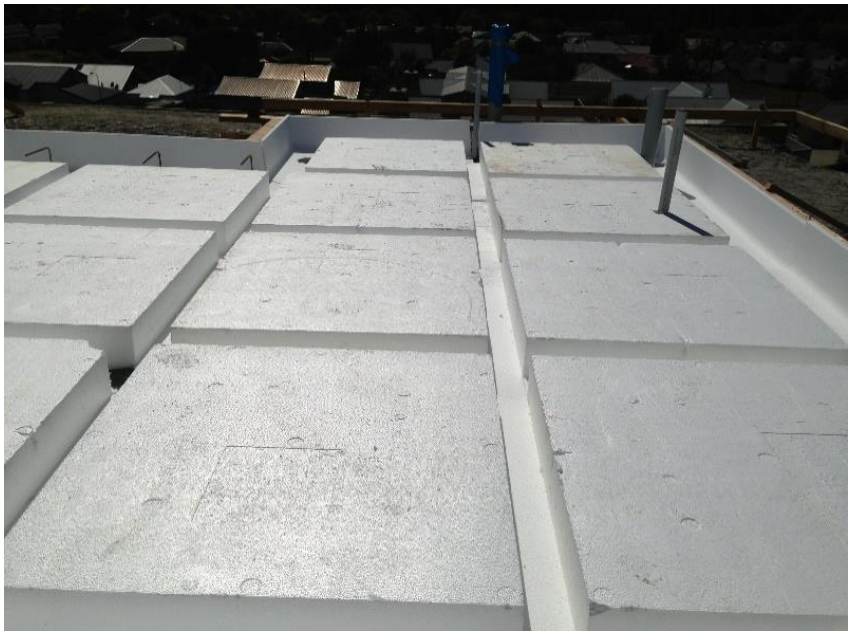
MAXRaft®

Fully Insulated Foundations



MAXRaft® Installation Manual

MAXRaft®
Fully Insulated Foundations

1 General

This Manual details the installation information required for the MAXRaft® system. All MAXRaft® fully insulated foundations require site-specific engineering and all concrete and reinforcing specified in the engineering must be adhered to when installing the MAXRaft® system. This Manual is to be utilised only by MAXRaft® personnel and authorised third parties.

2 Site Requirements

2.1 General

The sites must be prepared to the standard specified in the MAXRaft® quote and by the engineers.

Where reference is made in the MAXRaft® quote to excavations or otherwise referenced in a Geotech report, the site must adhere to standards recommended in the Geotech report.

Where fill is used to bring a site up to the required level, or as a replacement for excavated soil, it should be tested to ensure that it meets the ground bearing capacity previously specified by MAXRaft®.

The contractor is to check all dimensions with the architectural drawings and notify MAXRaft® of any discrepancy before construction.

3 Installation Procedure

3.1 Site Preparation

The site should be cut to underside of slab level plus any extra allowance for hard fill and blinding layers.

All vegetation, topsoil and other loose material shall be removed from the building footprint as per distance specified by engineer.

Where fill is required, it shall adhere to the requirements set out in section 2 - Site Requirements.

The cut platform should not be left exposed to dry out for any significant time, particularly where expansive soils have been identified.

Set out the foundation plan on profiles, keeping profiles 800mm from the building line.

3.2 Plumbing and services

Plumbing and services required beneath the slab should be planned and laid to the required location; then brought up at 90 degrees through the subgrade to a height that takes account of the sand blinding, the MAXRaft® insulation and the concrete topping, as per Fig 1. The trenching and placement shall conform to the project architect's consent documentation. Plumbing should be kept a minimum of 50mm from the profile lines where possible.

Fig 1

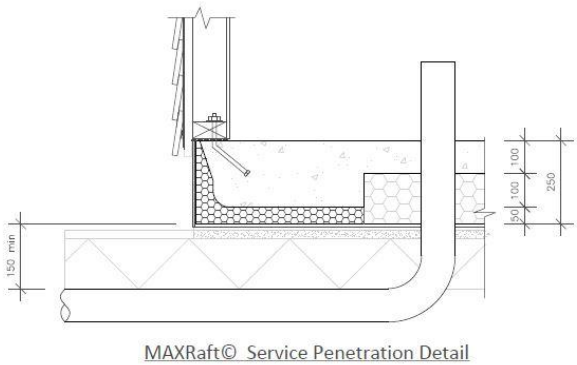


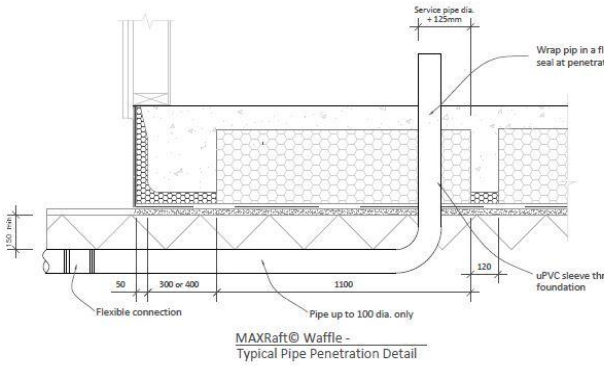
Fig 2 Standard MAXRaft® Penetration

Material excavated when digging plumbing trenches should be discarded outside the perimeter of the building footprint. The trenches should be refilled with hardfill and topped with compacted sand, screeded to the correct level.

Plumbing/Services brought through the slab should be covered with a 25mm thick polystyrene capping for protection. Where required, pipes can be run through the MAXRaft® insulation by removing polystyrene locally around the piping following installation of the MAXRaft® insulation.

Where MAXRaft® 320 or MAXRaft® 400 is utilised, no one pod may support more than one penetration of greater than 100mm. Where more than one such penetration is required within the confines of a single pod, a 120mm rib shall be inserted to divide the pod into two separate areas.

Fig 3 - MAXRaft® 320 or MAXRaft® 400 Penetration:



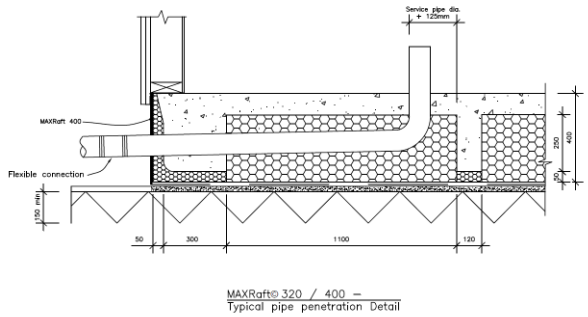


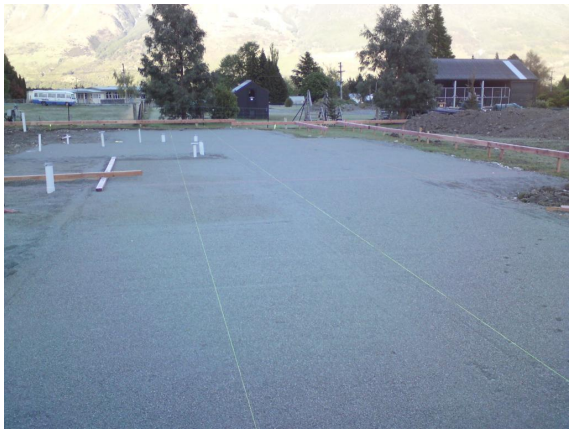
Fig 3

3.3 Sand Blinding

A layer of sand/scalpings 25mm deep consisting of compacted fines shall be laid over the building platform, and extending at least 500mm beyond the perimeter of the foundation slab. This blinding must be compacted and levelled to +/- 3mm of the desired level, as per Fig 4.

If the building platform is over clay, ensure the clay surface has not been softened by building activity.

Fig 4



If the clay has been softened, remove the softened material and replace compacted screed. If the depth of the softened clay is over 50mm beneath the desired base of the MAXRaft®, fill shall be placed instead in accordance with Clause 7.5.3 NZS3604:2011.

The sand is required to ensure a level platform is provided for the MAXRaft® system and that the system remains level and stable throughout the installation process and to provide a smooth surface to receive the damp proof membrane (DPM).

If blinding is done before plumbing, additional blinding material should be left on site to infill plumbing excavations.

3.4 Formwork

MAXRaft® recommends the use of LVL's or shutters as formwork at up to 1500mm centres. Although the MAXRaft edge requires

less bracing than a traditional waffle slab, shuttering will ensure a strong and tidy finish and make the process of installing rebates easier.

Fig 5. Typical MAXRaft LVL

The formwork should be set to a height of the slab and concrete placed with a laser to ensure the appropriate finish.

