

PRODUCT MANUAL



 **rawMAT**
PRE-HYDRATED BENTONITE



 **waterproofing systems**
KEEPING YOU WATERTIGHT

Designated by Government
to issue
European Technical
Approvals

RAWMAT HDB WATERPROOFING SYSTEM

Système d'étanchéité
Bauwerksabdichtungen

Product



• THIS CERTIFICATE RELATES TO THE RAWMATTM HDB WATERPROOFING SYSTEM, A WATERPROOFING MEMBRANE CONSISTING OF A 4.6 mm THICK PRE-HYDRATED HIGH DENSITY BENTONITE LAYER, SURFACED ON BOTH SIDES BY GEOTEXTILE FABRIC.

• The system is used to protect underground structures against water from the ground, generally in accordance with BS 8102 : 1990.

• The system does not require priming or protection boards.

• The system is satisfactory for Type A basement construction as defined in Table 1 of BS 8102 : 1990.

Regulations

1 The Building Regulations 2000 (as amended) (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of waterproofing systems with the Building Regulations. In the opinion of the BBA, the Rawmat HDB Membrane Waterproofing System, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement:	A1	Loading
Comment:		When adequately confined, the system satisfies this Requirement. See section 13 of this Certificate.
Requirement:	C4	Resistance to weather and ground moisture
Comment:		The system is an effective barrier to liquid water and water vapour. See section 9 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See section 14 of this Certificate.

Readers are advised to check the validity of this Certificate by either referring to the BBA's website (www.bbacerts.co.uk) or contacting the BBA direct (Telephone Hotline 01923 665400).

Contents

Introduction	3
Installation	6
Detail Drawings	9
Quality Control	15

THIS PUBLICATION

This manual provides the technical information necessary to correctly specify the RawMAT® membrane system. It has also been designed for use by Waterproofing Systems Ltd (WPS) approved applicators, for training and quality management purposes.

This manual may also be used by main contractors and Building Consent Authorities (BCA's) for quality management and inspection purposes.

NOTE TO APPLICATORS

As a WPS approved applicator you are required to comply fully with the contents of this manual. Where a specific situation arises on a particular project that makes it difficult for you to follow the published procedure or comply with a particular detail drawing, you are required to communicate this to WPS for an approved solution.

FOR FURTHER INFORMATION, CONTACT: WATERPROOFING SYSTEMS LIMITED

P: (0508) 2 WATERPROOF (2 92837)

E: info@waterproofing.co.nz

W: www.waterproofing.co.nz

BRANCHES:

AUCKLAND

WELLINGTON

CHRISTCHURCH

USING THE ICONS

Four different visual icons have been created for this manual to draw the reader's attention to important pieces of information.



1. QUALITY CONTROL ICON

Information about warranties, quality control checks and related information.



2. USEFUL TIPS ICON

Helpful advice to make the applicator's job easier and successful installation more likely.



3. CRITICAL ICON

Vital information about the system and installation methodology. It is crucial that the specifier and/or applicator are aware of these facts.



4. HEALTH & SAFETY ICON

Information about the importance of safety checks and ensuring that the work environment is always safe with potential hazards identified and minimised.

Introduction

PRODUCT DESCRIPTION

The rawMAT pre-hydrated bentonite tanking system is designed to protect foundations and vertical walls from aggressive soil attack, dampness and vapour transmission.

The rawMAT tanking system is the premier tanking system and is used in challenging tanking applications.

HOW DOES BENTONITE WORK?

When in contact with water the natural sodium bentonite Clay will absorb the water and expand and when confined, e.g. between the ground and the floor slab, this tendency to swell generates substantial swell pressures preventing the passage of water. When correctly installed, the Rawmat®/Rawseal® acts as an effective hydrostatic seal. It is important that both faces and all edges are tightly and fully confined.

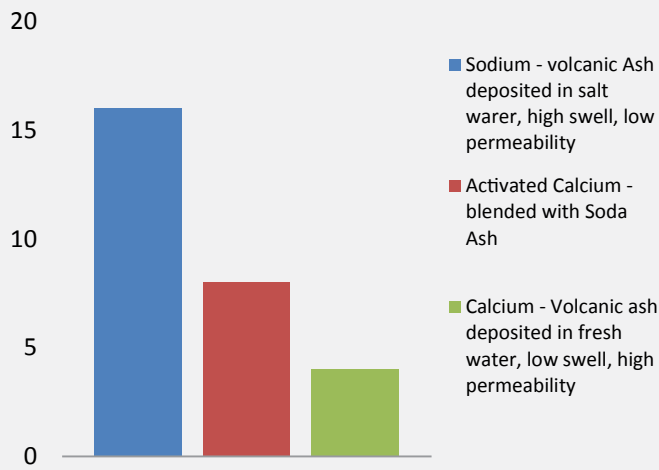
An important factor affecting the amount of swell achieved is the quality of water hydrating the bentonite. The significant advantage of the pre-hydrated system is that the initial hydration occurs under factory controlled conditions.

