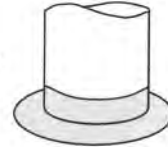


*NOTE: Fillets must be used on all internal corners.*

## FLASHING - EXISTING PIPE

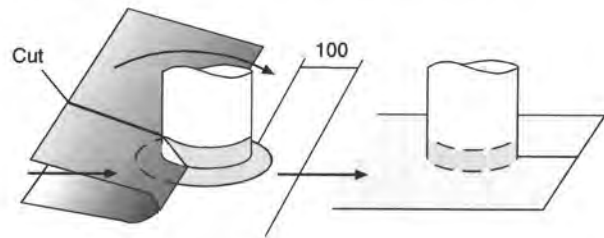
### STEP 1

Under flash pipe with 100mm Butynol flashing tape.



### STEP 2

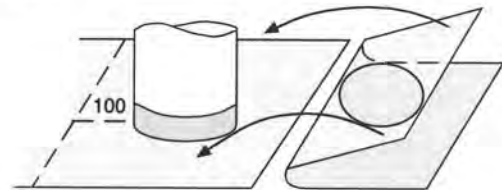
Bond Butynol to 100mm past pipe. N.B. When flashing black Butynol use Butynol or detail tape.



### STEP 3

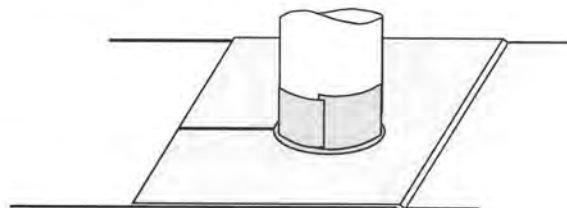
Bond continuation of Butynol to overlap base sheet and beyond pipe 100mm.

Cut a smooth round hole 20mm smaller than diameter of penetration.



### STEP 4

Apply collar of detail tape or Butynol cover strip. DO NOT STRETCH STRIP.



**N.B. Flashing tape MUST NOT be left exposed. Cover strip must be Butynol. When detail tape is used a cover strip of Butynol is not required.**

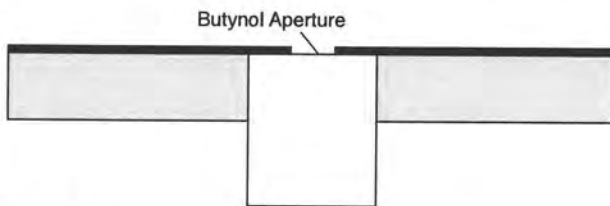
# ARDEX Butynol

## BRANZ Appraised, E2/AS1 Acceptable Solution

### FLASHING - NEW PIPE

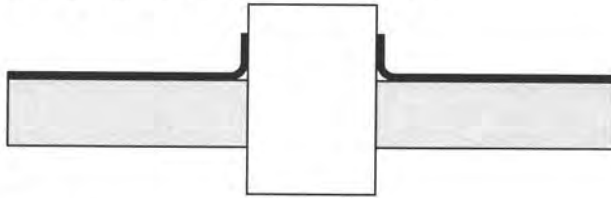
#### STEP 1

Cut smaller diameter hole than pipe.



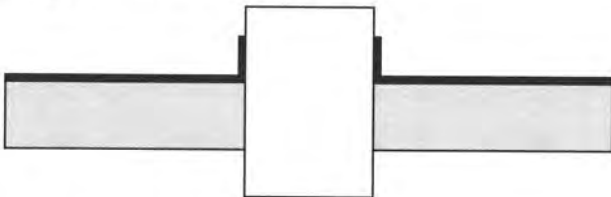
#### STEP 2

Pipe is raised through smaller diameter hole in Butynol, forcing edge upwards to create upstand.



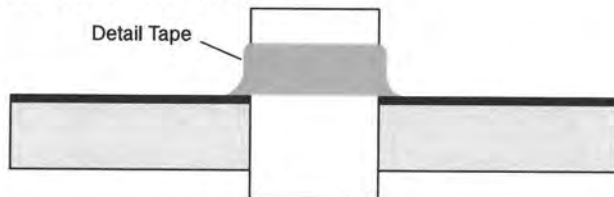
#### STEP 3

Pull pipe down to eliminate void.



#### STEP 4

After pulling pipe down approximately 1cm to sharpen corner, tape upstanding Butynol to pipe using WA98 adhesive and detail tape.

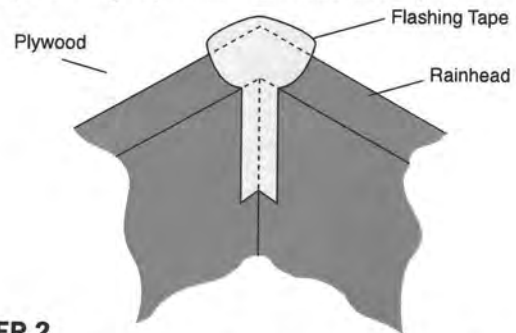


**N.B. If flashing tape is used it MUST NOT be left exposed. A cover strip of Butynol must be applied over the flashing tape to finish.**

### INTERNAL CORNERS FOR RAINHEADS and areas where a pig's ear cannot be used.

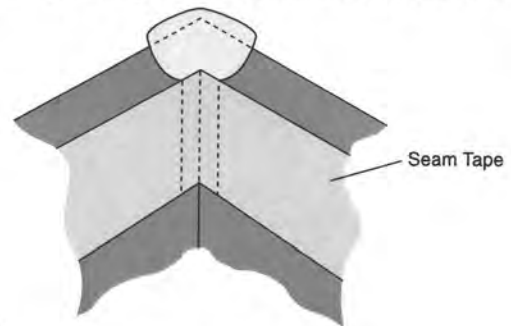
#### STEP 1

Apply Flashing Tape over Rainhead and Plywood.



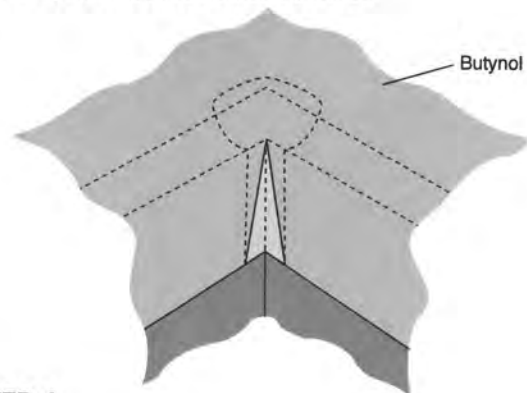
#### STEP 2

Run Seam Tape along all four vertical sides of Rainhead.



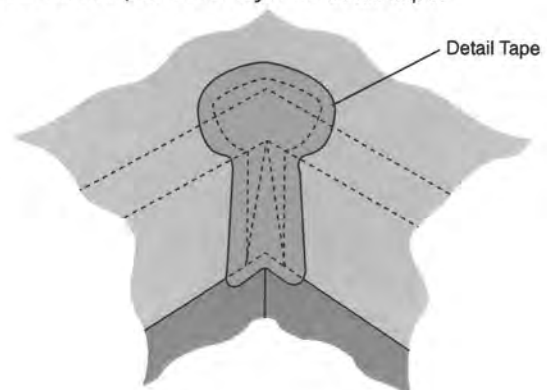
#### STEP 3

Cut Butynol sheet to fit into corners.



#### STEP 4

Cover corner point with layer of detail tape.

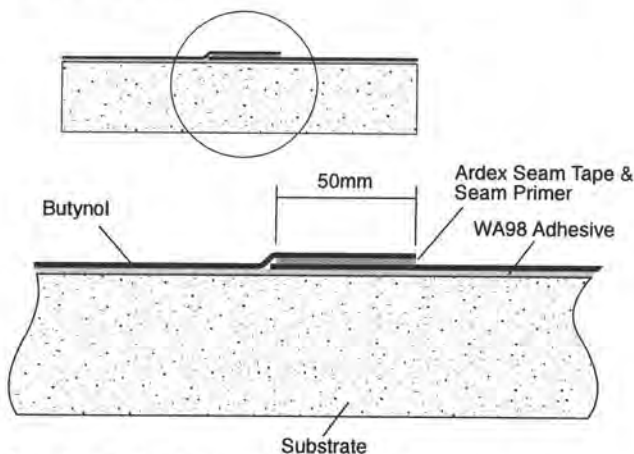


## BONDING THE LAPS

Roofs with a pitch of less than 5°, all **coloured membranes** and all guttering and areas subjected to periodic ponding require special lap bonding.

Refer Acceptable Solution E2/AS1 8.5.5.2a.

All **coloured membranes**, irrespective of pitch require special lap bonding.



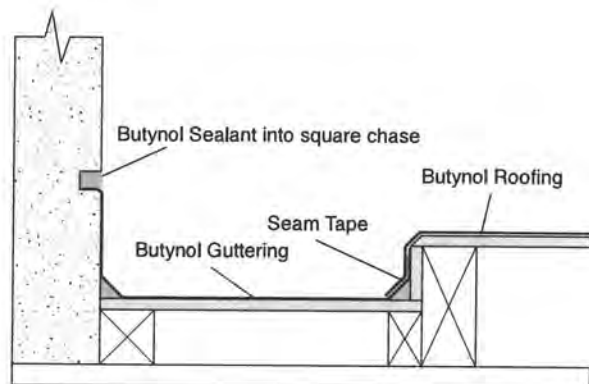
1. The top lap is positioned and the bottom sheet marked to indicate the edge of the top sheet.
2. The top sheet is folded back.
3. The Ardex Seam Primer is then applied to the Butynol in the area marked on the bottom sheet and 50mm in from the edge on the top sheet. The Ardex Seam Primer is applied to the mating surfaces using a synthetic scrubbing pad. Scrubbing pads should be replaced as they become dirty. Allow the primer to become 'touch dry'.
4. Position and unroll the 50mm Ardex Seam Tape along the seam. The edge of the seam tape should be aligned to the mark on the bottom membrane sheet. The see-through backing film makes this very simple.
5. Roll the length of the seam with backing film still in place.
6. Remove the backing film from the Ardex Seam Tape by pulling at a 45° angle away from the seam. Keep the backing film low to the roof surface as it is removed.
7. Fold into place the primed edge of the top sheet.
8. Roll the completed seam.

*Black Butynol and roofs with minimum pitch of 5° and sufficient fall to prevent periodic ponding may be formed using the sheet bonding adhesive WA98. All laps must be wiped with WA98 solvent prior to bonding.*

## FORMING LAPS FOR GUTTERS

Laps are most important in gutter work and should be formed using Ardex seam tape and seam primer.

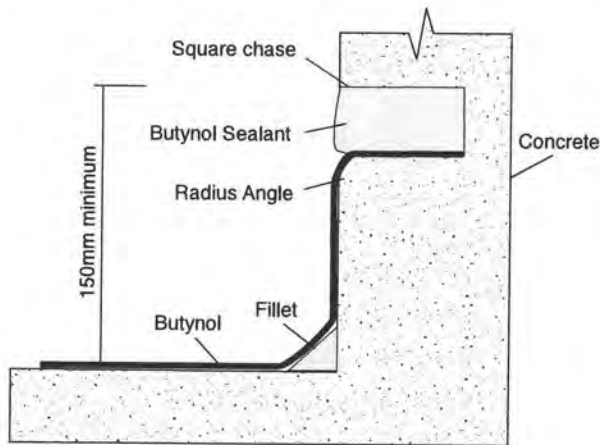
All internal boxed gutters can be easily formed to any shape or size using Butynol over any specified substrate.



# ARDEX Butynol

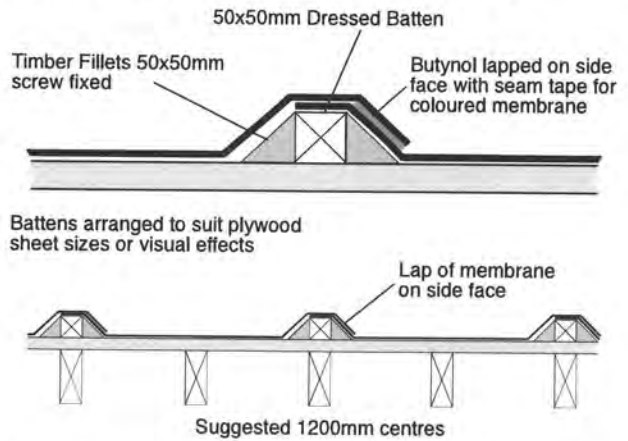
BRANZ Appraised, E2/AS1 Acceptable Solution

## FLASHING INTO CONCRETE WALLS



Butynol is glued into square chase and finished with Butynol Sealant.

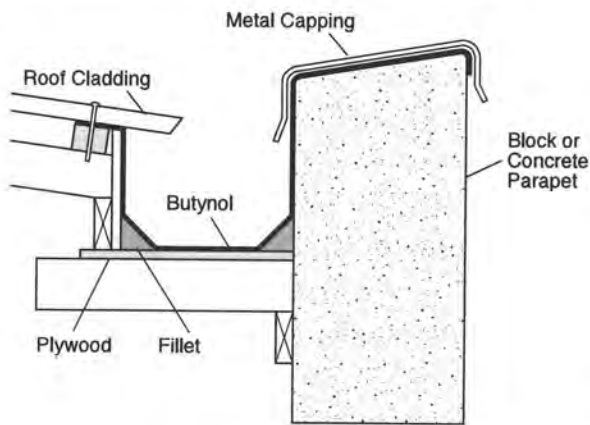
## RECOMMENDED BATTEN PROFILE DETAIL



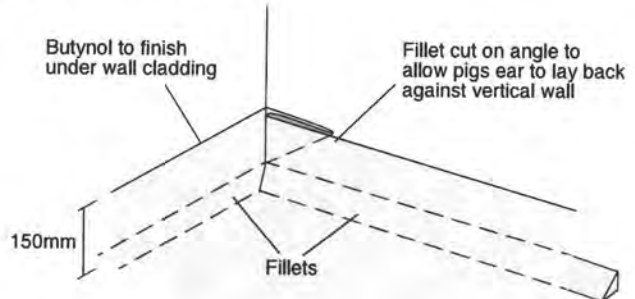
Example of a 1400mm sheet of Ardex Butynol dressed over battens at 1200mm centres

Note: Treatment for battens must be H3.2 (CCA) only. Not LOSP treated.

## BOXED GUTTER AND PARAPET DOWNTURN



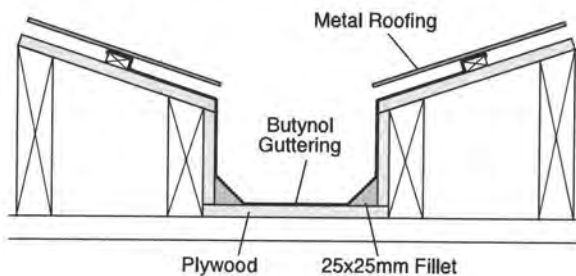
## INTERNAL CORNERS



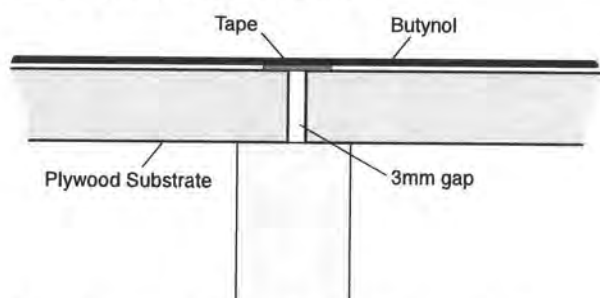
Without cutting Butynol simply fold a 'pig's ear' corner as shown. The angle fold should be behind the main sheet.

NOTE: Fillets must be used on all internal corners.

## INTERNAL GUTTER



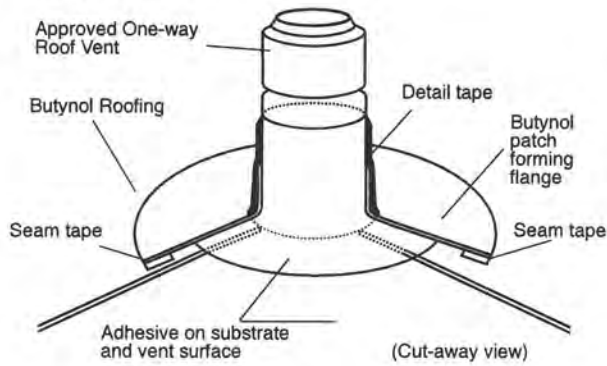
## TAPING SUBSTRATE SHEETS



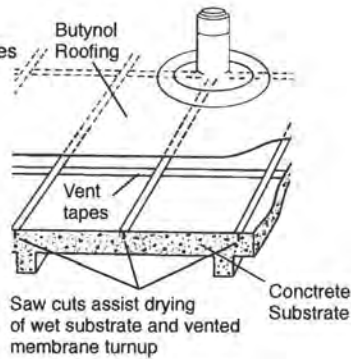
All joints between substrate sheets of Ply should be taped to prevent stressing of the Butynol in case of marked timber movement.

## ONE WAY SUBSTRATE VENTILATOR

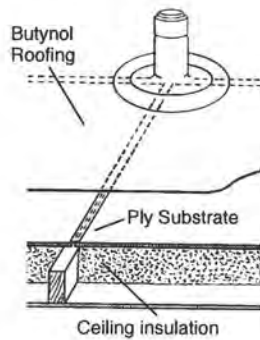
### PVC or Aluminium



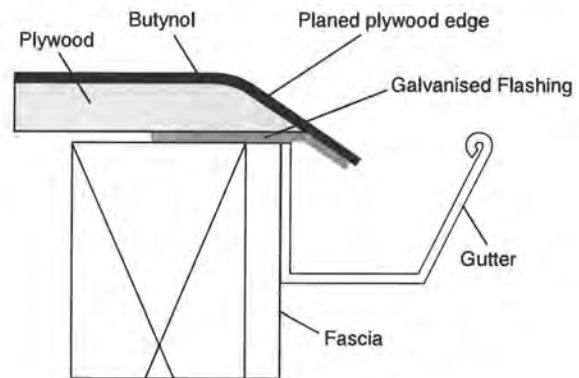
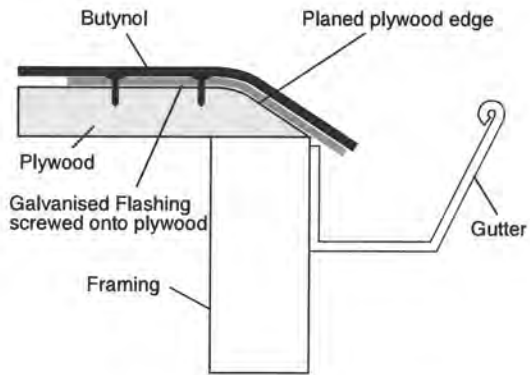
Vent installed over intersection of vent tapes on concrete substrate



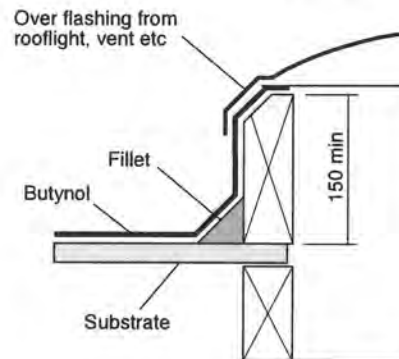
Vent installed over intersection of 3mm gap between Ply substrate sheets.



## TWO METHODS FOR FINISHING OVER A GUTTER



## ROOFING PENETRATION IN MEMBRANE

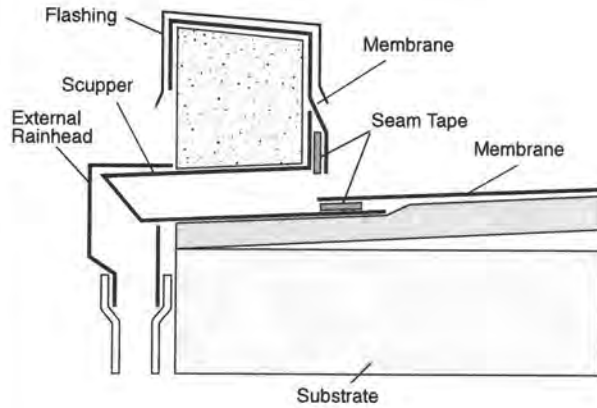


- NOTE: 1 For maximum penetration size of 1200x1200mm  
2 External corners to be formed as shown

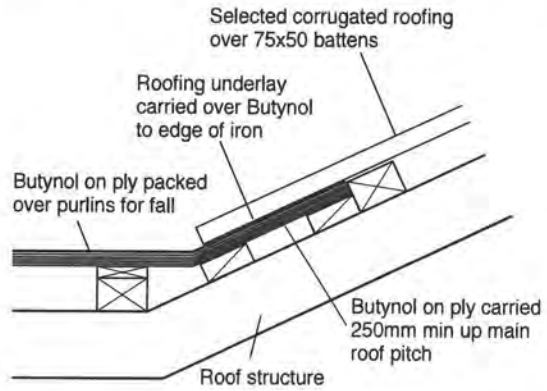
# ARDEX Butynol

BRANZ Appraised, E2/AS1 Acceptable Solution

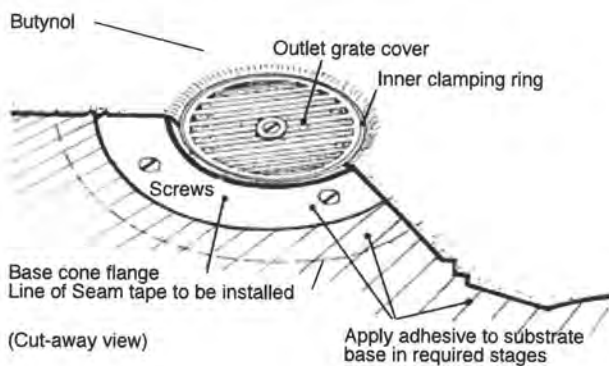
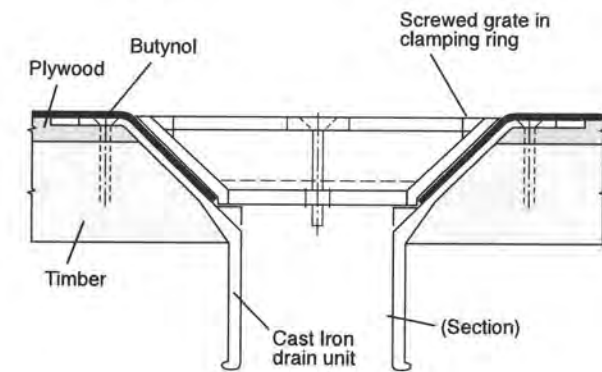
## SCUPPER OUTLET



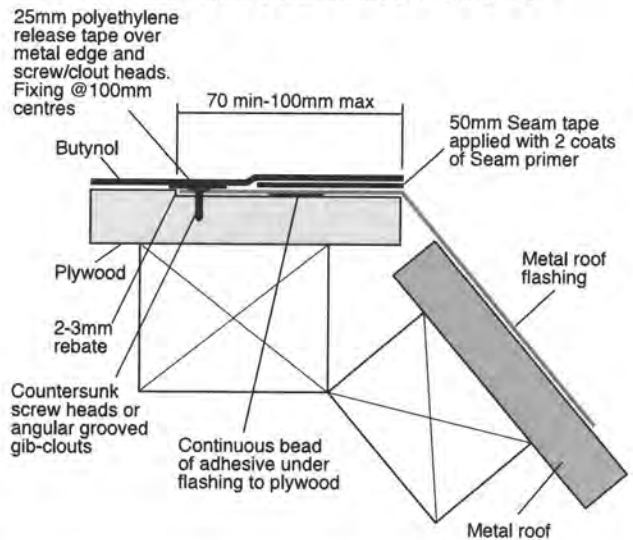
## BUTYNOL/CORRUGATE PITCH CHANGE JUNCTION



## INTERNAL ROOF DRAIN (NZBC E2/AS1 Approved)

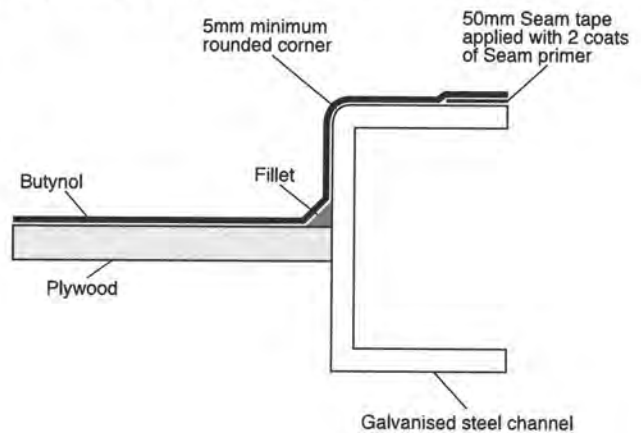


## BUTYNOL LAPPING OVER METAL FLASHING



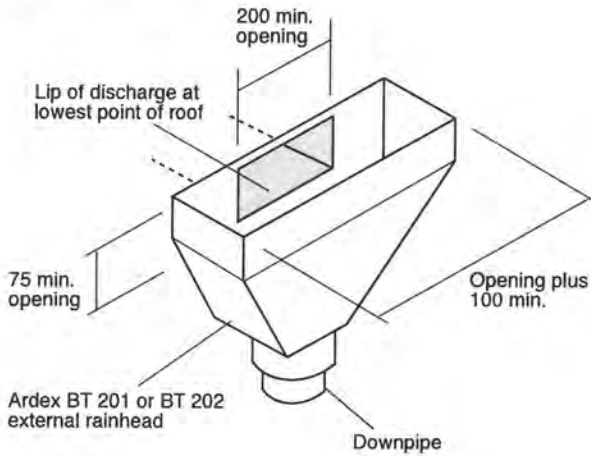
Where Seam tape is to be used **no** silicone sealant should be used when installing flashing. If silicone is present remove completely with solvent.

