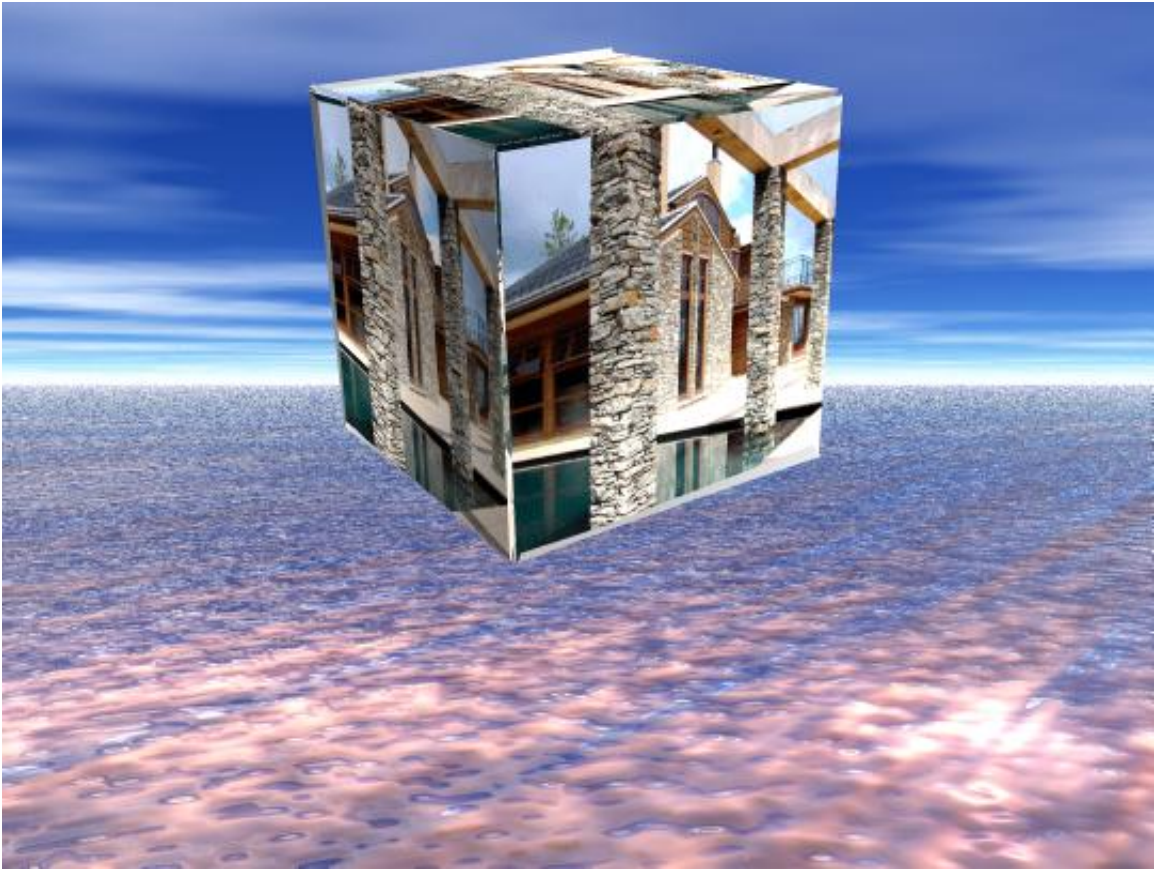


# Hydestone™ System Installation Manual



Version 2.07  
27 May 2008



## Introduction

The design and installation of Schist Veneer walls in New Zealand, while not new, does require some serious thought with regards to the structural and weathertightness performance of the system. With the introduction of 20 mm cavities for light weight cladding systems covered by NZBC Acceptable Solution E2/AS1, there may be the temptation to assume that the installation of schist veneer over cavities constructed in accordance with E2/AS1 will solve all of the issues that need to be addressed. This was not the belief of Hydestone Ltd and led this company to seek verification and Appraisal of the Hydestone™ Schist Wall Cladding System by BRANZ. The evaluation of the Hydestone™ Schist Wall Cladding System against the BRANZ developed criteria resulted in the issue of BRANZ Appraisal No. 508 (2006) for the system. The following is a summary of the basis of the system design and critical areas of evaluation for these types of systems.

### Performance Criteria

The performance criteria from which BRANZ developed the evaluation requirements for the Hydestone™ Schist veneer system when attached to a timber frame wall were based on the masonry construction Standards NZS 3604, NZS 4210 and AS/NZS 2699. These New Zealand Standards clearly outline the requirements of such a system. Schist and Stone veneer system incorporating 20 mm cavities designed around the requirements of E2/AS1 do not follow any of the New Zealand Standards and must therefore be the subject of specific structural and weathertightness design.

The above mentioned Standards are specific about requiring a cavity of between 40 mm and 70 mm in depth. This cavity performs two main and important functions. Firstly it provides structural separation between the rigid masonry or stone veneer and the flexible timber frame wall, and secondly it provides a 40 mm ventilated drainage path to the building exterior for water that penetrates the masonry or stone to protect the structural timber wall frame. This is explained further below.

### Structural Separation

A masonry or stone veneer is very rigid and timber frame buildings are relatively flexible. Under earthquake loading the timber frame building will try to deflect, in other words move independently to the veneer. Brick wall ties complying with AS/NZS 2699.1 are specifically tested to ensure they are able to withstand this relative movement. To allow this movement to occur on actual site installations there must be a minimum 40 mm deep cavity between the back of the veneer and the wall frame. The leg of the wall tie must not only be embedded in the veneer at least the minimum amount required by the Standard (often a challenge for stone veneers where the correct cavity depth is used), but it must also be clear of the back of the veneer by a minimum of 40 mm before it is connected to the timber frame wall, i.e. it must be in a cavity.

The Hydestone™ Schist Wall Cladding System meets the performance requirements expected by NZS 3604, NZS 4210 and AS/NZS 2699.1.

Another point to note is that the cavity battens and fibre cement backer board must also be able to move independently of the wall frame, i.e. a proprietary installation method is required for the cavity battens and fibre cement sheet. The Hydestone™ Schist Wall Cladding System also meets this requirement.

Any system that fixes the wall tie directly to either the timber wall framing or a cavity batten without the 40 mm cavity, or fixes the fibre cement backer board to cavity battens that are securely fixed to the wall frame, is inviting **significant structural failure** in an earthquake.

## **Weathertightness**

The weathertightness of masonry veneer is provided by a minimum 40 mm cavity which is vented and drained at the bottom of the cavity and vented at the top. The minimum ventilation requirements for the top and bottom of the wall are openings equivalent to 1000 mm<sup>2</sup> per lineal metre of wall. This is as specified in NZS 3604 and NZS 4210 and is designed to take account of a wet (or at least a damp) cavity. This is very different to the requirement within NZBC Acceptable Solution E2/AS1 for 20mm cavities for fibre cement sheet, EIFS, weatherboard etc. These cavities are designed to remain dry throughout their serviceable life and are designed to handle incidental water only in the event of a weathertightness failure. They are not designed to be constantly wet and are therefore only required to be drained and vented at the bottom of the cavity.

A point of interest is that in order to verify that Alternative Solution cladding systems incorporating 20 mm drained cavities meet the performance requirements of NZBC Clause E2, the system must be tested to the external moisture verification method E2/VM1. Masonry and stone veneer systems that meet the performance requirements of NZS 3604 and NZS 4210, i.e. incorporate a minimum 40 mm drained and vented cavity, are not required to be subjected to this weathertightness verification testing.

The Hydestone™ Schist Wall Cladding System provides the 40 mm deep drained and vented cavity as required by NZS 3604 and NZS 4210.

## **Summary**

To summarise, the Hydestone™ Schist Wall Cladding System meets the following performance criteria for masonry and stone veneer wall claddings:

- There must be a minimum 40 mm deep cavity for the masonry wall ties to perform their function.
- There must be a minimum of 40 mm of flexible wall tie leg behind the veneer (i.e. the wall tie cannot be fixed to a cavity batten).
- There must be a minimum 40mm drained and ventilated (NZS 3604) cavity which will manage weathertightness.
- Specific design must be carried out for the timber frame supporting walls where the veneer exceeds 220 kg/m<sup>2</sup>.



**BRANZ Appraised**  
Appraisal No.508 [2006]

BRANZ Appraisals

Technical Assessments of products  
for building and construction

**BRANZ  
APPRAISAL  
No. 508 (2006)**

Amended 27 May 2008

## **THE HYDESTONE™ SCHIST WALL CLADDING SYSTEM**

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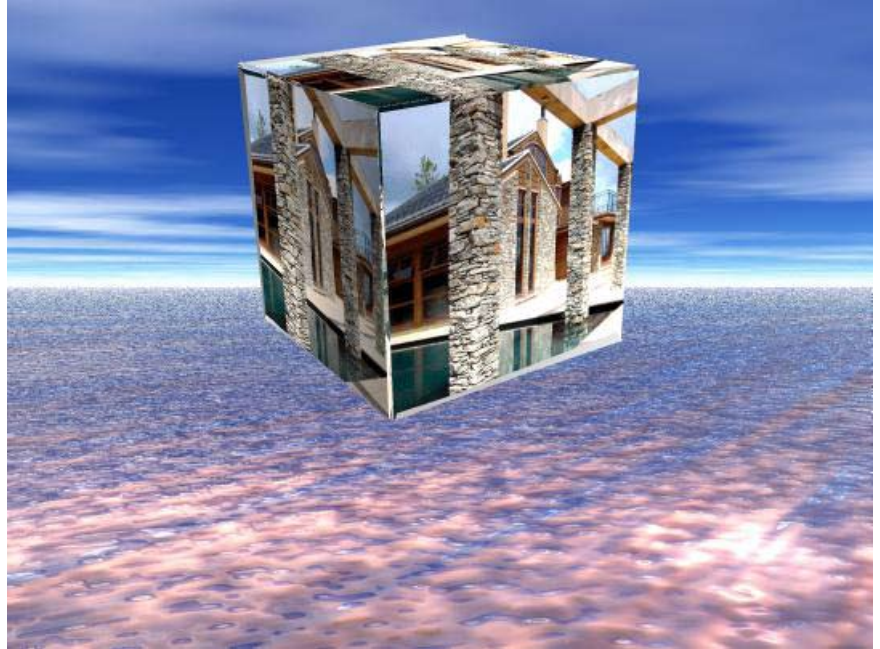
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## Product

1.1 The Hydestone™ Schist Wall Cladding System consists of Hyde Brown or Hyde Grey schist stone, installed over a 40 mm, vented, wet cavity system. It can be installed on residential and light commercial buildings where domestic construction techniques are used.



## Scope

2.1 The Hydestone™ Schist Wall Cladding System has been appraised for use as a veneer wall cladding system for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1 in terms of floor area; and,
- with a risk score of 0-20, calculated in accordance with NZBC Acceptable Solution E2/AS1, Table 2; and,
- the scope limitations of NZS 3604 Section 11.7; and,
- on slab on ground and foundation walls constructed in accordance with NZS 3604, and as modified in the Technical Literature; and,
- constructed with timber framing complying with the NZBC; and,
- situated in NZS 3604 Building Wind Zones up to, and including, 'Very High'.

2.2 The Hydestone™ Schist Wall Cladding System must only be installed on vertical surfaces.

2.3 The Hydestone™ Schist Wall Cladding System is appraised for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. (*The Appraisal of The Hydestone™ Schist Wall Cladding system relies on the joinery meeting the requirements of NZS 4211 for the relevant Building Wind Zone.*)

2.4 The Hydestone™ Schist Wall Cladding System must only be installed by approved Stone Masons documented in the Technical Literature.

## Building Regulations

### New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, The Hydestone™ Schist Wall Cladding System, 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 B1 Structure:** Performance B1.3.1, B1.3.2 and B1.3.4. The Hydestone™ Schist Wall Cladding System meets the requirements for loads arising from self-weight, earthquake, wind, impact and creep and shrinkage [i.e. B1.3.3 (a), (f), (h), (j) and (q)]. See Paragraphs 8.1 – 8.4.

**Clause B2 Durability:** Performance B2.3.1 (a), not less than 50 years. The structural support elements and hidden flashings meet this requirement. Performance B2.3.1(b), 15 years. The veneer wall cladding meets this requirement. See Paragraphs 9.1 and 9.2.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.2. The Hydestone™ Schist Wall Cladding System meets this requirement. See Paragraphs 13.1 – 13.5.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. The Hydestone™ Schist Wall Cladding System meets 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.

## Technical Specification

4.1 System components and accessories supplied by Hydestone Limited are:

- Schist Stone - Quarried stone is supplied pre-dressed to a maximum depth of 150 mm front to back and is available in two grades being Hyde Brown and Hyde Grey. The stone is supplied stacked on a wooden pallet weighing approximately 1 tonne. The stone varies in thickness and length and can be laid in various styles with the mortar being visibly raked or recessed. One tonne of dressed stone will cover approximately 5 m<sup>2</sup>.
- Cavity Battens - Nominal 45 x 40 mm minimum (45 mm x 70 mm maximum) timber treated to Hazard Class H4. The battens are grooved with 20 mm wide by 15 mm deep grooves at maximum 150 mm centres along the length of the batten to provide free air movement within the cavity.

4.2 Accessories used with the Hydestone™ Schist Wall Cladding System which are supplied by the Stone Mason are:

- Mortar - composed of Portland cement, sand, hydrated lime and water complying to NZS 4210, Section 2.2.
- Masonry Ties and Fixings - **Eagle Wire 135 mm “King Ties”** manufactured in accordance with AS/NZS 2699: Part 1. Fixings are 14g x 35 mm long Tek screws. Ties and fixings are either hot-dipped galvanised or grade 316 stainless steel to meet the durability requirements of NZS 4210 Table 2.E1. Ties and fixings must be selected to comply with the classification of exposure zones in NZS 3604.
- Steel lintels and fixings – complying with AS/NZS 2699.3 and the Hydestone™ Schist Installation Guide.
- Fibre cement sheet and fixings - 4.5 mm thick fibre cement sheet manufactured in accordance with AS/NZS 2908.2 with fixings of 40 x 2.8 mm hot-dipped galvanised flat head fibre cement nails
- Damp Proof Course - 50 mm wide bituminous damp proof course complying with NZBC Acceptable Solution E2/AS1 Paragraph 4.3.10 or damp proof courses covered by a valid BRANZ Appraisal.
- Cavity batten fixings – 100 x 4.0 mm hot-dipped galvanised flat head nails for attaching the batten to the bottom plate and 100 x 4.0 mm bright steel nail **for temporary nailing the batten to the top the plate.**
- First course waterproof membrane – Specified width by foundation design bituminous damp proof course complying with NZBC Acceptable Solution E2/AS1 Paragraph 4.3.10 or damp proof courses covered by a valid BRANZ Appraisal.