Fig 6, alternative boxing

3.5 Damp Proof Membrane (DPM)

A continuous layer of 0.25mm damp proof membrane consisting of polythene sheeting in accordance with NZS3604:2011 shall be used under the MAXRaft®. The DPM should be placed on top of the sand blinding layer over the foundation area plus an additional 100mm extending past the foundation line and cut in a straight line at the end of the 100mm extension.

Fig 7

The joints should lap at least 150mm and be sealed with pressure sensitive tape.

All penetrations through the DPM by services/plumbing shall be sealed with similar tape.

The DPM may either extend beyond the formwork or may be stapled to the inside of the formwork. If stapling, ensure that there is enough material to allow for a 90 degree angle at the base to allow the MAXRaft® insulation to sit up against the formwork, Fig 8. If using staples be mindful of tears. Damage to the DPM will require repair.

Fig 8

It is imperative that the Polythene DPM is protected and kept straight and clean during construction as the exterior coating system will be applied down the face of the finished MAXRaft® and out onto the Polythene DPM.

3.6 Mitring Profiles

For our 'Drop-Off'' service outside the Central Otago/Otago area, the MAXRaft perimeter footings may require mitring. This is done by working from the panel plan to identify the perimeter length and left hand or right hand mitred side.

Use a set square to mark the 45deg angle and a skillsaw/handsaw to cut through the footing base. Then use a handsaw to saw down the upstand wall, to complete the mitred corner.

See figs, 9, 10 and 11

Fig 9

Fig 10

Fig 11

3.7 MAXRaft® installation

The MAXRaft system will be delivered with a panel plan and goes together like a jigsaw. Each piece will be labelled and should be placed as designated in the panel plan provided.

If a schist veneer is specified, a 100mm diameter hole should be cut around the protruding steel. This will allow for the concrete to be poured around it to ensure a good connection. Any polythene beneath this hole should be cut away.

Fig 12

Cut any service holes that may be required 20mm larger than the size of the penetration using either a gibsaw, holesaw, sabre saw or a handsaw. This should be done away from the building footprint to ensure no polystyrene beads float up during concrete placement.

Once the penetration has been inserted through the hole, this area must be filled with Expanding Foam to ensure a seal is created, Fig 13.

Fig 13

Once the steel has been laid in line with the directions below, perimeter corners and joins should be sealed by placing a line of Expanding Foam between the relevant footings and any other gaps, Fig 14.

Fig 14

3.8 Reinforcing Steel

Reinforcing steel, whether in the perimeter footings, internal thickenings or in ribs (if using MAXRaft® 320 or MAXRaft® 400), shall be laid in accordance with the specifications as per the engineering plans. All laps and stirrups must comply with the relevant specifications.

The steel reinforcing can come in pre-tied lengths before the MAXRaft® arrives. This allows you to place them in the footings once the MAXRaft® system is in place. Chair up all reinforcing.

The concrete cover for reinforcing steel will be specified in the engineering documents.

Where steel fibres have been specified, install reinforcing steel as specified in the engineering documents and keep a copy of the concrete delivery slip to record the steel fibre quantities within.

3.9 Reinforcing Mesh

Mesh as specified in the engineering documents shall be placed over the MAXRaft® insulation and supported on chairs as per fig 15. The chairs should be of sufficient number to ensure that the mesh does not sag excessively between support points. The mesh should be lapped as per mesh specification and tied at all laps.

Fig 15

If a PS4 is required for the building consent, the reinforcement requires inspection by a suitably qualified engineer to ensure it has been placed satisfactorily. This shall be done prior to pouring the concrete. If a PS4 is not required, the local authority shall inspect the reinforcement prior to the concrete pour.

3.9.1 Rebates

Timber rebates shall be inserted where necessary as dictated by the architect's plans.

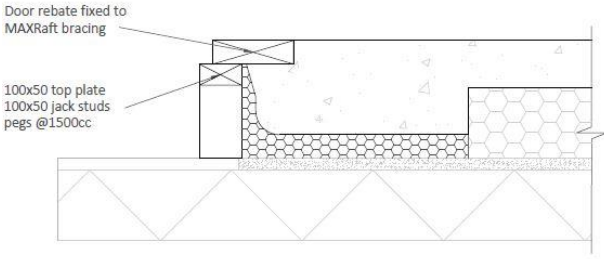
Any gaps between the perimeter mouldings and the rebates should be filled with expanding foam.

All rebates to be H3 timber.

3.9.2 Door Rebates

Timber rebates are fixed to the perimeter

100 x 50mm brace as per Fig 16.



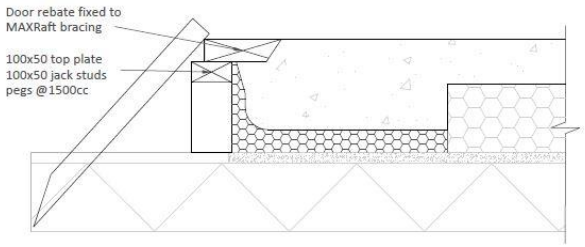
MAXRaft© Door Rebate

Fig 16

3.9.3 Brick Rebates

Timber rebates are fixed to the perimeter 100 x 50mm brace as per Fig 17.

The dimensions of the brick rebate will be specified in the MAXRaft® engineering document. Fig 17



MAXRaft© 90mm Brick Veneer

3.9.4 Shower Rebates

Box any shower rebates with 150 x 50mm formwork. The concrete is to be poured separately.

The shower rebate may occasionally be specified in the engineering documents. Where it is not specified, the MAXRaft® insulation is to be cut locally to ensure the concrete topping remains consistent with the rest of the floor.

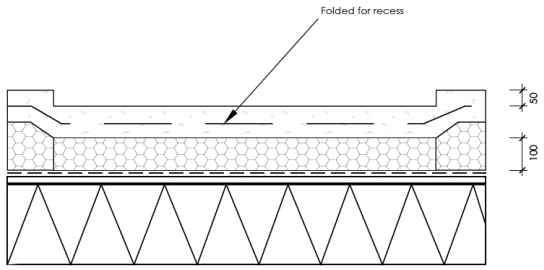
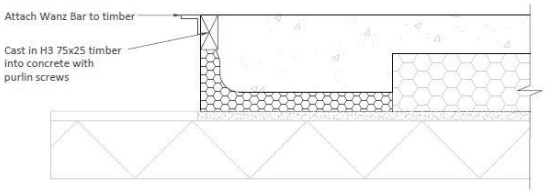


Fig 18

3.10 Door/Window Supports

H3 Timber can be cast into the MAXRaft® with Purlin screws, a WANZ bar can be fixed to this for exterior joinery as shown below in Fig 19.

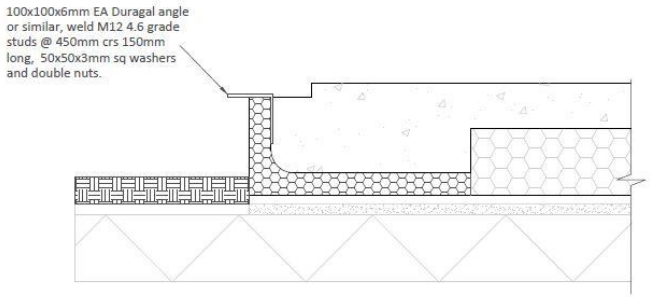
The cast in timber shall be placed below the desired rebate. Cut down the MAXRaft® mouldings below the level of the rebate to create room for the cast in timber. Foam up any gaps that appear between the timber and the mouldings once the timber is secure.



MAXRaft© Wanz Bar Fixing

Fig 19

Alternatively, if larger architectural doors are being used which require larger extrusions, a cast in galvanised angle can be used as shown in Fig 20.



MAXRaft© Door/Window Support Angle

Fig 20.

3.11 In-slab heating

Your heating contractor will install their pipes or cables. Depending on the heating system and the concrete cover, it may be possible to staple the heating system directly onto the MAXRaft® insulation as per Fig 21. If the heating system is laid on top of the mesh a 120mm slab may be required.

If the pipes are being stapled directly to the insulation, the heating system should be put in place prior to laying the mesh reinforcement, but after laying the perimeter reinforcement.

Where the heating system is being stapled directly onto the MAXRaft® insulation, the topping concrete thickness of at least 100mm will be required.

Fig 21

3.12 Bottom Plate Fixings

There are several options for the bottom plate fixings, depending on the width of the timber wall framing.

Bottom plate fixings and bracing hold down requirements may also be specified in the MAXRaft® engineering documents. See table 1 below.