## BUTYNOL FLUSH FINISH TO METAL EDGE

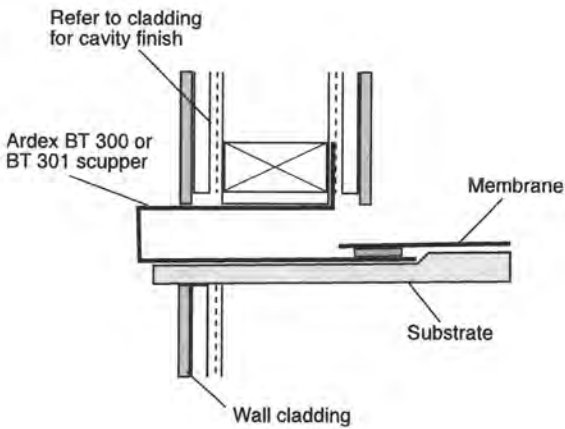


**RAINWATER HEAD AND SCUPPER OPENING IN MEMBRANE USING ARDEX BT 300 OR BT 301 SCUPPER**

**Deck outlet**

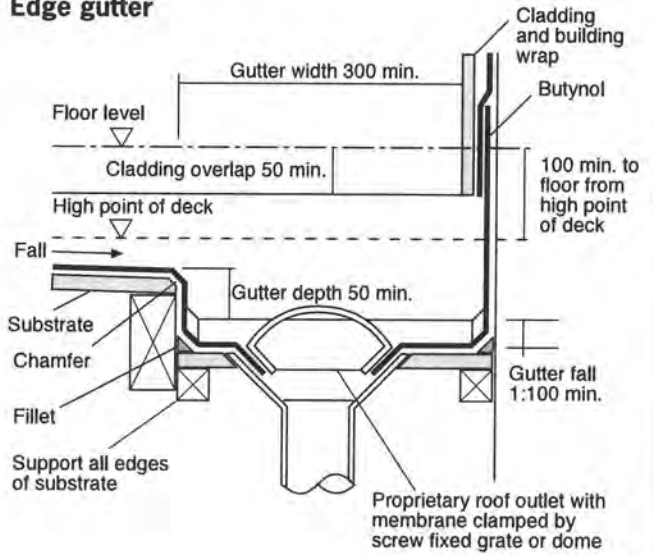


**Overflow**

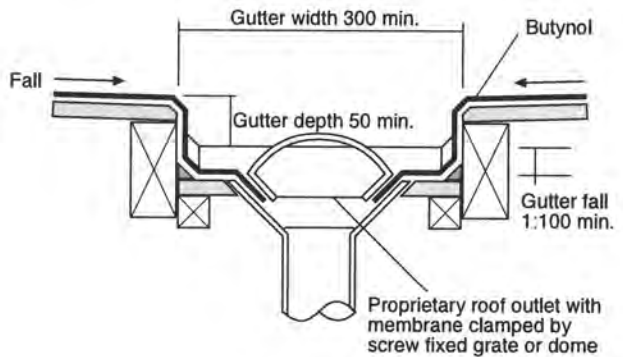


**GUTTERS AND OUTLETS IN MEMBRANE**

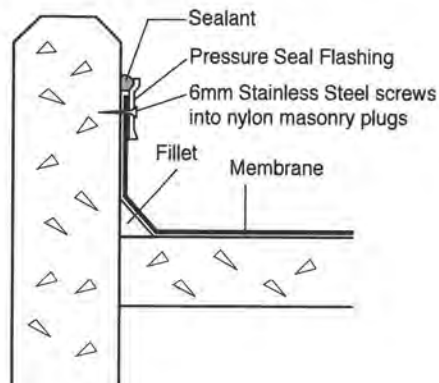
**Edge gutter**



**Central gutter**



**Aluminium Pressure Bar Seal**

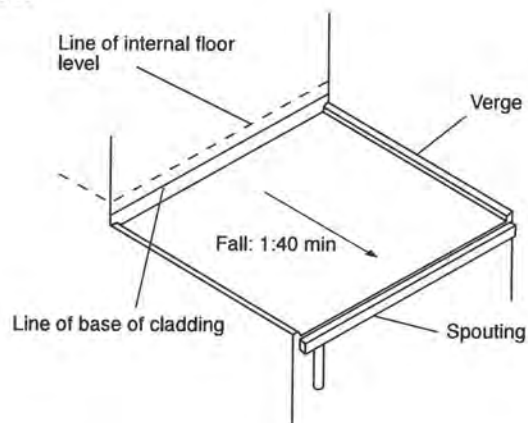


# ARDEX Butynol

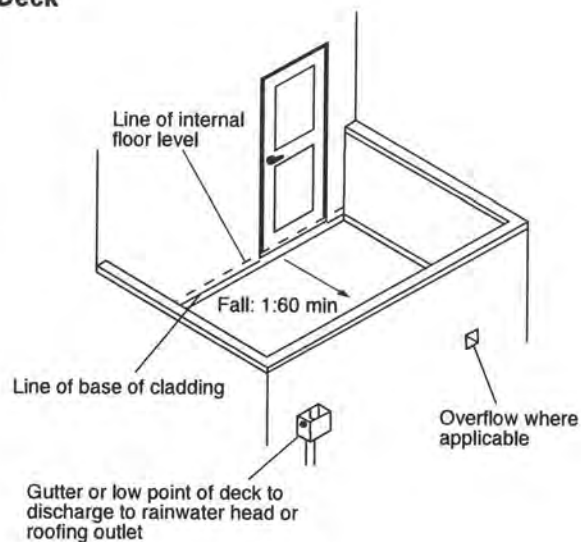
BRANZ Appraised, E2/AS1 Acceptable Solution

## FALLS IN BUTYNOL ROOFS AND DECKS

### Roof

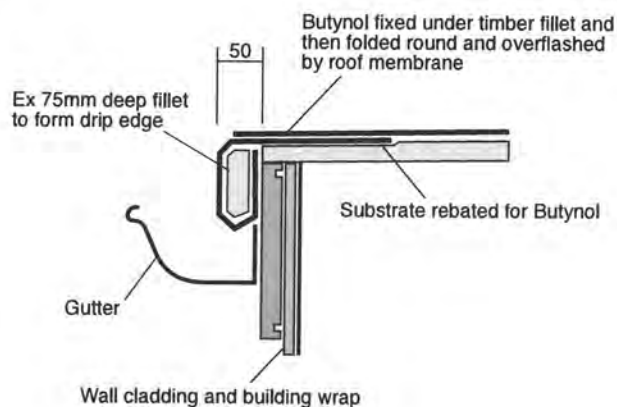


### Deck

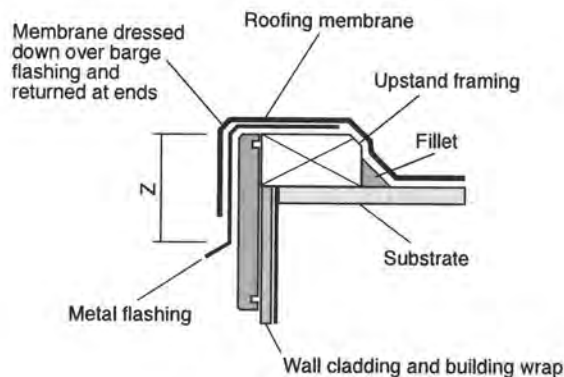
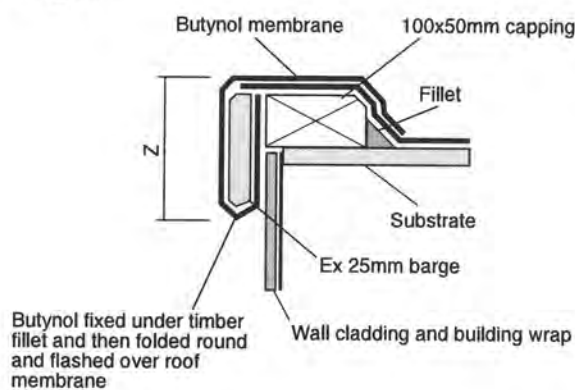


## EAVE AND VERGES IN BUTYNOL

### Eave



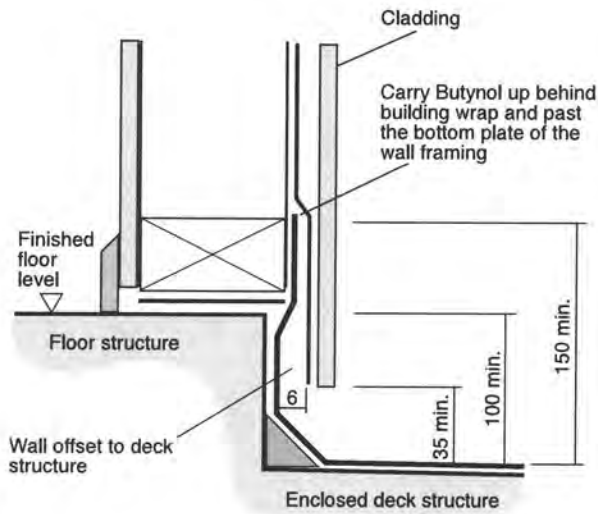
### Verges



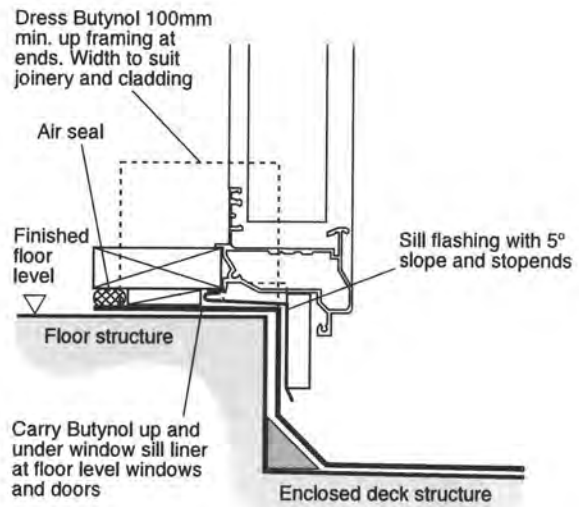
NOTE: Z = variable according to wind zone

## JUNCTIONS WITH WALLS FOR BUTYNOL

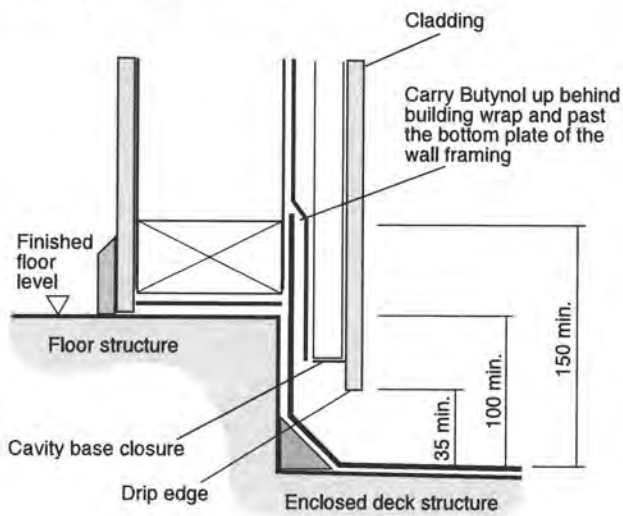
### Direct fix threshold at wall



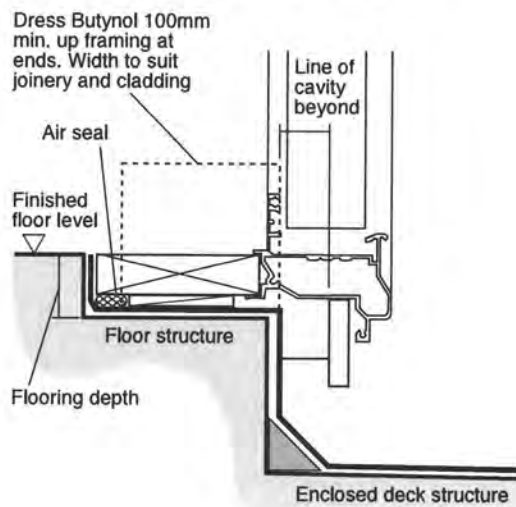
### Direct fix threshold at opening



### Cavity threshold at wall



### Alternative threshold at opening



- NOTE: 1 Internal corners to be formed as shown on page 26
- 2 Dimensions are shown to Butynol. However, where there is an additional material applied over the Butynol all dimensions shall apply to the highest level of the wearing surface

## LOOSE LAID APPLICATION OF BUTYNOL ROOFING

Materials used shall be as previously specified. When the surface is suitably prepared a large fully vulcanised Butynol sheet or sheets can be unrolled and spread over the prepared area and allowed to remain in this position for approximately one hour to relieve stresses induced by manufacture and storage. If necessary for ease of handling, these sheets can be supplied in varying sizes and vulcanised on site using an Ardex vulcanising machine or using seam tape with seam primer.

The Butynol sheet shall be set out in the exact position in which it will be finally required and whilst it is held firmly in place it shall be folded back at least one metre from the roof's surrounding parapet or wall to allow the application of adhesive to that area of the exposed substrate.

WA98 adhesive may be applied to the substrate and the corresponding area of Butynol sheeting which may then, when the adhesive is touch dry, be worked back into its required position avoiding wrinkles and the inclusion of air bubbles.

Upon completion of the detail work, parapets, drains and rainheads etc a layer of rounded gravel 30-40mm should be applied up to 50mm deep, over a layer of Geo Textile Fabric for protection of the Butynol sheet.

Care must be taken at outlets to ensure the ballast cannot enter or cause a blockage that prevents rainwater from leaving the roof area. Maintenance paths should be created to air-conditioning or roof plant with concrete tiles.

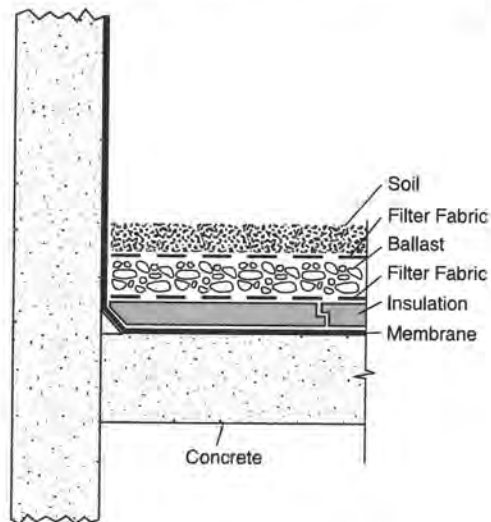
Effects on the membrane in areas of high wind can be eliminated by stabilising the ballast with cement. Dry cement should be broadcast over the 30-40mm gravel with a broad mouth shovel and left to hydrate or lightly sprayed with water to set off.

If possible a water test should be carried out prior to the application of ballast.

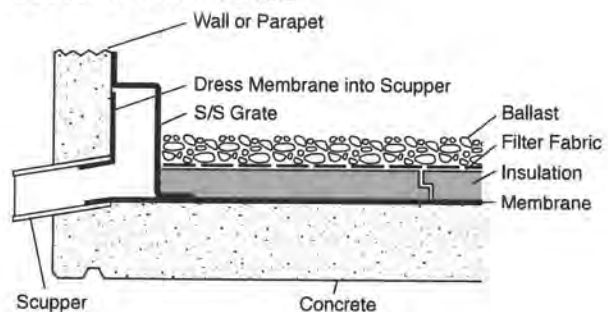
Note: Minimum pitch 1.5° to comply.

Refer NZBC Clause E@/AS1 External Moisture 8.5.1 (a).

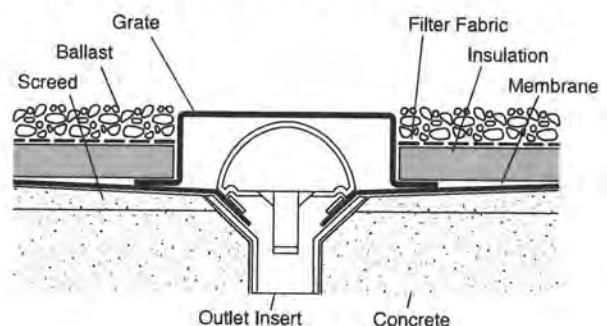
## TYPICAL BALLASTED/GARDEN ROOF DETAIL



## SCUPPER ROOF OUTLET



## SCUPPER ROOF OUTLET & GRAVEL RETAINER





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# ARDEX Butynol Sealant

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# ARDEX Butynol Sealant

## BUTYNOL SEALANT

### Description

Butynol Sealant has been specially designed and formulated for sealing Butynol flashings into chases. Butynol Sealant has excellent sealing and adhesive properties to Butynol and a variety of building components.

### DANGER

Gives off highly flammable vapour. Keep well away from heat, sparks and open flame. Keep closed when not in use.

### AVOID BREATHING VAPOUR

Use with adequate air flow.

### DIRECTIONS

Once the Butynol Membrane has been fixed into place, prepare the chase to ensure it is clean dry and sound. Cut the cartridge nozzle to give the desired aperture and angle. For best results the sealant should be gunned by pushing the cartridge nozzle forward during application. Tool the sealant bead to ensure there are no voids, gaps or air pockets and that the bead has a neat and flush finish.

### TACK FREE TIME

Approx. 24 hours, depending on temperature conditions, can be painted within 4 to 6 days.

### FULL CURE TIME

4-6 days depending on temperature conditions.

### CLEAN UP

Clean tools, etc., with mineral turps.

### COLOUR

Black in 375ml tubes

### Also available for Butynol

Seal 'n' Flex Polyurethane

600ml sausages

Colours - black and grey

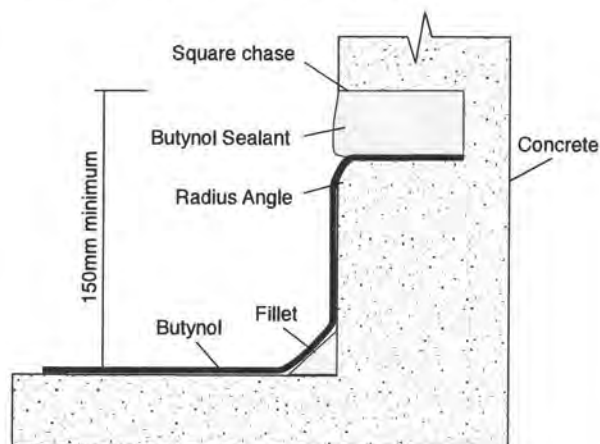
Silaflex MS

300ml tubes

Colour - grey

Refer to respective tubes for their material warranty.

## FLASHING INTO CONCRETE WALLS



Butynol is glued into square chase and finished with Butynol Sealant.



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# Drainage & Substrate Ventilation

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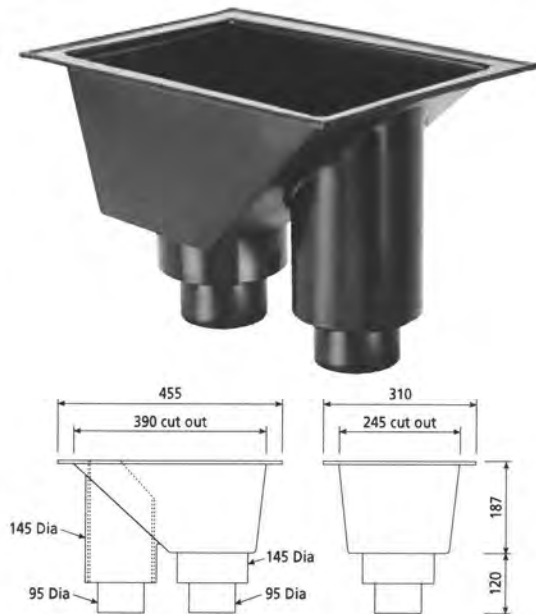
# Drainage & Substrate Ventilation

## BT 200 RAINHEAD (illustrated)

Moulded rainhead with overflow.  
To suit 100mm or 150mm downpipe.

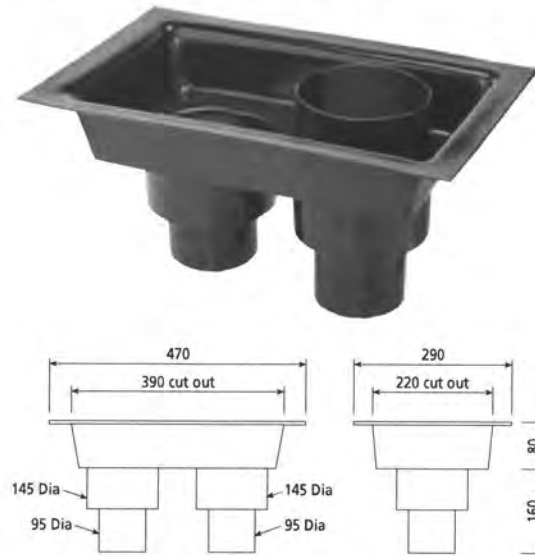
### Complies with E1/AS1 5.5.1

An internal gutter overflow outlet should be located to give an early, conspicuous warning to the building occupier that maintenance is required.



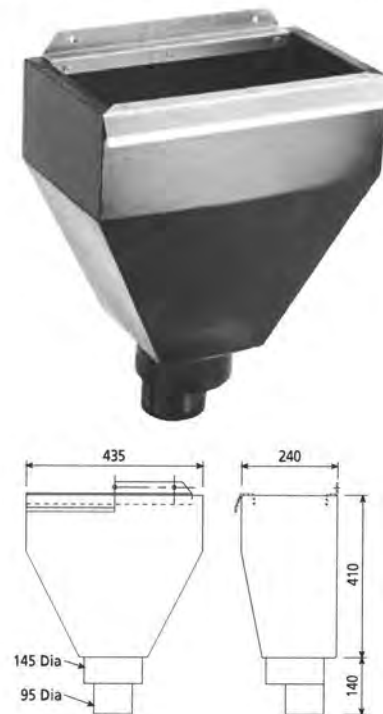
## BT 205 RAINHEAD

Moulded rainhead with overflow.  
To suit 100mm or 150mm downpipe.



## BT 202 EXTERNAL RAINHEAD

Moulded rainhead with metal fixing strip.  
To suit 100mm or 150mm downpipe.  
Can be used in conjunction with BT 301 Scupper.



## BT 204 RAINHEAD

Moulded rainhead with overflow.  
To suit 150mm or 200mm downpipe.



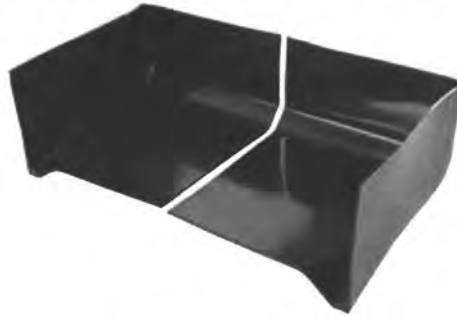
### BT 203 SQUARE RAINHEAD

Moulded rainhead 295mm square.  
To suit 100mm or 150mm downpipe.



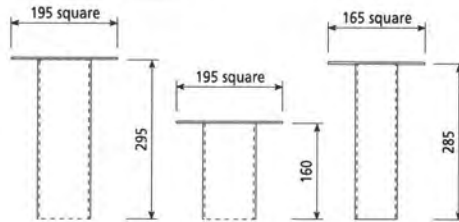
### BT 700, BT 701 KICKOUT FLASHING

Available in Black (BT 700) or Grey (BT 701).



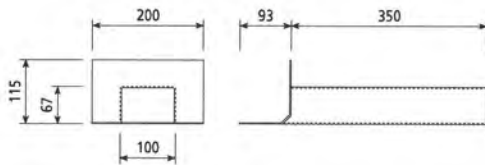
### BT 100, BT 101, 102 DROPPERS

To suit 100mm (BT 100), 80mm (BT 101),  
150mm (BT 102) downpipes.



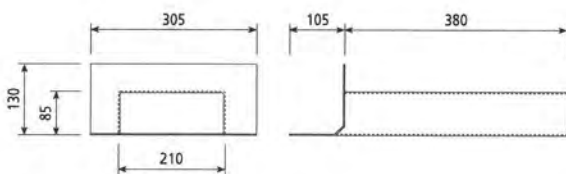
### BT 300 SCUPPER

For all types of single ply membrane roofing.



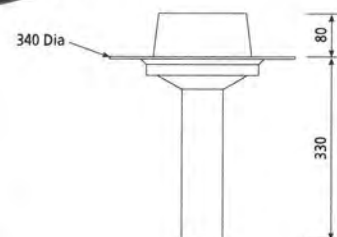
### BT 301 SCUPPER

For all types of single ply membrane roofing.



### BT 608, BT 609, BT 610 DRAIN

3 piece unit with clamp.  
BT 608 - 80mm, BT 609 - 100mm, BT 610 - 150mm.



# Drainage & Substrate Ventilation

## BT 602, BT 603 PLASTIC DECK DRAIN

Flat white plastic.  
BT 602 - 80mm, BT 603 - 100mm.



## BT 604, BT 605 CHROME DECK DRAIN

Flat chrome insert.  
BT 604 - 80mm, BT 605 - 100mm.



## BT 606, BT 607 DOME DECK DRAIN

Bronze cast dome and insert.  
BT 606 - 80mm, BT 607 - 100mm.



## BT 500 LEAFGUARD

Moulded from tough PVC to suit 80-140mm outlets such as the BT 100 Dropper.



## BT 501 LEAFGUARD

Moulded from tough PVC to suit 100-180mm outlets.



## BT 502 LEAFGUARD

Moulded from tough PVC. Fits into BT 300 and 302 Scuppers.



## BT 400, BT 401, BT 402 ROOF VENTS

These one-way ventilators are available in spun aluminium (BT 400) or moulded polyethylene Black (BT 401), Grey (BT 402) for use on concrete or plywood substrates.



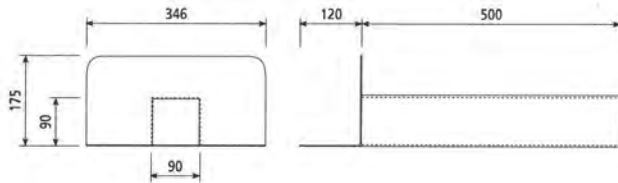
### IMPORTANT NOTE

Ardex vents are designed only for venting substrate - ie plywood, joists etc.

If venting roof or ceiling cavities a ventilation engineer should be contracted to advise on requirement especially for skillion roof construction.

Whilst predominately torch-on these accessories can be used with Butynol and EPDM membranes where by-laws permit.

**BT 302 SCUPPER**

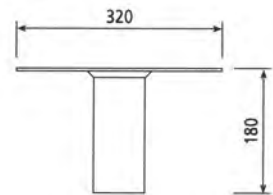


**BT 103 DROPPER**

To suit 100mm downpipe.

**BT 104 DROPPER**

To suit 80mm downpipe.



**BT 420 PAVER SUPPORT**

Protects membrane against damage from heavy paving slabs. For use over external membrane.



**BT 355, BT 360 SCUPPER DOWNPIPE CONNECTOR**

Connects to BT 302 80mm or 100mm Scuppers.

BT 355 - 100mm

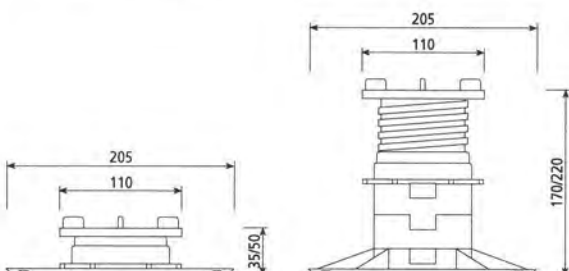
BT 360 - 80mm.

**MAXI ADJUSTABLE SUPPORT**

An adjustable paving support for floating paving systems.

Adjustable height from 35-220mm.

Available on indent order.





## **New Zealand**

### **Head Office and Christchurch Branch**

32 Lane Street, Woolston, PO Box 19549

Phone 03-384 3029, Fax 03-384 9779

### **Wellington Branch**

Phone 04-568 5949, Fax 04-568 6376

### **Auckland Branch**

Phone 09-580 0005, Fax 09-579 9963

Ardex Adhesives Phone 09-296 7690

## **Australia**

### **New South Wales**

20 Powers Road, Seven Hills, NSW 2147

Phone 02-9851 9199, Fax 02-9674 5621

### **Queensland**

Phone 07-3881 3888, Fax 07-3881 3188

### **Victoria/Tasmania**

Phone 03-9308 9255, Fax 03-9308 9332

### **South Australia**

Phone 08-8268 2511, Fax 08-8345 3207

### **Western Australia**

Phone 08-9455 1644, Fax 08-9455 1227

[www.butynol.co.nz](http://www.butynol.co.nz)

[www.ardex.com](http://www.ardex.com)



BCA/03/19

14 FEBRUARY 2012



BC110554  
#25659.