4.3 Accessories used with The Hydestone™ Schist Wall Cladding system which are supplied by the building contractor are :

- Building wrap – papers or synthetic wrap complying with NZBC Acceptable Solution E2/AS1, Table 23 or breather-type membranes covered by a valid BRANZ Appraisal for use as wall wraps.
- Where the studs are installed at greater than 450 mm centres, the building wrap must be supported between the studs to prevent the wrap bulging into the cavity space when bulk insulation is installed in the wall frame cavity. Acceptable means of support include polypropylene strap or galvanised wire.
- Flexible sill and jamb tapes – flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11, or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- Window and door trim cavity air seals - air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6 or self expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal for use around window and door penetration openings.

## Handling and Storage

5.1 Hydestone™ Schist is packaged and delivered on pallets. The stone must be handled with care to avoid physical damage, and must be stored so that they are protected from dust and contamination.

5.2 Components such as masonry ties and lintels must be handled so as to avoid damage. They must also be stored in dry locations protected from the weather.

5.3 Handling and storage of all materials supplied by the building contractor, whether on or off site, are under the control of the building contractor. Materials must be handled and stored in accordance with the relevant manufacturer’s instructions.

## Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for The Hydestone™ Schist Wall Cladding System. 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.

## Design Information

### Framing

#### Timber Treatment

7.1 Timber wall framing behind The Hydestone™ Schist Wall Cladding System must be treated as required by NZS 3602.

#### Timber Framing

7.2 Due to the mass of the Hydestone™ Schist veneer system loading, the timber wall studs will be required to resist greater inertia face loads in an earthquake. These loads are greater than allowed for by NZS 3604. To allow for this additional loading, the timber studs must be selected from NZS 3604 Stud Tables using the greater of actual Building Wind Zones or Building Wind Zone ‘High’ in seismic Zone A and Building Wind Zone ‘Medium’ in seismic Zone B. Stud selection need not consider the additional veneer weight in seismic Zone C.

## General

7.3 The Hydestone™ Schist Wall Cladding System consists of Hyde Brown or Hyde Grey schist stone mortared in arranged patterns and laid against a fibre cement sheet which is used as a permanent former. Masonry ties penetrate through the fibre cement sheet and are fixed into the external wall framing studs.

7.4 The 40 mm minimum (maximum 70 mm) vented wall cavity construction consists of 45 mm wide grooved battens with DPC attached to the rear of the batten where the batten contacts the top and bottom plates and dwang timbers. The batten fixings are designed to allow for seismic movement and must be offset 100 mm from the external framing studs to allow for movement between the stone cladding and the external wall framing.

7.5 Building designers incorporating The Hydestone™ Schist Cladding System into their design must ensure that the design information referenced in the Technical Literature is adhered to.

7.6 Where the building specifier has the requirement for vertical expansion joints, these must comply with NZBC Acceptable Solution E2/AS1 Paragraph 9.2.

## Structure

### Mass

8.1 For structural design purposes, Hydestone™ Schist has a mass of approximately 360 kg/m<sup>2</sup> as a total system including mortar.

### Impact Resistance

8.2 The Hydestone™ Schist Wall Cladding System has good resistance to human and hard body impacts likely to be encountered in normal residential use. Some chipping of the finish could occur with hard impacts.

### Wind Zones

8.3 The Hydestone™ Schist Wall Cladding System is suitable for use in all Building Wind Zones of NZS 3604, up to, and including 'Very High'.

### Foundations

8.4 Foundation systems supporting the schist veneer must be designed and constructed in accordance with NZS 3604 and the Technical Literature to cater for the total veneer system mass.

### Masonry Ties

8.5 The mass of the veneer system results in maximum specifications for tie spacings. Ties must be fixed to the wall framing at maximum centres as specified in Table 1 of the Technical Literature.

### Wall Bracing Requirements

8.6 The mass of the veneer system results in a greater wall bracing demand. A minimum bracing demand of 15 bracing units/m is required. The Bracing Table in the Technical Literature must be used for calculating the bracing demand requirements.

### Steel Lintel Angles

8.7 Lintel angle sizes and support details must be taken from NZS 3604 Table 11.4 and modified as required by the Technical Literature.

## Durability

9.1 Assessment of durability to meet the NZBC is based on difficulty of access and replacement, and the ability to detect failure of The Hydestone™ Schist Wall Cladding System both during normal use and maintenance of the building.

9.2 Masonry ties, fixings and lintels must meet the durability requirements of NZS 3604 Paragraph 4.5 and Table 4.4.

### Serviceable Life

9.3 The Hydestone™ Schist Wall Cladding System will have a serviceable life of at least the life of the building and in excess of 50 years.

## Maintenance

10.1 An inspection of the Hydestone™ Schist Wall Cladding System must be carried out at least annually. Weep holes must be kept clear of dust, dirt, spider webs and the like to ensure that moisture can continue to drain from the cavity. Any cracks that develop in the mortar or stone must be investigated (this may require a structural engineer's assessment).

## Control of External Fire Spread

11.1 The Hydestone™ Schist Wall Cladding System is suitable for use as an external wall cladding on all buildings in accordance with NZBC Acceptable Solution C/AS1 Part 7, Paragraph 7.11.2(a).

## Outbreak of Fire

12.1 Natural stone is considered a non-combustible material and need not be separated from flues and chimneys. However, when used in conjunction with, or attached to heat sensitive materials, the heat sensitive material must be separated from chimneys and flues in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 9 for the protection of combustible materials.

## External Moisture

13.1 The Hydestone™ Schist Wall Cladding System, when installed in accordance with this Appraisal and the Technical Literature, prevents the penetration of moisture that could cause undue dampness or damage to building elements.

13.2 The cavity must be sealed off from the roof and sub-floor space to meet code compliance with Clause E2.3.5.

13.3 The Hydestone™ Schist Wall Cladding System allows excess moisture present at the completion of construction to be dissipated without permanent damage to building elements to meet compliance with Clause E2.3.6.

13.4 Weathertightness details that are developed by the designer are outside the scope of this Appraisal and are the responsibility of the designer for compliance with the NZBC.

## Installation Information

### Installation Skill Level Requirements

14.1 Installation of components and accessories supplied by Hydestone Limited must be installed by Stone Masons approved by Hydestone Limited.

14.2 Installation of accessories supplied by the building contractor must be completed by tradespersons with an understanding of masonry cavity wall construction in accordance with the instructions given with the Hydestone™ Schist Wall Cladding System Technical Literature.

## The Hydestone™ Schist Wall Cladding System Installation

15.1 This section must be read in conjunction with the Technical Literature. All framing and foundation requirements must be met prior to the installation of the cladding system.

### Building Wrap and Flexible Sill and Jamb Tape Installation

15.2 The selected building wrap and flexible sill and jamb tape system must be installed in accordance with the manufacturer's instructions prior to the installation of the cavity battens. The building wrap must be installed horizontally and be continuous around corners. Wrap must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Particular attention must be paid to the installation of the building wrap and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed timber wall framing in the opening is protected. All penetrations through the building wrap must be sealed and joints sealed or lapped 150 mm.

15.3 When the studs are installed at greater than 450 mm centres, the building wrap must be supported between the studs to prevent the wrap bulging into the cavity space when bulk insulation is installed in the wall frame cavity. Acceptable means of support include polypropylene strap or galvanised wire.

### Aluminium Joinery Installation

15.4 The aluminium joinery and associated head flashings must be installed in accordance with the window manufacturer's instructions. A 7.5 - 10 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed after the joinery has been secured in place.

### Hydestone™ Schist System

15.5 The 45 x 40 mm minimum (45 mm x 70 mm maximum) cavity battens are installed after the wall wrap has been secured to the framing. A 50 mm wide DPC must be nailed to the batten where the batten contacts the wall framing. The battens are to be fixed in accordance with the Technical Literature.

15.6 The fibre cement sheet can be installed horizontally or vertically and fixed at 150 mm centres to the battens. The fibre cement sheet does not require any additional moisture protection as the sheet acts as a 'former' only.

15.7 The stud centre lines must be clearly marked to allow for the accurate positioning and cutting of the holes required to enable the installation of the masonry ties back onto the wall framing studs. The masonry ties are installed in accordance with the Technical Literature.

15.8 The installation of the schist stone must be carried out by a Hydestone Limited approved Stone Mason. All masonry construction methods and techniques must comply with NZS 4210.

15.9 During the construction of the schist stone wall, it is important that all residue mortar is cleaned from the masonry ties and all residue mortar is removed from the wet wall cavity. Removal of any surplus material out from the cavity weepholes can be achieved by raking out with a fabricated wire scraper.

15.10 The lintels and flashings must be installed in accordance with the Technical Literature.

### Inspections

15.11 The Hydestone™ Schist Wall Cladding System incorporates a batten fixing method which allows the masonry ties to perform their function and accommodate lateral movement during an earthquake. The Technical Literature must be referred to during the inspection of The Hydestone™ Schist Wall Cladding System installations by the Building Consent Authorities and Territorial Authorities.

## Health and Safety

16.1 Hearing and eye and foot protection must be worn while installing the Hydestone™ Schist Wall Cladding System.

## Basis of Appraisal

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

### Tests

17.1 The following testing has been completed by BRANZ:

- Durability testing of The Hydestone™ Schist Wall Cladding System to AS/NZS 4456: Part 10.
- Masonry tie testing for ties used in The Hydestone™ Schist Wall Cladding System to AS/NZS 2699.1.

17.2 BRANZ expert opinion on NZBC code compliance for The Hydestone™ Schist Wall Cladding System was based on design and evaluation of all details within the scope and as stated within this Appraisal. BRANZ experts reviewed the performance of the foundation detail, window head, jamb and sill details, meter box head, jamb and sill details, internal and external corner detail. The details contained within the Technical Literature have been reviewed, and an opinion has been given by BRANZ technical experts that the system will meet the expected performance levels of NZBC Clause E2, External Moisture.

### Other Investigations

18.1 Durability, structural and weathertightness opinions have been provided by BRANZ.

18.2 Site inspections were carried out to examine the practicability of installation.

18.3 The Technical Literature for The Hydestone™ Schist Wall Cladding System has been reviewed by BRANZ and found to be satisfactory.

### Quality

19.1 The manufacturing process of The Hydestone™ Schist Wall Cladding System has been examined by BRANZ, and the details of the quality and composition of the materials used were obtained and found to be satisfactory.

19.2 The quality of materials, components and accessories supplied by Hydestone Limited is the responsibility of Hydestone Limited.

19.3 Designers are responsible for the building design, and building contractors are responsible for the quality of installation of framing systems and joinery, building wraps, flashing tapes, airseals and joinery head and jamb flashings in accordance with the instructions of the designer.

19.4 Stone Masons are responsible for the installation of the cladding system.

19.5 The quality of installation, handling and storage on site is the responsibility of the installer.

19.6 Building owners are responsible for the maintenance of the Hydestone™ Schist Wall Cladding System in accordance with the instructions of Hydestone Limited.



## Sources of Information

- AS/NZS 2699.1:2000 Built-in components for masonry construction – Wall ties.
- AS/NZS 2699.3:2002 Built-in components for masonry construction – Lintels and shelf angles (durability requirements).
- NZS 3602:2003 Timber and wood-based products for use in building.
- NZS 3604:1999 Timber framed buildings.
- NZS 4210:2001 Masonry construction: Materials and workmanship.
- NZS 4211: 1985 Specification for performance of windows.
- 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.



**BRANZ**

**In the opinion of BRANZ, The Hydestone™ Schist Wall Cladding System is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.**

**The Appraisal is issued only to the Appraisal Holder, Hydestone Limited, 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. The Appraisal 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 Appraisal Holder.
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.

For BRANZ

P Robertson  
Chief Executive

Date of issue: 1 June 2006

## Amendment No. 1, dated 27 May 2008

The Appraisal has been amended to update current BRANZ Logos, and to add Trademark.

## Hydestone™ Schist System Installation Guide.

Natural stone is durable, timeless and is a reflection of individuality and character. No two stones are alike. Hydestone offers the building designer the following technical details in order for this timeless schist product to be installed as an alternative solution for exterior cladding for new or existing homes.

### Copyright

This technical literature is the property of Hydestone Limited. Any unauthorised use of this literature is strictly prohibited.

### References

- AS/NZS 2699.1:2000 Built-in components for masonry construction – Wall ties.
- AS/NZS 2699.3:2002 Built-in components for masonry construction – Lintels and shelf angles (durability requirements).
- NZS 3602:2003 Timber and wood-based products for use in building.
- NZS 3603:1993 Timber structures standard.
- NZS 3604:1999 Timber framed buildings.
- NZS 4203:1992 General structural design and design loadings for buildings.
- NZS 4210:2001 Masonry construction: Materials and workmanship.
- NZS 4211: 1985 Specification for performance of windows.
- 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.