Bottom Plate Fixings		
	90mm Framing	140mm framing
Cast-in bolts	✓	✓
Screw-in bolts	X	✓
Epcon C6 Chemset Anchors	X	✓

Table 1

3.12.2 Screw in Bolt for 140mm

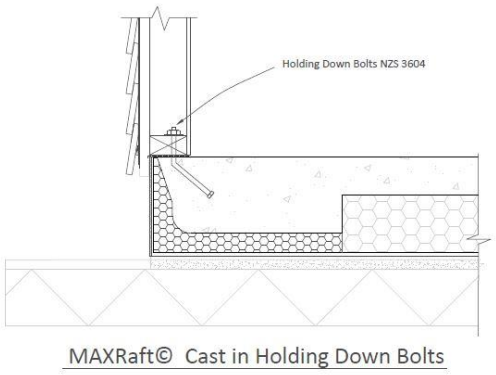
Screw in Bolts of 15kN capacity may be used on 140mm framing. These should be placed at 900mm centres.

1) Mark out the position of where the screw bolts are to be fixed, with the square washer flush with the inside of the frame
2) Drill a 12mm hole 100mm deep.
3) Clean out all of the dust in hole.
4) Using a Rattlegun fix a 10mm diameter 145mm long screwbolt through a square washer into place.

Fig 23

3.12.3 Cast in Holding Down Bolt for 90mm

Holding down bolts as per NZS3604:2011 may be used as per Fig 24.



MAXRaft© Cast in Holding Down Bolts

Fig 24

3.12.4 – Chemical Anchors

Ramset M10 Grade 5.8 Chemset Studs with Epcon C6 or Structaset 401 may be used.

3.12.5 – Bracing Elements

Any additional 15kN fixing required for 90mm bracing element hold downs to be Ramset Epcon C6 Chemical Anchors with 25mm edge distance to internal face of framing.

Any additional 15 kN fixing required for bracing element hold downs to be Hilti M10 Screw Anchors with 25mm edge distance to internal face of framing.

3.13 Concrete Installation

Concrete placing should be carried out by experienced contractors, strictly in accordance with NZS3109:1997, Clause 7.

Concrete strength and depth will be specified in the engineering documents.

Ensure reinforcement has been inspected by either a qualified engineer or council prior to pouring concrete.

3.13.1 Placing

The concrete shall be poured in such a manner as to ensure that the MAXRaft® insulation does not move during the process.

Ideally, concrete should be placed through the centre of the foundation prior to placing the perimeter footings, internal thickenings or ribs to prevent flotation or movement during placing. The concrete should not be directed at the upstand of the perimeter insulation as the formwork is not designed to withstand direct impact and may break under the pressure.

The concrete shall be placed in such a manner as to minimise segregation.

The concrete shall be compacted by vibration around all steel and against all rebates and perimeter footings.

3.13.2 Finishing

The concrete should be screeded with the assistance of a level immediately after placing and compaction has been completed. Ensure the top surface is finished within tolerance using a laser level. Do not use the top of the MAXRaft® as a base point for levelling the concrete.

Clean any concrete off the polythene and the MAXRaft® system.

3.13.3 Curing

Where the possibility of adverse weather conditions could lead to early drying of the top surface, the contractor should consider delaying the pour, or alternatively, take appropriate actions to ensure plastic cracking does not form on the surface of the slab.

Proper curing methods are recommended as follows:

- Ponding of water (Fig 25)
- Continuous sprinkling of the slab
- Placing wet sacking over the slab

Fig 25

If a large change in temperature is expected within 24 hours of pouring, then ponding or continuous sprinkling is recommended to mitigate adverse effects in the slab.

Where a polished concrete floor is specified, we recommend ponding the slab soon after placing for 3 days (or as long as possible).

When ponding, lay a 10mm high strip of foam around the top of the perimeter to keep the water in place.

3.13.4 Saw Cuts

Where control joints are provided as specified in NZS 3604, floor finish, the location of load bearing walls and underfloor heating should be taken into account. Saw cuts should be cut into the slab within 24 hours after pouring once the slab is sufficiently hard.

Saw cuts should be approximately 1/3rd of the concrete topping thickness, with a minimum 25mm deep cut for concrete 85mm thick. For large floors, formed control joints may be required.

Saw cuts shall be placed where specified in the architect's plans.

If the slab has been ponded, it should be re-ponded after saw cuts have been completed.

3.14 Removal of Formwork

The formwork must not be removed within 12 hours of finishing the slab. No loads are to be placed on either the slab or the MAXRaft® insulation before the concrete has cured sufficiently over 4 days.

Formwork should be removed with care so as not to damage the MAXRaft® exterior or polythene under layer. Once the boxing is stripped the poly should be checked for any non-conformities (concrete spillage etc.) and cleaned down straight away before it sets to leave a clean MAXRaft outside face of the slab.

3.15 Landscaping / Paving

Landscaping/paving shall not take place until the exterior of the MAXRaft® perimeter has been protected with the relevant coating application.

Where possible a 60mm drainage strip between the MAXRaft and path should be laid, Fig 26.

Fig 26

If concrete paths are to be laid, drainage should be as per E2 NZBC e.g. a slot drain or similar. Fig 27

Fig 27

The minimum levels for paved, concrete and landscaped surfaces are set out in NZBC E2 and should be adhered to.

Allowance shall also be made to ensure that large trees and their associated roots do not impact on the stability of the MAXRaft®.

4 Protecting the MAXRaft® System

4.1 General

The MAXRaft® system exterior requires protection from physical damage, UV rays and water absorption.

MAXRaft® should be protected by the use of a coating that protects the insulation and is suitable for use in the subgrade.

Where the coating is not tanked on to the DPM extending beneath the MAXRaft®, a layer of weathertight flashing tape with a bead of silicone at the junction of the MAXRaft® and DPM should be placed beneath the coating, attaching to both the MAXRaft® and DPM with an overlap of at least 10mm on each.

Coating products must be applied in line with the relevant manufacturer's specifications.

For ease of application it is recommended that the exterior coating is applied to the MAXRaft edge prior to the external cladding being installed.

There are a number of protection systems available, some of which are listed below. These systems meet the relevant requirements for subgrade protection.

- Beccrete;
- Plaster in conjunction with plaster-able weathertight flashing tape (Exterior Insulation and Finish Systems Tape);
- Supercoat MFS Waterproofing and Finishing System;
- StoMiral Plaster System;
- Specialized – Tankit Penetration Waterproofing System.

The MAXRaft website is regularly updated with further systems as they become available (http://www.maxraft.co.nz/protecting-maxraft/)

4.2 Beccrete Edge Protection;

Beccrete on MAXRaft has been specifically engineered for MAXRaft EPS & XPS Edge. The system comprises of a butyl tape to seal the polystyrene-polythene junction, then a waterproofing slurry coat is applied to the polystyrene edge over the tape. Specialised Beccrete products along with selected sands and pigments are added then mixed to make the first stage of Beccrete. This is then applied at 2-3mm thick with Alkalai resistant fibreglass mesh embedded into the surface to

create the second stage. The final stage is a 2mm application before curing.

This system is installed by approved Beccrete applicators.

4.3 Supercoat MFS Waterproofing and Finishing System;

This system is installed by approved Supercoat applicators. It must be applied as described in the Supercoat MAXRaft Foundation System Specification. In order to prepare the MAXRaft® for application of the Supercoat system, the MAXRaft® exterior and polythene DPM should be clean and dry. A 5 coat system will be applied by the applicator as per the Supercoat MFS Technical Manual.

It can be applied so that the membrane stops at the top of the MAXRaft® exterior, Fig 27, or it can continue beneath the bottom plate, Fig 28

4.1 MAXRaft™ Foundation System (MFS) Supercoat™ Alternative Detail 2

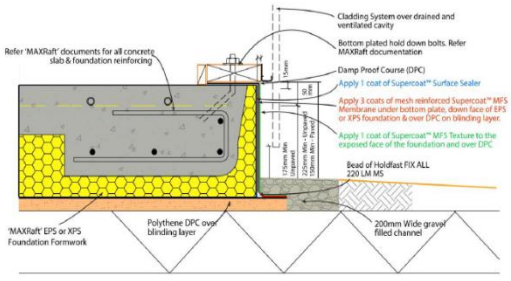
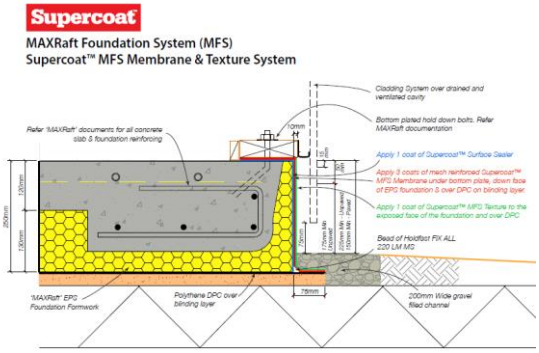


Fig 27

Fig 28

4.4 StoMiral Plaster System;

The StoMiral Plaster System should be installed by a Sto Contractor in line with the MAXRaft Insulated Foundation Construction – StoMiral Plaster System over MAXRaft Foundations guidelines.