**KAPITI COAST DISTRICT COUNCIL  
PRIVATE BAG 60 601  
PARAPARAUMU 5254**

**ATTENTION: CHIEF BUILDING INSPECTOR**

Dear Sir/Madam

**RE:155 FIELD WAY, WAIKANAE BEACH**

**REF:6604-K**

**APPLICATION FOR AMENDED BUILDING CONSENT No. 1**

ORIGINAL SHEETS SUPERSEDED:	7A, 8, 9, 10 + COVER SHEET
AMENDED SHEETS:	7B, 8B, 9B, 10B + COVER SHEET
FULL SET:	1, 2, 3, 4A, 5, 6, 7B, 8B, 9B, 10B, 11, 12, 13A, 14, 15A + COVER SHEET

Please find attached our application for Amendment to Building Consent at the above address. The documentation which formulates this application is:

- i) This letter
- ii) A cheque being the application fee
- iii) Council's application form
- iv) Two A3 sets of approved working drawing plans
- v) Two A1 sets of amended working drawing plans
- vi) Two Ardex Butynol & EPDM Membranes manufacturers information dated 1 March 2008

As the timeframe for this application is important, it would be appreciated if it could be processed within the required statutory time period.

If you require any further information regarding this application please do not hesitate to contact us as soon as possible.

Yours faithfully,

**GAVIN BARBER**

6604-k  
Encls



RECEIVED  
17 SEP 2011  
N00023

KCDC Building Consent Authority  
Building Consent Documentation Filed

BCNo.	110554
Street Address.	155 Fieldway Waikanae Beach Addition on top of existing GARAGE.

Tick indicates document(s) included in this Building Consent

Building Consent Application,		✓
Application checksheet,		✓
Costing schedule,		✓
Plans and specifications,		✓
Invoice and receipt,		✓
Processing records/checksheets,		✓
Inspection page printouts		✓
	1 to 25   60 to 69   80 to 84   87 to 130	✓
Building consent and memorandum,	131 to 145   151 to 155	✓
Inspection reports,		✓
Application for CCC,		✓
Code of Compliance Certificate.		✓
Producer statements and supporting documentation,		✓
Peer review documents,		NA
Fire design documents,		NA
Requests for further information and other correspondence,		NA
Amendments,		✓
Supplementary information,		NA
Energy work certificates,		✓
Notices to Fix.		NA

This form comprises part of the Building Consent documentation and indicates the contents of the Building Consent File. Refer KCDC Policy 029.

KCDC CODE COMPLIANCE REVIEW CHECK SHEET

**Criteria:** All building work except for minor works or major projects. Refer BI-WI-024

RECEIVED  
2/1/2015  
BC No: 110554

Address: 155 Fieldway Waiheke Beach.	Date: 2/1/2015
	BC No: 110554

application for code compliance certificate (Form 278) completed	<input checked="" type="radio"/> Y	<input type="radio"/> N
--	------------------------------------	-------------------------

Confirm all required inspections have been completed and passed: Answer:  Yes or  No

If inspections have been missed, what supporting info and method of verification has been provided to compensate for missed inspection. (Describe):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Work in accordance with approved consent and approved amendments	<input checked="" type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No
If no, has NTF been issued:	<input checked="" type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No
Have items of non compliance been resolved and NTF uplifted.	<input checked="" type="radio"/> N/A	<input type="radio"/> Yes	<input type="radio"/> No

Note: If work is not in accordance with consent, (and approved amendments) or NTF matters have not been resolved, suspend application for Code Compliance Certificate

**Supporting documentation required in building consent addenda** (Accept in accordance with KCDC Policy 002) Form completed during BC Approval process

Tick (✓) indicates yes, N/A indicates considered - but not applicable	Req'd	Supplied	Accept
copy of electrical certificate	✓	✓	✓
copy of gas certificate	N/A		
an "as-built" drainage plan	✓		
plumbing (Form 125) for pressure test and installation piped services	✓	✓	✓
drainage (Form 126) for stormwater installation	✓	✓	✓
drainage (Form 127) for private sewer installation	N/A		
a Construction Review (PS4) statement for Structural engineering	✓	✓	✓
a Construction Review (PS4) statement for Fire engineering	✓	✓	✓
a Construction Review (PS4) statement for Geo-technical engineering	N/A		
Roof cladding warranty	✓	✓	✓
Solar water heating technical specifications	✓		
wall cladding/texture coating installation applicator warranty	✓		
a copy of the lift certificate	✓		
a certificate from the fire alarm installer	✓		
a certificate from the sprinkler installer	✓		
a copy of wet-area membrane installers warranty	✓	✓	✓
A copy of deck membrane manufacturer's installers warranty/guarantee	✓		
FPIS (verifier) Fire Systems Certification	✓		

KCDC CODE COMPLIANCE REVIEW CHECK SHEET

If specified supporting documentation has not been provided, what alternative information or verification method has been provided to compensate. (describe):

.....

.....

.....

**Compliance Schedule**

Is a new or amended compliance schedule required?	Y	N
If "Y" Has it been issued? (Refer note below)	Y	N
If the new/ revised compliance schedule has not been issued, what action has been taken to ensure it will be issued? Outline:		
.....		
.....		
.....		

*Note: If the draft/revised compliance schedule has not been issued, the Code Compliance Certificate cannot be issued. Suspend issuing CCC until this matter is addressed.*

**Building consent requirements.**

Are there any item specified in the building consent or PIM that have not been completed.

Outline: .....

.....

.....

.....

.....

.....

Are there any development impact fees to be paid outstanding? Yes /  No (If yes, CCC cannot be issued)

Approve to issue Code Compliance Certificate if all other outstanding fees are paid  YES / NO

Building officer:

Signature: .....

Date: 2/12/15

Name: Cameron

Co-reviewer:

Signature: .....

Date: 5/2/15

Name: Russell Brook

RECEIVED  
12 SEP 2011

BC

**VEHICLE CROSSING**  
**INSPECTION FORM**

Date:

To: Building Inspectors

Owner:

Address: 155 Fieldway Waihorae Beach

Can you please inspect the above Vehicle Crossing, footpath and  
berm and return the completed form to me signed.

Thank you

Inspected by:	
Date Inspected:	
Approved:	YES NO

Comments:



RECEIVED

12 SEP 2011

Form 436

BC.....

### PROCESSING CHECKLIST

No = Plans, specifications & documentation not complying with the Building Code &/or Bld. Act (The reason specified alongside each prompt) \*

Yes = Plans, specifications & documentation complying with the Building Code &/or Bld. Act (The reason specified alongside each prompt)

N/A = Not Applicable to this application. (The deletion of whole sections as N/A is permitted) For alternatives comment below each section.

Note - The further information requests are identified by hand written numbers and corresponding on FIR letters / e-mails sent

Category... (2).....

#### Site Plan ( NZS 3604 Sec 3.4, 4,5 Code clB1, B2,E1, E2 F1&F2 Sect. 72, 75 BA04)

N/A NO YES

Comments

- Wind zone High V/ High Specific..... GIS.....
- Flooding / ponding hazards ..... GIS.....
- Slippage/ fault line hazards ..... GIS.....
- Erosion, river & coastal hazards ..... GIS.....
- Subsidence/ soft soil hazards ..... Site inspection notes
- Corrosion zone Sea spray or Zone 1 ..... GIS.....
- Soil contamination ..... GIS.....
- Distances to boundaries / siting..... District plan
- Floor levels/ contours..... E2/AS1 & NZS 3604 E1
- Two or More Allotments..... Sec 75 - 83 Bld Act
- Noise / sound insulation (airport & highway)

Encroaches Height

#### Specific Design ( Verified Online PS2 B1 B2 VM1 )

Comments

- PSI Design Certificate ..... B1 B2 VM1
- PS2 Peer Review..... B1 B2 VM1
- Calculations ..... VM1
- CPeng ..... Verified Online

#### Concrete / Foundation Plan ( NZS 3604 NZS 4210 & 4229 E2/AS1 )

Comments

Layout

- Layout dimensions..... NZS 3604
- Control joints..... NZS 3604
- Slab thickening..... NZS 3604, cl 7.6
- Alternative.....specify reason

Section

- Depth & width..... NZS 3604
- Reinforcement..... NZS 3604;B2
- Plate fixings..... NZS 3604;B2 cl 7.5
- DPM ..... NZS 3604;B2
- Engineer design and Calcs..... B1;B2
- Concrete strength..... B1;B2 cl 4.8.2
- Alternative.....specify reason

Cracks - unknown upper level extension

**Timber / Subfloor Plan** (NZS3604 NZS 3602 & 3640, B1,B2)

Comments

Layout

N/A NO YES

- Layout dimensions.....
- Bearers details.....B1 ; B2.....
- Joist details.....B1:B2.....
- Alternative.....specify reason.....

Section

- Foundation type/size..... NZS 3604;B2.....
- Piles post sizes & treatment ..... NZS 3604;3602;3640;B2.....
- Pile c/c..... NZS 3604.....
- Fixing..... NZS 3604;B2.....
- Coatings(durability)..... NZS3604 ;B2.....
- Ventilation & Access to sub floor spaces ..... NZS 3604.....
- Alternative.....specify reason .....

*If the addition is an upper storey show details on upgrading existing foundations, joints, piles, etc (may require Engineer design)*

*New 125x125 posts set into concrete foundations will need the ground conditions*

**Floor plans / layout** (B1, B2, C1-4, D1, E3, F7, G1, G2, G12 G3, G9, G11, G13)

Comments

General

N/A NO YES

- Room dimensions.....
- Sectional lines.....
- Location of partitions.....
- All designated spaces.....
- Lintels..... NZS 3604;B2.....
- Beams..... NZS 3604, B2 by engineer.....
- Point loads by engineer or pre-naller.....B1 B2.....
- Smoke detectors.....F7.....
- Wet areas / WCs ..... D1, Table 2; B2.....
- Kitchen.....G3, G9, G11.....
- Alternative.....specify reason .....

*Changes to existing work requires both an existing floor plan & a proposed floor plans  
Facility provided for washing utensils / food G3, Section 1.1 & Figure 1:  
Preparation Area and Access to Facility Paragraphs 1.1.2 and 1.5*

**Wall / Framing** B1, B2, E3

Comment

General

- Identify engineering / Structural items/ portals, .....B1 B2..... *(Pen's) File*
- By pre-naller or to NZS 3604..... B1 B2.....
- Fixing types ..... NZS 3604..... B1 B2.....
- Stud c/c as per wind zone... NZS 3604..... B1 B2.....
- Building wrap..... NZS 3604.....
- Stud heights of rooms..... NZS 3604..... B1 B2.....
- Alternative.....specify reason .....

*- Please confirm stud centres*

**Roof..... NZS 3604,3602 &3640 B1B2E2 E2/AS1**

Trussed / by pre-nailer or Framed roof NZS 3604

Comments

N/A NO YES

- Fixing layout & details..... B1 B2
- Correct layout..... B1
- Max span (12m or Engineer)..... B1
- Purlin or batten c/c..... B1 B2
- Rafters / Beams..... B1 B2
- Alternative..... specify reason

Roof cladding - Metal; Profiled Metal; Masonry, Membranes *Code E2, E2/AS1 B2*

- Pitch / profile..... E2
- Underlay..... E2
- Flashings..... E3;E2 B1 B2
- Parapets..... B1 E2 B2
- Membrane Roofs and substrate *Code E2/AS1 B2* no old NZ AS1
- Gutters, Barges & Fascias detail *Refer E2, section 8.3, cl 8.3.9*
- Alternative..... specify reason

*Installation of profiled metal roof cladding shall be by trained installers, approved by the tile manufacturer or NZ agent. In some cases experienced builders undertake installation, refer E2, section 8.4, cl 8.4.2 'General'.*

*Insights? Details*

**Claddings Code B1 & B2 E2/AS1, Branz good practice Guides & Weather tightness Vol 12&3**

Comments

- Risk matrix Cavity or direct..... E2
- Brick Veneer..... E2 "The brick book" Branz Masonry Guide; B2
- Timber Weatherboard ..... E2 Branz Timber Guide Vol 1&2; B2
- Stucco ..... B1 NZS 3604 Branz good practice guide; B2
- Profiled Metal..... E2 Metal Roofing Practice; B2
- Plywood ..... E2; B2
- Fiber Cement W/b..... E2; B2
- Board & Batten..... Branz good practice guide; B2
- Fiber Cement Sheet..... E2; B2
- Weathertightness details..... E2; B2
- Alternative..... specify reason

**Bracing NZS 3604 B1, B2, B3**

Comments

N/A NO YES

- Subfloor bracing..... B1 & NZS 3604
- Wall bracing..... B1 & NZS 3604
- Roof bracing..... B1 & NZS 3604
- Bracing calculations..... B1 & NZS 3604
- Provide bracing plan layout..... B1 & NZS 3604
- Double top plate (if > 5m)..... B1 & NZS 3604
- Indicate dragon tie (if > 6m)..... B1 & NZS 3604
- Diaphragm ceilings (if > 7.5m)..... B1 & NZS 3604
- Check for distribution ..... B1 & NZS 3604 *Insights*
- Alternative..... specify reason

**Light & Ventilation** B1 G4, Clause 1.2 ; G4, clause 1.3 G7, G9 F2

General

Comments

N/A NO YES

- Vent 5%.....G4
- Light 10%.....G7
- Electrical.....G9
- Mechanical ventilation.....G4
- Exterior space for awareness.....G7

Glazing

- Safety glass.....F2
- Wind zone.....B1, NZS 3604
- Alternative.....specify reason

**Insulation** BRANZ Home Insulation Guide, NZS 4218, AS/NZS 2918

Comments

- Floor .....H1
- Wall.....H1
- Roof.....H1
- Windows / glazing.....H1
- Alternative.....specify reason

**Stairs / Landings / Handrails** D1, sec 4

Comments

- Stair tread & risers.....B1
- Landing size.....D1
- Handrail.....D1
- Riser opening ( min) where children.....D1
- Residential Accessibility.....D1
- Alternative.....specify reason

Stair type

Minor Private; Max rise 220mm/Min tread 220mm,  
 Secondary Private; Max rise 200mm/Min tread 250mm,  
 Main Private; Max rise 190mm/Min tread 280mm. (Main private includes exterior stairs)

**Decks / Balconies / Barriers** D1, F4 & NZS 3604, Section 6 & 7,

Comments

- Barrier & deck fixing durability.....D1 B1 B2
- Top rails, balusters, bottom rails, palings.....D1 B1
- If Engineer then calculations required.....B1 B2
- Max 3m height or Engineer.....B1 B2
- Deck joist sizes, grade, treatment, span & spacing.....D1 B1 B2
- Piles & bearers the correct grade, treatment, size, spacing & span.....D1 B1 B2
- Slip resistance .....D1
- Appropriate waterproofing membrane..... B1 B2
- Stringer size & connections .....D1 B1 B2
- Thresholds.....D1 E2
- Alternative.....specify reason

**Fire (Residential) NZBC F7;Cdoc**

Comments

N/A NO YES

- Travel distances max 24m.....C3.15.....
- Smoke detectors.....F7.....
- Wood burners .....F7.....
- Garage fire wall details .....C7 (C7.10 C7.8) .....
- Alternative.....specify reason .....

**Swimming Pool & Fencing *Fencing of Swimming Pools Act 1987***

Comments

- Refer to Compliance for sign off.....
- Specific Engineering Design .....
- Proprietary system/design.....
- Section/construction .....
- Pool backwash discharging the sewer.....
- Fence height .....
- Gate(s) / door(s) open outward.....

**Ambiguity / Contradictions**

Comments

- Manufacturers Specs .....
- Engineer compared with Designer/Architect .....
- Any Other contradictions .....

**Alternative Solutions**

*Record assessment, decision and reasons for decisions below. Has the designer substantiated why they believe the proposal complies with the building code? Is there a determination on a similar proposal? Has corroborative evidence been provided (peer review, appraisal or determination)? Include reference to comparison with acceptable solutions, other documents / standards / best practice guides / publications, expert opinion, determinations, in-service history, product certification, professional judgment, building code objectives. Refer BRANZ Bulletin # 456 (Dec 2004). List any conditions / communications / actions:*

**This sheet relevant to plumbing & drainage only**

Comments

**General**

N/A NO YES

- Kitchen area.....G3/AS1 *no change*
- Laundry.....
- Bathrooms.....
- Location of sanitary fixtures.....
- Plumbing layout.....

Plumber's Reg no.....*T.B.A.*

Drainlayers Reg no.....*T.B.A.*

**Effluent Disposal Systems**

Comments

- Engineering Site Investigation
- Design Specification & Producer Statement

*(The design criteria should include; Capacity based on bedroom numbers, Loading calculation, site evaluation, soil profile, site characteristics.)*

*connected to town sewer*

**Water Supplies**

Comments

- G12 .....
- Town supply,.....
- Private scheme.....
- Type & location.....*Council Full supply*
- Alternative.....specify reason.....

*extension of internal pipework*

**Sanitary Drainage**

Comments

- G13.....
- Layout .....
- Council availability or .....
- Septic tank design & calos.....
- Alternative.....specify reason

**Stormwater Drainage**

Comments

- E1 .....
- Layout .....
- Council availability .....
- Alternative.....specify reason

**Sanitary Plumbing**

Comments

- G43.....*G3/AS3500*
- Layout .....
- Alternative.....specify reason .....

*D.P checked no easements ✓*  
 KCDC Form 436 V6

*P+D Pack ✓*  
 Page 6 of 11

Accessibility D1 ; NZS 4121

Comments

N/A NO YES

- Car parks .....
- Projections .....
- Kerb Ramps.....
- Footpaths/Ramps / Landings .....
- Entrances.....
- Public Facilities.....
- Lifts.....
- Stairs.....
- Stair / handrails.....
- Doorways/Doors/Corridors/ Lobbies.....
- Controls.....
- Places of assembly/entertainment/Recreation.....
- Warning Systems.....
- Toilet Facilities / Laundering .....
- Food preparation / accommodation.....
- Signs.....

N/A

Comments

Fire report C1,C2, C3, C4

- Purpose group FHC .....
- Fire cell separation /use of building .....
- f- rating .....
- s- rating .....
- Occupancy numbers .....
- Means of escape .....
- Travel distances .....
- External walls/unprotected areas .....
- Fire resistance to supporting elements/floors/ walls. ....
- Risks to/below escape routes .....
- Fire safety precautions .....
- SFI's / SDI's .....
- Alternatives .....
- Referral to DRU .....
- Alternative.....specify reason

N/A

Comments

Solid waste G15

- Waste bin area .....
- Environmental health referral .....
- Alternative.....specify reason

Comments

Hazardous Agents, Materials & substances F1 - F3

- Waste bin .....
- Environmental health referral .....

N/A

Work Sheet

- 1) Building Consent Application Review complete (F4) (F4)
- 2) These tasks to exist functions is suitable (unusual)
- 3) Eavelet to wall junction detail is outside scope of WCAAS  
will require further clarification
- 4) Roofs details require further clarification where cladding  
have been direct fixed
- 5) Ed of Membrane not recommended 1:30 fall as per WCAAS
- 6) Membrane roofing on 7mm ply wood is unsatisfactory
- 7) Fish tanking to be confirmed that suitable for  
point loads & additional level.

- 8) Brick work on Eavelet coping the edge may cut the  
membrane so are unsuitable
- 9) New Posts set on concrete Rafters to need to confirm  
what the ground conditions are like by suitably qualified  
person
- 10) Lower roof area (being used as gutter please confirm  
the fall for it a roof)

11

General stamp prompts

- Wind Zone
- Corrosion
- Cladding
- Electrical
- Bracing Highlighted
- Boundary setting out
- Engineers design

- Set Status
- Complete checklist
- Addenda
- Section 72 / ponding
- Set inspections




<b>Change Of Use – Sec 114:</b> (record decisions and basis for decisions – confirm whether sec 115 applies)		.....
Date	N/A	
<b>Alteration to Existing Building – Sec 112:</b> (record decisions and basis for decisions – confirm whether sec 118 applies and if so, has it been complied with?). List conditions / communications / actions:		.....
Date	Yes existing building but edge is new structure	
<b>Hazards – Sec 71-74 :</b> (record decisions and basis for decisions – see under "site plan above already done")		.....
Date:		
<b>Compliance Schedule – Sec 100 - 107:</b> (record if new / amended compliance schedule required, and attach copy of replica compliance schedule. Ensure that note is recorded on building consent that new / amended compliance schedule will be issued).		
Date	N/A	

Note :- Refer to the associate code clause along side each prompt above for compliance or reason of decision

**Plan checked yet Unsatisfactory**  
(request for further information- see attached copy)

Signature, name & date

Bldg..... [Signature] 5/10/11

Plumbing.....

Fire.....

I am satisfied on reasonable grounds that the provisions of the Building Code are met and the **Building consent may be granted (refer Bld Act Sec 49(1))**

All previous Further Information Requests now satisfactory.

Signature, name & date

Bldg..... [Signature] 7.11.2011  
( for all pages except those listed below )

Plumbing..... [Signature] 20/9/2011  
(For pages 6 of 11 unless otherwise listed )

Fire.....  
( As listed on page 7 of 11 )

**Addenda to Form 436**

**Allocation of work to approvals officer outside current competency**

<b>Building Category</b>	<i>Circle appropriate category</i>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>

<b>1) Authorized by Team leader or delegate</b>	<b>Level of supervision reqd</b>	<b>Reason for decision</b>
Name, Signature & date	Coaching Mentoring Peer review on completion	In training Vetting one level above competency Other
<b>2) Approval Officer undertaking training</b>	<b>Record of Learning</b>	<b>Decision</b>
Name, Signature & date  Current competency level Category 0,1 or 2		I am satisfied on reasonable grounds that the provisions of the Building Code are met and the building consent may be granted (refer Bld Act 49(1))
<b>3) Coach/Mentor/Peer reviewer</b>	<b>Training needs identified</b>	<b>Comments</b>
Name, Signature & date  Current competency level Category 1,2 or 3		I am satisfied on reasonable grounds that the provisions of the Building Code are met and the building consent may be granted (refer Bld Act 49(1))

**Allocation notes**

- Categories of building are determined on receipt of application
- All applications are re assessed for the category and allocated to each appropriate Officer at the earliest opportunity and then placed in processing shelves accordingly
- Approvals staff are aware of their own competency level and check the allocation of work.
- Approvals staff may select, for training purpose, a consent 1 (one) category higher than their current competency for the purpose of increasing their skill level provided they gain approval from the Team Leader Building Consent Approvals. Once approval is given the Team Leader Building Consent Approvals will arrange for the appropriate supervision and final peer review.

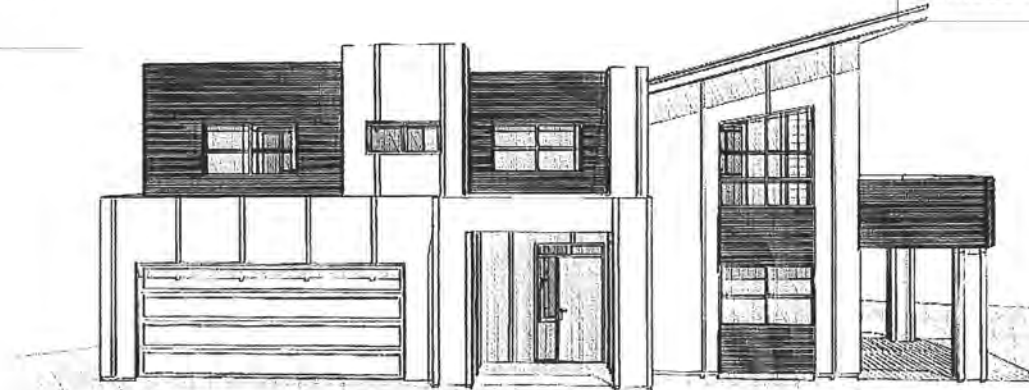
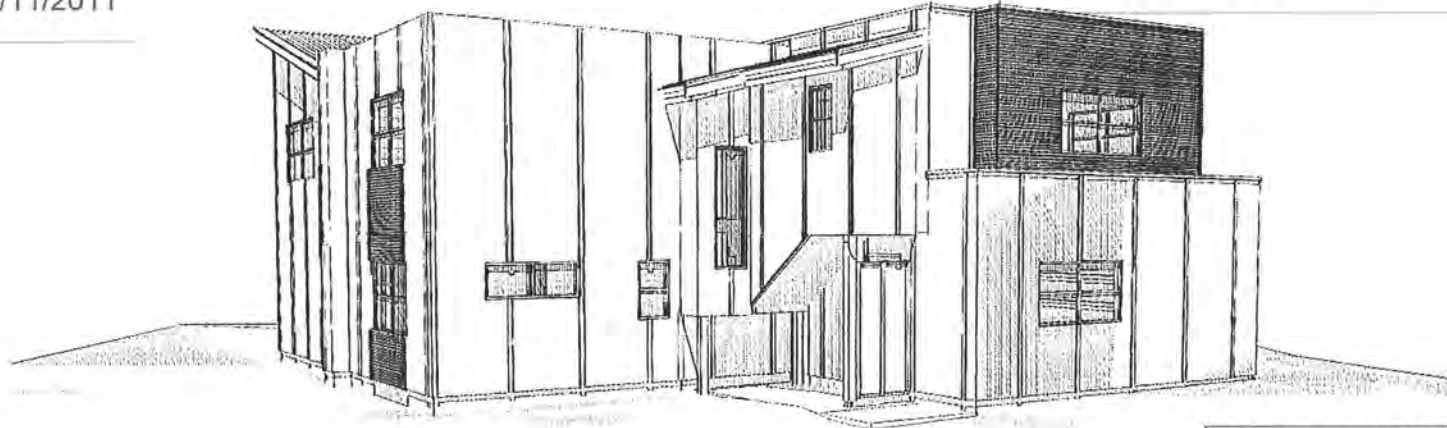
APPROVED  
BY  
BUILDING  
Leon  
Smith  
7/11/2011

Note area is coastal corrosion area, and components must meet 50yr durability requirements of NZ Bldg Code

Restrictor stays limiting sash opening to max 100mm must be fitted wherever sill height is less than 760mm and the difference in levels are 1.0m or greater. Refer F4.NZBC.

VERY HIGH WIND ZONE

SEVERE COASTAL ZONE  
All propriety or bolted fixings exposed to air plus cladding fixings to be stainless steel.



Provide electrical certification after completion and prior to Code Compliance Certificate being issued

**BOUNDARY LINES**

The Owner/Builder is responsible for clearly defining the site boundary lines and pegs. This may require a survey. NOTE: established fences are not necessarily on the site boundary.

Endorsements made on any single page apply equally to the entire project.

**ENGINEERS DESIGN**

This project contains elements specifically designed by an engineer. The owner/builder is required to ensure the engineer inspects the work and provides KCDC with written evidence of the inspection.