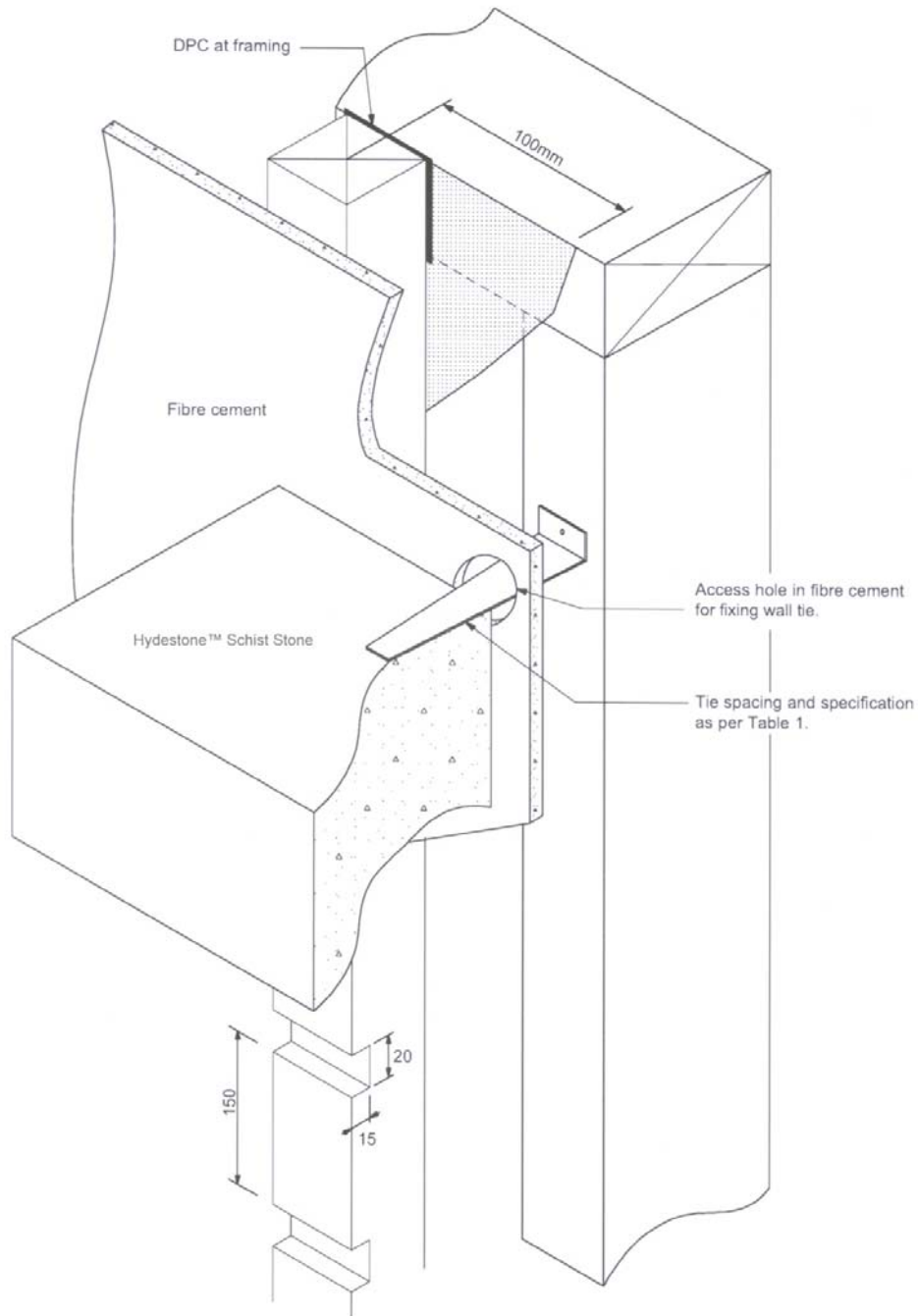
### The Hydestone™ System Components

Hydestone™ Schist Stone wall cladding system follows the principles of a wet wall brick veneer system and is installed using a 40 mm vented cavity. It can be installed on residential and light commercial buildings where domestic construction techniques are used.

The Hydestone™ wall cladding system consists of Hyde Brown or Grey schist stone mortared in arranged patterns and laid against a fibre cement sheet which is used as a former. Masonry ties penetrate through the fibre cement sheet and into the external wall framing studs.

The 40 mm minimum (maximum 70 mm) vented wall cavity construction consists of 45 mm wide grooved battens with DPC attached to the rear of the batten where the batten would contact the top, bottom or dwang timbers. The battens fixings are specified to allow for seismic movement and are offset 100 mm from the external framing studs to allow for movement between the stone cladding and the external wall framing. The construction of the building must meet the requirements of NZBC Acceptable Solution E2/AS1 or specific design meeting the requirements of the NZBC.

An isometric view of the component of the cladding system is seen in figure 1.



**Figure 1**

### **Schist Stone**

The quarried stone is supplied pre-dressed to a maximum depth of 150 mm front to back and is available in two grades being Hyde Brown and Hyde Grey. The stone is supplied stacked on a wooden pallet weighing approximately 1 tonne. The stone varies in thickness and length and can be laid in various styles with the mortar being visibly raked or recessed. One tonne of dressed stone will cover approximately a 5 square meter area.

The mass of the quarried schist is variable. The total system, (including the mortar) has a mass which ranges between 220 kg/m<sup>2</sup> to 360 kg/m<sup>2</sup>. Details for the increased structural loading due to the increased system weight is covered within this document.

**Mortar**

The mortar used with Hydestone™ Schist must comply to NZS 4210, Section 2.2.

**Masonry Ties and Fixings**

*Eagle Wire 135 mm “King Ties” must be used* and are manufactured in accordance with AS/NZS 2699: Part 1. Fixings are 14g x 35 mm long Tek screws. Ties and fixings are either hot-dipped galvanised or 316 stainless steel to comply with the durability requirements of NZS 4210 Table 2.E1. Ties and fixings must be selected to comply with the classification of exposure zones in NZS 3604: 1999.

**Masonry Tie Spacing**

Table 1 details the Eagle Wire King Tie spacing. The values are expressed maximums.

**Table 1** Maximum spacing of King Ties

Veneer Mass				
	220 kg/m <sup>2</sup>		360 kg/m <sup>2</sup>	
Zone	Horizontal	Vertical	Horizontal	Vertical
A,B,C	600 mm	400 mm	400 mm	400 mm
A,B,C			600 mm	300 mm
B,C			600 mm	400 mm

**Lintels**

Lintels are to be selected from NZS 3604 Table 11.4, 90 mm Thickness of Veneer with the following limitation to the maximum weight of veneer supported:

- 210 mm replaces 350 mm
- 420 mm replaces 700 mm
- 1200 mm replaces 2000 mm

Being wider, the Hydestone™ veneer will overhang the lintels by a greater amount than normal veneer. It is recommended that wider angles (see Figure 7) are used or the tie spacing be decreased with the veneer and lintel propped for at least 48 hours to allow the tie fixing in the veneer mortar joints to reach adequate strength. The lintels must meet the durability requirements of AS/NZS 2699.3:2002 Built-in components for masonry construction – Lintels and shelf angles (durability requirements). Refer NZS 3604: 1999, section 4.5 and Figure 7 in the installation component of this Technical Literature.

### **Cavity Battens**

Nominal 45 x 40 mm minimum (maximum 45 mm x 70 mm) timber treated to Hazard Class H4 after grooving. The battens must be grooved to provide free air movement within the cavity. The grooving in the battens must be evenly spaced at no more than 150 mm intervals along the length of the batten, with a 20 mm wide by 15 mm deep groove.

### **Fibre Cement Sheet**

4.5 mm thick fibre cement sheet manufactured in accordance with AS/NZS 2908.2.

### **Damp Proof Course**

Bituminous damp proof course (DPC) complying with NZBC Acceptable Solution E2/AS1 Paragraph 4.3.10 or damp proof courses covered by a valid BRANZ Appraisal. DPC must be stapled where the batten contacts the bottom and top plates or the dwangs. DPC is also required to be used where shown in the Figures.

### **Accessories**

- Fibre cement sheet fixings – 40 x 2.8 mm hot-dipped galvanised flat head fibre cement nails.
- Cavity Batten fixings – 100 x 4.0 mm hot-dipped galvanised flat head nails for attaching the batten to bottom plate and temporary nailing (see section “System Installation”) the batten to top the plate
- Building wrap – paper or wrap complying with NZBC Acceptable Solution E2/AS1 Table 23, or breather-type membranes covered by a valid BRANZ Appraisal for use as wall wraps.
- Flexible sill, head and jamb flashing tape – flexible flashing tapes complying with NZBC Acceptable Solution E2/AS1, Paragraph 4.3.11 or flexible flashing tapes covered by a valid BRANZ Appraisal for use around window and door joinery openings.
- Joinery sill and head flashings – folded from aluminium or galvanised steel to suit the window or trim opening. Refer to NZS 3604, Section 4 and NZBC Acceptable Solution E2/AS1, Table 20 for durability requirements.
- Window and door trim cavity air seal – air seals complying with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6, or self-expanding, moisture cure polyurethane foam air seals covered by a valid BRANZ Appraisal for use around window, door and other wall penetration openings.

### **Handling and Storage**

Handling and storage of all materials supplied by Hydestone Limited, whether on or off site, is under the control of the installer. The Hydestone™ System components must be protected from damage. They must be stored in clean, dry conditions to avoid contamination of the mortar and surfaces to be mortared. All masonry components must be handled in accordance with NZS 4210:2001.

## Design Information

### Design Responsibility

The Specifier for the project must ensure that the details in this literature including the scope statement are suitable for the intended application and that additional detailing is provided for specific design or any areas that fall outside the scope and specifications of this literature.

### Scope

This literature covers the use of the Hydestone™ System as an external wall cladding for buildings within the following scope:

- the scope limitations of NZBC Acceptable Solution E2/AS1, Paragraph 1.1; and,
- the scope limitations of NZS 3604 Section 11.7; and,
- constructed with timber framing complying with the NZBC; and,
- situated in NZS 3604 Building Wind Zones up to, and including 'Very High'.

The Hydestone™ system is designed for use with aluminium window and door joinery that is installed with vertical jambs and horizontal heads and sills. *(The system relies on the joinery meeting the requirements of NZS 4211 for the relevant Building Wind Zone.)*

For applications which are outside the scope of this literature and details which are not in this literature the specifier must ensure that the design meets the relevant performance requirements of the NZBC.

### Building Regulations

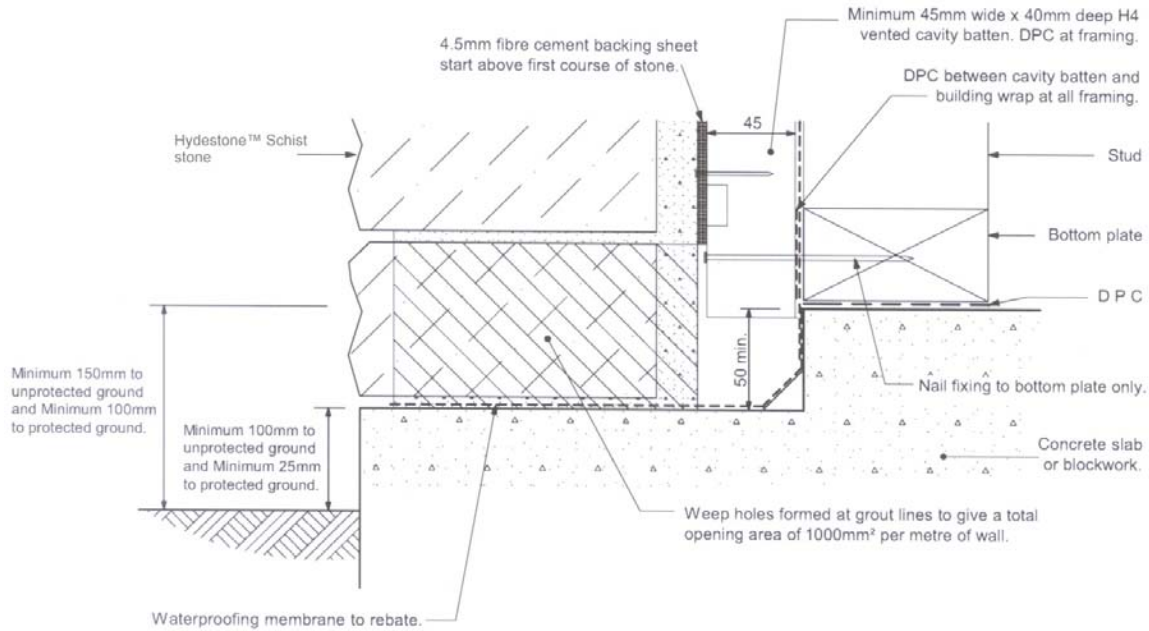
The Hydestone™ system if designed, used and installed in accordance with the statements and conditions of this literature, will meet the following provisions of the New Zealand Building Code:

- Clause B1 Structure
- Clause B2 Durability
- Clause E2 External Moisture
- Clause F2 Hazardous Building Materials

### Ground Clearances and Foundation Detail

The finished floor level must have a minimum clearance to paved or unprotected ground as required by NZS 3604:1999. Figure 2 identifies the minimum ground clearance and foundation detail. As the weight of the schist as a system including the mortar will weigh up to 360 kg/m<sup>2</sup>. The minimum foundation width is to be 300 mm and reinforced with 2 – D12 bars. The foundation details in NZS 3604:1999 Figures 6.14, 7.14 and 7.15 must be

increased to a minimum footing width of 300 mm and the veneer overhang over the foundation must not be more than 25 mm. All other foundation specifications must comply with NZS 3604: 1999.



**Figure 2**

## Structure & Framing

Timber wall framing behind the Hydestone™ system must be treated as required by NZS 3602:2003 *Timber and wood-based products for use in building*.

Timber framing must comply with NZS 3604 for buildings or parts of buildings within the scope limitations of NZS 3604. Buildings or parts of buildings outside the scope of NZS 3604 must be to a specific design in accordance with NZS 3603 and NZS 4203. Where specific design is required, the framing must be of at least equivalent stiffness to the framing provisions of NZS 3604. Use of timber framing must be in accordance with framing manufacturer's specifications.

Due to the 360 kg/m<sup>2</sup> mass of the Hydestone™ veneer system loading, the timber wall studs will be required to resist greater inertia face loads in an earthquake. These loads are greater than allowed for by NZS 3604: 1999. To allow for this, the timber studs must be selected from NZS 3604: 1999 tables using the greater of actual wind zones or wind zone 'High' in seismic Zone A and wind zone 'Medium' in seismic Zone B. Stud selection need not consider the additional veneer weight in seismic Zone C.

The additional weight will result in greater wall bracing demand. The Bracing Table in Appendix A of this document must be used for the bracing demand requirements. A minimum bracing demand of 15 bracing units/m is required.

In all cases studs must be at maximum 600 mm centres, with dwangs fitted flush between the studs at maximum 800 mm centres.

### **Installation Skill Level Requirements**

Installation of The Hydestone™ System must be completed by tradespersons with an understanding of Stone Masonry, building systems, aluminium joinery and this cladding system, in accordance with instructions given within this Technical Literature. Only Stone Masons recorded in Appendix B are approved to install the Hydestone™ Schist System.

### **System Installation**

This section of the literature should be read in conjunction with the installation detail drawings. All framing, foundation and bracing requirements must be met prior to the installation of the cladding system.