4.5 Specialized – Tankit Penetration Waterproofing System

The Specialized Tankit waterproofing membrane is a one component polymer modified cementitious material which is mixed with clean potable water and used in conjunction with fiberglass reinforcing material to create a high build membrane. It is formulated to be applied over a variety of properly prepared surfaces. Application as per the Tankit Waterproofing Specification.

5 Durability

Where MAXRaft® is correctly specified, installed, protected and maintained in line with this guide and the Technical Manual, it will meet the NZBC 1992 B2 Clause requirement for at least 50 years life expectancy.

The MAXRaft® Durability Statement can be provided upon request.

A signed quality assurance form from MAXRaft® must be provided to ensure that the polystyrene has been supplied in line with the PS1 and is covered by the Durability statement.

6 Builder's Responsibilities

It is the builder's responsibility to ensure that all the above procedures are followed when installing a MAXRaft® foundation.

The builder is also responsible for ensuring that the house dimensions are correct after

concreting and prior to the construction of any framing.

Tools Required

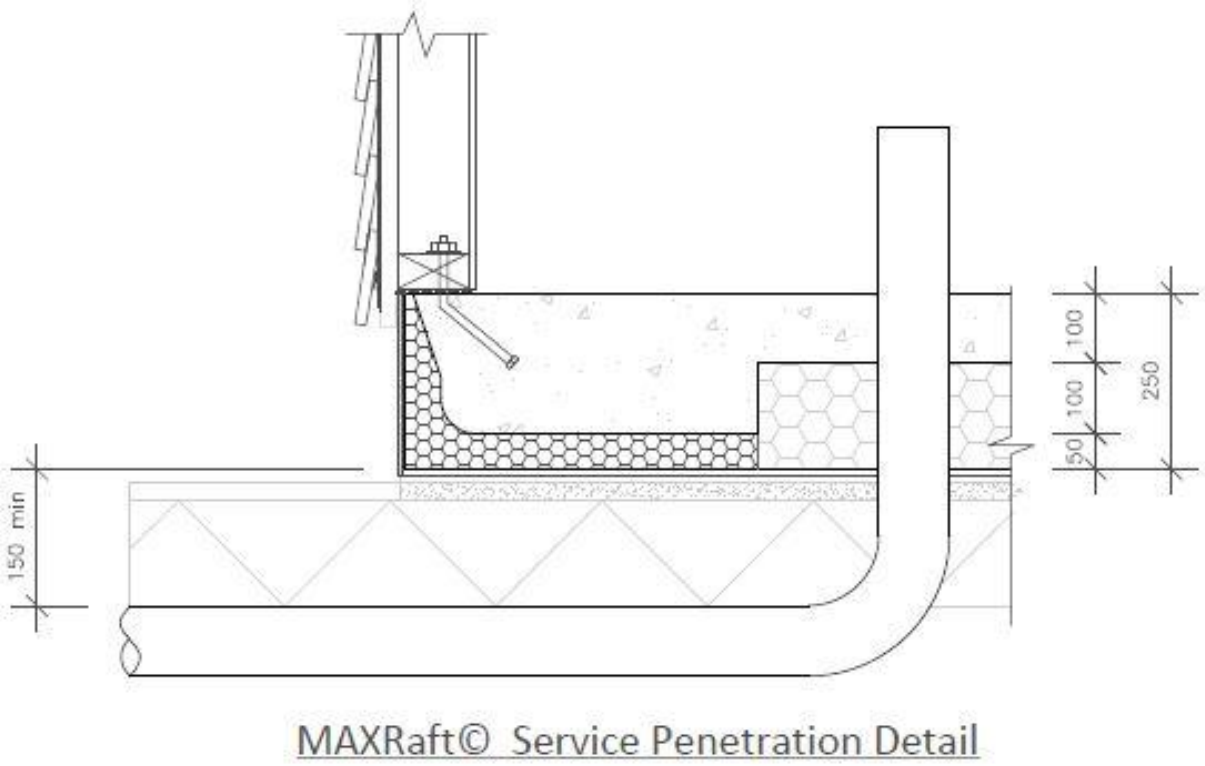
- Profiles / stringlines – to ensure building is correctly sited.
- Laser level – to ensure profiles and substrate are at correct level.
- Sledgehammer – to ensure bracing is stable.

- Screws or nails – for bracing and supports.
- Most up to date plans sent to MAXRaft® – to ensure cuts are to correct size and can be placed correctly.
- Handsaw – to cut out any penetrations.
- Gibsaw – for any additional onsite cuts.
- Skillsaw – to mitre corners
- 45° protractor
- Polythene & Tape – to ensure DPM, lapped as per S.2.3.5 above.

- 100 x 50 MAXRaft® formwork – to ensure support for MAXRaft® as concrete is being poured.
- Reinforcement bent & tied – to allow for easy positioning where reinforcing is required as per engineering.
- Cans of Sika Boom-G expanding foam – to fill around penetrations and gaps, and glue mitred corners and joins together.
- Site set up as per onsite guide.