**THIS TIMBER FRAMED ADDITION HAS BEEN DESIGNED IN ACCORDANCE WITH NZS 3604:2011**

**INDEX:**

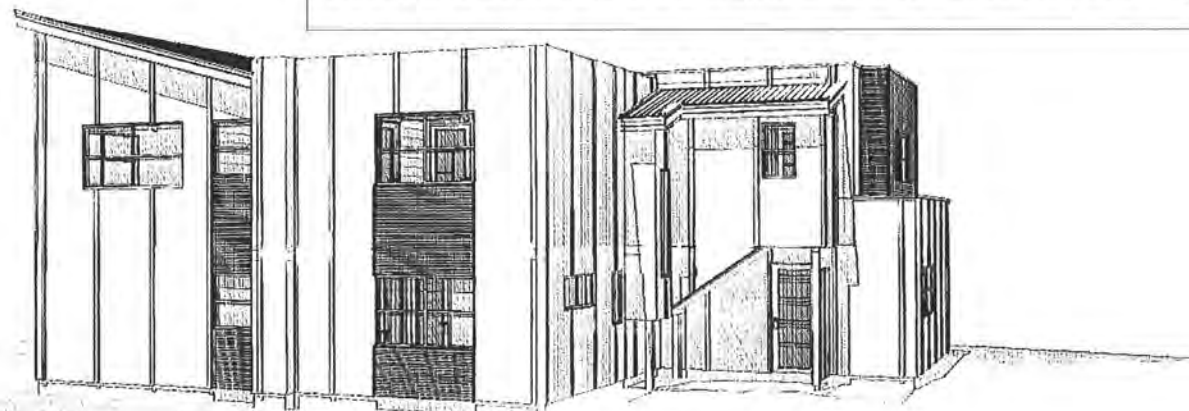
DRAWING	SHEET	26/10/11
INDICATIVE PERSPECTIVE & INDEX	COVER	A
SITE PLAN, EXISTING FLOOR PLANS, NOTES	1	
ELEVATIONS, RISK MATRIX, H1 CALCULATIONS, GLAZING RATIO, VENTILATION & LIGHT RATIO, WINDOW AND DOOR SCHEDULE, NOTES	2	
FOUNDATION PLAN, POST TO BEAM CONNECTION AND POST UPLIFT FIXING DETAILS	3	
LOWER LEVEL FLOOR PLAN, NOTES	4	A
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WINDOWS DETAILS	11	
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JUNCTION DETAILS	14	
GUTTER SECTIONS AND KEY PLAN	15	A

Architect, agent or builder to provide the applicant with suitable written details of a regular inspection and maintenance regime in respect of all flat roof, balcony and deck waterproof membranes and associated flashings.

**CAUTION**

Plans have been digitally reproduced and may not be to scale.

Cladding to be installed to manufacturers requirements in particular fixing and ground clearance



INDICATIVE PERSPECTIVE ONLY

**Noisy Equipment**

It is the responsibility of the owner to ensure that no work with noisy equipment shall be carried out before 7:30 a.m. or after 6 p.m. Monday to Saturday. During the week there may be workers on site from 6:30 a.m. quietly preparing for work.

Work with noisy equipment is not permitted on Sundays or public Holidays.



**BUILDING CONSENT APPLICATION  
PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY, WAIKANAI BEACH  
REFERENCE - 6604K**

**Design Network**  
ARCHITECTURE LTD

P.O BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT.(04) 5896-109, KAPITI(04)9025-505

BC 110554

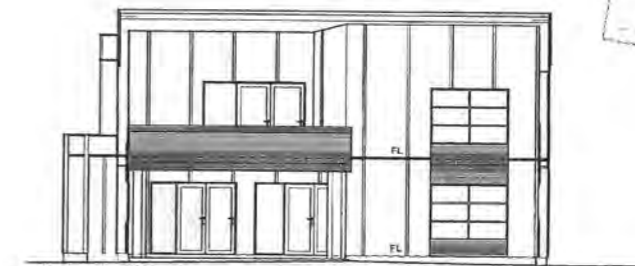
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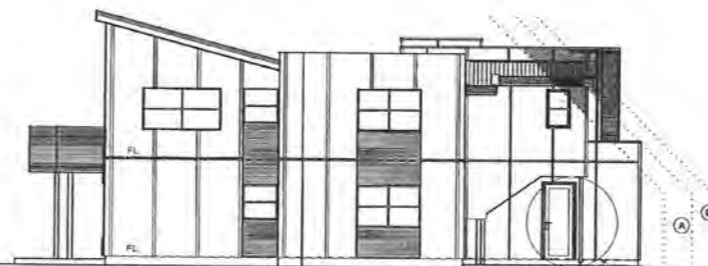
SOUTH WEST



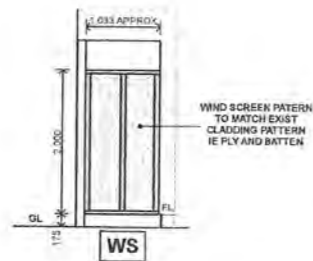
SOUTH EAST



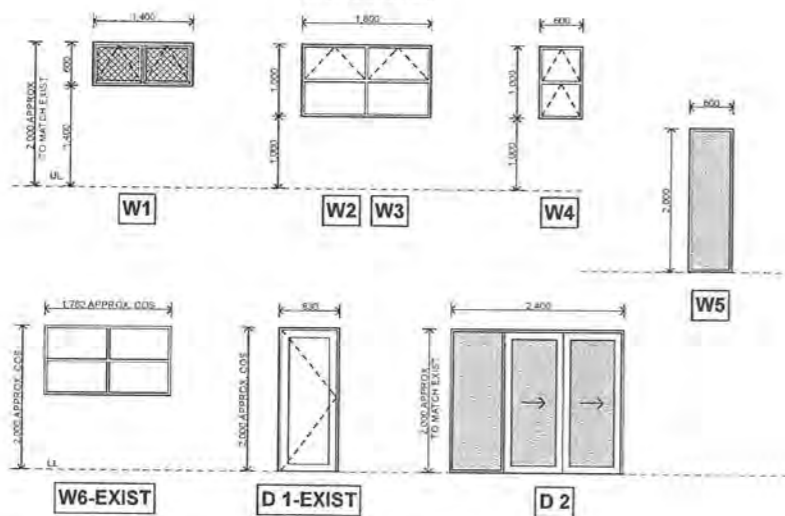
NORTH EAST



NORTH WEST ELEVATIONS



WIND SCREEN



EXTERNAL WINDOW AND DOORS

SEE ALLOW TO INSTALL NEW REVEAL ALL ROUND TO SUIT WIDER WALL AND CLADDING.

**ALUMINIUM DOORS & WINDOWS:**  
POWDER COATED ALUMINIUM FRAMES, COLOUR TO BE SELECTED AND APPROVED BY OWNER PRIOR TO FABRICATION

- LINTELS SHOWN IN BRACKETS I.e. (2)190x45
- CHECK ALL OPENINGS ON SITE BEFORE FABRICATION
- OBSCURE GLASS TO ENSURE
- ALL WINDOWS TO BE DOUBLE GLAZED UNLESS STATED OTHERWISE
- DOUBLE GLAZING TO BE 4mm MIN. INNER & OUTER WITH 12mm ARGON GAS FILLED CAVITY. REFER METROGLASSTECH CATALOGUE & REFERENCE GUIDE (8th EDITION) TABLE 12.4.

ON DELIVERY WINDOWS SHOULD BE INSPECTED AND CHECKED TO ENSURE THAT:

- THEY ARE IN SATISFACTORY CONDITION I.e. NO DAMAGE
- THE INSTALLATION POSITION OF EACH WINDOW IS IDENTIFIED
- THE JOINTS IN THE FRAMES ARE BACKSEALED
- FLASHINGS HAVE BEEN SUPPLIED
- EACH WINDOW HAS BEEN LABELLED TO SHOW THE MANUFACTURERS NAME, THE WIND ZONE, AIR LEAKAGE LEVEL AND COMPLIANCE WITH NZS4211:1995

**SAFETY GLAZING**  
ALL GLAZING TO COMPLY WITH NZBC F2/A5.1 & NZS4223:1999, APPENDIX 3.D. SIZE IN ACCORDANCE WITH NZS4223:1999 TABLE 3.1. ALL GRADE A SAFETY GLASS TO BE TOUGHENED SAFETY GLASS.

**DOORS**  
DOOR SIZES SHOWN ARE LEAF SIZE. ALLOW FOR JAMBS & PACKING WHEN FRAMING FOR ROUGH OPENING AS REQ'D.

LABELS ARE TO BE REMOVED AFTER THE WINDOWS & DOORS HAVE BEEN INSPECTED.

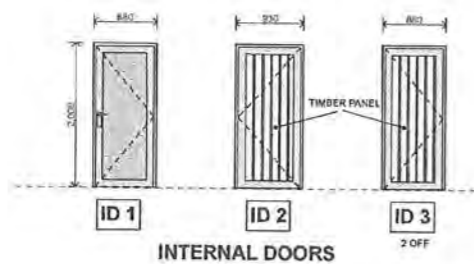
**NOTE - FLASHINGS**  
IT IS THE WINDOW MANUFACTURERS RESPONSIBILITY TO SUPPLY ALL HEAD AND SILL FLASHINGS. SITE MEASURE ALL OPENINGS. ESTABLISH APPROPRIATE CORROSION ZONE AND COMPATIBILITY WITH ALUMINIUM JOINERY.

**SUPPORT BAR**  
ALLOW TO FIX WINDZ SUPPORT BAR TO ALL WINDOWS & DOORS WITH A 1.60m SPAN OR GREATER.

**GLAZING LEGEND:**

- STANDARD GLASS
- SAFETY GLASS
- OBSCURED GLASS
- OBSCURED SAFETY GLASS

ALUMINIUM WINDOW & DOORS SCHEDULE



INTERNAL DOORS

INTERNAL TIMBER DOORS SCHEDULE

**BUILDING RISK MATRIX:**

RISK MATRIX CALCULATED FOR SOUTH EAST ELEVATION  
SINGLE CLADDING CHALLENGES ARE DETERMINED ON ELEVATION WITH THE HIGHEST RISK

RISK FACTOR	LOW	MEDIUM	HIGH	VERY HIGH	SUB TOTAL
WIND ZONE	0	0	1	2	2
NO. OF STOREYS	0	1	3	4	2
ROOF/WALL	0	1	3	5	3
EAVES WIDTH	0	1	2	5	2
ENVELOPE COMPLEXITY	0	1	2	6	3
DECKS & BALCONIES	3	2	4	6	6
<b>TOTAL</b>					<b>15</b>

**SUITABLE WALL CLADDINGS:**

TOTAL SCORE	PIRROT FIXED GLAZING	OVER 20mm MIN. DRAINED CAVITY
15-20	A) VERTICAL PROFILED METAL - CORRUGATED ONLY	A) MASONRY VENEER B) STUCCO C) HORIZONTAL PROFILED METAL D) RUSTICATED WOODS E) FIBRE CEMENT W/STDS F) FIBRE CEMENT SHEET G) PLYWOOD SHEET H) EIFS I) BR W/ST

**GLAZING RATIO CALCULATION:**

ZONE	WALL AREA	GLAZING AREA
NORTH WEST	=10.25m²	=0.60m² = 5.89%
SOUTH WEST	=22.34m²	=3.20m² = 14.33%
SOUTH EAST	=14.57m²	=2.84m² = 19.49%
<b>SUB-TOTAL</b>	<b>=47.16m²</b>	<b>=6.64m² = 14.09%</b>
NORTH EAST	= 1.14m²	=0m²
<b>TOTAL</b>	<b>=48.30m²</b>	<b>=6.64m²</b>

**WALL/GLAZING RATIO (MAXIMUM 30%)** = 12.84% (BRO. GARAGE DOOR)

**H1 COMPLIANCE CAN THEREFORE BE DETERMINED BY:**

SCHEDULE	CALCULATION	MODELLING

**NZBC - H1 COMPLIANCE:**  
NZS 4218:2004

ELEMENT	REQD R-VALUE	PROVIDE R-VALUE	CONSTR. R-VALUE
ROOF	R2.9	R3.2	R3.1
WALLS	R1.9	R2.2	R1.9
FLOORS	R1.3	R1.5	R1.3

**INSULATION:**  
WALLS: TASMAN INSULATION R2.2W PINK BATTS.  
CEILING: TASMAN INSULATION R 3.2C PINK BATTS.  
FLOORS: SNUB FLOOR 430 R1.6 PINK BATTS.

- INSTALLATION OF ALL INSULATION SHALL BE DONE IN ACCORDANCE WITH NZS 646:2006 - ENERGY EFFICIENCY - INSTALLING INSULATION IN RESIDENTIAL BUILDINGS.

- THE INSTALLER OF ALL INSULATION MUST BE EXPERIENCED & FAMILIAR WITH THE HEALTH AND SAFETY REQUIREMENTS OF APPENDIX 'B' - NZS 4246:2006.

**VENTILATION & LIGHT RATIOS:**  
NZBC CLAUSES G4 & G7

ROOM	VENTILATION min. 25%	NATURAL LIGHT min. 2.0%
BED 1	= 18.40m³	= 1.52m² = 8.22%
		= 3.04m² = 18.44%

**Design Network**  
ARCHITECTURE LTD  
P.O BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT: (04) 5696-109, KAPITI (04) 9025-505

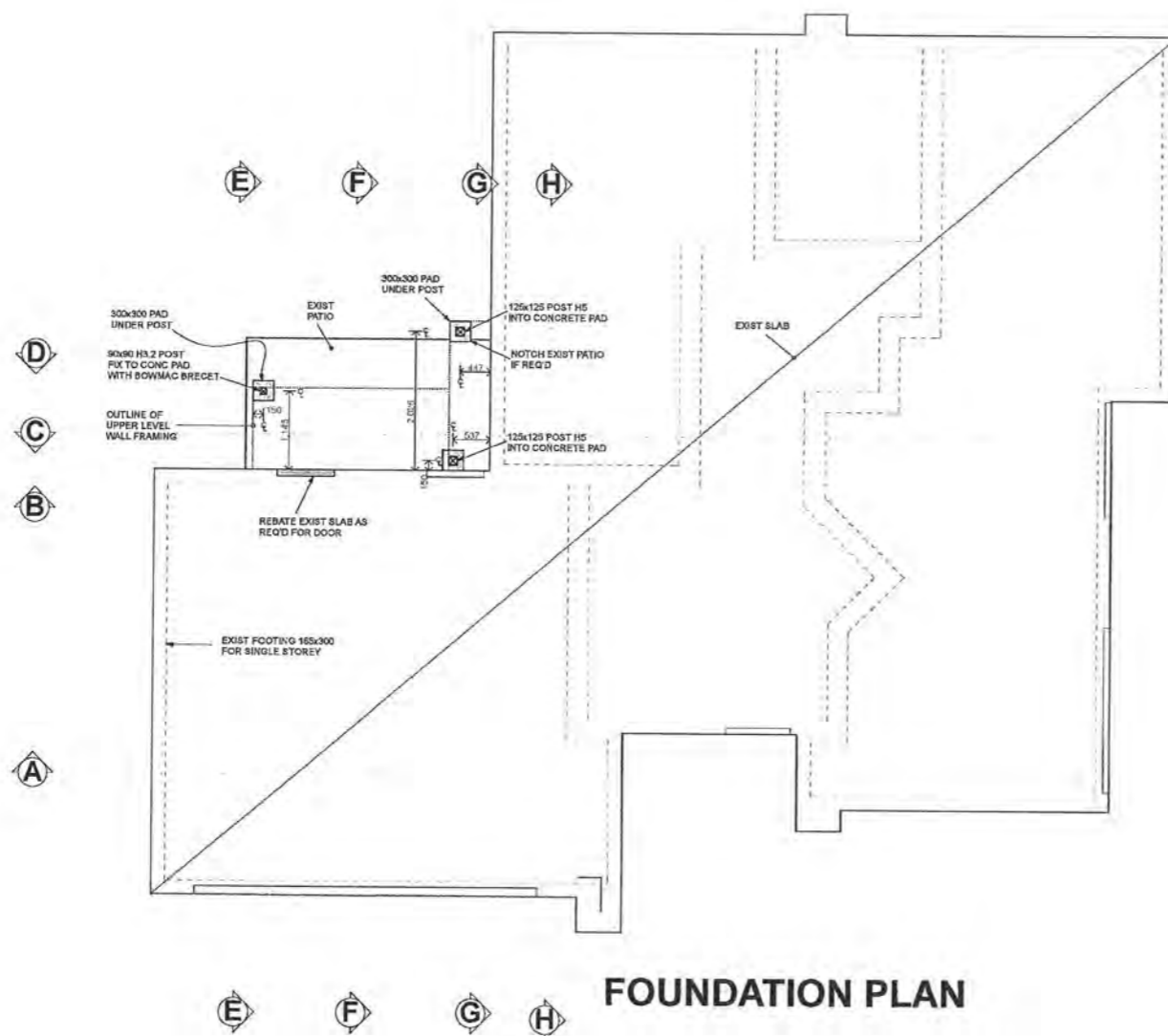
PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY  
WAIKANAI BEACH

REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	BUILDING CONSENT APPLICATION	SHEET No.
	18-07-2011				2
	30-08-2011				
	09-09-2011				

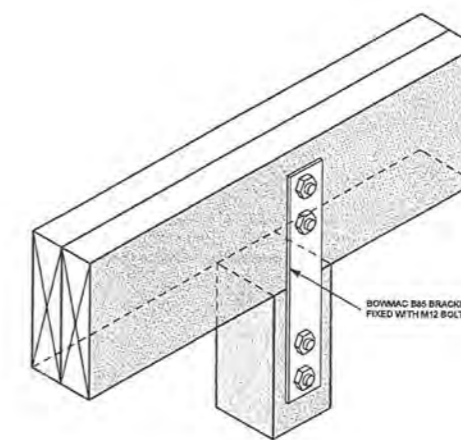
FINISH DATE: 09-09-2011  
SCALES FOR A1 SIZE PAPER: 1:100 1:50  
CODE: P20N  
REF: 6504K

DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED

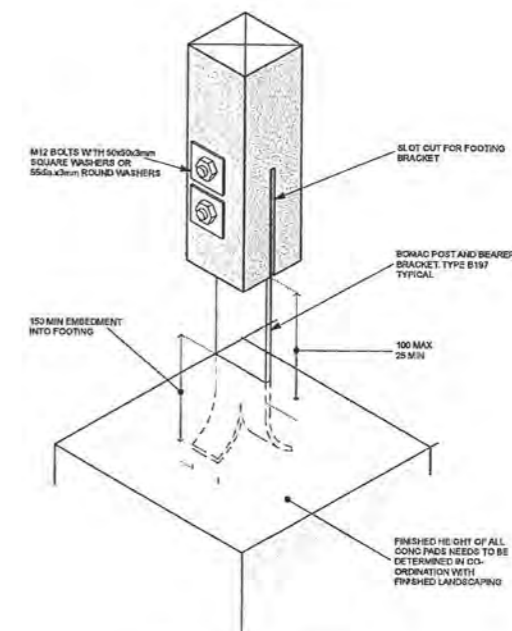
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12 SEP 2011  
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FOUNDATION PLAN



POST TO BEAM CONNECTION



POST UPLIFT FIXING

**Design Network**  
ARCHITECTURE LTD

P.O BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT:(04) 5696-109, KAPITI(04)9025-505

PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY  
WAIKANAI BEACH

REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	BUILDING CONSENT APPLICATION	SHEET No.
			18-07-2011		3
			30-08-2011		
			09-09-2011		
			FINISH DATE	SCALES FOR A1 SIZE PAPER	CODE
				1:50 1:5	P20N
			COPYRIGHT RETAINED BY DESIGN NETWORK ARCHITECTURE LTD. DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED		REF
					6604K

**TENDERING, WORKMANSHIP & PRICING CONTINGENCIES**

**NEW WORK** - [ ]  
**REMOVAL WORK** - [ ]  
**EXIST WALLS** - [ ]

ALL PRICING IS CONSIDERED PROVISIONAL UNTIL ALL COMMENTS ARE OBTAINED AND THE REQUIREMENTS OF THE PROJECT ARE FULLY REALISED.

THE PLANS AND SPECIFICATIONS SHOULD BE THOROUGHLY READ AND UNDERSTOOD BY ALL CONTRACTORS INVOLVED WITH THE PROJECT FOR THE PURPOSES OF QUOTING AND EXECUTING THE WORKS INVOLVED.

UPON READING THE DOCUMENTATION ANY CONCERNS ABOUT THE DOCUMENTATION WITH REGARD TO ANY ASPECT OF THE PROJECT INCLUDING, BUT NOT LIMITED TO MATERIALS AND WORKMANSHIP SHOULD BE IMMEDIATELY ADDRESSED TO THE DESIGNER.

A PRELIMINARY SITE INVESTIGATION SHOULD BE CARRIED OUT BY THE MAIN CONTRACTOR AND ANY SUBCONTRACTORS DEEMED NECESSARY BY THE MAIN CONTRACTOR, TO ESTABLISH THE EXISTING STATUS OF THE SITE & STRUCTURE, PRIOR TO PROCEEDING WITH QUOTING.

ANY EXISTING ELEMENTS THAT MAY BE AFFECTED BY THE PROPOSED WORK, THAT CAN NOT BE VISUALLY INSPECTED PRIOR TO COMMENCING THE WORK SHOULD BE CONSIDERED AS VARIABLES AND SUBJECT TO ADDITIONAL CONTINGENCY COSTS IF DETERMINED AS UNSUITABLE ONCE EXPOSED AND INSPECTED.

ANY CONCERNS ABOUT ANY ON SITE CONDITIONS SHOULD IMMEDIATELY BE ADDRESSED TO THE DESIGNER FOR FURTHER CLARIFICATION.

THE MAIN CONTRACTOR IS RESPONSIBLE FOR CONFIRMING ALL EXISTING AND PROPOSED DIMENSIONS, HEIGHTS, ROOF PITCHES, OVERHANDS, MATERIALS, SITE CONDITIONS, SITE LEVELS AND ANY OTHER ASPECTS OF THE PROJECT WHICH MAY AFFECT IT'S OUTCOME.

ALL WORKMANSHIP AND EVERY ASPECT OF THE PROJECT IS TO COMPLY WITH THE RELEVANT STANDARDS, THE NZBC, TERRITORIAL AUTHORITY REQUIREMENTS, BUILDING CONSENT DOCUMENTS AND COMMENTS FROM THE VARIOUS COUNCIL DEPARTMENTS AND IS TO BE EXECUTED TO THE BEST TRADE PRACTICE BY SUITABLY QUALIFIED AND EXPERIENCED PROFESSIONALS AND SHOULD BE PRICED AS ALLOWING FOR SUCH.

ANY VARIABLES OR UNKNOWN QUANTITIES SHOULD BE TAGGED IN THE QUOTATION.

ANY REFERENCE IN THE DRAWINGS FOR ASPECTS OF THE WORK THAT ARE TO BE DETERMINED ON SITE, SHOULD BE TAGGED IN THE QUOTATION.

ANY ITEMS NOTED ON THE PLANS OR IN THE SPECIFICATIONS TO BE CHECKED OR CONFIRMED ON SITE ARE TO BE DONE SO BY THE MAIN CONTRACTOR PRIOR TO THE COMMENCEMENT OF ANY WORK OR AS SOON AS PRACTICALLY POSSIBLE AND PRIOR TO FABRICATION OR PURCHASE OF ANY ITEMS THAT ARE TAGGED BY THE ITEM REQUIRED TO BE CHECKED OR CONFIRMED.

ANY DISCREPANCIES UPON CHECKING OR CONFIRMING ON SITE SHOULD IMMEDIATELY BE ADDRESSED TO THE DESIGNER PRIOR TO PROCEEDING ANY FURTHER.

THE TERRITORIAL AUTHORITY IS TO BE SATISFIED IN ALL RESPECTS OF THE WORK AND THEREFORE ANY QUERIES ARE TO BE ADDRESSED TO THEM BY THE MAIN CONTRACTOR FOR FINAL CONFIRMATION.

ALLOW FOR A 10% CONTINGENCY SUM BASED ON AND IN ADDITION TO THE COST OF THE WORKS.

**TENDERING FOR ALTERATIONS & ADDITIONS:**  
 A PRELIMINARY SITE INVESTIGATION SHOULD BE CARRIED OUT BY THE CONTRACTOR TO ESTABLISH THE EXISTING STATUS OF THE SITE, PRIOR TO CONFIRMATION OF ANY TENDER PRICES.

ANY CONCERNS SHOULD IMMEDIATELY BE ADDRESSED TO THE DESIGNER FOR FURTHER CLARIFICATION.

ANY VARIABLES OR UNKNOWN QUANTITIES SHOULD BE TAGGED IN THE QUOTATION.

**DEMOLITION:**  
 ALLOW FOR ALL REMOVALS AS INDICATED ON WORKING DRAWINGS.

CONTRACTOR TO CONFIRM ALL STRUCTURAL LOADS PRIOR TO ANY REMOVAL OR DEMOLITION WORK BEING UNDERTAKEN.

CONTRACTOR TO VERIFY PRESENCE OF ANY SERVICES LOCATED IN AREAS TO BE DEMOLISHED.

ALLOW FOR SUITABLE TEMPORARY PROPPING OF STRUCTURE DURING DEMOLITION WORK.

ENSURE NO UNNECESSARY DAMAGE OCCURS AND DAMAGE IN GENERAL IS MINIMISED DURING DEMOLITION AND REMOVAL WORK.

ENSURE PROTECTION OF NEIGHBOURING PROPERTY DURING DEMOLITION, MINIMISING DUST, NOISE AND GENERAL NUISANCE.

IF STRUCTURE IS REVEALED TO BE OTHERWISE THAN INDICATED ON WORKING DRAWINGS AFTER EXPOSURE, THEN CONTACT DESIGNER.

ALLOW TO MAKE GOOD ALL FLOOR, WALL & CEILING SURFACES AFTER DEMOLITION AND REMOVALS REVEW TO MATCH EXISTING MATERIALS OR NEW FINISHES AS INDICATED IN WORKING DRAWINGS.

ALLOW FOR REMOVAL OF ALL DEMOLITION AND WASTE MATERIAL FROM SITE.

**WIND ZONE:**  
 THE WIND ZONE CLASSIFICATION IS TO BE CONFIRMED BY ALL MANUFACTURERS OF ANY BUILDING COMPONENTS TO WHICH THIS INFORMATION IS RELEVANT, PRIOR TO FABRICATION OF ANY ELEMENTS.

**VERY HIGH WIND ZONE**

WIND ZONE DETERMINED BY:  
 TERRITORIAL AUTHORITY

BUILDING WRAP	THERMAKRAFT WATERGATE PLUS
EXTERIOR WALLS	REFER TIMBER TREATMENT NOTES
EXT. LOAD-BEARING STUDS	REFER TABLE
RAFTER FIXING TO TOP PLATE	29x63.15 SKW NAILS & 2 WIREDOCS
PURLIN (BATTEN) FIXING	TYPICALLY 1/10 SELF-DRILLING SCREWS, 60mm LONG, REFER NZS 3604:2011, TABLES 10.10 - 10.12
TRUSS FIXING TO TOP PLATE	REFER TRUSS MANUFACTURER
UNDERFLOOR WINDBARRIER	N/A
ROOF UNDERLAY	THERMAKRAFT 215 UNDERLAY

**INSULATION:**  
 WALLS: TASMAK INSULATION R2.3W PINK BATTES.  
 CEILING: TASMAK INSULATION R 3.0 PINK BATTES.  
 FLOORS: SHUUFLOOR R 450 R16 PINK BATTES.

- INSTALLATION OF ALL INSULATION SHALL BE DONE IN ACCORDANCE WITH NZS 4246:2001 - ENERGY EFFICIENCY - INSTALLING INSULATION IN RESIDENTIAL BUILDINGS.

- THE INSTALLER OF ALL INSULATION MUST BE EXPERIENCED &

**TIMBER TREATMENT:**

BUILDING COMPONENT	TREATMENT
A: IN CONTACT WITH GROUND	H5
B: EXPOSED TO WEATHER	H3.2
C: PROTECTED BUT EXPOSED TO GROUND	H3.2
D: PROTECTED BUT RISK OF MOISTURE PENETRATION	H1.3
E: PROTECTED AND DRY CONDITIONS	H1.2

**TOP PLATES:**  
 TOP PLATE SIZES IN ACCORDANCE WITH TABLE 8.1F NZS3604:2011, DETERMINED BY PRE-MAKER.

**BOTTOM PLATES:**  
 BOTTOM PLATE SIZES IN ACCORDANCE WITH TABLE 8.1F NZS3604:2011, DETERMINED BY PRE-MAKER.

**FRAMES & TRUSSES:**  
 ALLOW FOR 20 ROUND OPENING HEAD HEIGHT FOR WINDOWS & EXTERIOR ALUM. DOORS, UNLESS STATED OTHERWISE.