The selected building wrap and flexible sill and jamb tape system must be installed in accordance with the manufacturer's instructions prior to the installation of the cavity battens. The building wrap must be installed horizontally and be continuous around corners. Wrap must be lapped 75 mm minimum at horizontal joints and 150 mm minimum over studs at vertical joints. Particular attention must be paid to the installation of the building wrap and sill and jamb tapes around window and door openings to ensure a continuous seal is achieved and all exposed timber wall framing in the opening is protected. All penetrations through the building wrap must be sealed and joints sealed or lapped 150 mm.

When the studs are installed at greater than 450 mm centres, the building wrap must be supported between the battens to prevent the wrap bulging into the cavity space when bulk insulation is installed in the wall frame cavity. Acceptable means of support include polypropylene strap or galvanised wire.



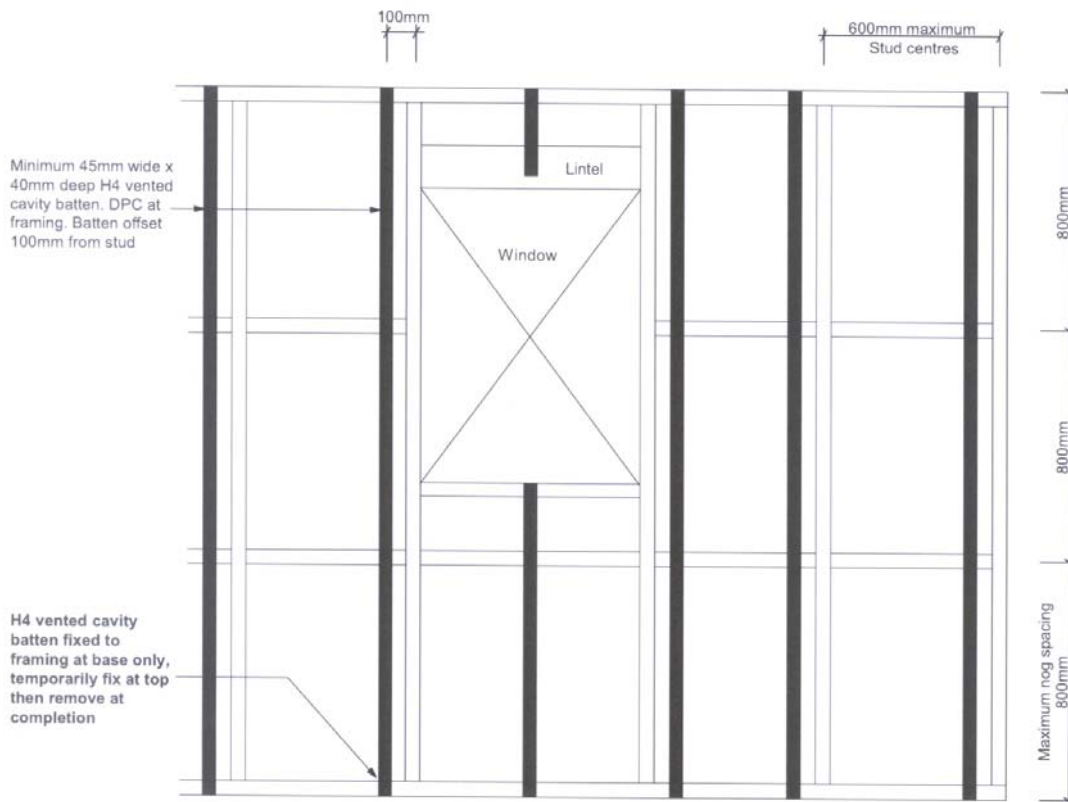
### Cavity batten Installation

The 45 x 40 mm cavity battens can only be installed after the wall wrap has been secured to the framing. A 50 mm DPC must be nailed to the non grooved side of the 45 x 40 mm batten and can be the full length of the batten or only where the batten will contact the dwangs, top and bottom plates.

The battens are to be fixed grooved face out and located 100 mm from the stud line with one nail into the bottom plate that forms a pivot and a temporary nail in the top plate.

***This temporary nail must be removed prior to the final course of the stone being laid.***

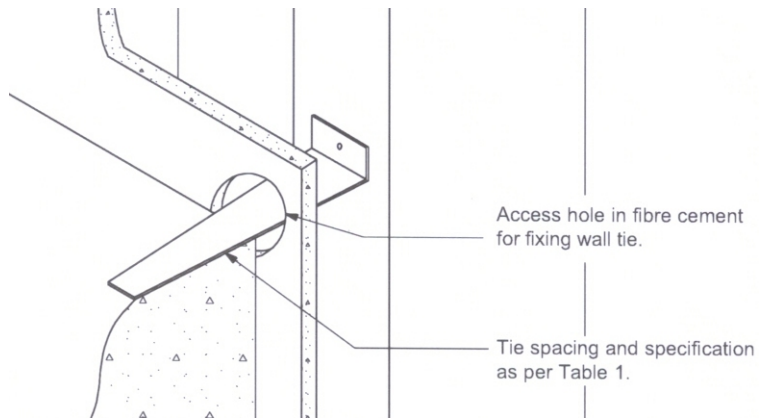
Figure 3 shows a generic stud / batten layout. Studs must comply with NZS 3604: 1999 requirements for wind loading. (See “Structure and Framing” for earthquake stud spacing)



**Figure 3**

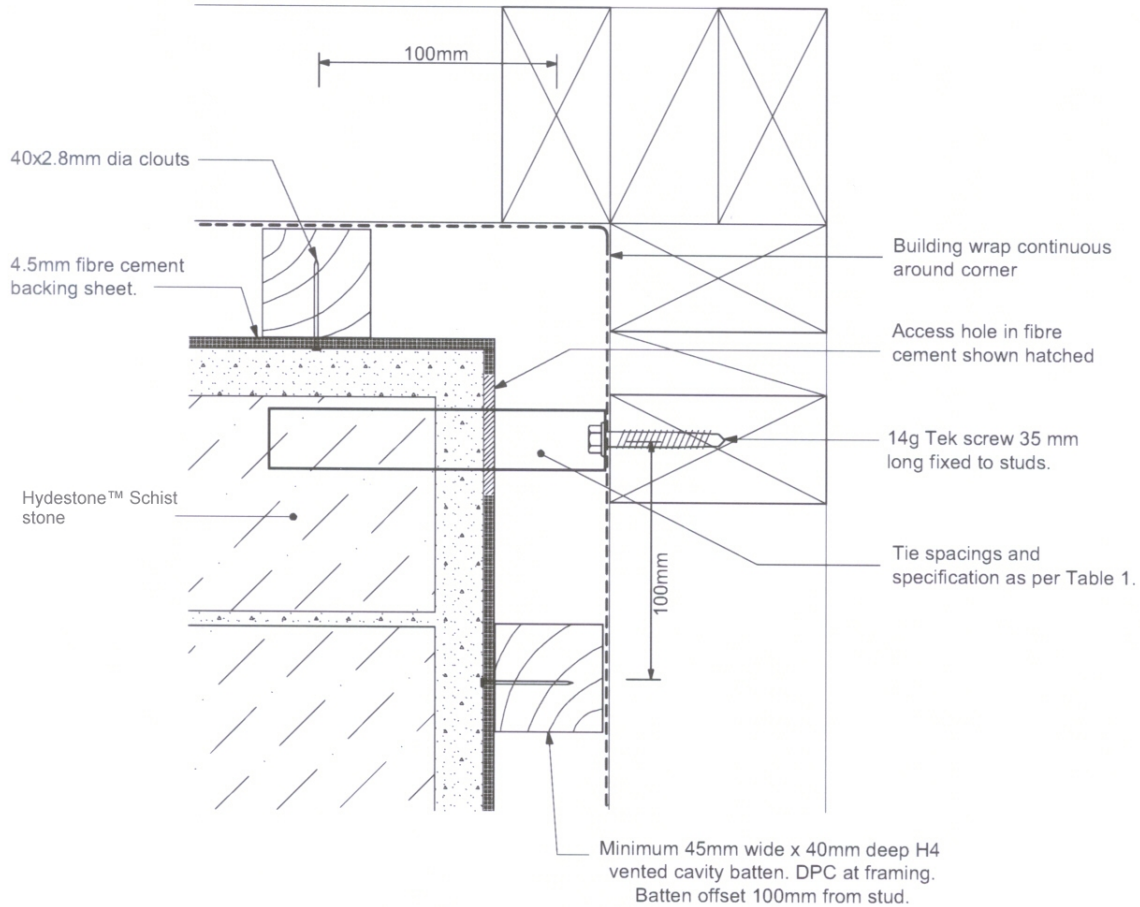
### Fibre Cement Sheet.

The fibre cement sheet can be installed horizontally or vertically and fixed at 150 mm centres to the battens. The fibre cement sheet does not require any additional moisture protection as the sheet acts as a former only. The stud centre lines must be clearly marked to allow for the accurate cutting of the holes required to install the King Ties back onto the wall framing studs. The drilled or cut hole is only required to be large enough to provide access for the application of the tie and the Tek Screw as in Figure 4.



**Figure 4**

The detailing of the fibre cement sheets must not allow any mortar to protrude into the cavity space.



INTERNAL CORNER CONNECTION

**Figure 5**

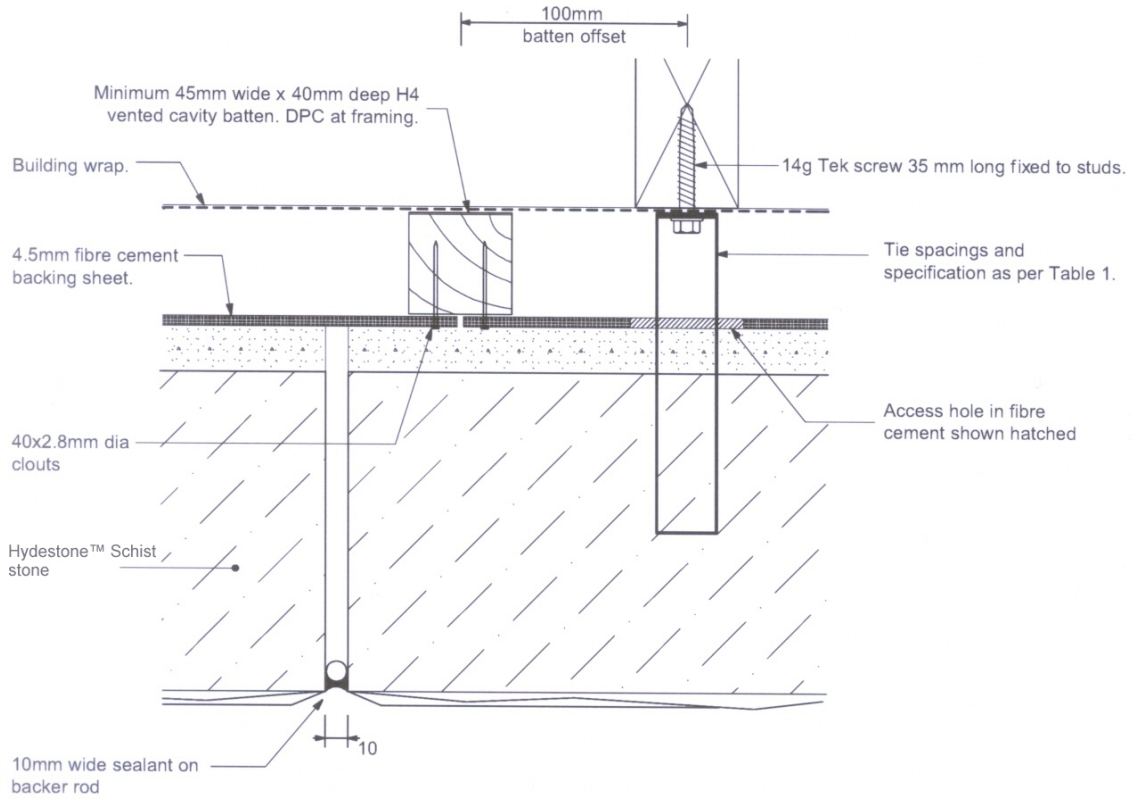
**Masonry**

The installation of the schist cladding must be carried out by a Hydestone approved stone mason. All masonry construction methods and techniques must comply with NZS 4210:2001 Masonry construction: Materials and workmanship. All tie spacing must be to the specifications set out in Table 1 of this literature.

During the construction of the schist stone wall, it is important that all residue mortar is cleaned from the masonry ties and all residue mortar is removed from the wet wall cavity. Removal of any surplus material out from the cavity weepholes can be achieved by raking out with a fabricated wire scraper.

Weep holes are required on the bottom course to provide an opening of 1000 mm<sup>2</sup> per lineal meter of horizontal wall. As the stone varies in depth, care must be taken to allow for this requirement (100 mm high stone with 10 mm gap every 1 metre length of wall).

Where the building specifier has the requirement for vertical expansion joints, these must comply with NZBC Acceptable Solution E2/AS1 Paragraph 9.2.