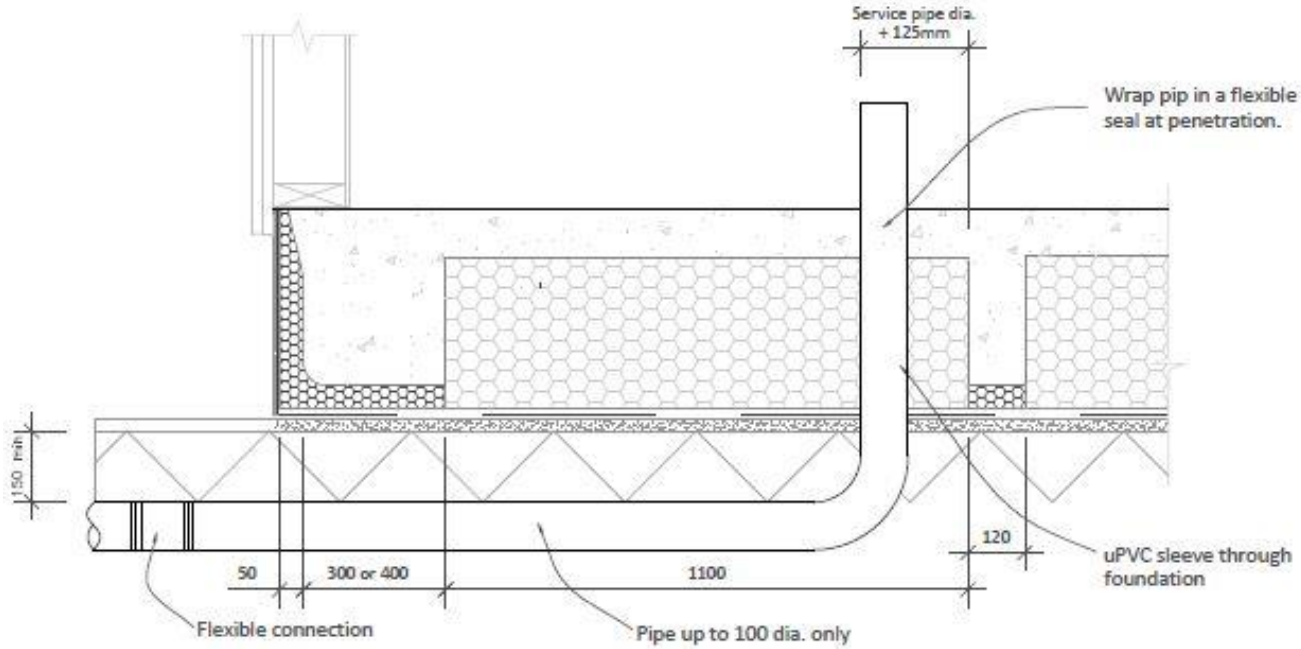
Enlarged Pictures

Fig 1

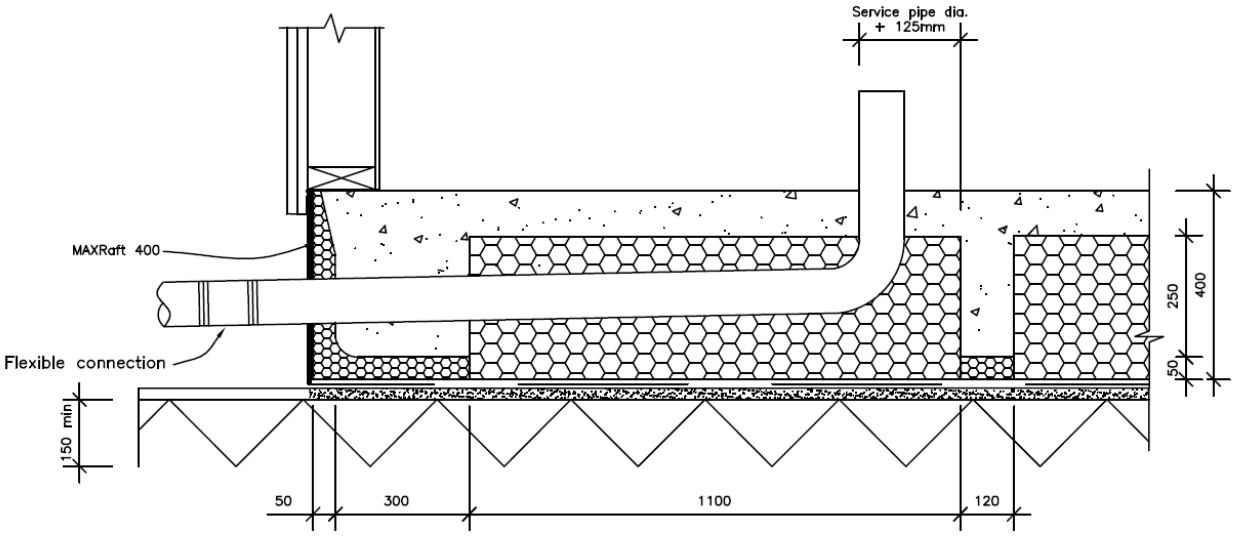


MAXRaft© Service Penetration Detail

Fig 2



MAXRaft© Waffle -
Typical Pipe Penetration Detail



MAXRaft© 320 / 400 –
Typical pipe penetration Detail

Fig 3

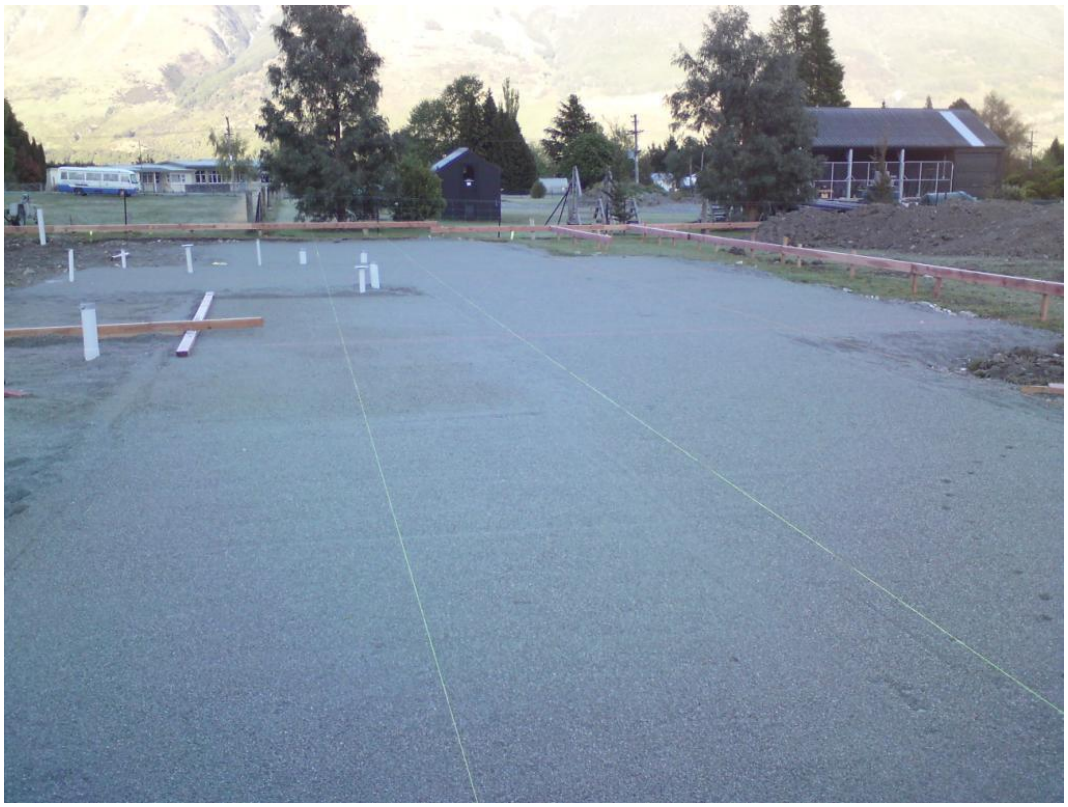