90mm TIMBER WALLS TO BE 90x90 OR GREATER IN ACCORDANCE WITH NZS 3602:193 AMENDMENT 4 AS AN ALTERNATIVE SOLUTION TO THE ALSO CLAUSE 9.1.

ALL TIMBER UNITS TO BE 90x90 OR GREATER UNLESS OTHERWISE STATED PER NZS 3604:2011

PRENAILER TO SUPPLY CERTIFICATION WITH NZBC FOR ALL FRAMES & TRUSSES & SUPPLY CERTIFICATE TO COUNCIL & A COPY TO DESIGNER REMAINING FULL COMPLIANCE, JOB ADDRESS & CLIENT, BEFORE FABRICATION.

THE UNITS SHOWN TAKE NO ACCOUNT OF CONCENTRATED LOADINGS FROM GIRDER TRUSSES, OTHER THAN THOSE SHOWN, MANUFACTURER TO DESIGN ALL NECESSARY TRANSFER OF LOADS OR CONTACT DESIGNER FOR FURTHER CLARIFICATION.

**INTERNAL LININGS:**  
 GIB SHEET LININGS MUST BE STORED, HANDLED & FIXED IN ACCORDANCE WITH WINSTONE WALLBOARDS LTD GIB SITE GUIDE DATED JAN 2010

ALL SHEETS MUST BE FULL LENGTH, FIXED VERTICALLY (NO PATCHES)

ALLOW FOR ADDITIONAL DRAWINGS AS REQ'D FOR BOTTOM/TOP FRONTO

ALLOW FOR GIB GIDLINE TAPE ON TRIMS AS REQ'D

WALL LININGS - 10mm BRACELINE - REFER FLOOR PLANS FOR THE LOCATIONS  
 AQUALINE - IN SUITE  
 HOISELINE - ALL EXTERIOR WALLS  
 STANDARD GIB - ELSEWHERE

CEILING LININGS  
 13mm GIB 80 FOR 600mm GUN PORT STRUCTURE SPACING  
 10mm GIB 80 FOR 450mm GUN PORT STRUCTURE SPACING

VERTICAL GIB JOINTS MUST NOT OCCUR ON LOAD BEARING DOOR OR WINDOW STUDS

NO JOINTS WITHIN 200mm OF G PILING JAMB

**TYPICAL GIB SHEET WALL FIXING DETAIL**

**CEILING BATTENS & LININGS:**  
 ALLOW TO FIX 'GIB' ROUND METAL CEILING BATTENS TO THE UNDERSIDE OF ALL TRUSSES, FIXED IN ACCORDANCE WITH MANUFACTURER'S DETAILS.

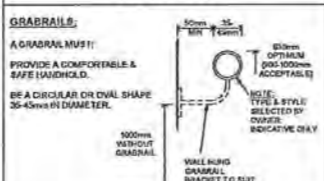
ALLOW FOR 150x40 PERIMETER PLATE FIXED OVER TOP PLATE SUPPORTING TRUSSES ONLY.

BATTENS AT:  
 -600mm c/c. MAX. FOR 13mm GIB B.D.  
 -450mm c/c. MAX. FOR 10mm GIB B.D.

**SINGLE OR UPPER LEVEL STUDS**  
 (MIN. SIZES & MAX. SPACINGS REQ'D BY NZS3604:2011)

STUD HEIGHT	EXT. LOAD BEARING WALLS	INT. LOAD BEARING WALLS
2.40m	90x45 @ 400mm	90x45 @ 600mm
2.70m	90x60 @ 600mm	90x45 @ 600mm
3.00m	90x90 @ 400mm	90x45 @ 600mm

**INTERNAL GRABRAILS**



**WATER FLASH:**

WALL & FLOOR SURFACES TO AREAS CONTAINING SANITARY FIXTURES OR APPLIANCES MUST BE IMPERVIOUS & EASILY CLEANED IN ACCORDANCE WITH NZS2 CLAUSE 8.5.1.

**WALLS:**  
 PAINTED GIB AQUALINE INSTALLED TO MANUFACTURERS SPECIFICATIONS.

**FLOORS:**  
 SELECTED TIER BEE TILE NOTE.

**JOINTS:**  
 WHERE BASH ABOUT IMPERVIOUS LINING, THE JOINT BETWEEN FIXTURE AND LINING SHALL BE SEALED TO PREVENT WATER PENETRATION TO CONCEALED SPACES OR BEHIND LININGS.

**TILES:**  
 TILES TO BE SELECTED BY OWNER AND INSTALLED STRICTLY TO MANUFACTURERS INSTRUCTIONS BY QUALIFIED, EXPERIENCED TILER ONLY.

TILES TO BE CHECKED THAT THEY ARE SUITABLE FOR THE PURPOSE IN WHICH THEY WILL BE USED, E.G. WETROOM, WEAR, INTERIOR/EXTERIOR, FLOOR/WALL, SLIP RESISTANCE.

TILING SYSTEMS TO BE USED STRICTLY ACCORDING TO SYSTEM MANUFACTURERS INSTRUCTIONS.

TILED AREA TO BE PREPARED & CLEANED TO THE TILES DE GIB STANDARDS BY CONTRACTOR PRIOR TO COMMENCING WORK.

ALL VIBRATION-INDUCING CONSTRUCTION TO BE COMPLETED BEFORE TILING COMMENCES TO PROTECT AGAINST TILE DISTURBANCE.

TILES MUST BE ADHERED TO A SUBSTRATE OR BACKING MATERIAL THAT PROVIDES A SOUND, NON-FLEXING, RIGID BASE. PATTERNED SYSTEMS TO BE LAYED IN SUCH A MANNER THAT PATTERNS LINE UP & MATCH AS REQ'D.

USE ALL ADHESIVES STRICTLY ACCORDING TO MANUFACTURERS INSTRUCTIONS & MAKE SURE THEY ARE SUITABLE FOR THE TILE SYSTEM IN USE.

GROUT TO BE SELECTED ACCORDING TO TILE APPLICATION AND USED STRICTLY TO MANUFACTURERS INSTRUCTIONS.

MOVEMENT CONTROL JOINTS TO BE LOCATED BY TILER AS REQUIRED.

TILES TO BE CLEANED AS REQUIRED AT COMPLETION.

**ELECTRICAL:**  
 ALL WORK TO BE CARRIED OUT BY OR UNDER THE DIRECT SUPERVISION OF A HOLDER OF A PRACTICING CERTIFICATE UNDER THE ELECTRICITY REGULATIONS 1992

- TEST & COMPLETE A CERTIFICATE OF COMPLIANCE, SUPPLY CERTIFICATE TO OWNER

- CONTRACTOR TO ALLOW FOR FINISHED CONNECTION TO STREET SUPPLY INCLUDING LADING WITH THE NETWORK UTILITY OPERATOR AND THE SUBMISSION OF ALL REQUIRED FORMS AND ASSOCIATED PAPERWORK.

- CONTRACTOR TO ALLOW FOR SERVICES OF ALL ELECTRICAL FITTINGS AS SHOWN ON PLANS & OR AS DIRECTED BY OWNER

ALLOW FOR: (LOCATION AS DIRECTED BY OWNER)

- DOUBLE SOCKET POWER UNITS
- CEILING MOUNTED OR RECESSED LIGHT FITTINGS
- EXT. SECURITY SPOTS WITH SENSOR
- TV AERIAL SOCKETS
- TELEPHONE SOCKETS
- TO CONNECT ALL APPLIANCES, FANS ETC AS REQ'D
- SHAWERS POINT IN ENSUITE, WHERE DIRECTED BY OWNER

- ALL FITTINGS & LOCATIONS TO BE CONFIRMED BY OWNER PRIOR TO PURCHASE OR INSTALLATION

**DOMESTIC SMOKE ALARMS:**  
 ALLOW FOR SMOKE ALARMS ON OR NEAR CEILING IN ACCORDANCE WITH AS 1870 & MANUFACTURERS INSTRUCTIONS. SMOKE ALARMS TO BE LOCATED ON THE ESCAPE ROUTES WITHIN THE HOUSEHOLD UNITS, ON LEVELS CONTAINING THE SLEEPING SPACES, THE SMOKE ALARMS SHALL BE LOCATED WITHIN:

A) EVERY SLEEPING SPACE, OR  
 B) 3.0m OF EVERY SLEEPING SPACE DOOR, IN 3. SMOKE ALARMS MUST BE AUDIBLE TO SLEEPING OCCUPANTS ON OTHER SIDE OF CLOSED DOORS.

**SHELVING:**  
 SHELVES TO BE CONSTRUCTED FROM 42x20mm THICK DRESSED PINE, SCREW FIX.

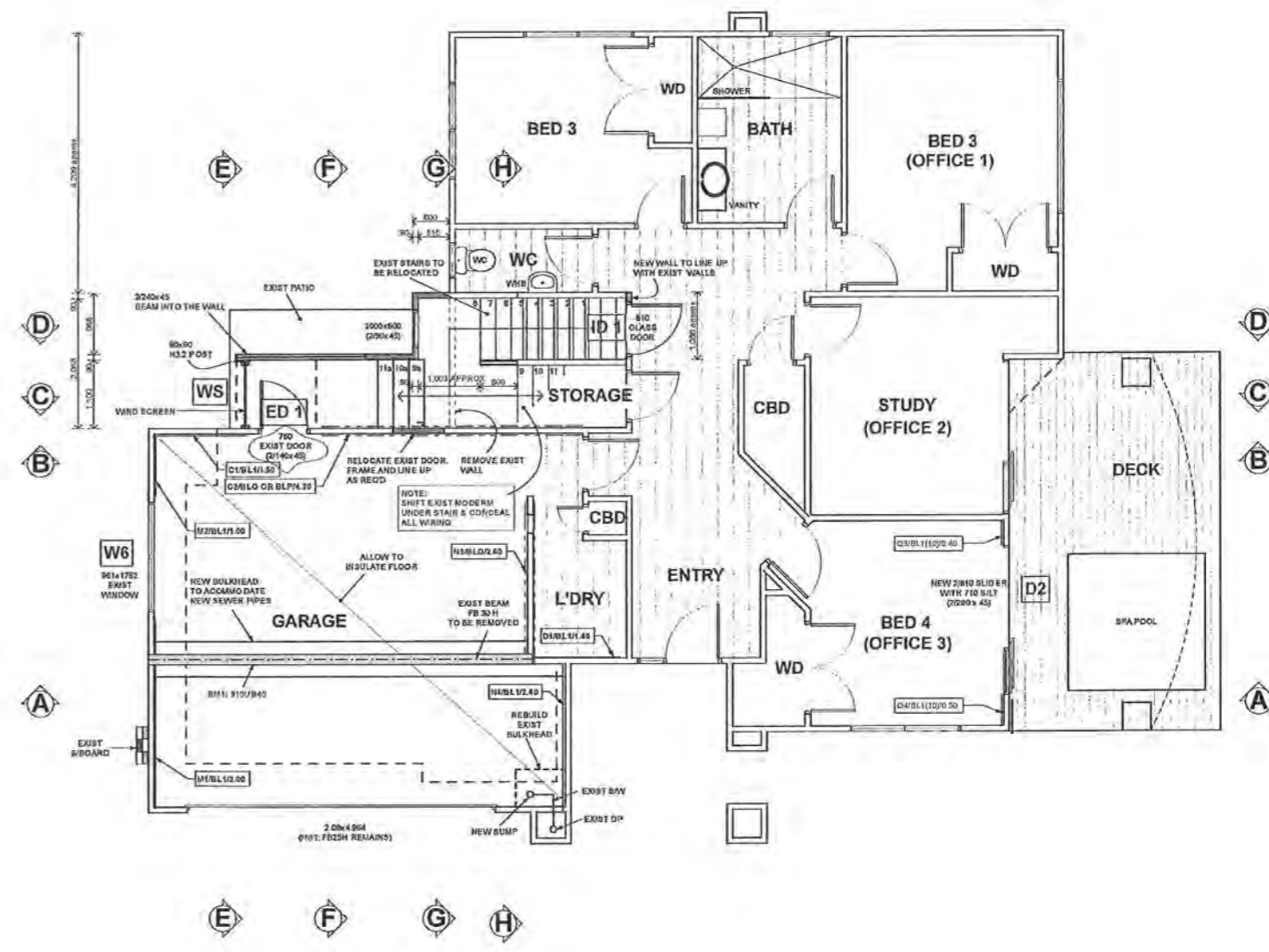
SLATED SHELVES ARE REQUIRED IN ALL HALL CUPBDS.

SHELVES ARE REQUIRED IN ALL BEDROOMS WITH RAIL TO BE INSTALLED IN WARDROBES.

THE ABOVE MAY BE SUBSTITUTED WITH A PROPRIETARY WARDROBE ORGANISER. REQUIREMENTS TO BE CONFIRMED WITH CLIENT.

**AIR EXTRACTION & VENTING:**  
 ALLOW FOR AIR EXTRACTION FANS IN ENSUITE TO BE INSTALLED TO MANUFACTURERS INSTRUCTIONS AND TAKEN TO EXTERIOR AS REQ'D.

FANS MUST BE SIZED TO PROVIDE A MINIMUM AIR CHANGE OF 25 LITRES PER SECOND & WIRED TO LIGHT SWITCH WITH A MINIMUM 6 AMP/10 A WIRE TO BE REQ'D



**LOWER LEVEL**  
 151.51m<sup>2</sup> (1631 sq.ft.)+ DECKS 36.58m<sup>2</sup>(394 sq.ft.)

preline plumbing inspection required.

BC 110554

frost prone water pipes are to be lagged with a suitable type of insulation.



**EZY BRACE BRACING:**

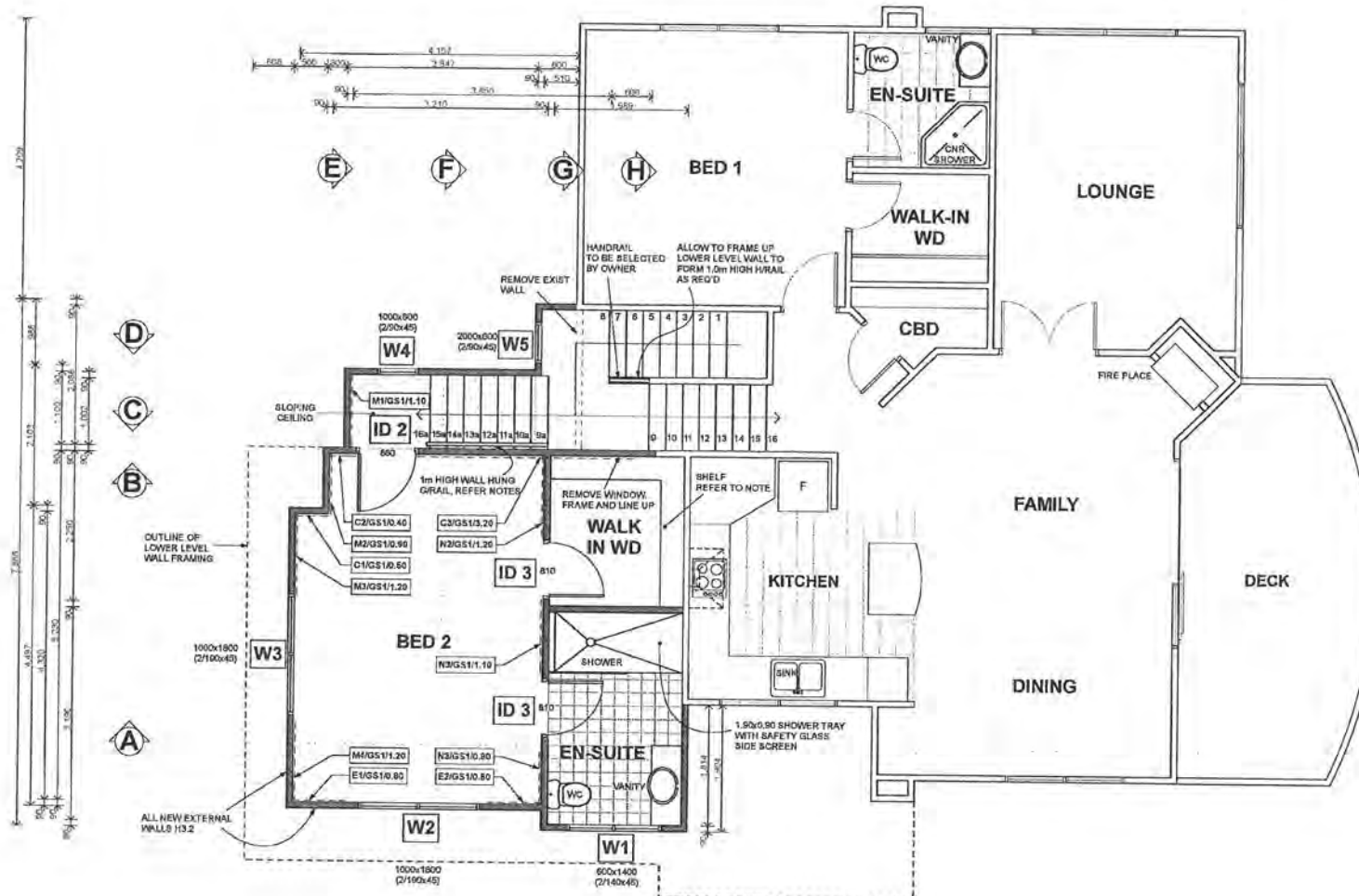
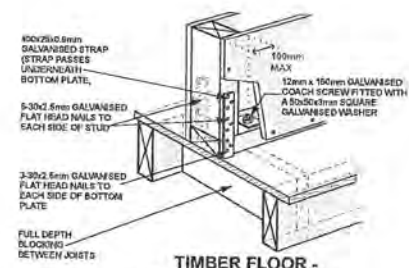
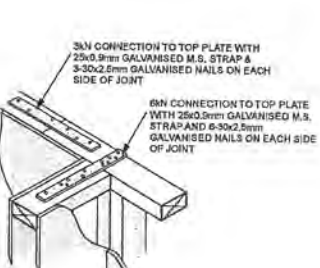
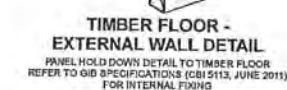
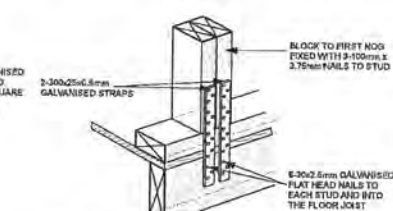
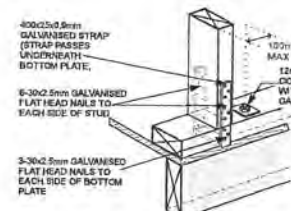
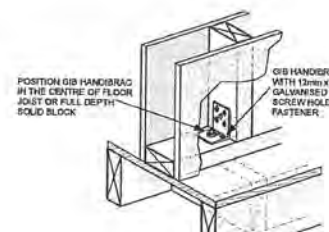
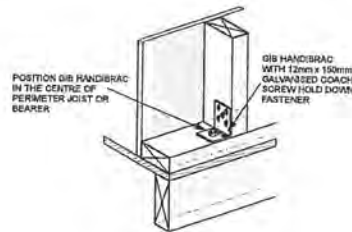
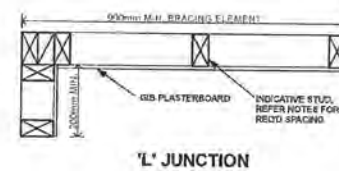
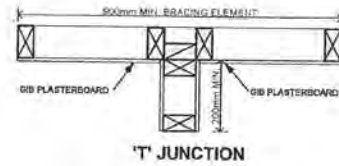
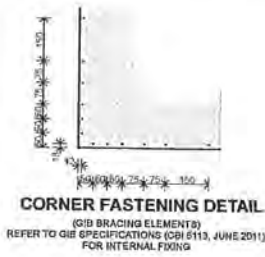
**NOTE:**  
ALL BRACING DESIGNED IN ACCORDANCE WITH "EZY-BRACE" SYSTEMS, JUNE 2011 & BRACES TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS

- FIX EACH END OF BRACELINE BRACING ELEMENTS TO CONCRETE SLAB WITH RAMSET 12x150mm ANKASCREWS AND THROUGH TIMBER FLOORS WITH 12x100mm GALLY COACH SCREWS. REFER MANUFACTURERS INFORMATION

- SUBSTITUTIONS OF PLASTERBOARD, REFER PAGE 21, "EZY-BRACE" SYSTEMS, JUNE 2011

- BRACING TABLES FOR 10mm & 13mm COMBINED

PLASTERBOARD	
BRACELINE	
A4/BL1/1.50	A4 = BRACING ELEMENT NO. BL1 = BRACE TYPE 1.50 = HORIZ LENGTH



**UPPER LEVEL**

132.97m<sup>2</sup> (1431 sq.ft.)+ DECKS 36.58m<sup>2</sup>(394 sq.ft.)  
EXISTING FLOOR AREA =96.29m<sup>2</sup> (1419 sq.ft.)  
NEW FLOOR AREA =36.68m<sup>2</sup> (395 sq.ft.)

APPROVED BY  
PLUMBING AND DRAINAGE  
Simon C  
20/9/2011

**Design Network**  
ARCHITECTURE LTD

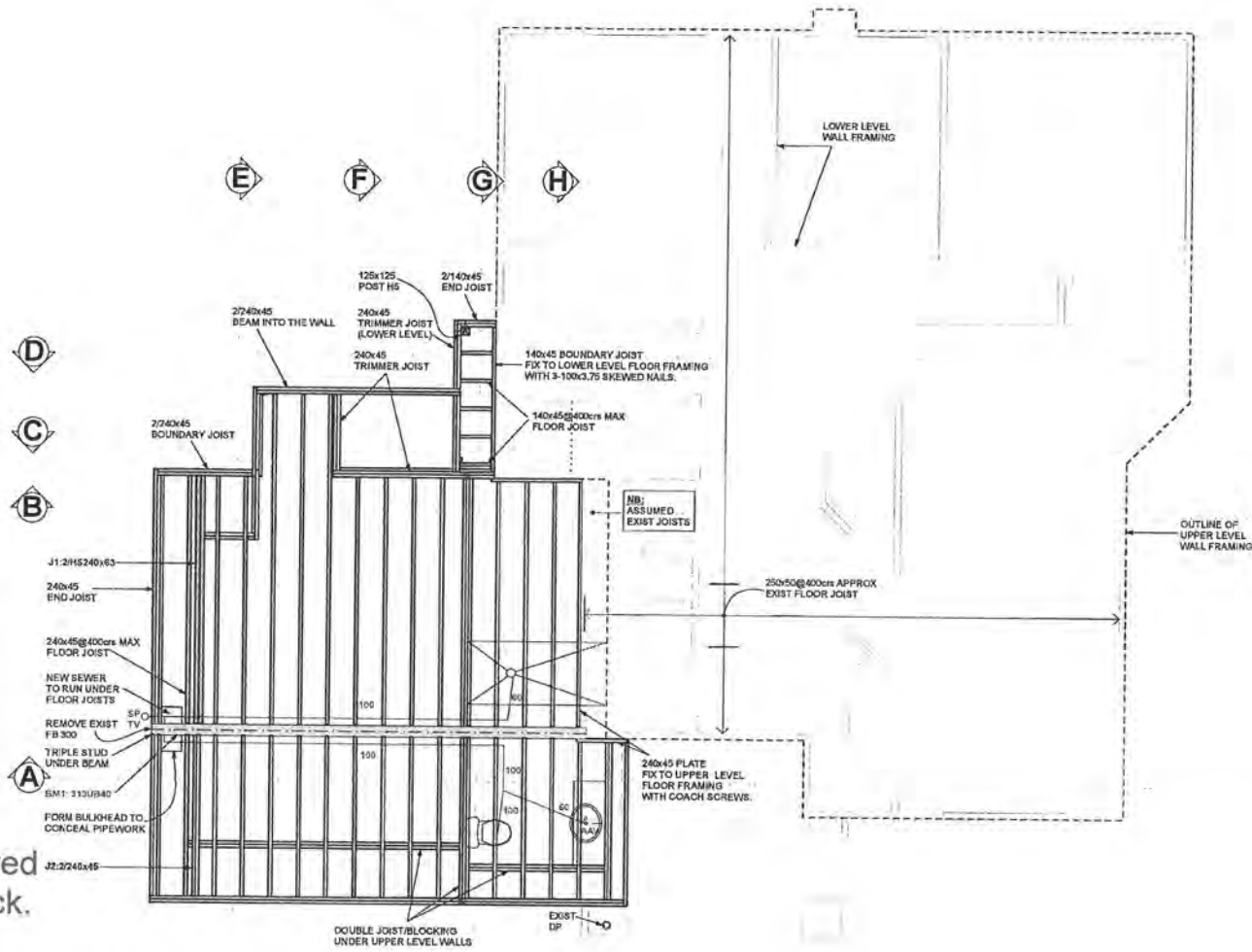
P.O BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT:(04) 5696-109, KAPITI:(04)9025-505

PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY  
WAIKANAI BEACH

REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	BUILDING CONSENT APPLICATION	SHEET No.
	18-07-2011				5
	30-08-2011				
	09-09-2011				
			FINISH DATE	SCALES FOR A1 SIZE PAPER	CODE
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			DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED		6604K

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**JOIST LAYOUT NOTES:**  
 ALL JOISTS TO BE MS98 24x45 FLOOR JOISTS @400mm c/c. MAX. UNLESS STATED OTHERWISE.  
 ALLOW FOR DOUBLE STUDS UNDER POINTS OF SUPPORT; TO ALL BEAMS, DOUBLE JOISTS, TRIMMER JOISTS AS REQUIRED.  
 REFER TO ENGINEERS DETAILS FOR ALL STEELWORK AND ASSOCIATED CONNECTION DETAILS.  
 ALLOW FOR FULL DEPTH SOLID BLOCKING:  
 - @ MID-SPAN OF ALL JOISTS  
 - BETWEEN THE DOUBLE JOISTS SPACED OVER WALLS ALLOWING ROOMS OF CEILING LINING  
 - @ 1.800m c/c MAX. @ OUTER END/ PERIMETER OF JOISTS  
 - @ 1.800m c/c MAX. OVER LINE OF SUPPORT  
 - ALONG THE LINE OF EACH WALL THAT CONTAINS A WALL BRACING ELEMENT IN THE STOREY BELOW  
 REFER BRACING DETAILS FOR ADDITIONAL BLOCKING REQUIRED FOR BRACING  
 ALL TANKED DECK JOISTS, EXPOSED JOISTS (INCLUDING THOSE IN SUBFLOOR SITUATION) AND ANY BOUNDARY OR END JOISTS ARE TO BE TREATED AS PER TREATMENT NOTES.  
 ALLOW FOR 50x50x3 WASHERS FOR BOLT FIXINGS TO TIMBER.  
 COUNTERSINK BOLT HEADS TO OUTSIDE FACE OF BOUNDARY AND END JOISTS AS REQUIRED.  
**DRAINAGE IN TIMBER FLOORS:**  
 THE PROPOSED LAYOUT IS A GUIDE ONLY. ON SITE ADJUSTMENTS WILL NEED TO BE ALLOWED FOR TO BETTER INCORPORATE SITE SPECIFIC SITUATIONS. THE FALL OF DRAIN IS USUALLY RESTRICTED BY STRUCTURE AND WILL NEED TO BE RE-EVALUATED ON SITE. CHECK WITH DESIGNER AND INSPECTING OFFICER TO CONFIRM ANY MODIFICATIONS.