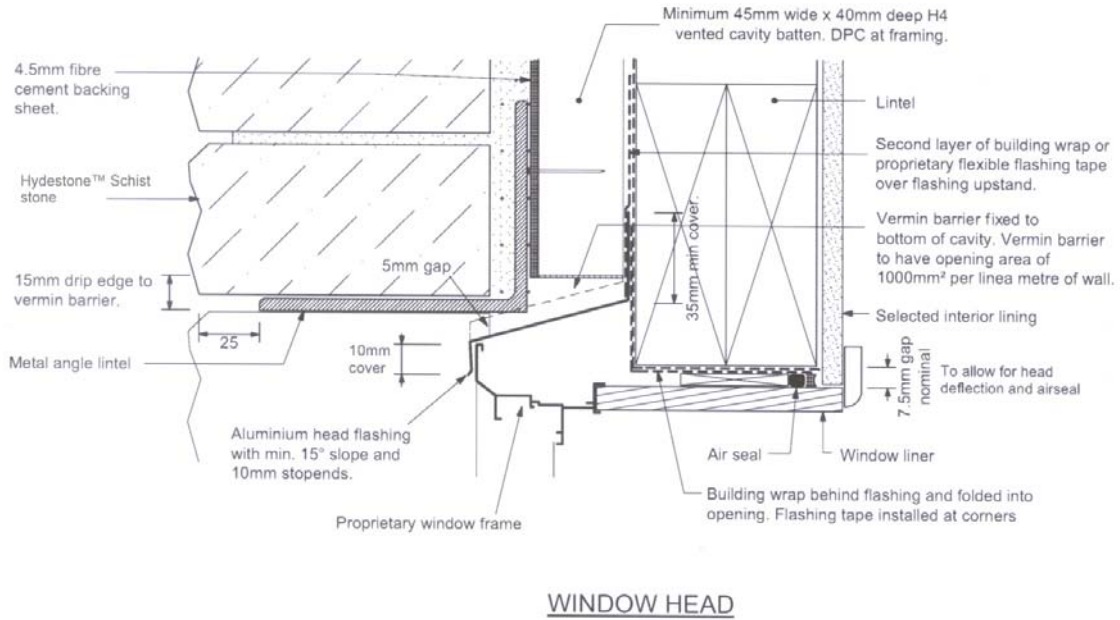


VERTICAL EXPANSION JOINT

**Figure 6**

**Lintel Installation**

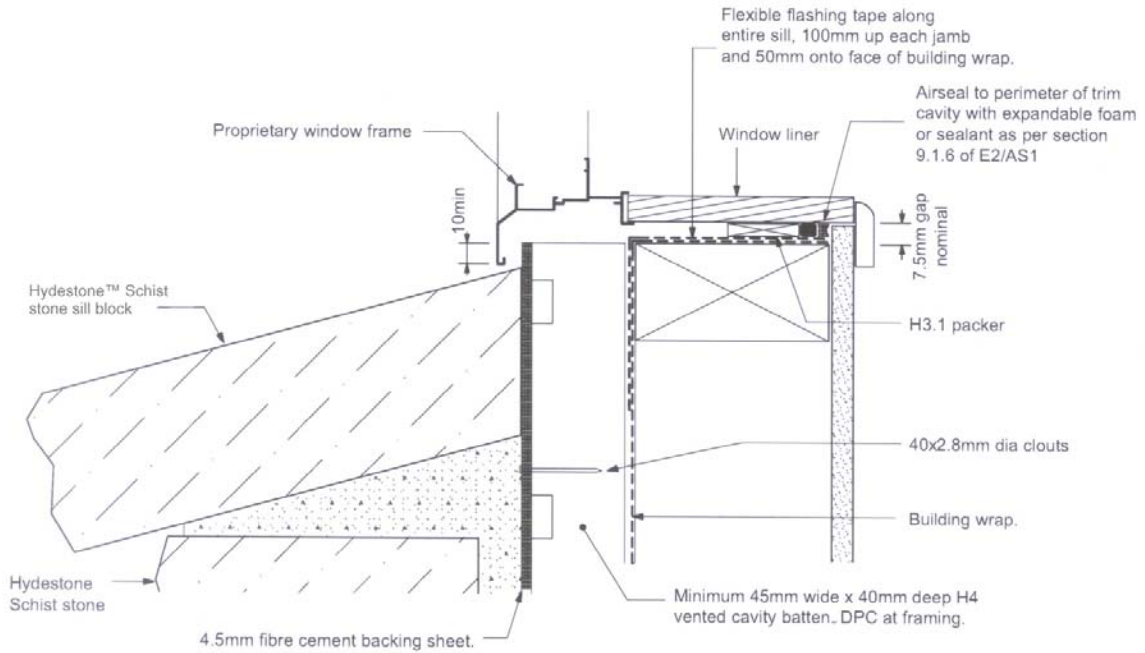
As described in the technical specification for lintels, Figure 7 shows the recommended detail for lintels and aluminium head flashing.



**Figure 7**

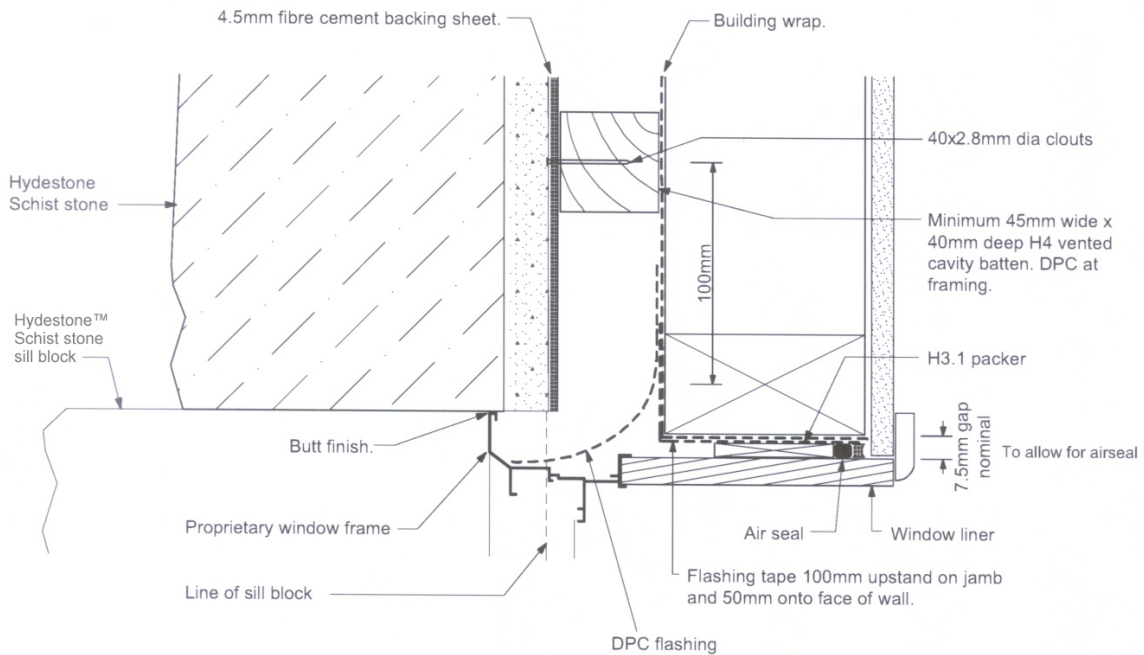
**Aluminium Joinery Installation**

Aluminium joinery and associated head flashings must be installed in accordance with the window manufacturer’s instructions. A 7.5 - 10 mm nominal gap must be left between the joinery reveal and the wall framing so a PEF rod and air seal can be installed in accordance with NZBC Acceptable Solution E2/AS1, Paragraph 9.1.6 after the joinery has been secured in place. Figures 8,9 and 10 show the required joinery detail.



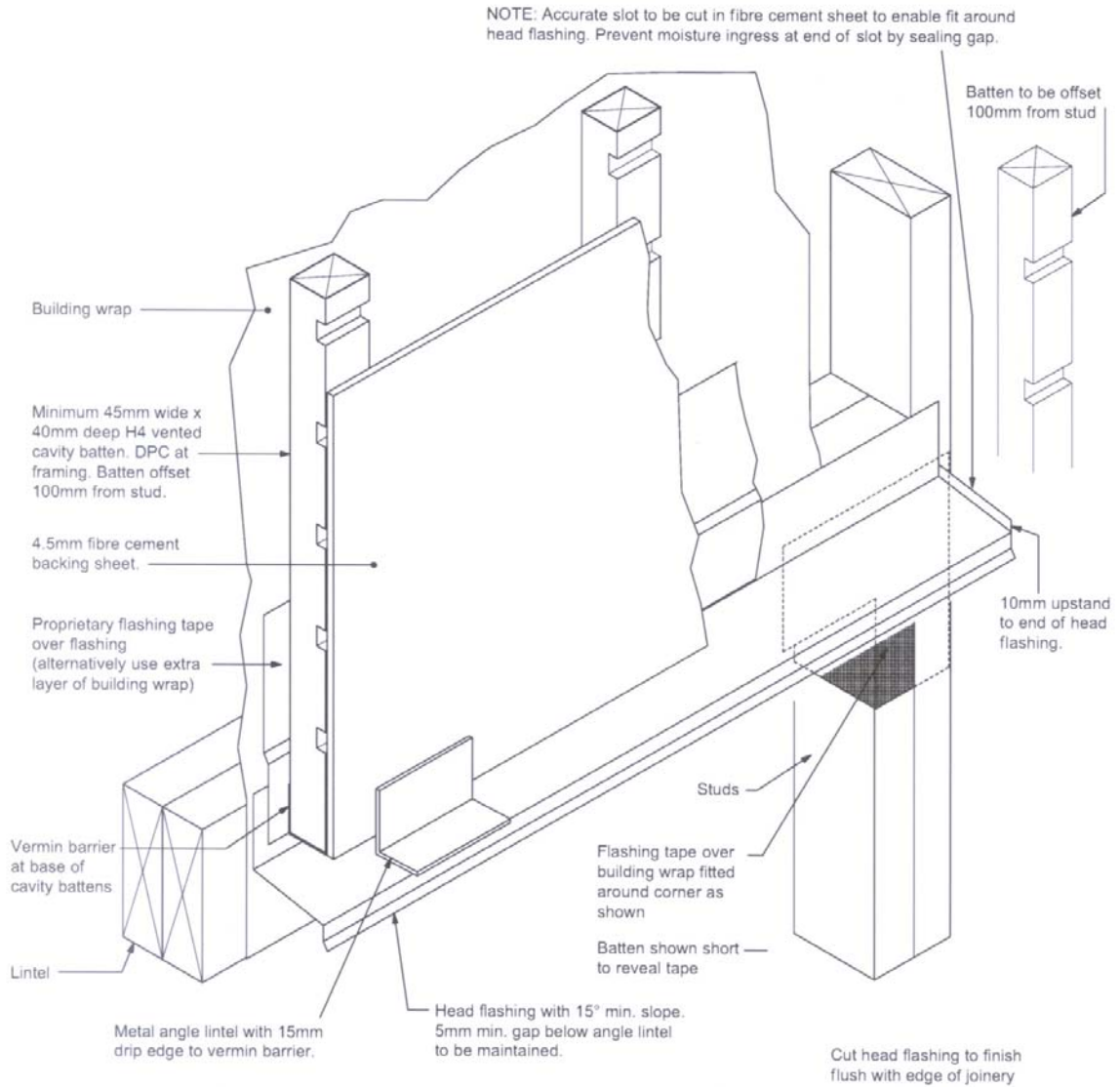
WINDOW SILL

**Figure 8**



WINDOW JAMB

**Figure 9**

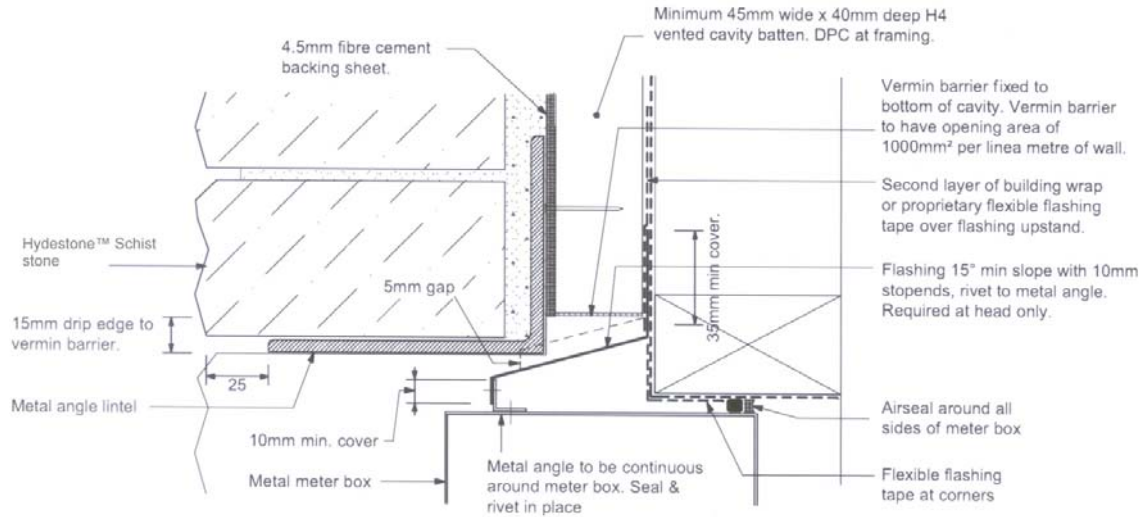


**CAVITY HEAD FLASHING TERMINATION**

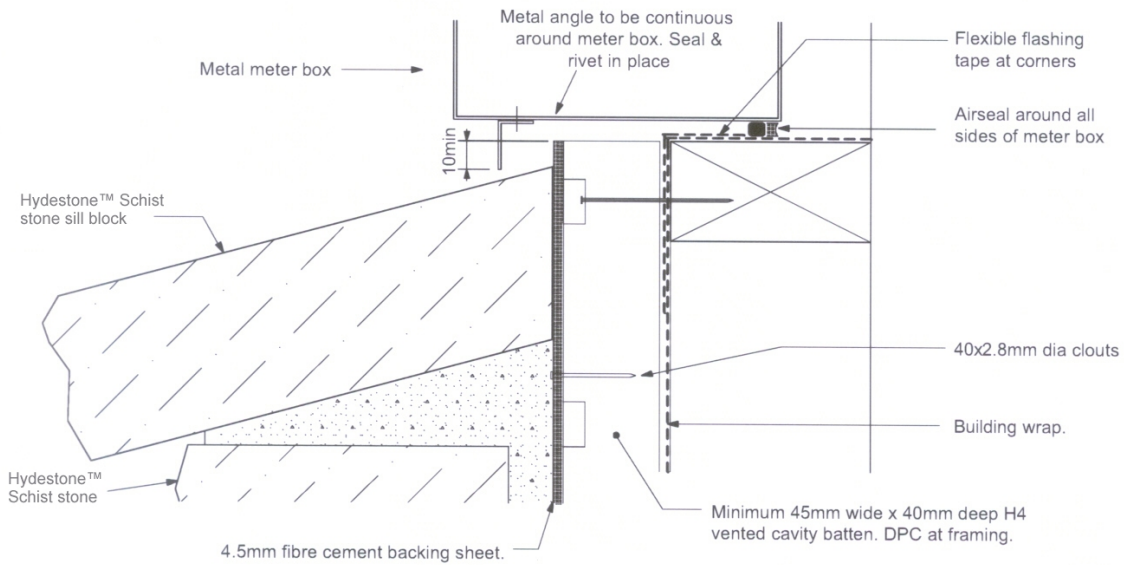
**Figure 10**

### Meter Box Flashing

The installation and flashing details follow the same principles as the detail for the aluminium joinery. Lintels, and flashings must be installed to specification. Figures 11 and 12 show these details.