Fig 4

Fig 5

Fig 6

Fig 7

Fig 8

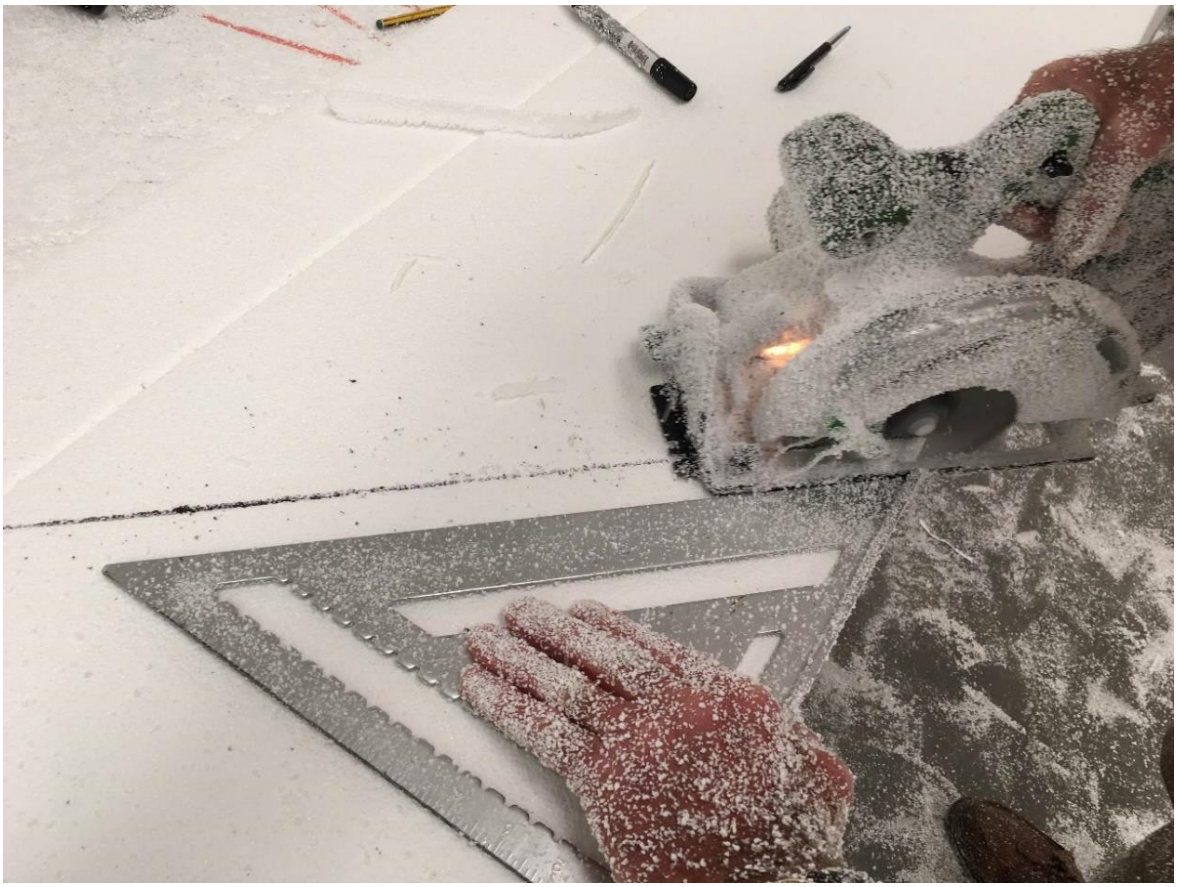


Fig 9

Fig 10

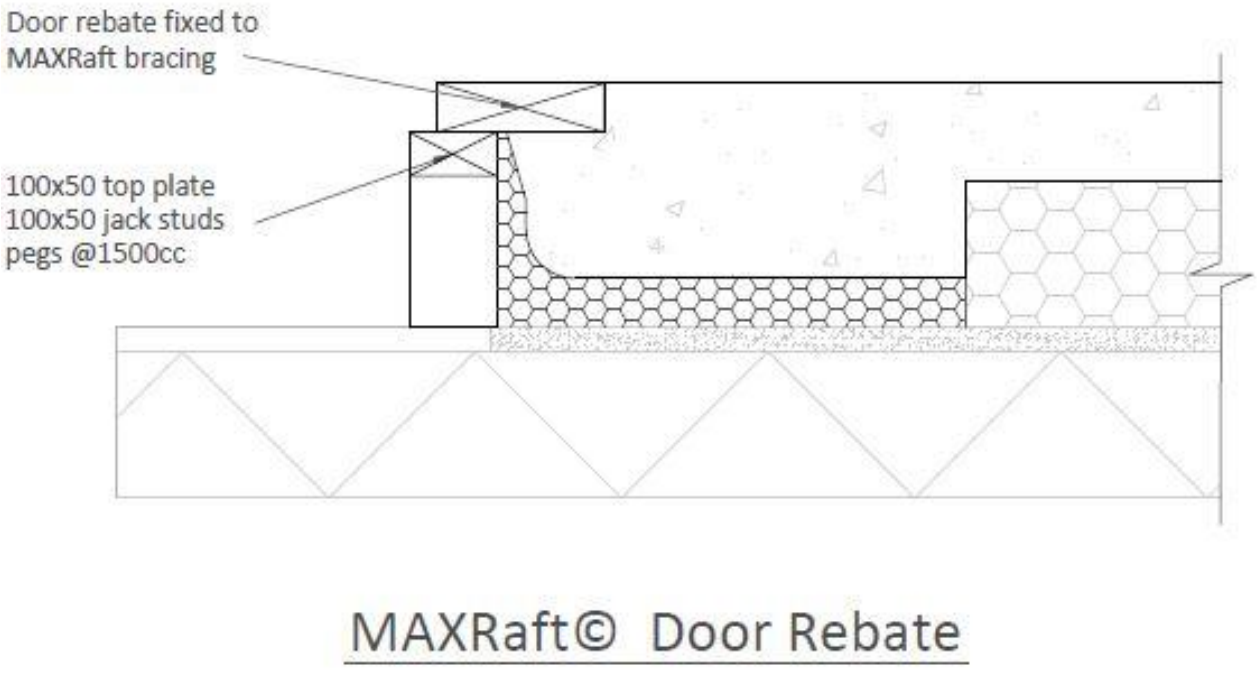
Fig 11

Fig 12

Fig 13

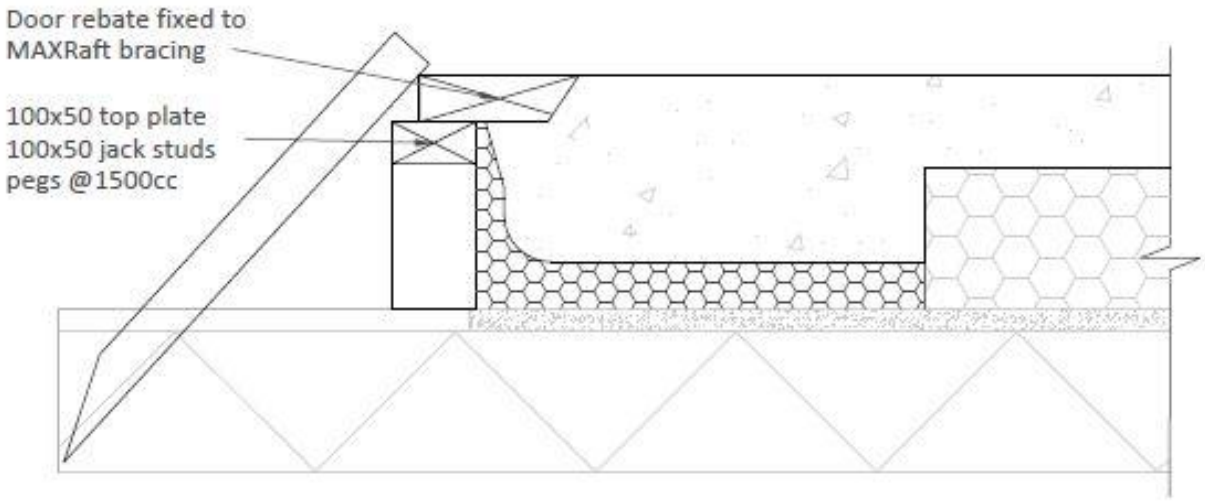
Fig 14

Fig 15



MAXRaft© Door Rebate

Fig 16



MAXRaft© 90mm Brick Veneer

Fig 17