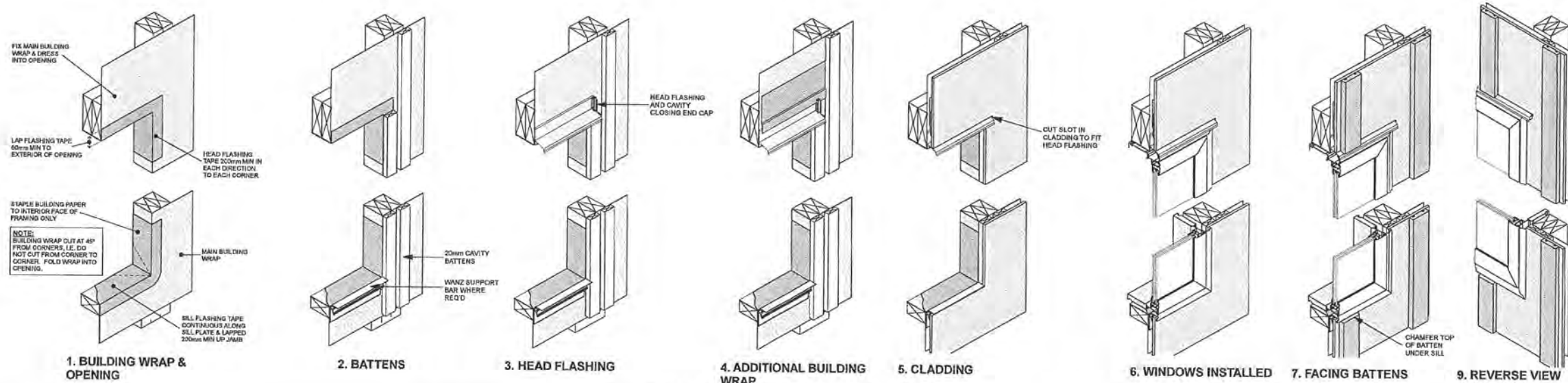
APPROVED BY  
 PLUMBING AND DRAINAGE  
 Simon C  
 20/9/2011

2x45 degree bends required at the base of the soil stack.

Any branches into the vertical soil stack are to installed with 45 degree junctions not strap bosses.

Water test soil stacks.

**JOIST LAYOUT PLAN**

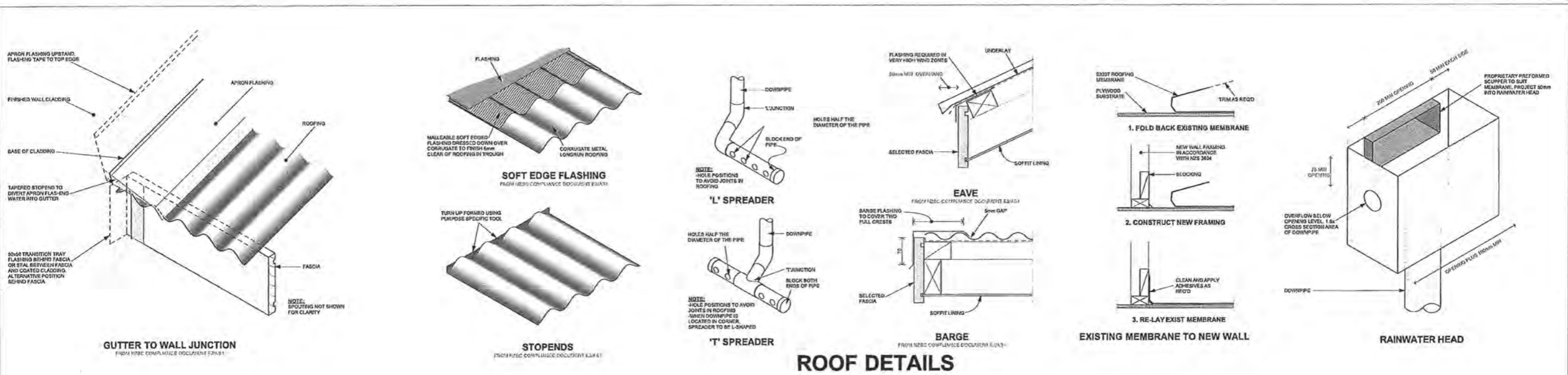


**WINDOW INSTALLATION SEQUENCE**

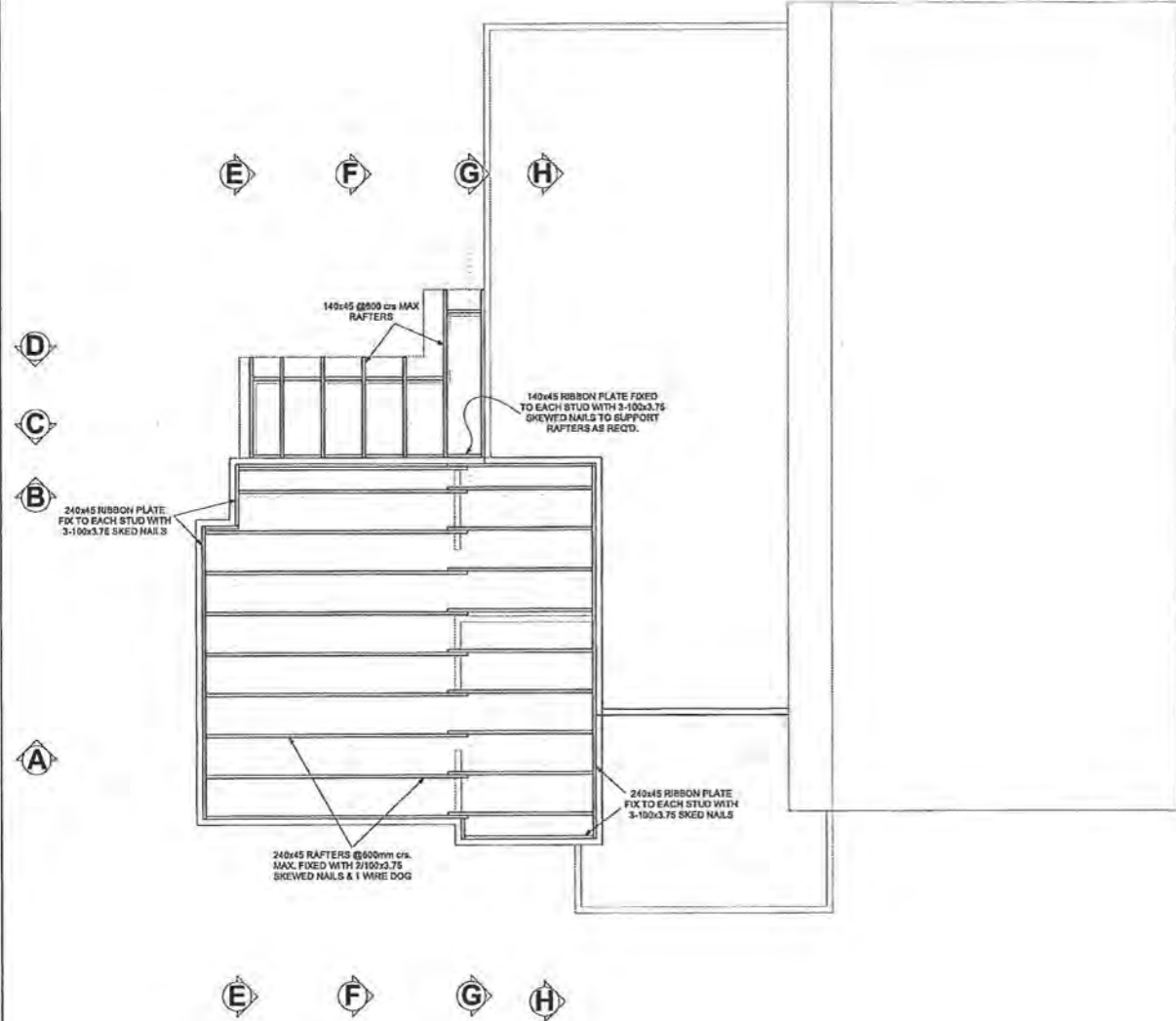
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PROPOSED ALTERATIONS & ADDITIONS  
 155 FIELD WAY  
 WAIKANAI BEACH

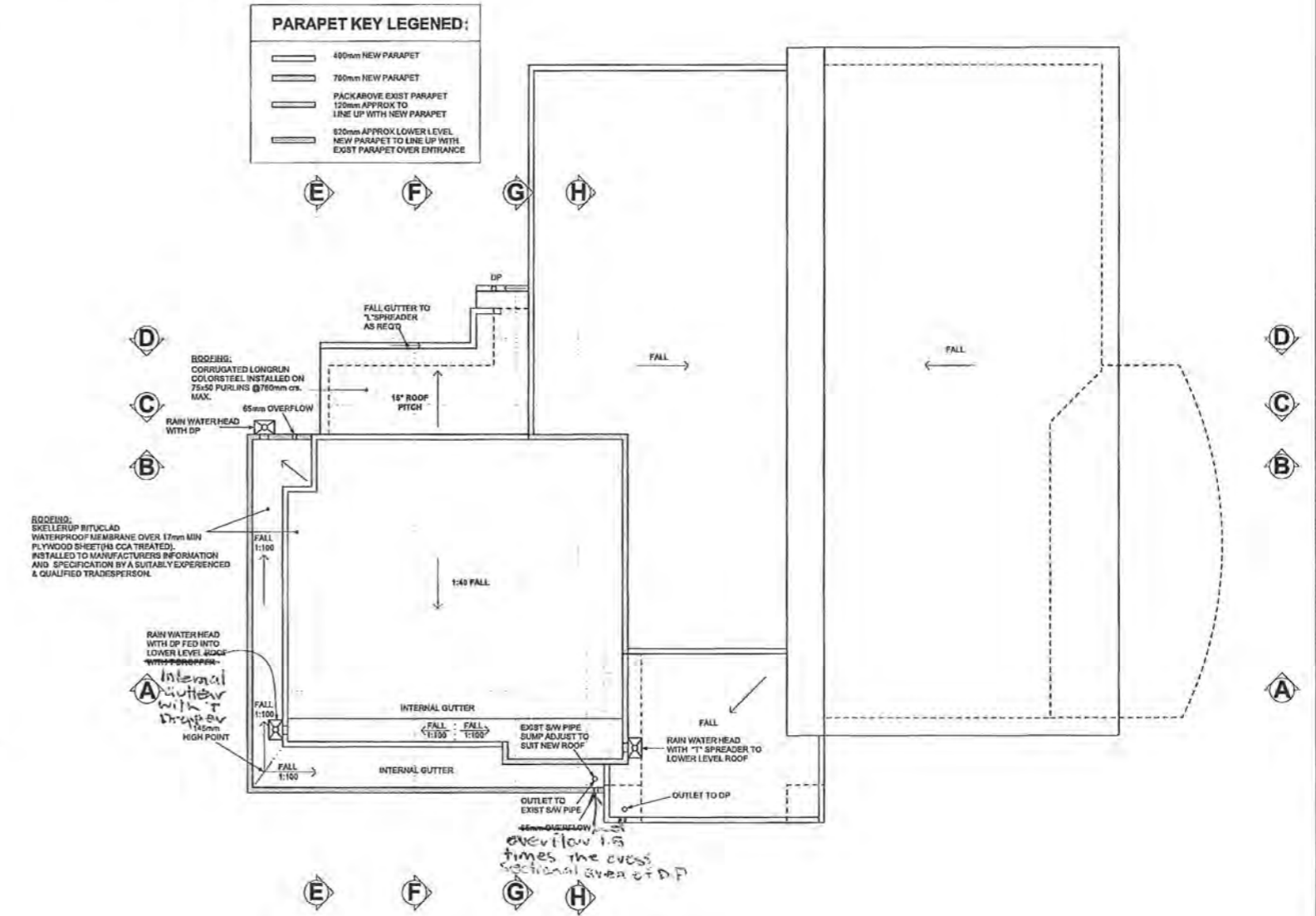
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					6604K



**ROOF DETAILS**



**RAFTER PLAN**

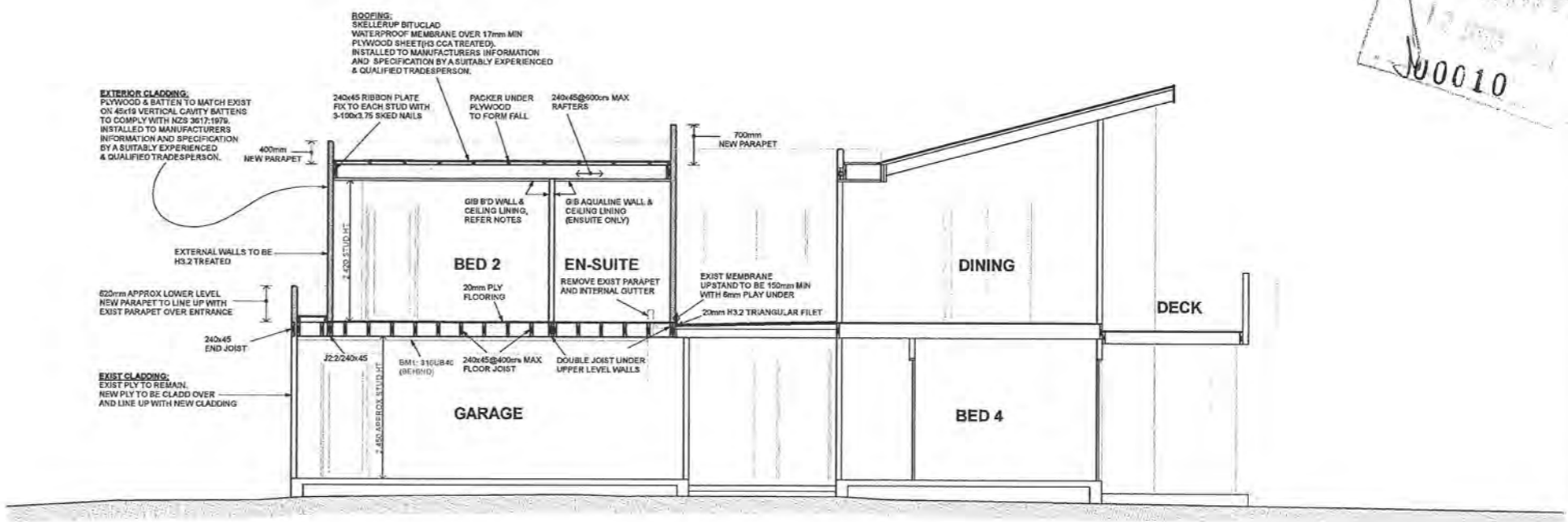
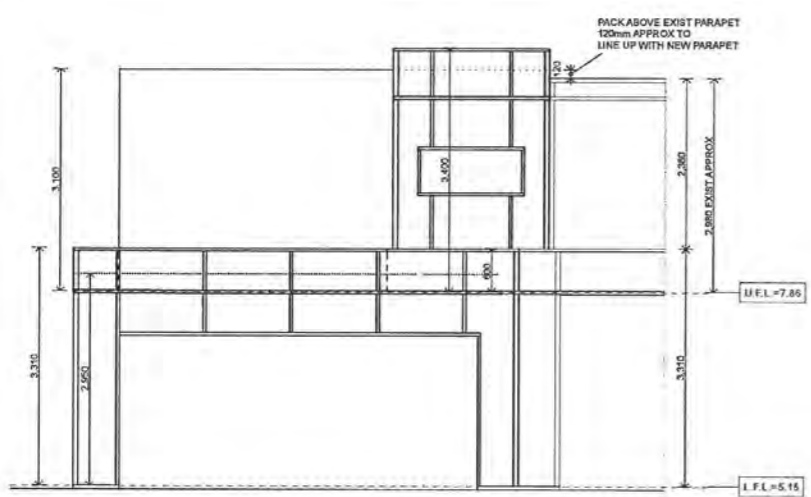


**ROOF PLAN**

<p><b>Design Network</b> ARCHITECTURE LTD P.O BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz PH: LOWER HUTT:(04) 5696-109, KAPITI(04)9025-505</p>	<p>PROPOSED ALTERATIONS &amp; ADDITIONS 155 FIELD WAY WAIKANAI BEACH</p>		REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	<p>BUILDING CONSENT APPLICATION</p>	SHEET No.
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						30-08-2011		
						09-09-2011		
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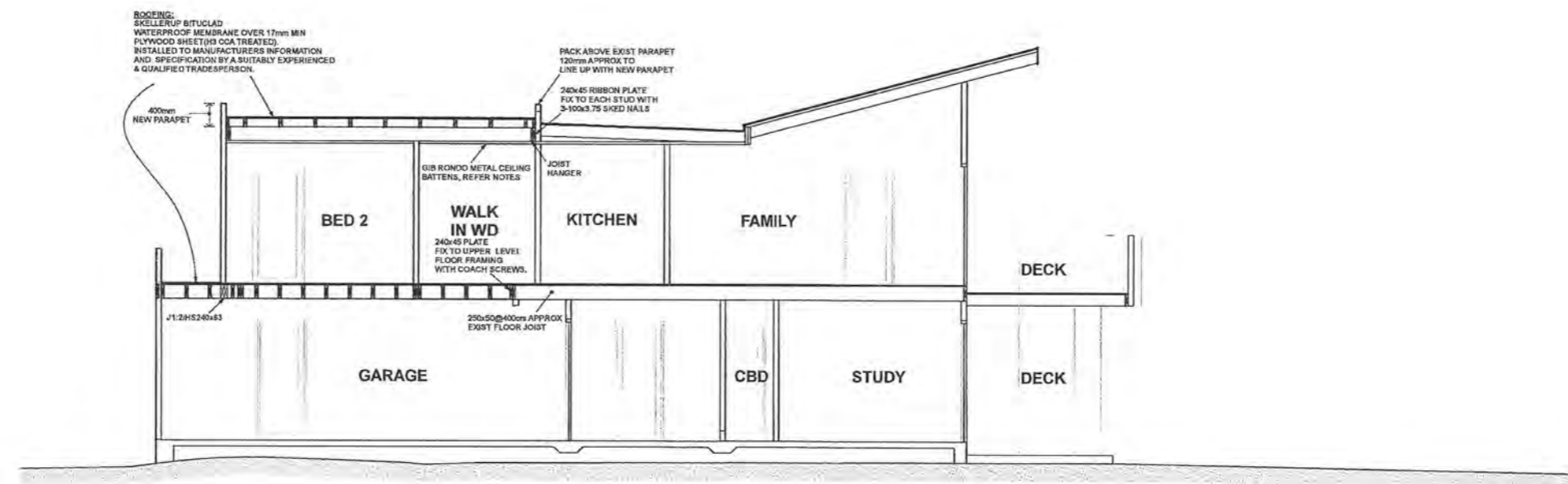
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12 SEP 2011  
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PARAPET HEIGHTS AND BATTEN PATTERN

A-A



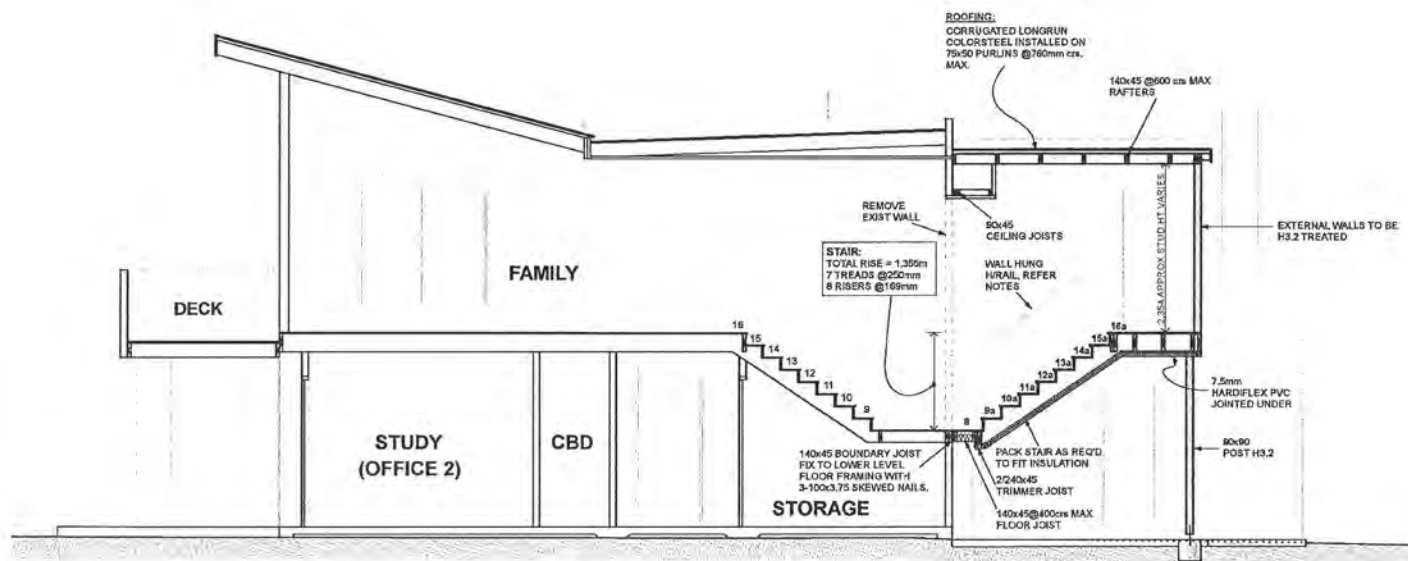
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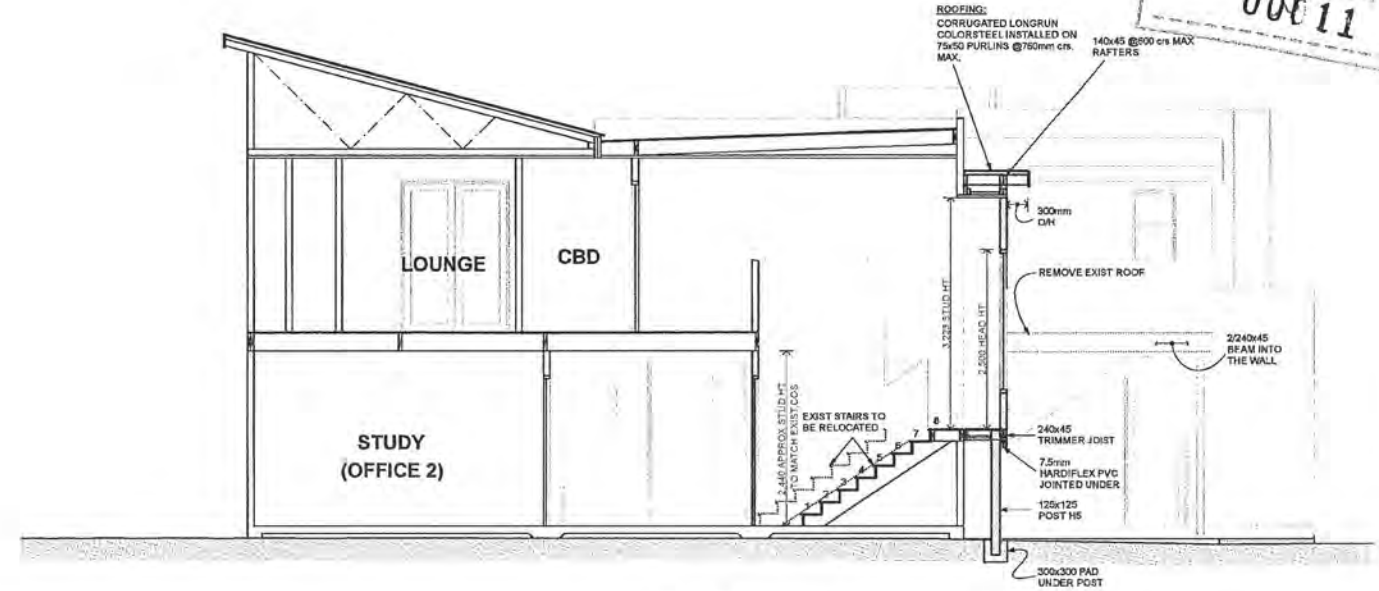
PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY  
WAIKANAI BEACH

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					6604K

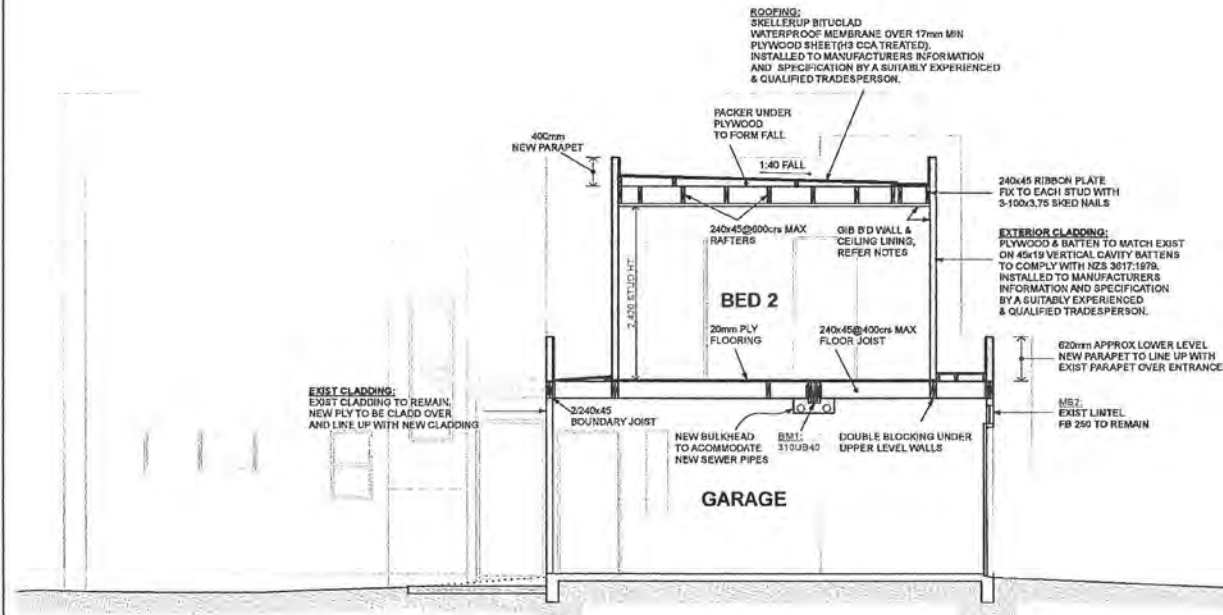
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12 SEP 2011  
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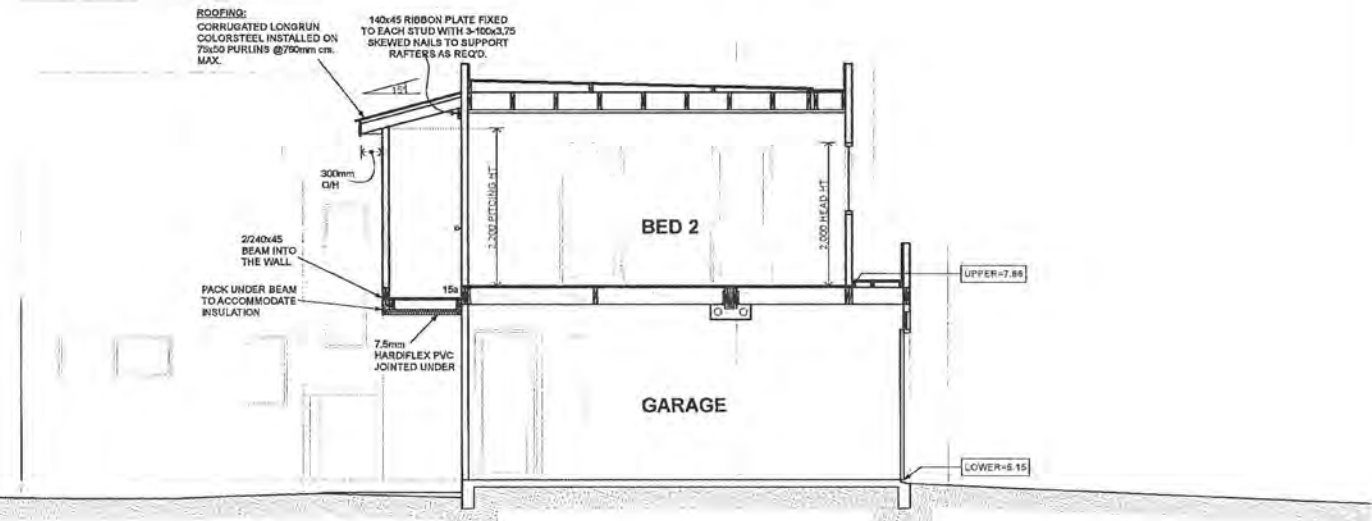
C-C