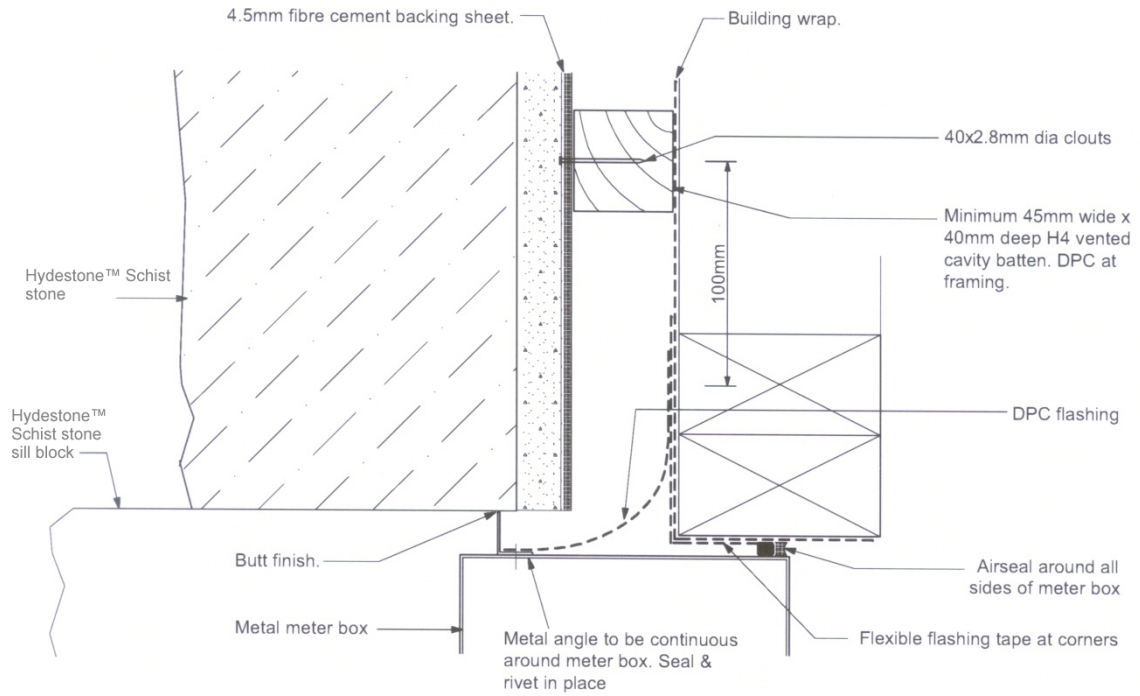
#### METER BOX AT HEAD



#### METER BOX AT SILL

Figure 11



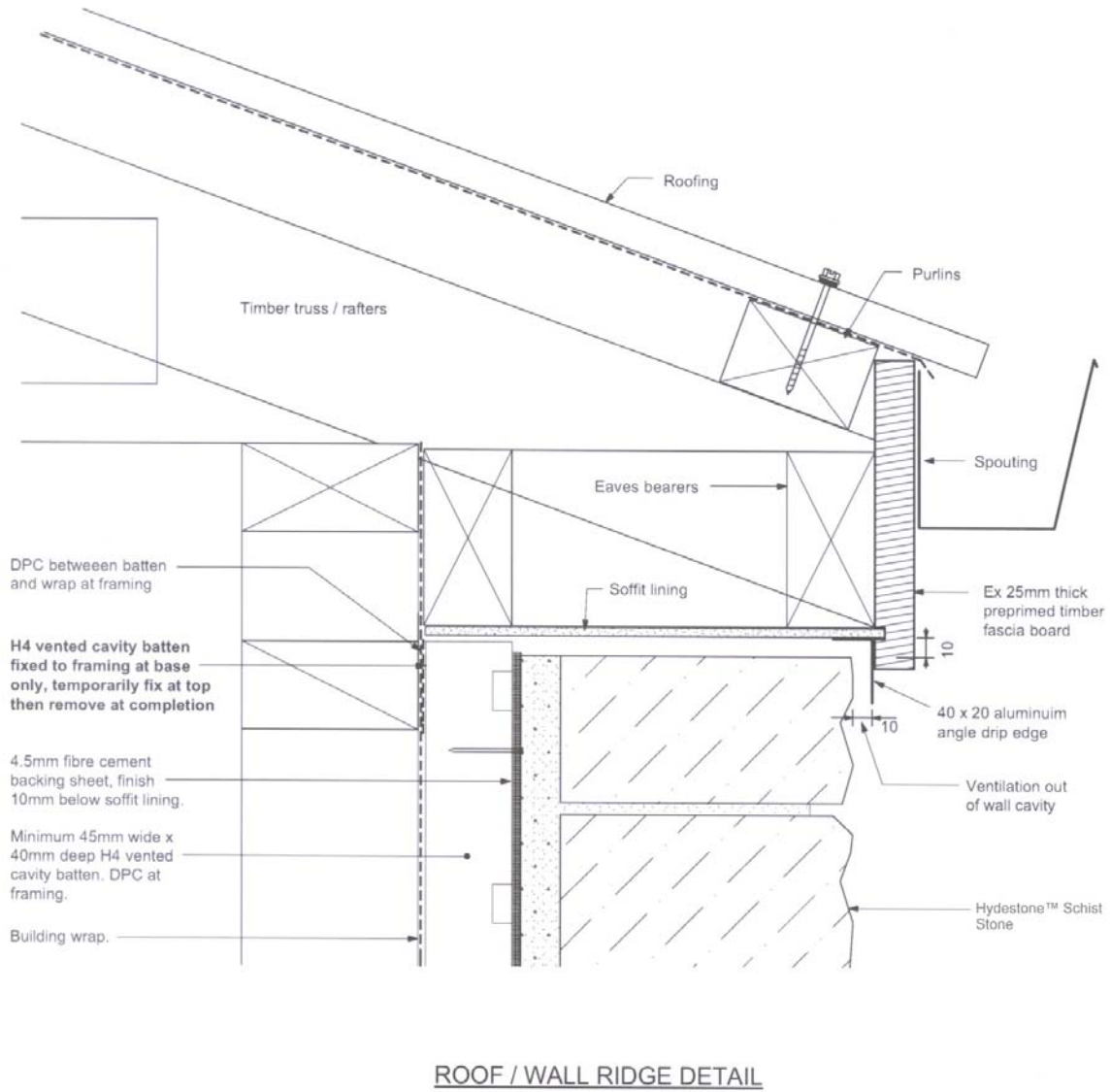


METER BOX AT JAMB

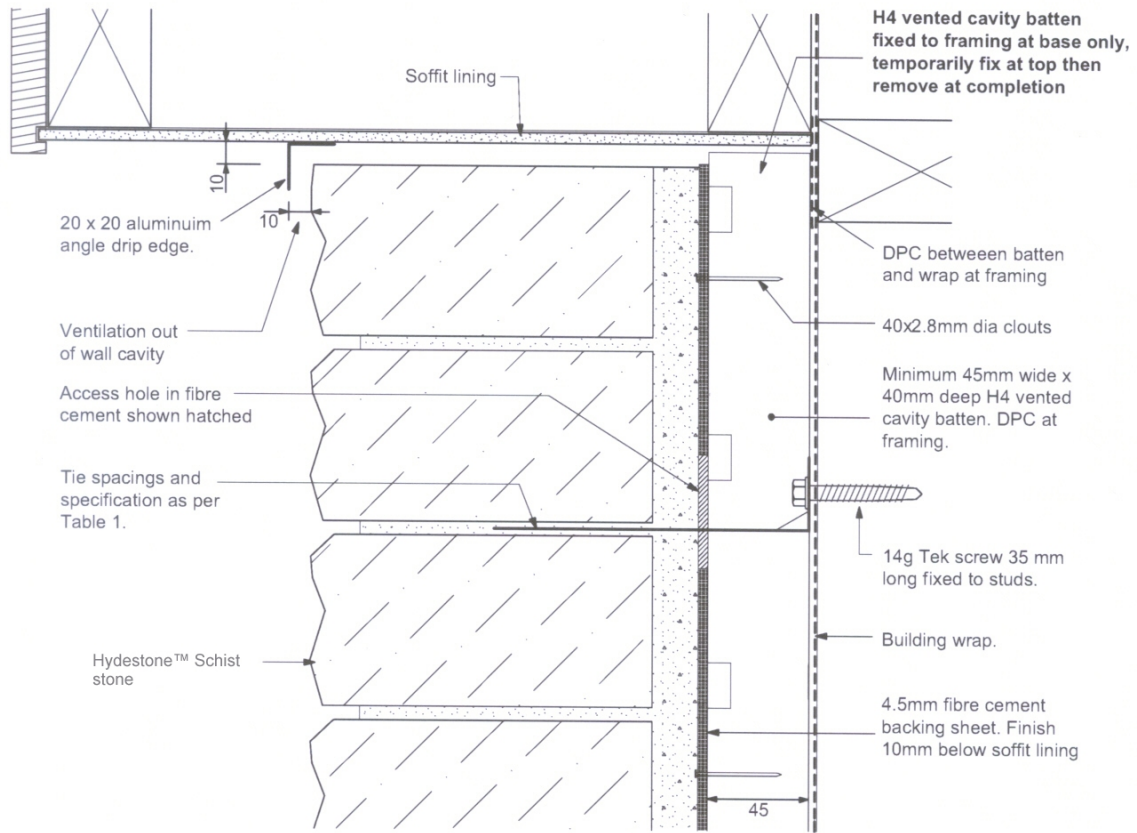
**Figure 12**

**Wall Finishing detail**

Figures 13 to 16 show the required finishing detail for external corner, roof wall junction and pipe penetrations.