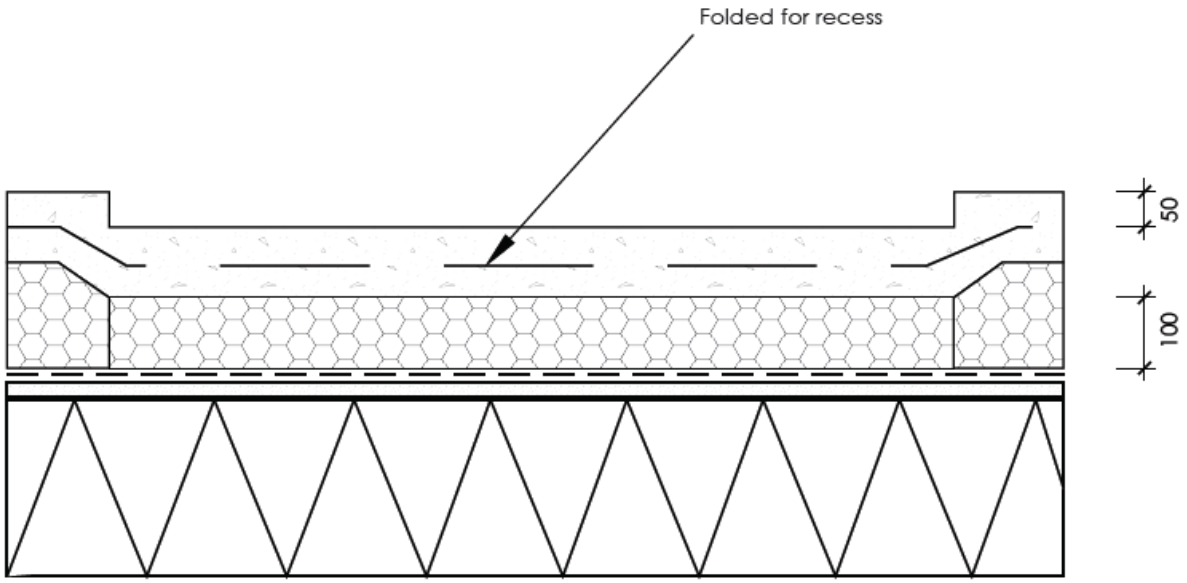


Fig 18 Shower Rebate

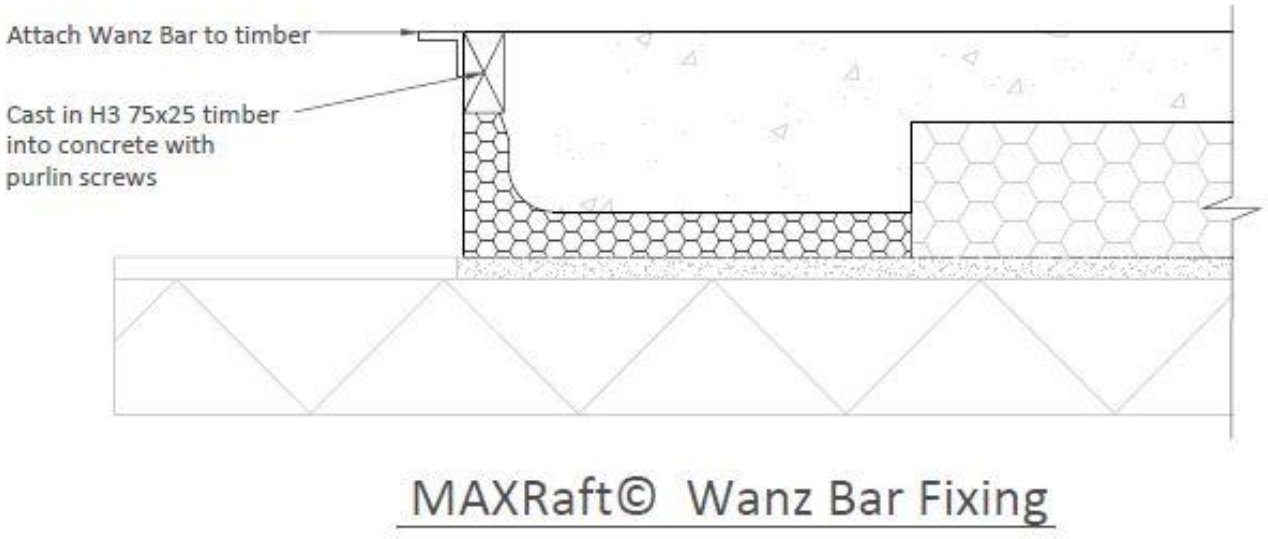


Fig 19

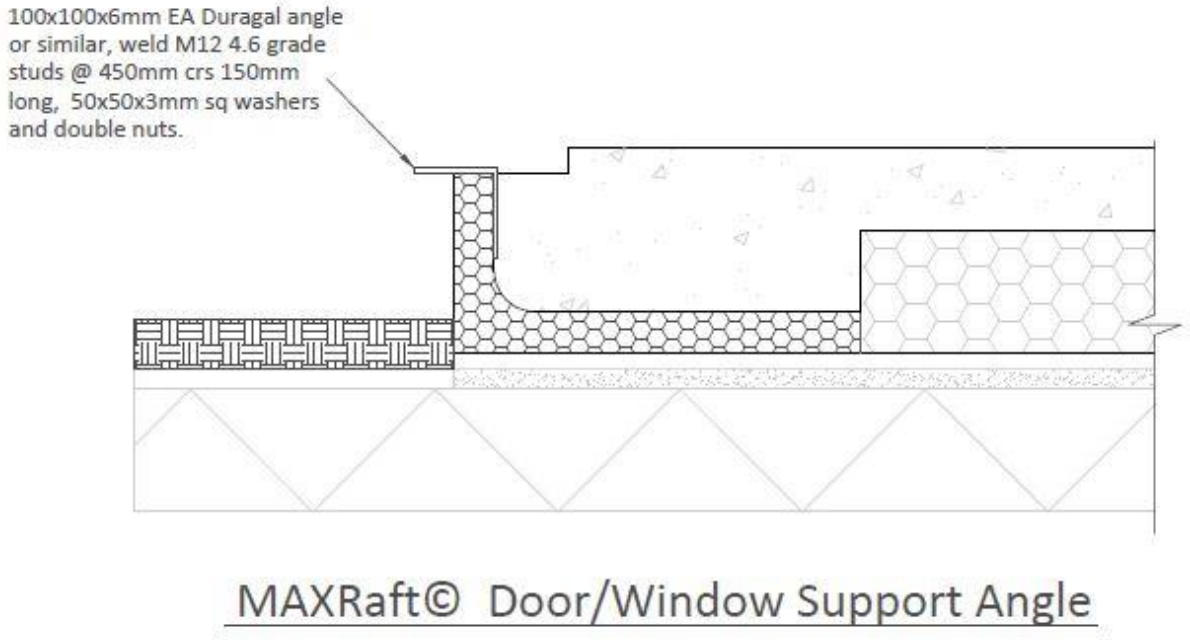


Fig 20

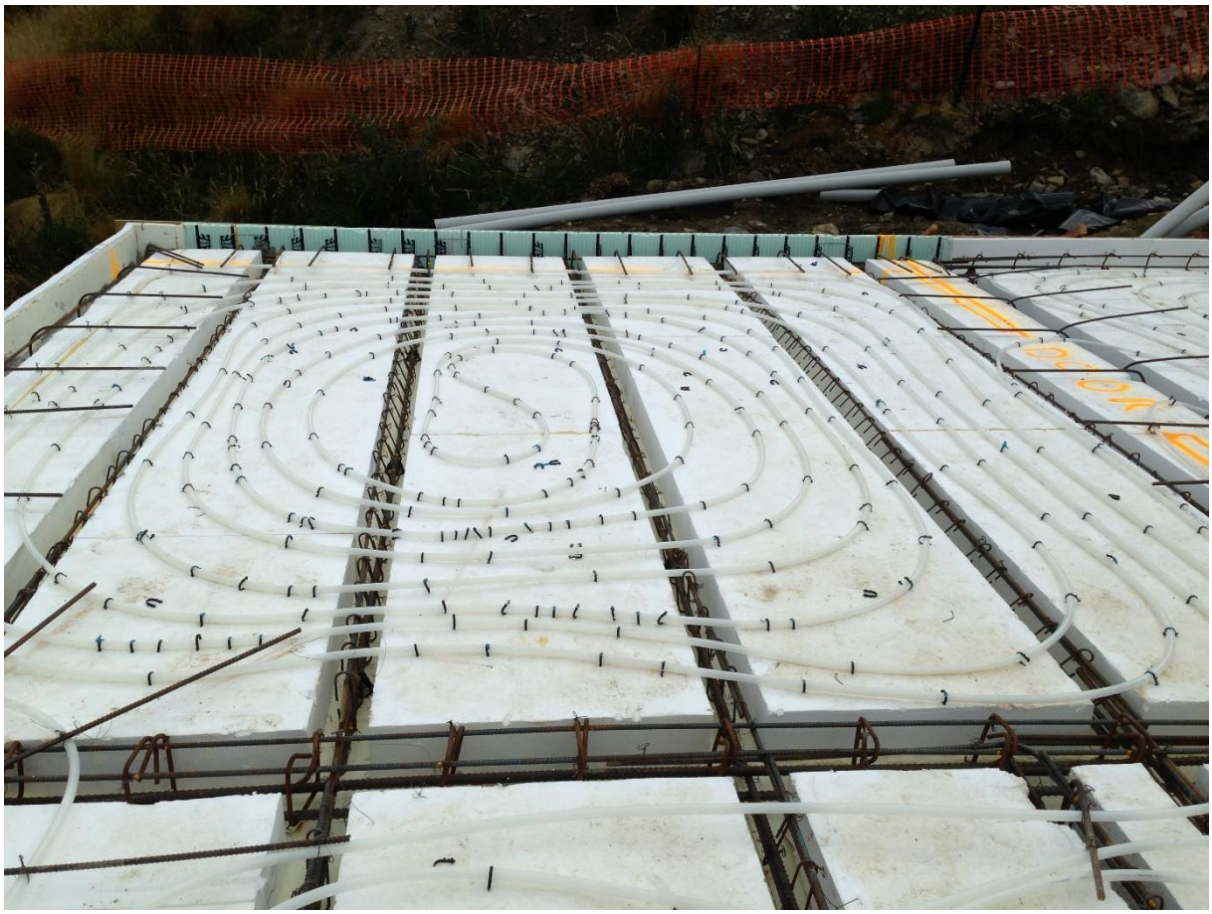


Fig 21

Fi

Fig 23

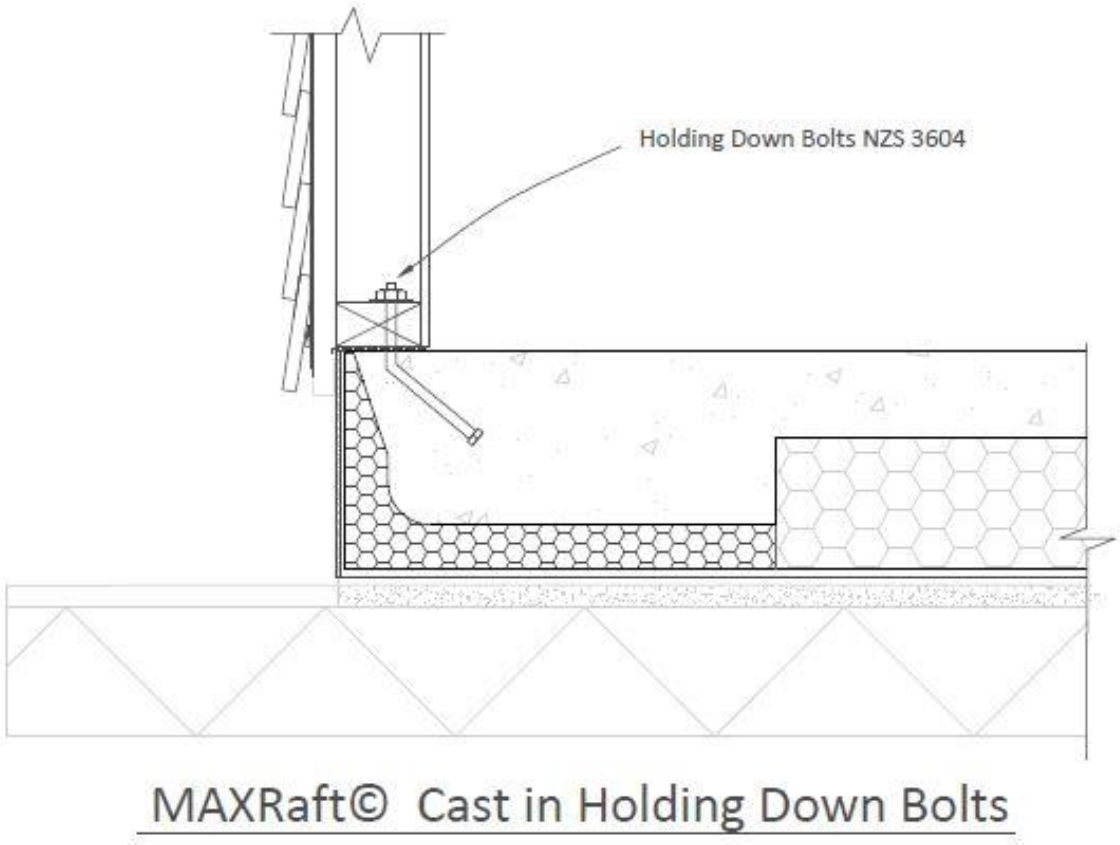


Fig 24

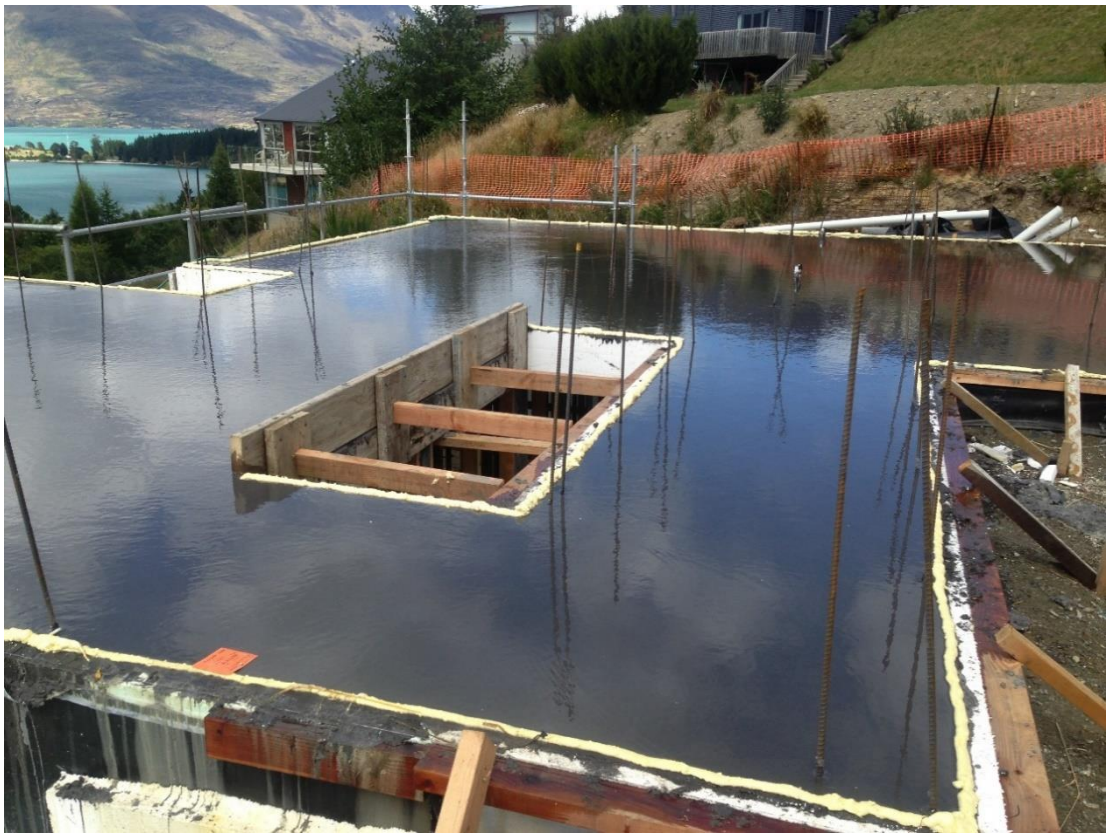