D-D



E-E



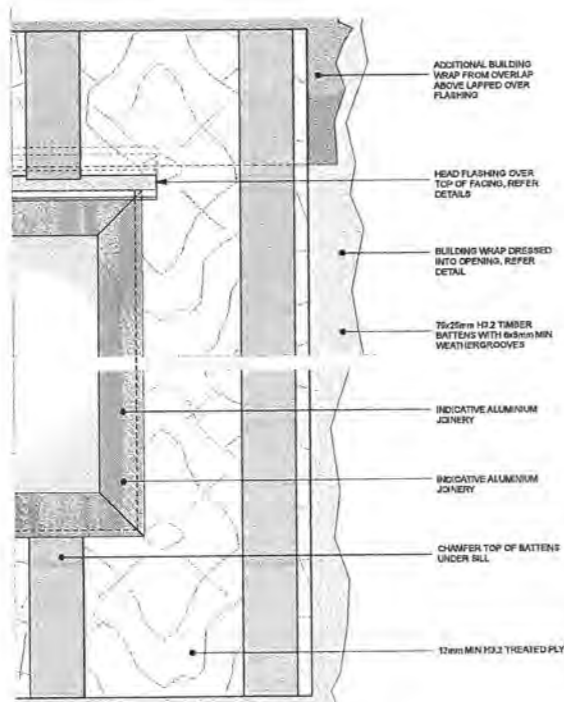
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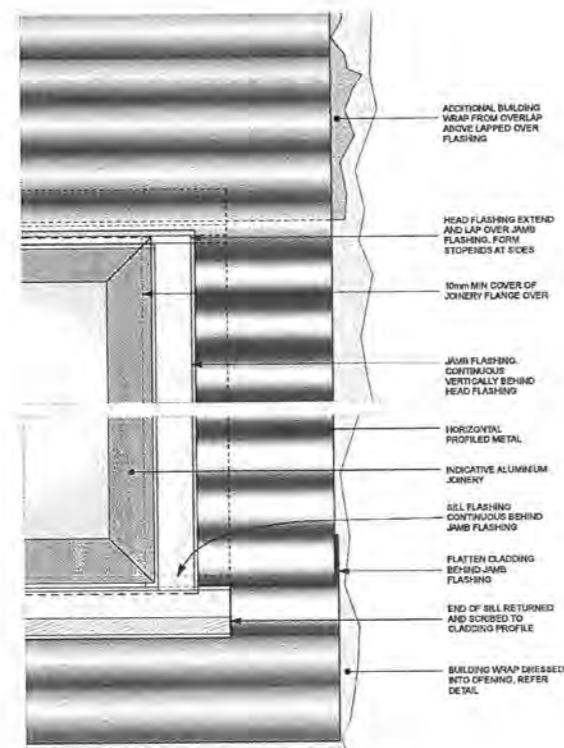
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REV. DATE	30-08-2011		
FINISH DATE	09-09-2011	SCALES FOR A1 SIZE PAPER 1:50	CODE P20N
COPYRIGHT RETAINED BY DESIGN NETWORK ARCHITECTURE LTD. DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED		REF	6604K



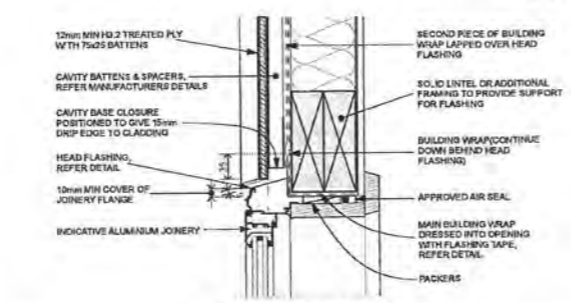
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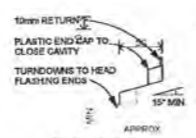
ELEVATION OF WINDOW FACINGS



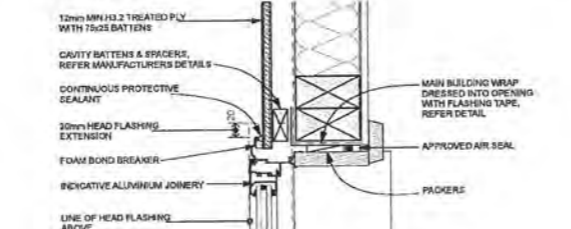
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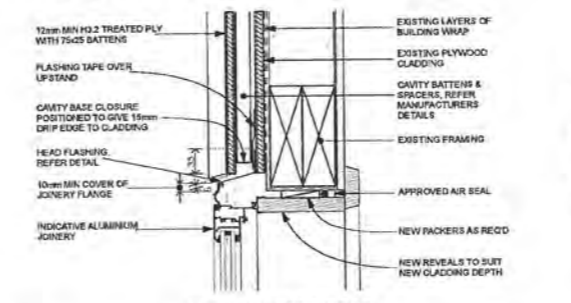
WINDOW/DOOR HEAD  
FROM NZBC COMPLIANCE DOCUMENT E24A1



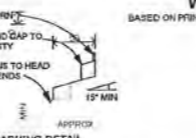
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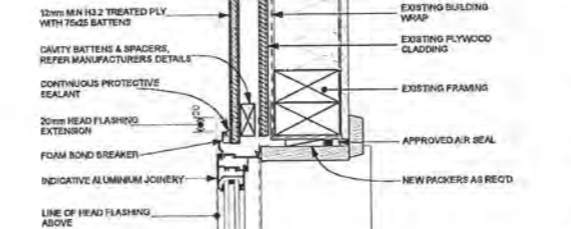
WINDOW/DOOR JAMB  
FROM NZBC COMPLIANCE DOCUMENT E24A1



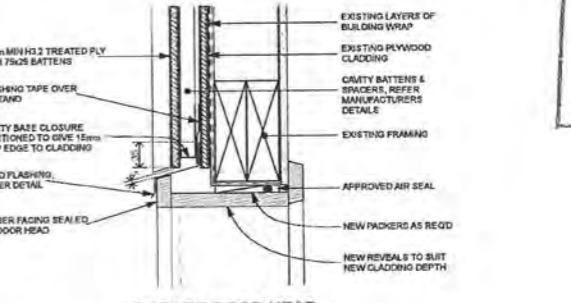
WINDOW/DOOR HEAD  
BASED ON PRINCIPLES FROM NZBC COMPLIANCE DOCUMENT E24A1



FLASHING DETAIL



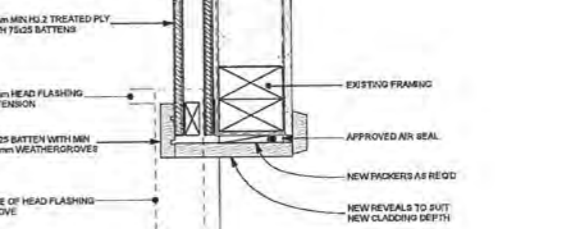
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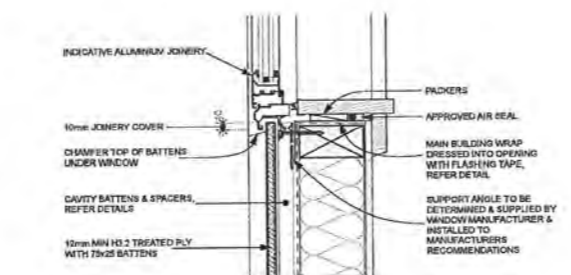
GARAGE DOOR HEAD



FLASHING DETAIL

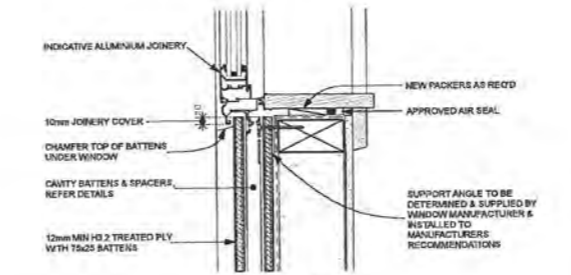


GARAGE DOOR JAMB



WINDOW SILL  
FROM NZBC COMPLIANCE DOCUMENT E24A1

NEW

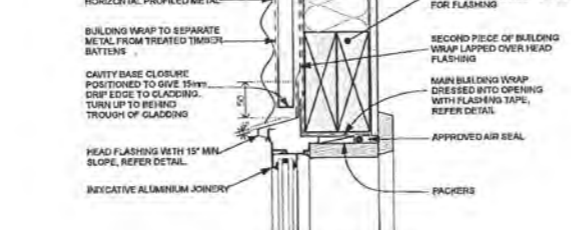


WINDOW SILL  
BASED ON PRINCIPLES FROM NZBC COMPLIANCE DOCUMENT E24A1

ALTERED



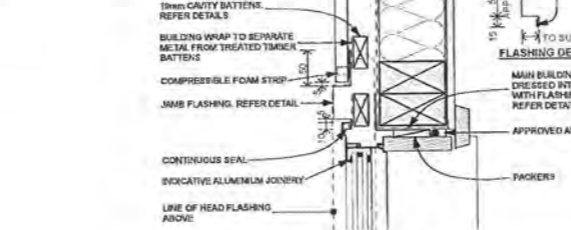
FLASHING DETAIL



WINDOW HEAD  
FROM NZBC COMPLIANCE DOCUMENT E24A1



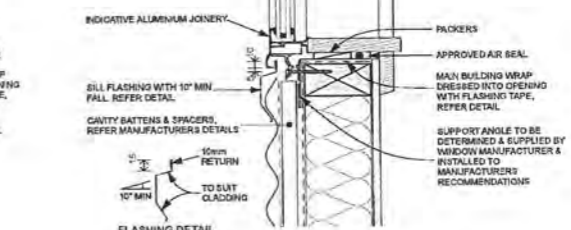
FLASHING DETAIL



WINDOW JAMB  
FROM NZBC COMPLIANCE DOCUMENT E24A1



FLASHING DETAIL



WINDOW SILL  
FROM NZBC COMPLIANCE DOCUMENT E24A1

WINDOW DETAILS

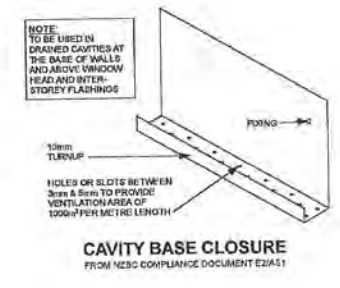
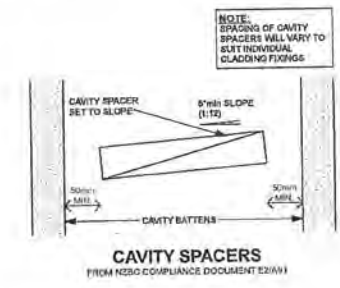
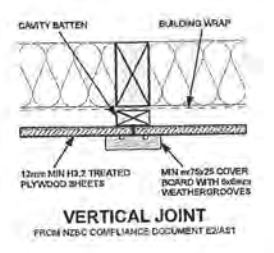
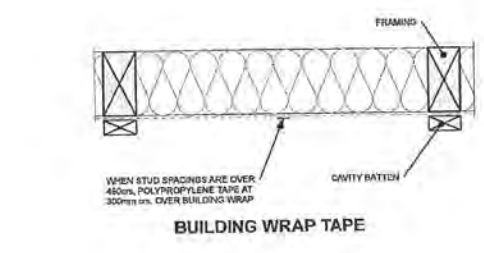
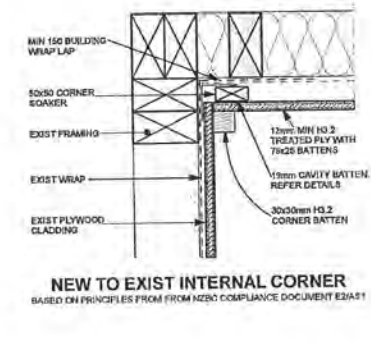
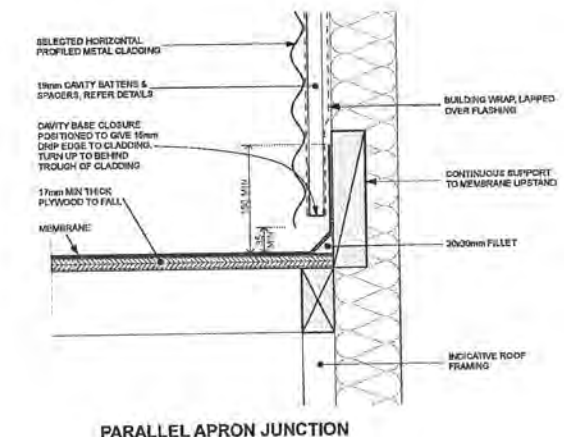
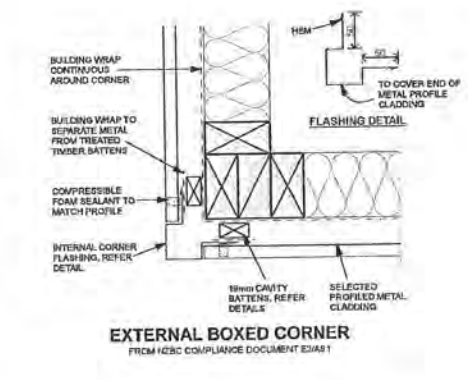
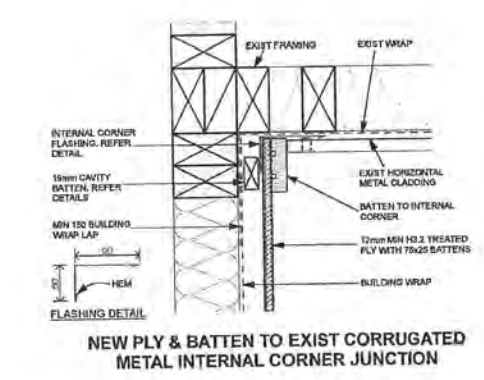
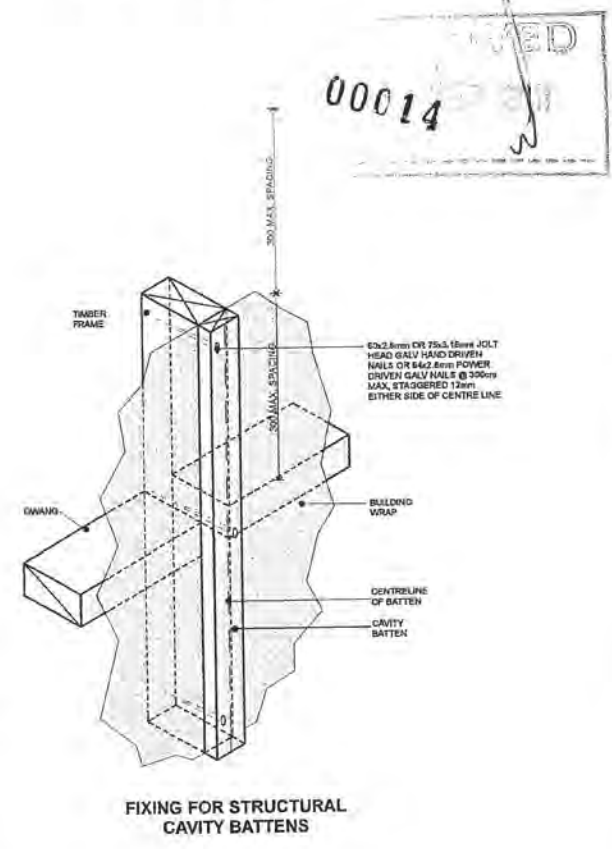
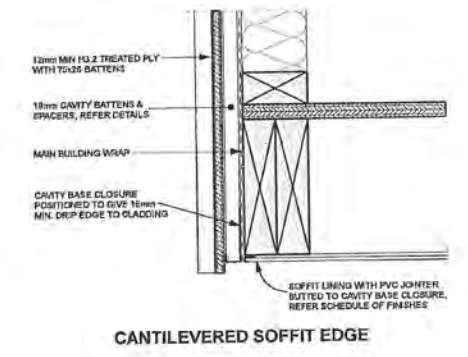
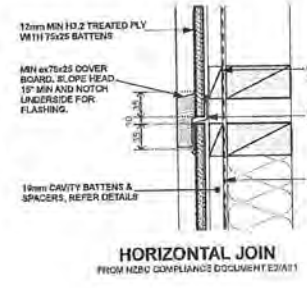
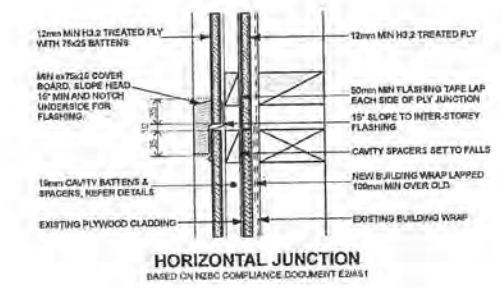
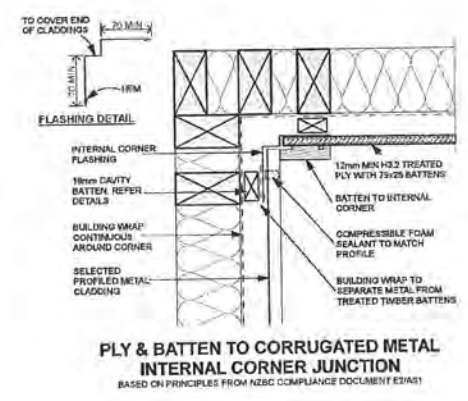
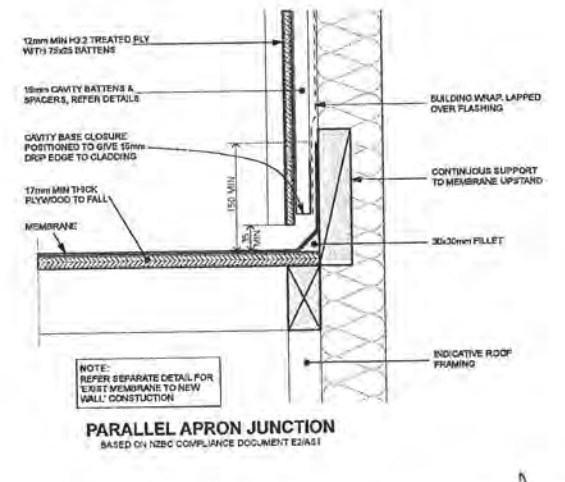
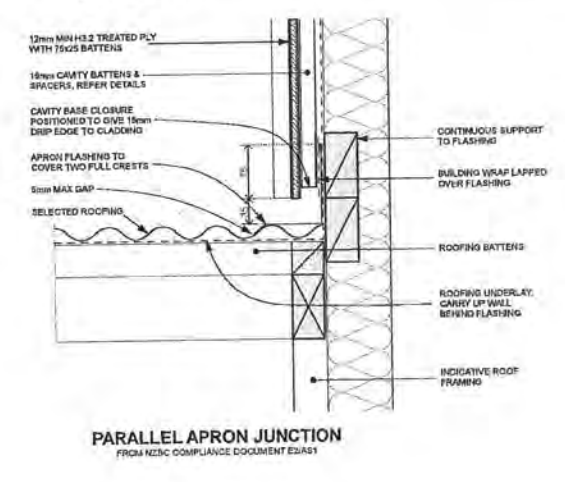
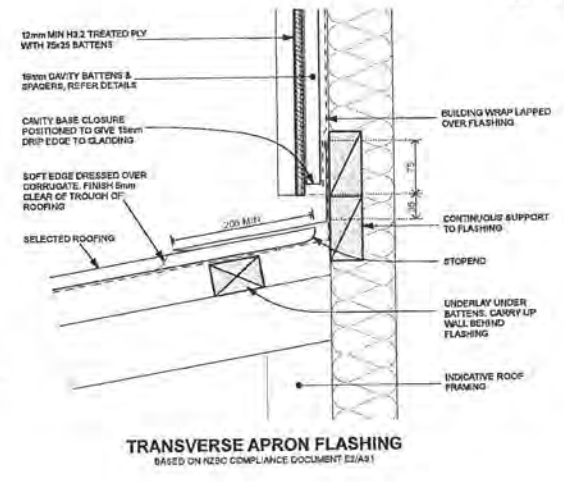
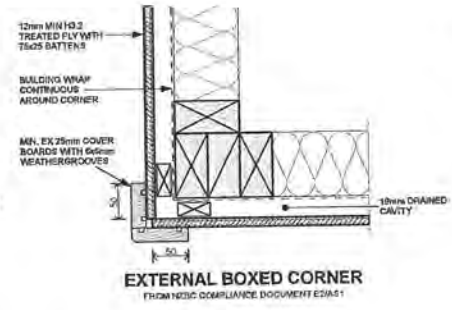
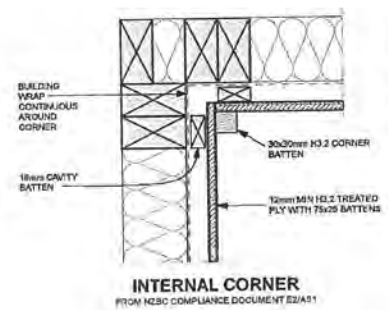
PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY  
WAIKANAI BEACH

REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	BUILDING CONSENT APPLICATION	SHEET No.
	18-07-2011				11
	30-08-2011				
	09-09-2011				
			SCALE FOR A1 SIZE PAPER: 1:5	CODE: P20N	REF: 6604K

Design Network  
ARCHITECTURE LTD

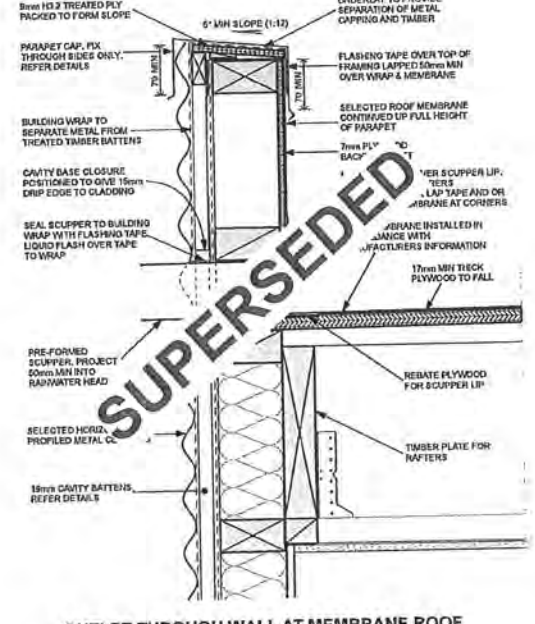
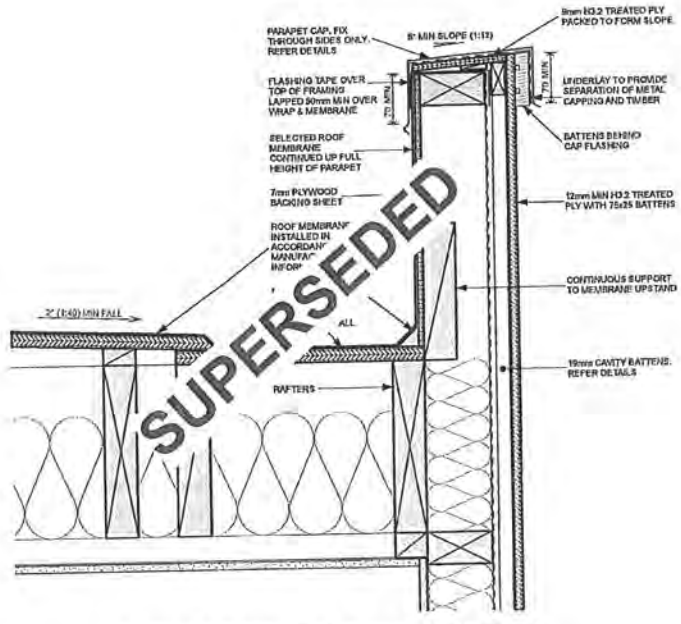
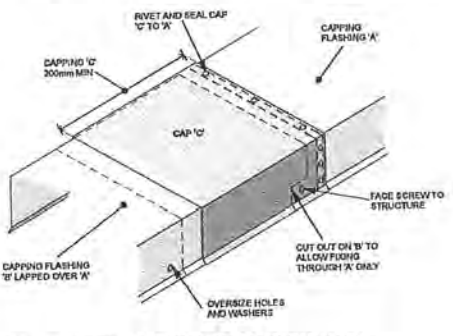
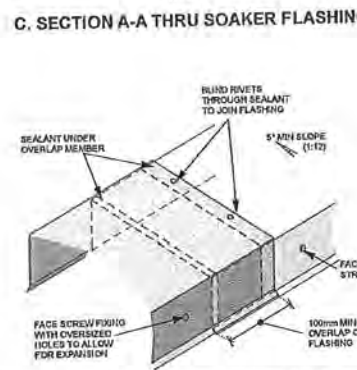
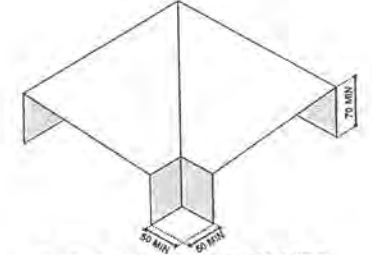
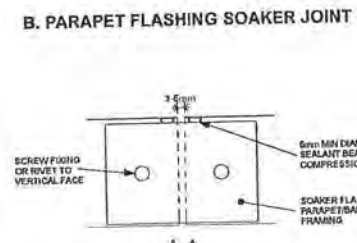
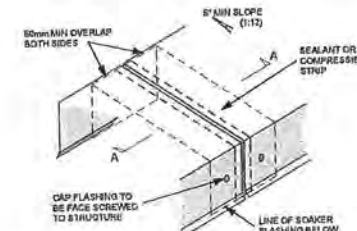
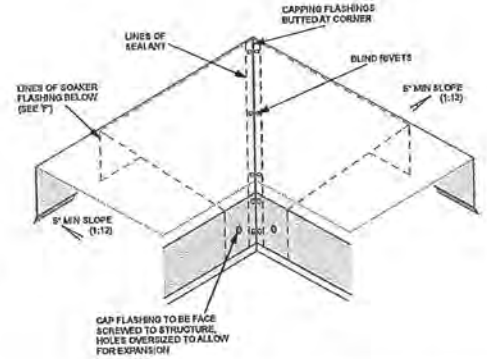
P.O BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT:(04) 5696-109, KAPITI:(04)9025-505