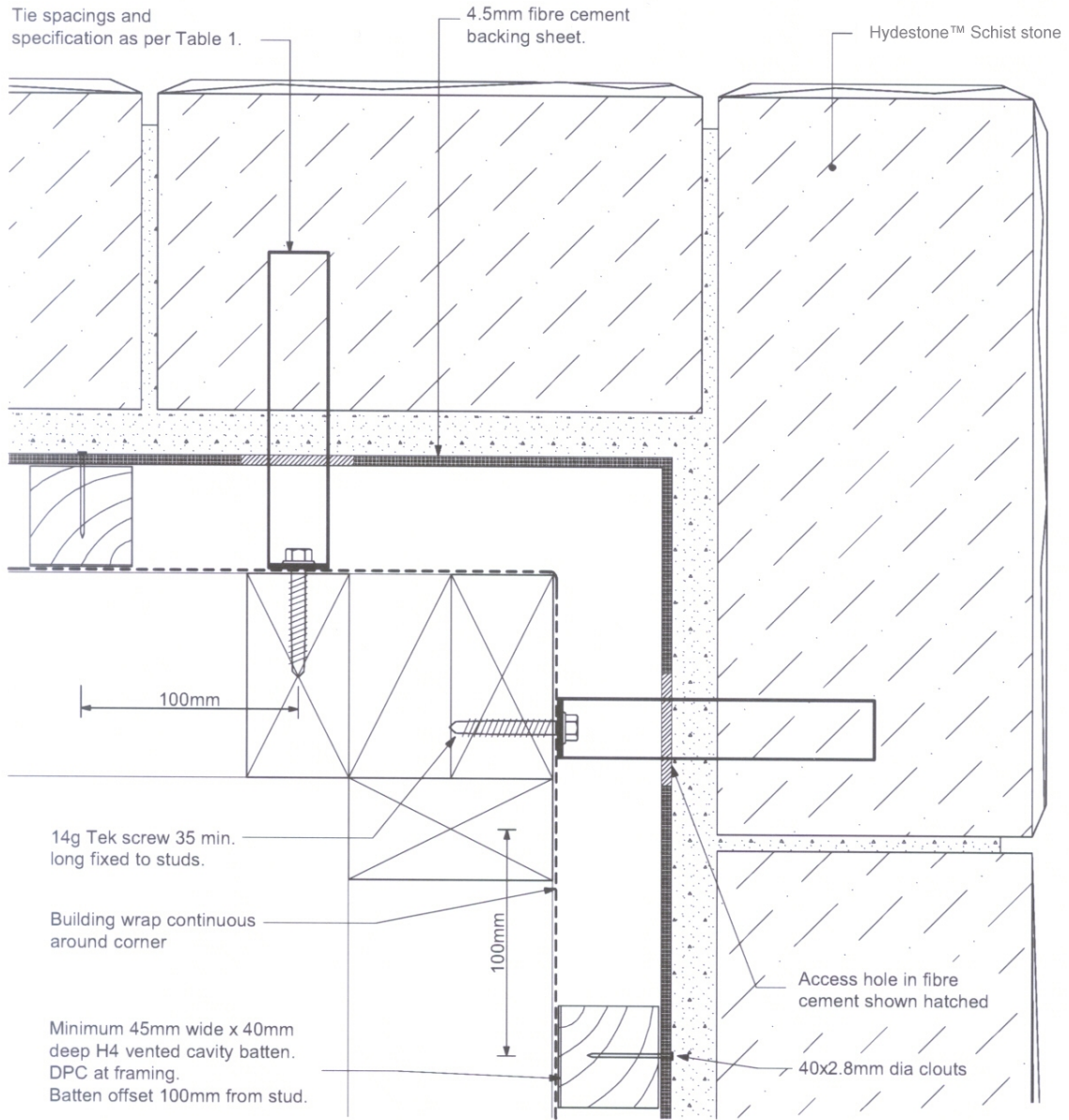


**Figure 13**



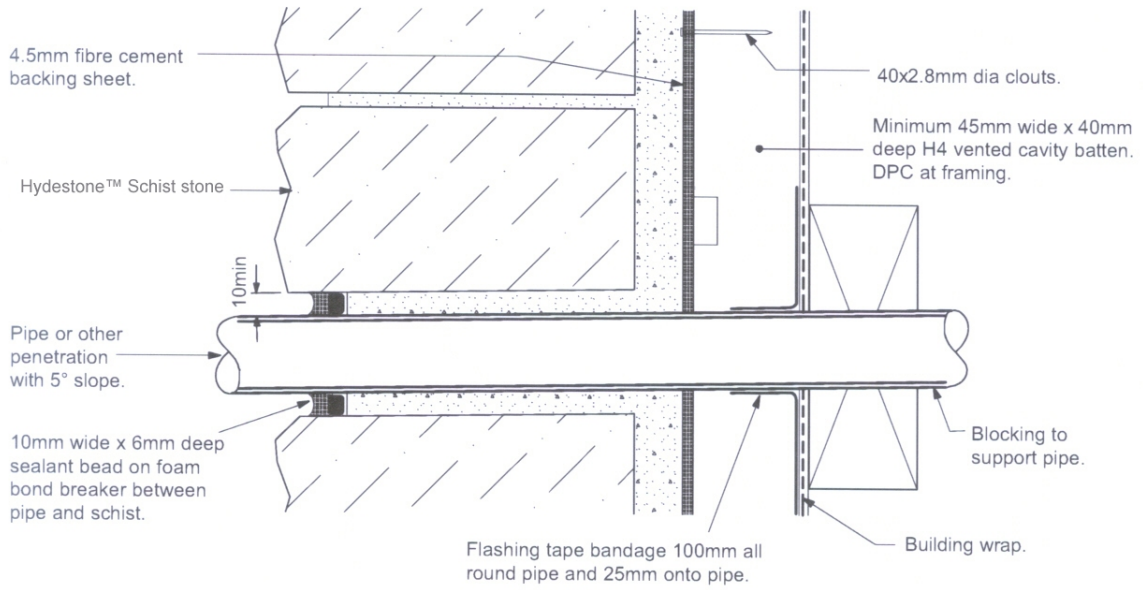
SOFFIT DETAIL

**Figure 14**



**EXTERNAL CORNER CONNECTION**

**Figure 15**



PIPE PENETRATION DETAIL

**Figure 16**

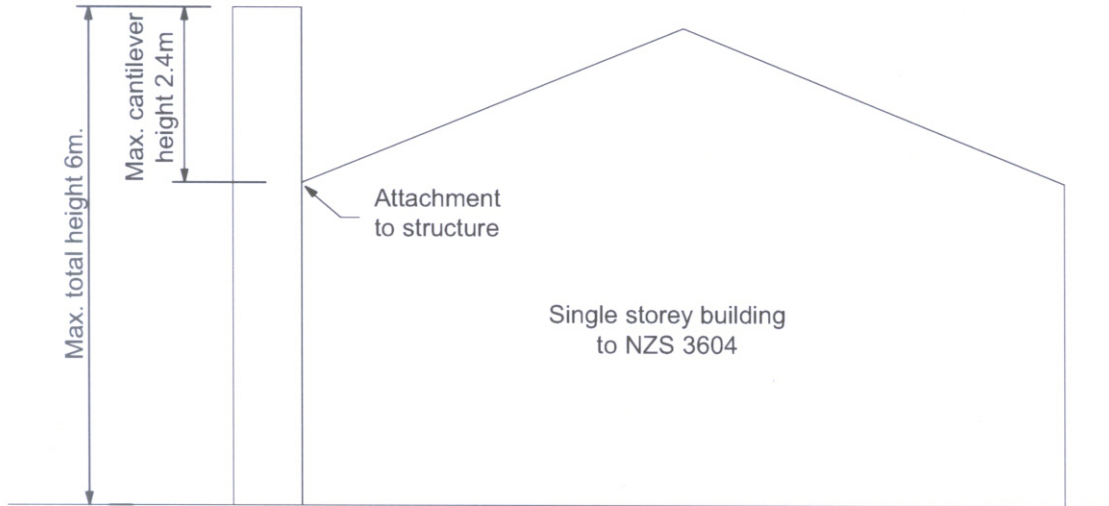
Bracing demand tables for Hydestone of density 3.6 kPa

Top Storey Cladding	Roof Cladding	Roof Pitch (Degrees)	Minimum number of bracing units per square metre for the structure set out below in earthquake zones A, B & C								
			Two Storey Buildings			Top Storey			Single Storey		
			Bottom Storey			Earthquake Zone			Earthquake Zone		
			A	B	C	A	B	C	A	B	C
Light	Light	0 - 25 25 - 45 45 - 60	15.6	11.6	7.7	6.5	4.8	3.3			
			16.0	11.9	7.9	7.2	5.2	3.5			
			16.6	12.4	8.3	7.6	6.0	4.0			
Light	Heavy	0 - 25 25 - 45 45 - 60	18.2	13.6	9.1	9.9	7.4	4.9			
			19.3	14.5	9.7	11.2	8.4	5.6			
			21.5	16.1	10.7	13.7	10.3	6.9			
Medium	Heavy	0 - 25 25 - 45 45 - 60	17.3	13.0	8.7	10.3	7.7	5.1			
			18.4	13.9	9.3	11.5	8.7	5.8			
			20.6	15.5	10.3	14.0	10.5	6.9			
Medium	Light	0 - 25 25 - 45 45 - 60	17.2	12.9	8.6	7.4	5.5	3.7			
			17.6	13.2	8.8	7.9	5.9	4.0			
			18.3	13.7	9.1	8.8	6.6	4.4			
Heavy	Light	0 - 25 25 - 45 45 - 60	24.9	18.6	12.4	11.4	8.5	5.8	6.7	5.0	3.3
			25.2	18.9	12.6	11.9	8.9	6.0	7.1	5.3	3.5
			26.0	19.4	13.0	12.8	9.7	6.4	7.8	5.8	4.0
Heavy	Heavy	0 - 25 25 - 45 45 - 60	27.6	20.6	13.8	14.8	11.1	7.4	9.4	7.0	4.8
			28.7	21.5	14.4	16.1	12.1	8.1	10.6	7.9	5.3
			30.9	23.1	15.4	18.7	14.0	9.4	12.7	9.6	6.4

Appendix B

Appendix A

Refer to AS/NZS 2918 for additional flue clearances to adjoining buildings.



All details in NZBC acceptable solution B1/AS3 still apply unless modified by this drawing.

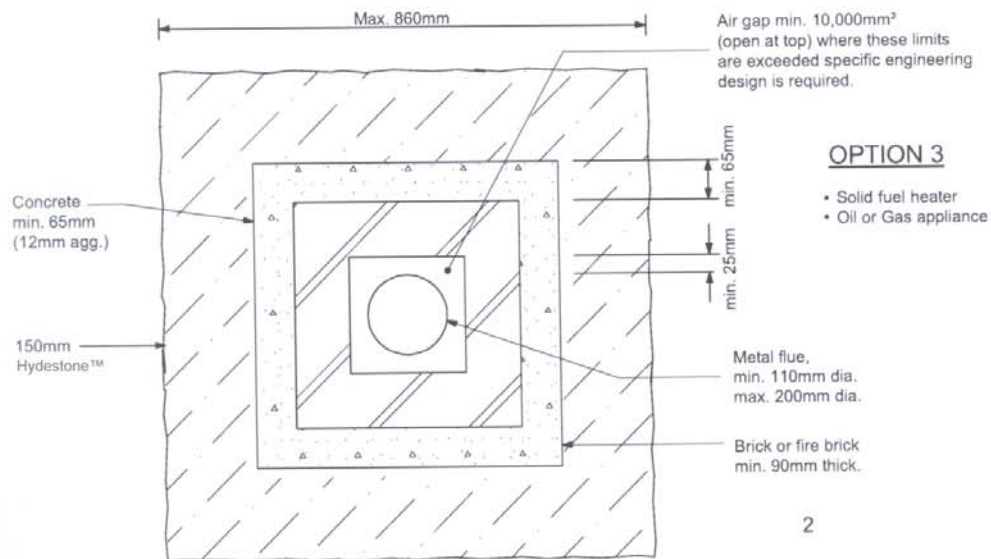
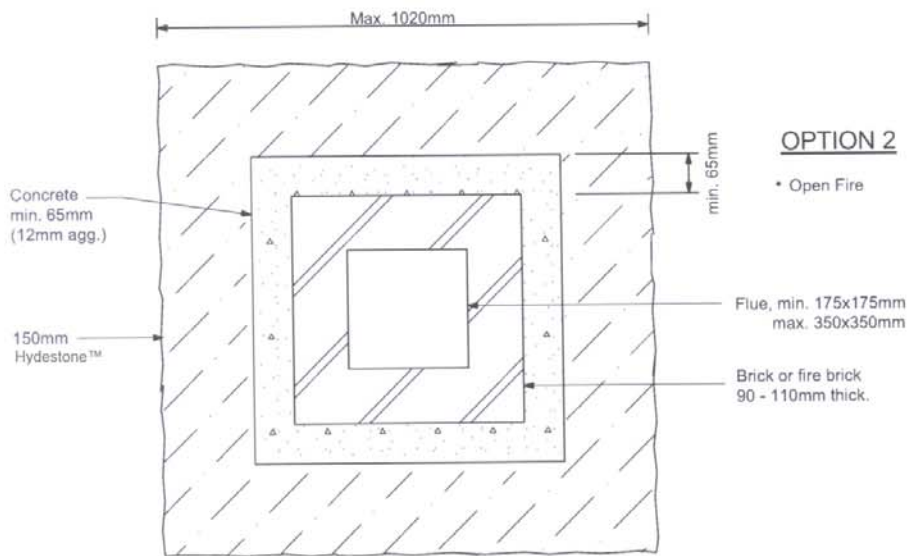
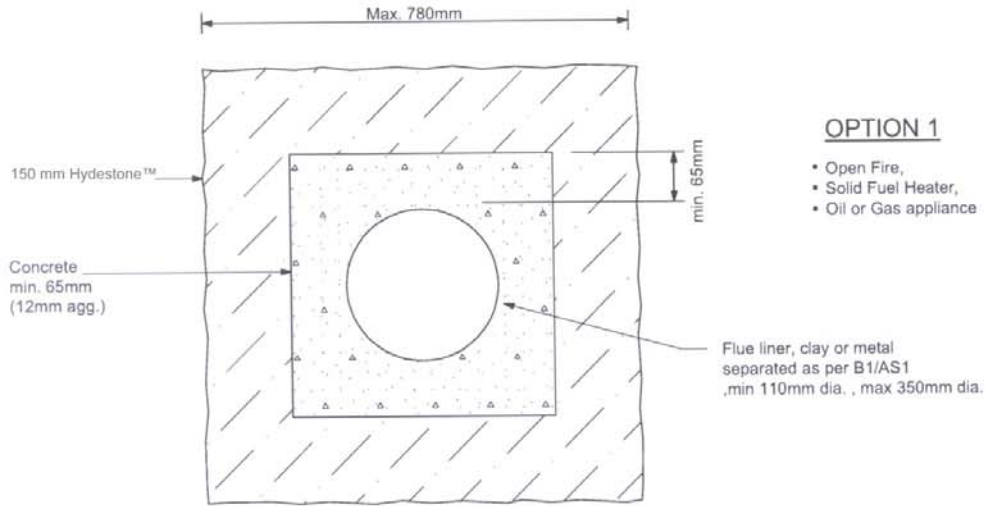
Limiting dimensions are shown in options 1, 2 and 3  
Beyond those limits, specific engineering design is required

Additional bracing demand to be added to NZS 3604 tables 5.8 or 5.10 :