Fig 25

Fig 26

Fig 27

4.1 MAXRaft™ Foundation System (MFS) Supercoat™ Alternative Detail 2

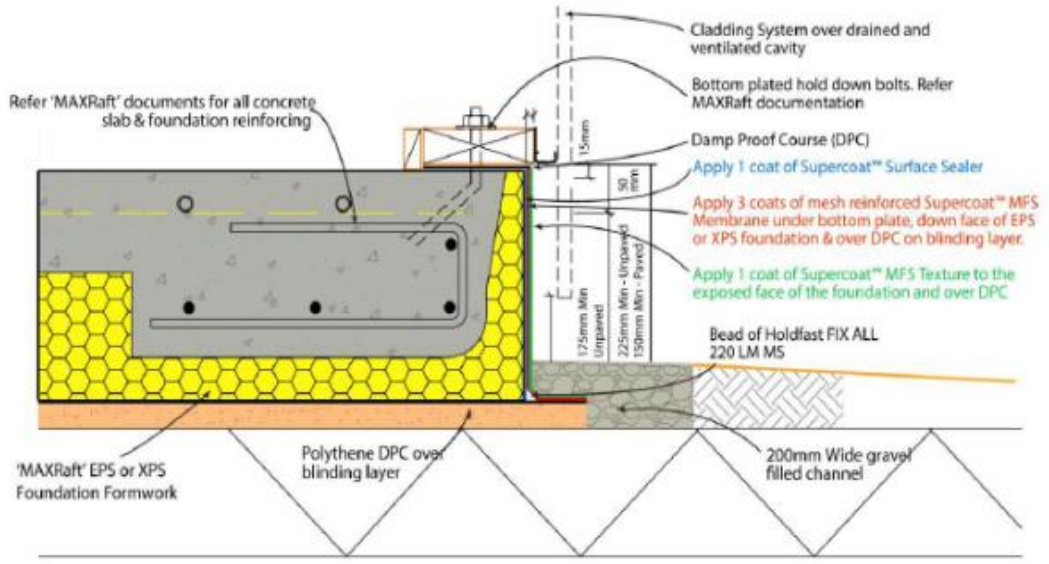


Fig 28

Supercoat

MAXRaft Foundation System (MFS)
Supercoat™ MFS Membrane & Texture System

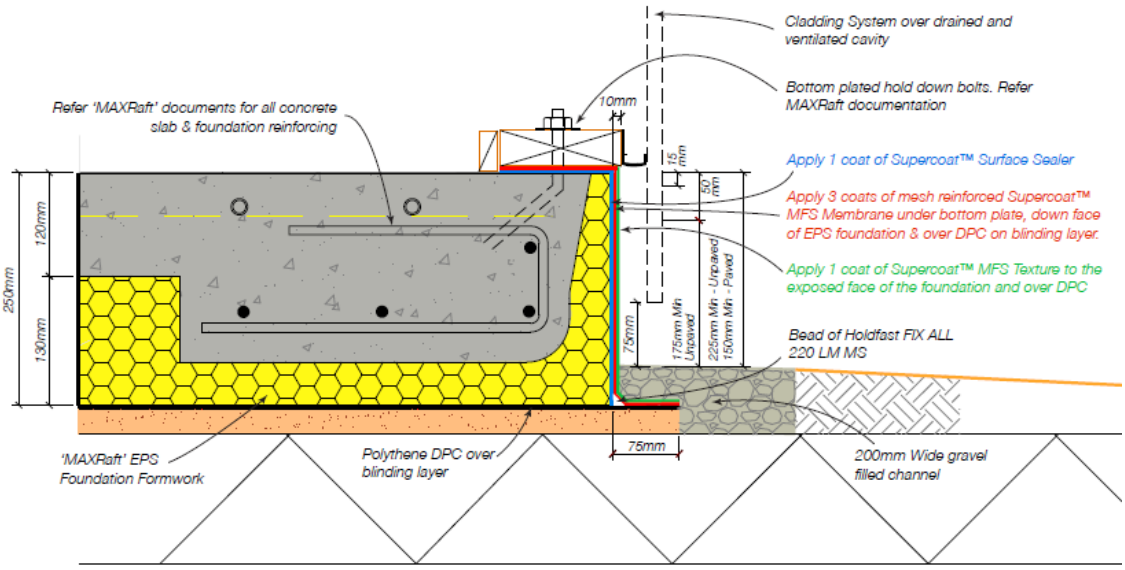


Fig 29