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**WALL DETAILS**

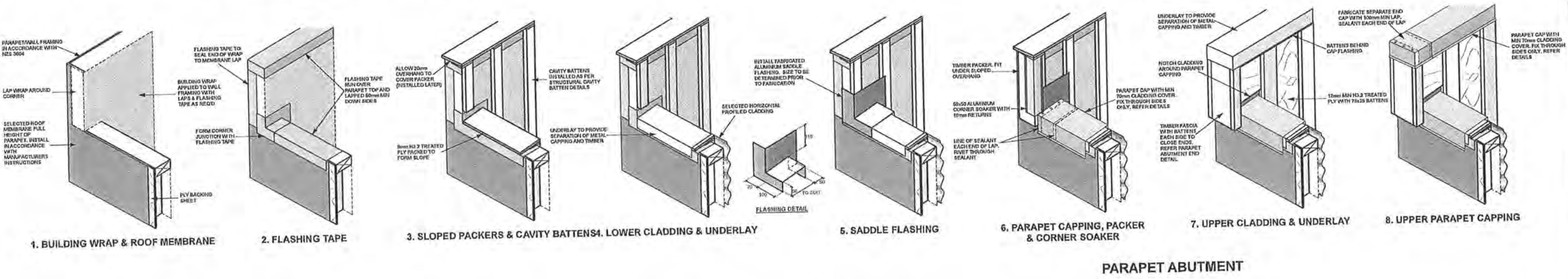
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			18-07-2011		12
			30-08-2011		
			09-09-2011	SCALE FOR A1 SIZE PAPER 1:5	CODE P20N
REF 6804K <small>COPYRIGHT RETAINED BY DESIGN NETWORK ARCHITECTURE LTD. DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED</small>					



SECTION THROUGH ROOF GUTTER AND PARAPET

OUTLET THROUGH WALL AT MEMBRANE ROOF (RAINWATER HEAD NOT SHOWN FOR CLARITY)

GENERAL CAPPING JOINTS FOR PARAPETS AND ENCLOSED BALUSTRADES (FROM NZBC COMPLIANCE DOCUMENT E2A51)



PARAPET DETAILS

PARAPET ABUTMENT

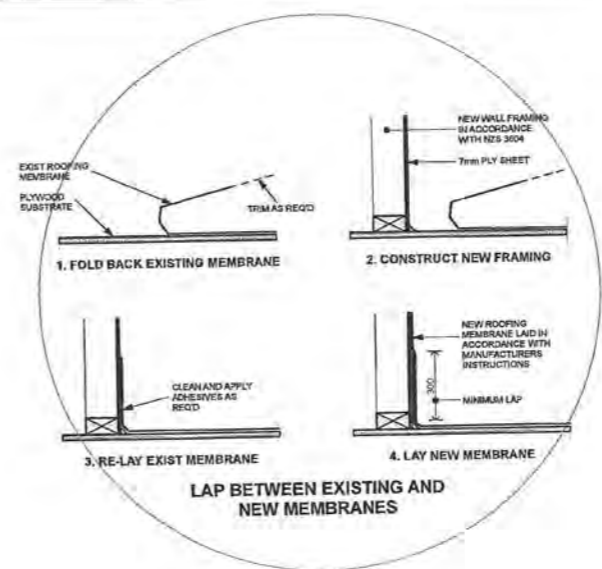
PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY  
WAIKANAI BEACH

REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	FINISH DATE	BUILDING CONSENT APPLICATION	SHEET No.
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						CODE P20N REF 6504K

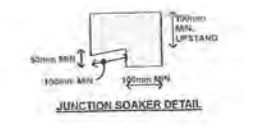
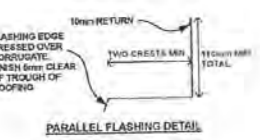
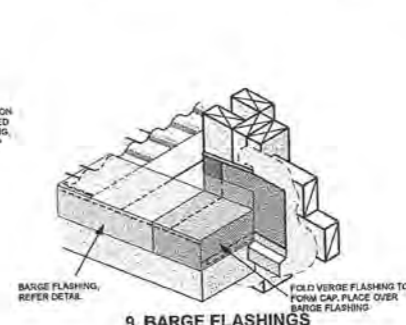
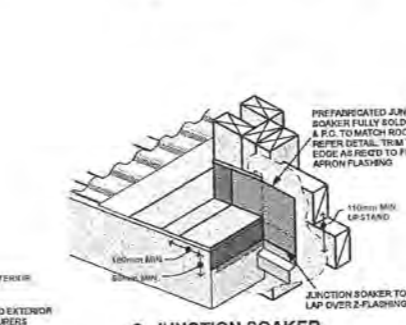
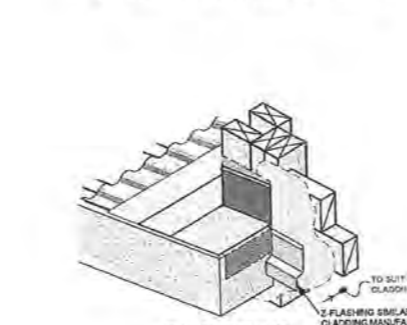
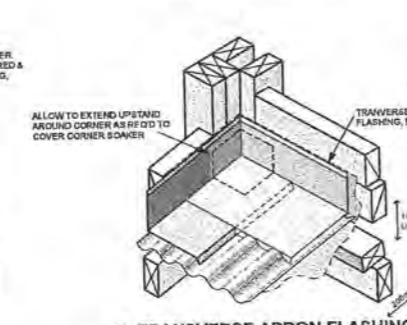
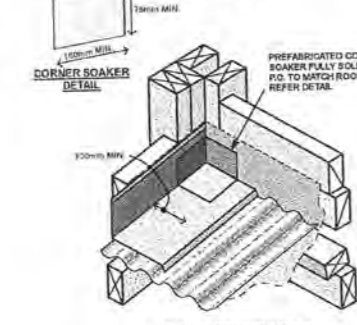
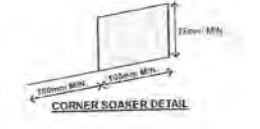
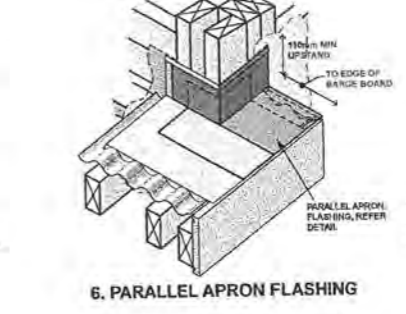
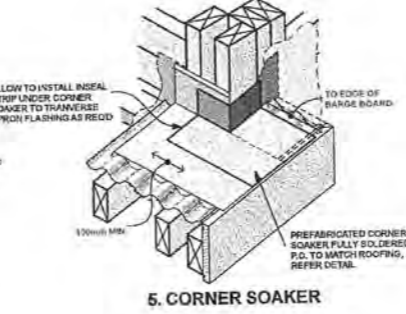
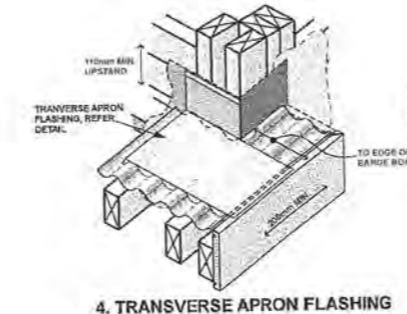
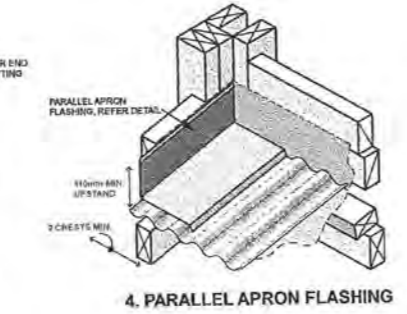
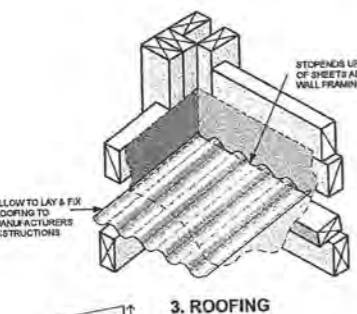
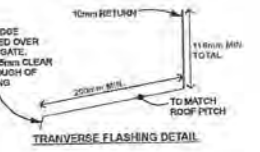
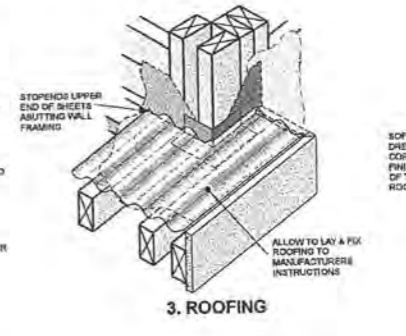
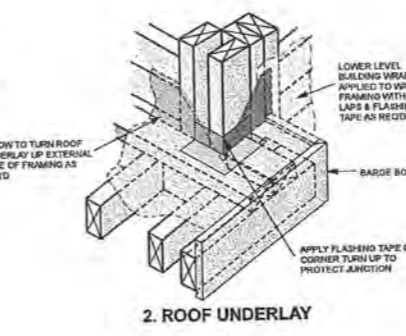
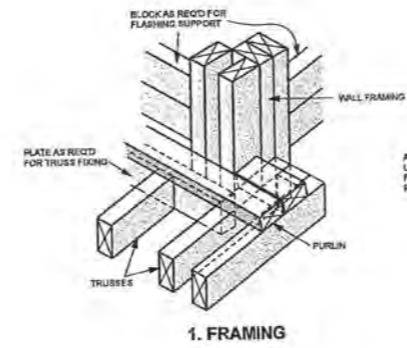
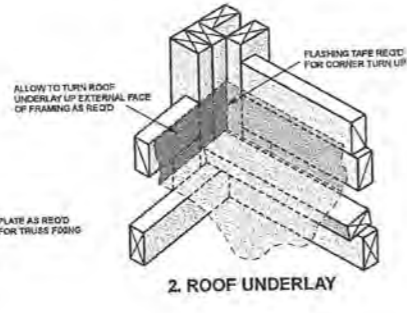
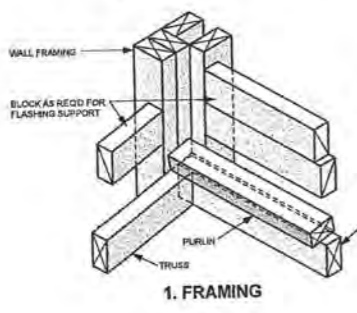
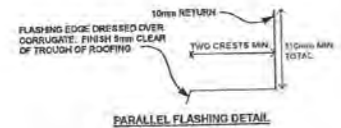
**Design Network**  
ARCHITECTURE LTD  
P.O. BOX 30614, LOWER HUTT 5040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT: (04) 5896-109, KAPITI (04) 9025-505

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RECEIVED  
00016 SEP 2011



LAP BETWEEN EXISTING AND NEW MEMBRANES



INTERNAL ABUTMENT  
**APRON FLASHING ABUTMENT DETAILS**  
(TO BE READ IN CONJUNCTION WITH EXTERIOR CLADDING DETAILS)

**VERGE TO WALL JUNCTION AT EXTERNAL CORNER**  
(TO BE READ IN CONJUNCTION WITH EXTERIOR CLADDING DETAILS - EXTERIOR CLADDING NOT SHOWN FOR CLARITY)

**JUNCTION DETAILS**

**Design Network**  
ARCHITECTURE LTD  
P.O BOX 30814, LOWER HUTT 6040, E-MAIL: office@designnetwork.co.nz  
PH: LOWER HUTT (04) 5696-109, KAPITI (04) 8025-505

PROPOSED ALTERATIONS & ADDITIONS  
155 FIELD WAY  
WAIKANAI BEACH

REV. No	REV. DATE	DRAWING AMENDMENT	START DATE	BUILDING CONSENT APPLICATION	SHEET No.
			18-07-2011		14
			30-08-2011		
			09-09-2011	SCALES FOR A1 SIZE PAPER 1:5	CODE P20N
				COPYRIGHT RETAINED BY DESIGN NETWORK ARCHITECTURE LTD. DESIGNER TO BE CONTACTED IMMEDIATELY IF AN ERROR OR DISCREPANCY IS DISCOVERED	REF 6604K



PLEASE READ REVERSE FOR GUIDANCE ON CARE AND MAINTENANCE OF YOUR VANTAGE JOINERY.

## PRODUCER STATEMENT/WARRANTY

### OUR WINDOWS COMPLY WITH THE BUILDING CODE

We hereby certify that all products supplied by our company meet or exceed the requirements of the New Zealand Building Code Means of Compliance, NZS 4211:2008 Performance of Windows and NZS 4223, Glazing in Buildings Parts 1, 2 and 3.

This means that our windows have been designed and tested to perform under the most diverse New Zealand weather conditions, and:

- have been successfully tested for strength under a range of wind pressures appropriate for the various wind zones in New Zealand.
- meet the requirements for deflection under simulated loads.
- meet stringent requirements for waterproofing and air leakage.
- have glass of the correct thickness and toughness to cope with expected wind loads and accidental human impact.

In accordance with our TERMS AND CONDITIONS OF SALE a guarantee for all VANTAGE products is provided under normal conditions of use against failure of materials and workmanship for 5 years from date of practical completion.

**DURABILITY.** VANTAGE ALUMINIUM JOINERY products can be expected to have a trouble-free serviceable life of not less than 15 years as required by section B2 of the New Zealand Building Code. This pertains specifically to the structural elements of the joinery.

In the course of normal use decorative elements and non-structural fittings such as window fasteners, door rollers, weatherpile and the like may need to be replaced as they wear out. This process does not contravene the B2 Durability requirements of the New Zealand Building Code or the warranty given by the manufacturer. The decorative coating on the joinery is covered by a separate warranty.

A window and door hardware warranty covers manufacturing defects, functionality and surface finish for 5 years, assuming that the care and maintenance guidelines are followed. Plated (soft) finishes are excluded from this warranty as deterioration is possible under some environmental conditions.

**Please Note:** This warranty is subject to correct installation as outlined in the Building Code Acceptable Solution Clause E2/AS1 External Moisture.

PURCHASER Carl Van der meer

ADDRESS CD Van der Meer Builders, PO Box 1673, Paraparaumu Beach

SITE ADDRESS Naef, 155 Fieldway, Wainkarae Beach.

MANUFACTURER Pritchard Joinery WARRANTY NO. 2328.

ADDRESS PO Box 67, 19 Watson Street, Bulls.

DATE INSTALLATION COMPLETED Feb 2012 SIGNATURE J Blee.

Supply

This Producer Statement covers product supplied as per our quotation and is based on window schedules, floor plans and elevations as supplied.

QUOTE NO. 2328 DATE \_\_\_\_\_ REVISION DATE \_\_\_\_\_

Supplied Only  Supplied & Installed  Unglazed  Glazed



To validate this Performance Warranty

Please complete this portion (your name as the actual owner may not yet be on our records) and return to:

Owner \_\_\_\_\_

Site address \_\_\_\_\_

Manufacturer \_\_\_\_\_

Date installation completed \_\_\_\_\_

Warranty No. \_\_\_\_\_



LICENSED APPLICATORS PRODUCER STATEMENT

For owner / builder or developer to present on final inspection to territorial authority to achieve final Certificate of Compliance

The products, system and installation procedures incorporated within the Flexi-Seal Waterproofing System have undergone stringent testing and audit, and the results have been confirmed by issue of BRANZ appraisals.

BRANZ Appraisal Certificate 474 (2010) Internal

BRANZ Appraisal Certificate 475 (2010) External

As the licensed applicator, we have installed the system to system specification, and that this meets Clause E3 Internal Moisture and/or Clause E2 External Moisture

The attached 15 year product guarantee applies.

Licensed Applicator Name C. FLVINES

License Number RLA100592/1

Date Job Completed 30-3-2012

Job Address 155 FIELDWAY WAIKAWAE W. NAEE

Signed by Licensed Applicator [Signature]

FLOOR/WET SHOWER

# COLORSTEEL® Maxx™



## RESIDENTIAL WARRANTY & MAINTENANCE REQUIREMENTS

PROPERTY OWNER: Carl Vandemeer Builders

SITE ENVIRONMENT: Very Severe

SITE ADDRESS: 155 Field Way  
Waikanae Beach  
Waikanae 5036  
New Zealand

BUILDING TYPE: Residential

ROLLFORMER: Brockelsby Roofing Products Ltd

SUPPLY DATE: February 2012

APPROVED ON: 11/06/2012

	Roofing	Wall Cladding	Gutters/downpipes	Fascia
Will not flake, peel or excessively fade:	-	15 Years	-	-
Will not perforate through corrosion:	-	15 Years	-	-

The product manufactured from COLORSTEEL® Maxx™ is subject to normal wear and tear, which may include uniform fading, chalking and dirt collection. Minor white corrosion, which may appear at unwashed tension bends or cut edges, is a natural weathering phenomenon of COLORSTEEL® Maxx™ and does not constitute a failure of the coating system. Testing to determine coating performance will be in accordance with the methods described in Australian Standard AS1580.

This warranty is subject to the following terms and conditions:

(Note: all New Zealand Steel literature referred to in this warranty is that current at the time of installation and is available from the rollformer or [www.nzsteel.co.nz](http://www.nzsteel.co.nz))

1. The maintenance program specified on the reverse **BEING STRICTLY ADHERED TO.**
2. The warranty periods stated above start from the date the material is supplied to site.
3. The installed pitch of the roof is equal to or greater than 3°, or the minimum recommended for the profile, whichever is greater.
4. The product is only used in the environments and applications as recommended in the *Environmental Categories* brochure and the *colour chart* (or on-line *Guidelines for Use*).
5. The product is designed, formed, stored, handled and installed in accordance with recommendations given in *Specifiers and Builders Guide*, *Colour Chart* (on-line *Guidelines for Use*), *Information Bulletins* and *NZ Metal Roof and Wall Cladding Code of Practice*.
6. This warranty covers the COLORSTEEL® Maxx™ material only and no accessories supplied which include, without limitation, fasteners, soft edge and building wrap.
7. All warranties, conditions, liabilities and obligations other than those specified in this warranty are excluded to the fullest extent allowed in law. In particular, where the product is supplied for the purpose of business, the guarantees contained in the Consumer Guarantees Act 1993 do not apply.
8. Failure of the material or the coating partially or wholly due to one or more of the following causes are not covered by this warranty:
  - o Use of the product within 50m of breaking surf on the East Coast or 100m of breaking surf on the West Coast.
  - o Physical damage during or after installation, including scratching, contact with other metal items, incorrect installation of external loads such as air-conditioning units, and failure to remove swarf.
  - o Contact with soil, ash, fertilizer, moisture retaining substances, or sunscreen.
  - o Contact with or runoff from lead or copper and other dissimilar metals, chemical agents, green or wet timber or treated timber.
  - o Water entrapment or ponding for any reason.
  - o Mechanical, chemical, corrosion or other damage sustained during transport, handling, storage, installation or subsequent to installation.
  - o Attack from chemical or other agents, fumes, liquids or solids other than direct rain or run-off falling onto the product under warranty.
  - o Application of post paint treatments or systems.
  - o Failure to install, use and maintain the product in accordance with NZ Steel's guidelines and applicable industry standards.
  - o Underside corrosion as a result of high humidity, condensation or pollution generated within a building
  - o Failure to replace corroded fasteners.
  - o Corrosion arising within lapped areas of end-lapped sheets.
  - o The product having been inappropriately stored prior to installation
  - o Causes beyond the control of New Zealand Steel or the roofing manufacturer, including earthquakes, fires, cyclones, tornadoes, storms, hurricanes, lightning, hail and other similar extreme "acts of god"
  - o Actions by other persons

If COLORSTEEL® Maxx™ pre-painted steel has failed to perform as warranted, the roofing manufacturer will at its sole option repair or replace (including labour) the affected material or provide a refund equal to the cash value of the cost of the replacement. A new warranty will be issued to cover the balance of the original offer for both the paint coating and perforation protection where repair or replacement is made, this period is not extended in case of replacement. Neither the roofing manufacturer named below nor New Zealand Steel will be liable for any consequential loss or damage except as may be required under any mandatory statutory provisions. Nothing in this warranty is intended to exclude or limit any rights consumers may have under the Consumer Guarantees Act 1993.

New Zealand Steel and/or the roofing manufacturer reserve the right to inspect a building prior to issuing of the warranty and/or to inspect and conduct tests as necessary at any time after a claim is made under this warranty and accordingly have access to the property.

COLORSTEEL® is a registered trademark of New Zealand Steel Limited  
Maxx™ is a trademark of New Zealand Steel Limited

# Applicator Workmanship Warranty

WARRANTY No. \_\_\_\_\_ DATE OF INSTALLATION Feb 2012

BUILDING OWNER & ADDRESS Cael Vandameer Builders 140

155 Fieldway Wilkenoe Beach, Calif Roofing Solutions

APPLICATOR (Name, Address, Phone No.) 190 Milne Dr Paeapaeanu

AREA LAID m<sup>2</sup> 75 sqm PRODUCT, TYPE AND USE 1.5 m. PVC

Roof Crete

Subject to the conditions appearing below, the Applicator warrants its workmanship as follows:

- a) All membrane products (the "Materials") are laid and installed in compliance with the manufacturer's instructions; and
- b) For a period of 1 years, the Workmanship on the Materials by the Applicator shall maintain a waterproof barrier to the area treated.

This Warranty shall be subject to the conditions which follow:

1. This Warranty shall extend only to the workmanship undertaken by the applicator and shall in no way bind the manufacturer of the Materials laid and installed by the Applicator.

2. The Applicator's obligations under this Warranty shall be limited to the Applicator making good at their expense any defect in the workmanship which permits the entry/escape of water. The Applicator shall have no further liability or responsibility for any direct, indirect or consequential injury, loss or damage whatsoever and howsoever arising.

3. This Warranty shall not apply to any alleged defective workmanship that is:

- a) Due directly or indirectly to any cause such as (without limiting the generality of this exclusion) governmental or environmental interference or any other cause beyond the reasonable control of the Applicator; or
- b) Caused by the act, omission, default or representation of any party other than the Applicator, its servants or agents and in particular the work of any other tradesmen and damage from persons not authorized by the Applicator to have access to or be employed in the repair, maintenance or alteration of the application during the warranty period; or
- c) Caused by the Materials or any of them being disturbed by any party other than the Applicator after fixing.

4. This Warranty shall be invalid unless the Applicator receives the Customer's written claim within the warranty period and within fourteen (14) days after the date of discovery of any alleged defect.

5. Where it is necessary for the Applicator to repair any defective workmanship, the Customer shall remove and/or replace plant, equipment or any other objects that hinder the access by the Applicator to the Materials. The cost of any site visit requested under a warranty claim which does not reveal any problem relating to the warranted scope of work shall be paid for by the party requesting the inspection at the then current trade consultancy rates.

6. The Customer shall have made payment in full to the Applicator for the nominated works within the terms of the Applicator's contract with the Customer prior to the Customer making claim under this Warranty.

7. In the event that any Materials subject to this Warranty are ordinarily acquired for personal, domestic or household use or consumption, then this Warranty shall be read subject to the guarantees contained in the Consumer Guarantees Act 1993.

8. The Customer acknowledges that the Applicator is not employed by nor is an agent of the manufacturer of the Materials and that the manufacturer will not be liable to any person for the Workmanship, acts or defaults of the Applicator.

Applicator Name (Print) Ben Kenolan Telephone No.: \_\_\_\_\_

Address: 190 Milne Dr

Signature of Applicator: \_\_\_\_\_

Date: 10/6/12

## PRODUCT USAGES

Wall Cladding with a Corrugate profile

- Will not flake, peel or excessively fade for at least 15 years
- Will not perforate through corrosion for at least 15 years

Lift References: P391717: Mirage, 0.4mm

## SIGNATURES

Installed by Coastal Roofing Solutions Ltd; [Signature] Signature of Installer

And carries the installers workmanship warranty for: Five Years

A copy of the current COLORSTEEL® Maxx™ colour chart has been provided: \_\_\_\_\_

Signature of property owner or agent: \_\_\_\_\_ Date: \_\_\_\_\_

**PLEASE RETURN A SIGNED COPY OF THE WARRANTY TO THE MANUFACTURER**  
 This Warranty is issued by (the manufacturer): Brockelsby Roofing Products Ltd

Signed: [Signature] Position: PA Date: 18/6/12

## MAINTENANCE PROGRAMME

All roofing and cladding products are subject to the cumulative effects of weather, dust and other deposits. Normal rain-washing will remove accumulated atmospheric contaminants from roofs. Gutters must be regularly inspected to remove debris, which may cause ponding.

	Rain washing	Rain washing	Rain washing
	Manual washing every year	Manual washing every 6 months	Manual washing every 6 months
	Manual washing every 6 months	Manual washing every 3 months	Manual washing every 3 months

Environment zones are described in detail in the *Environmental Categories* bulletin. If your building is within 1000 metres of the sea or in an area with a corrosive environment you should check these Categories.

Regular washing of COLORSTEEL® Maxx™ products increases the durability by reducing attack from airborne salts and pollutants. COLORSTEEL® Maxx™ surfaces should be manually washed with water and a sponge or a soft nylon-bristled brush. For large areas it may be appropriate to use water blasting at pressures up to 20 MPa.

Note: **High Risk** areas include around flues and extractor vents, under television aerials and trees and sites prone to mould, lichen, bird droppings or debris.



ENGINEERING COUNCIL OF NEW ZEALAND



J24340

Building Code Clause(s).....



### PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance notes on the use of this form are printed on the reverse side)

**ISSUED BY:** ISP Consulting Engineers Ltd  
**TO:** **Werner Naef**  
(Owner/Developer)  
**TO BE SUPPLIED TO:** **Kapiti Coast District Council**  
(Building Consent Authority)  
**IN RESPECT OF:** **Alterations & Additions**  
(Description of Building Work)  
**AT:** **155 Field Way, Waikanae Beach**  
**Lot: 8 DP: 91324**

(Address)

ISP Consulting Engineers Ltd has been engaged by **Werner Naef**

to provide  CM1  CM2  CM3  CM4  CM5 observation services  
(Engineering Categories)

in respect of clause(s) B1, VM1 of the Building Code for the building work described in documents relating to Building Consent No # **110554**. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / Site Inspection Report **Numbered 1** (copy attached) has been issued during the course of the works.

On the basis of  this  these review(s) and information supplied by the contractor during the course of the works,

I believe on reasonable grounds that  All  **Part only as specified of building work outside the scope of NZS3604:1999-**

- *Structural Steel Beams & Connections*

Of the building works have been completed in accordance with the relevant requirements of the Building Consents and Building Consent Amendments identified above, with respect to Clause(s) B1, VM1 of the Building Regulations.

I, John O'Hagan am CPEng Registered No. 179947

I am a Member of IPENZ and hold the following qualifications: NZCE(Civil), BE (Hons), MIPENZ, CPEng

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000\*.

The Construction Review Firm is a member of ACENZ

**SIGNED BY** John O'Hagan **ON BEHALF OF** ISP Consulting Engineers Ltd.

**Date:** 20<sup>th</sup> January 2012

**Signature:**.....

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Construction Review Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$500,000\*.

This form to accompany **Forms 6 or 8 of the Building (Form) Regulations 2004** for the issue of a Code Compliance Certificate.