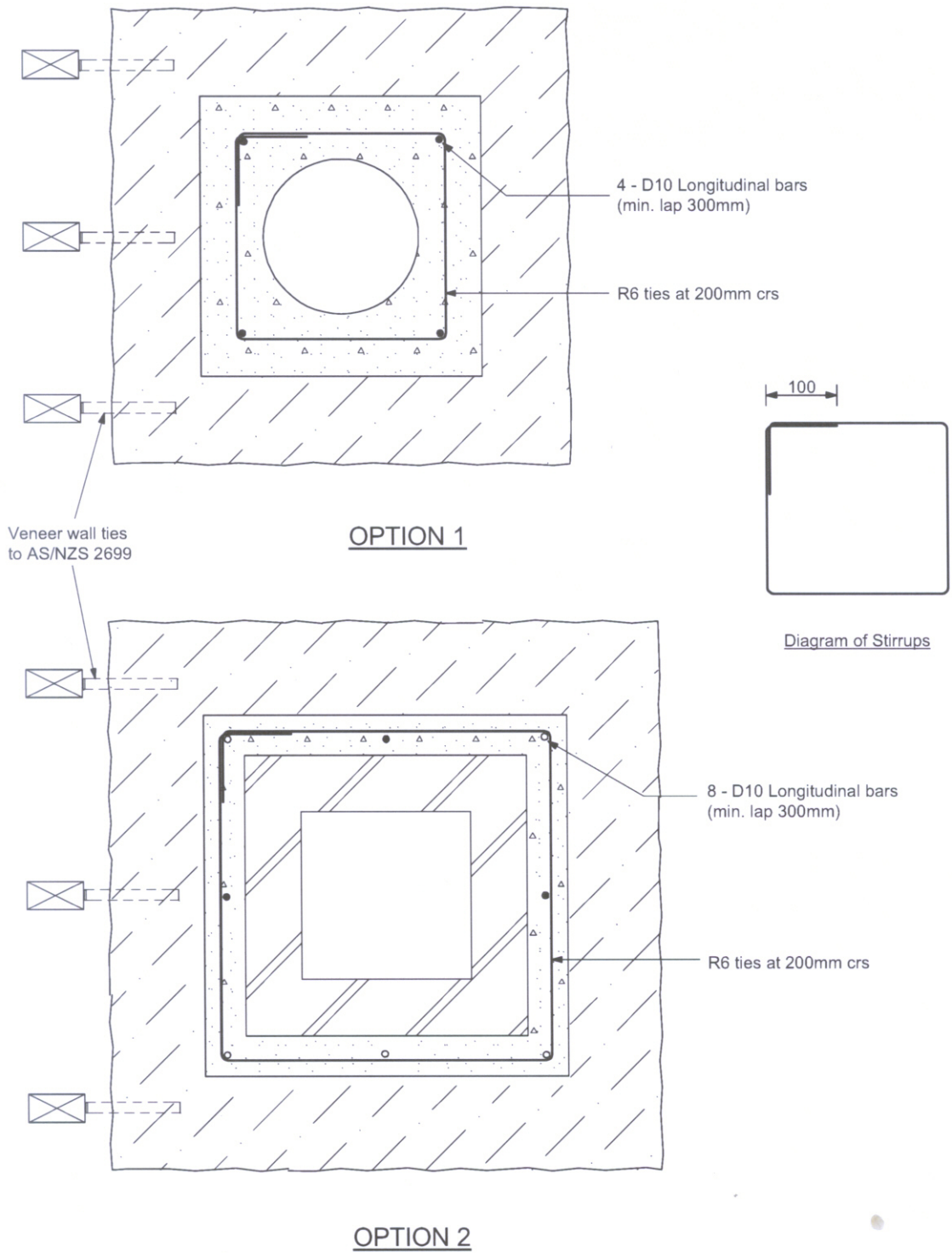
Zone A - 470 BU

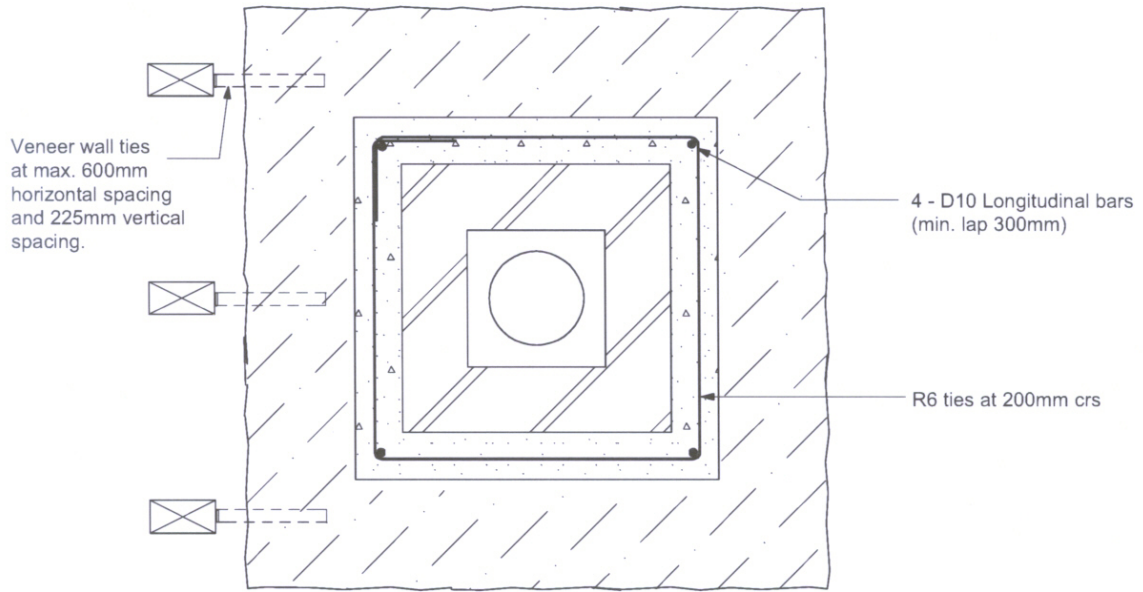
Zone B - 350 BU

Zone C - 235 BU



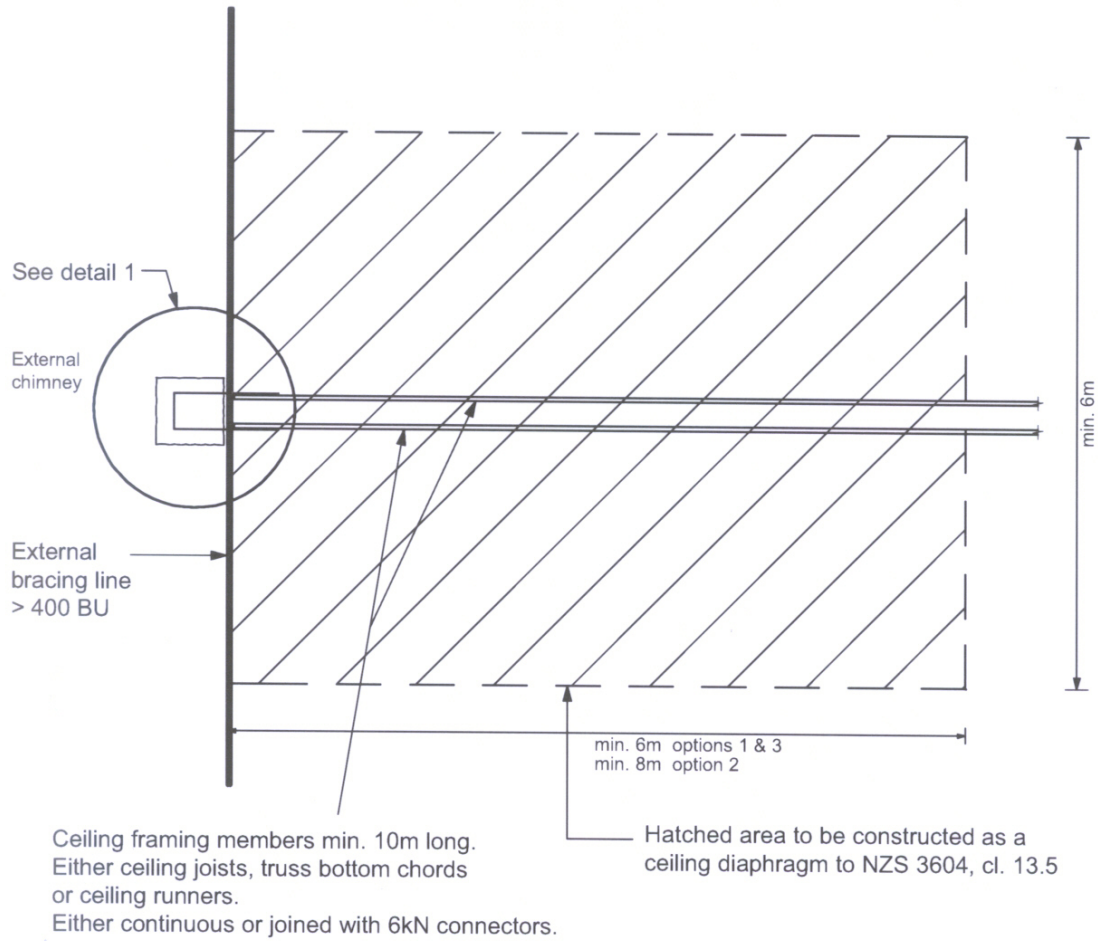




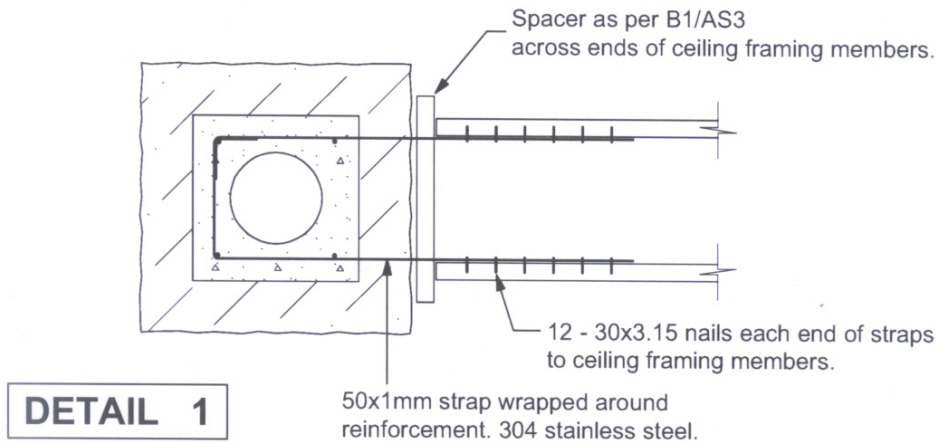


NOTE: Stone to be laid in stretcher bond.

OPTION 3

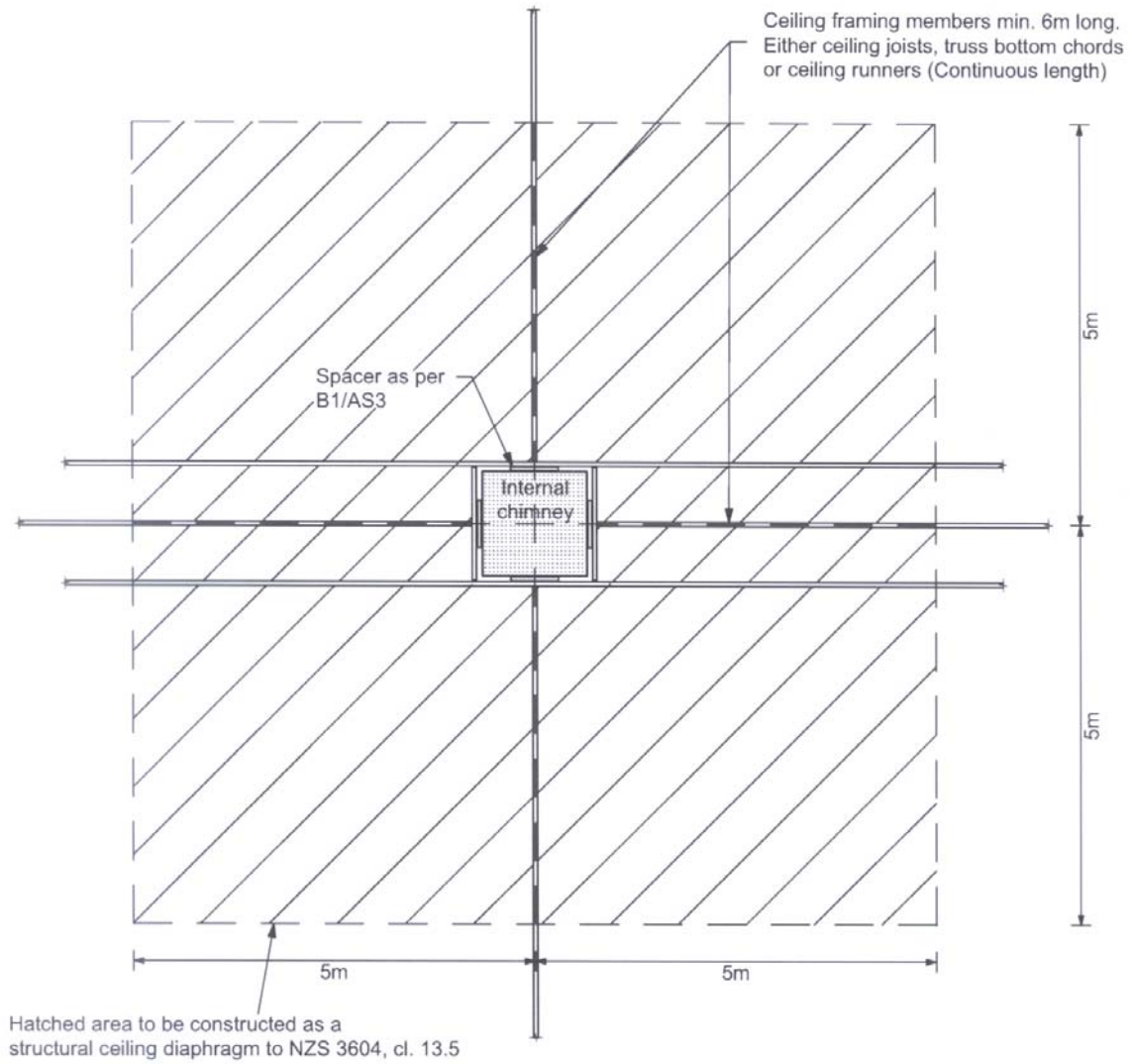


**PLAN AT CEILING LEVEL**



**DETAIL 1**

Note : If framing as shown cannot be accommodated, then specific engineering design is required.



**PLAN AT CEILING LEVEL  
(SIMILAR AT ROOF LEVEL)**

Note : If framing as shown cannot be accomodated,  
then attach chimney as for external situation

**Appendix C**  
**Hydestone Ltd Approved Stone Masons**

(1) **Auckland**

*Albany Stone Masons Ltd*

Chris Pallfy  
Ph & Fax 09 413 7979  
Cell 0274 909 274

*Dan Hitchcock*

Cell 021 412 731

*C W Grbic Masonry*

Chris Grbic  
Cell 027 970 361

*Stonescaping Ltd*

Rhonda Nicoll  
Cell 027 283 8069

*Stone Creations Ltd*

Joshua O'Conner  
Cell 021 786 632

*Spike Grimme*

Ph 09 810 9007  
Cell 027 501 3763

*Stonework*

Murray Smith ph/f 09 820 0439  
Cell 021 146 0753

(2) **Waikato**

*Albany Stone Masons Ltd*

Chris Pallfy  
Ph & Fax 09 413 7979  
Cell 0274 909 274

*ECLIPSE Landscaping*

Steve Vancoe  
Ph 07 854 5774  
Fax 07 854 5773

- Greenwell Bricklayers Ltd*  
Mank Greenwell 07 888 7128  
Cell 0274 935 472
- Matamata Bricklayers Ltd*  
Malcolm Raynell  
Cell 0274 799 933
- Stone Creations Ltd*  
Joshua O'Conner  
Cell 021 786 632
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Cell 0274 909 274
- Vernon Lamb*  
Cell 021 297 4913
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*Brian Whitley*  
Rotorua 07 348 8224
- Casmak Landscaping Ltd*  
Mark Henderson  
Tauranga 07 571 8134  
Cell 0272 967 949
- (5) **Taupo**  
*Albany Stone Masons Ltd*  
Chris Pallfy  
Ph & Fax 09 413 7979  
Cell 0274 909 274
- Stoneworks*  
Shane Shine 07 378 7769
- (6) **Manawatu**  
*Allan Parlane*  
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Palmerston North  
Ph 06 357 3266  
Cell 0274 497 226

- Kielstone Stone Masons***  
Martin Kiel  
Levin 06 367 0717  
Cell 0274 519 411
- (7) **Wellington**  
***Bam Bam Stonemasons Ltd***  
Nathan Walker 04 563 7667  
Cell 0272 239 922
- Bosworth Stone***  
Glen Bosworth 04 976 4099  
Cell 021 277 4098
- Stonewall Coy Ltd***  
Carl Gifford  
Cell 029997 18618
- (8) **Nelson; Marlborough and Canterbury**  
***Langs Natural Stone Ltd***  
256 Annex Road  
Christchurch  
Martin Lang 03 960 3307  
Fax 03 388 2056  
Cell 0274 999 623
- Stonelay Ltd***  
101 Shortland Street  
Jason Phillips  
Christchurch  
Ph 03 389 9353  
Cell 021 368 666
- Murray Wagstaff Ltd***  
6 Anzac Lane  
Methven  
Ph 03 302 8748  
Cell 0274 775 353
- (9) **Otago and Southland**  
***Bruce Lauder***  
Ph 03 445 9900  
Cell 021 735 472

***Franklin Stonemasons***

Rod Freeman  
Cell 027 248 4264

***Hollebon Landscaping***

Brad Hollebon  
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Ph 03 476 1177  
Cell 0274 364 430

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***Ken Harrison***

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***Mike Canson***

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