Unlike the dry systems, which are prone to shrinkage and cracking, the Rawmat® pre-hydrated bentonite is highly resistant to the effects of water contaminants. These contaminants induce cationic exchange in dry bentonite systems causing them to have a reduced swell and to shrink and crack as the clay converts from sodium bentonite to the calcium form.



The rawMAT system must be adequately confined in order to perform effectively.

Swell Capacity of the three different forms of bentonite clay available



PERMEABILITY UNDER CONTAMINANT CONDITIONS

Permeant	Effective Pressure	Permeability
Fresh Water	450KPa	5.4×10^{-14} m/sec
100K ppm Salt Water after 18 wet/dry cycles	450KPa	5.2×10^{-14} m/sec
100K ppm Salt Water after 30 Freeze/Thaw Cycles	450KPa	1.6×10^{-14} m/sec
30 g/l Conc. Ethylene Glycol	450KPa	4.9×10^{-14} m/sec
30 g/l Conc. Ethylene Glycol after 30 freeze/thaw cycles	450KPa	3.9×10^{-14} m/sec
Diesel Oil (Overlap with Mastic Applied)	450KPa	2.8×10^{-14} m/sec
Unleaded Petrol	25KPa	2.1×10^{-14} m/sec
Landfill Leachate (After 19 months contact)	25KPa	2.6×10^{-14} m/sec
Landfill Leachate (After 29 months contact)	25KPa	4.6×10^{-14} m/sec

WHY RAWMAT?

Unlike dry bentonite systems, the Rawmat® membrane and Rawseal® water stops are resistant to chemical degradation (Cationic exchange), are easy to install and also have the ability to withstand minor movement in the structure.

Additionally rawMAT products;

- Can be installed on damp and uncured substrates and in incimate weather
- Require no priming
- Can be nailed to the substrate
- Lose no bentonite when handling folding or cutting
- Are highly resistant to chemical and hydrocarbons
- Are natural products with an indefinite life
- Can be installed onto a variety of substrates including; concrete, rock face, compacted sub-bases, shutters etc.
- Can also be installed onto uncured or wet substrates, and can be installed in any weather conditions.
- Are able to selfheal when cut or damaged
- Are British board of agreement (BBA) approved (Cert no. 97/3337, 2nd Issue

INSTALLATION ADVANTAGE

Joining two sheets of Rawmat® could not be more simple. the nature of Rawmat® enables a self-sealing joint to form at all laps without the need for the addition of bentonite between the joints.

The membrane can be simply trimmed and cut with a utility knife to fit around pipes, inlets, posts and other protrusions. Rawmat® has a unique solid form which can be cut without any loss of bentonite, ensuring a secure seal in all cases.

Introduction

PRODUCT OVERVIEW

RAWMAT TYPE P MEMBRANE

A geosynthetic clay liner comprised of a woven geotextile, a factory pre-hydrated sodium bentonite core and a polypropylene fabric layer. rawMAT type P is used under floor slabs in compacted sub-base applications.

RAW GRANULES

Sodium Bentonite Granules used in a variety of detailing applications, including forming raw paste.

GRIPSET C-PLUG REPAIR MORTAR

Non segregating, shrink compensated, high strength mortar, for repair of surface defects and voids in concrete substrates and for treatment of pile caps.

RAWSEAL INTERNAL WATERSTOPS

CJ2025 – A 20mm x 25mm high density bentonite water stop. Supplied in boxes of 5m coils (5/box) and installed into preformed rebates within the concrete joint, or nailed/glued into position.



Water stops come in two grades – Black and Green. Black water stops should be used where delayed swell is required or when installing in salty/contaminated conditions.

PROTECTION BOARDS

Protection boards must be coreflute boards overlapped 50mm and taped together and mechanically fixed into position. All coreflute boards must be wrapped around internal and external corners.

BACK-FILLING MATERIALS

Includes sand and natural soil, free from stones larger than 15mm in size with a minimum of 25% fines. It is important that the back-fill has cohesive properties and can be compacted. Around the drainage coil, 6-15mm stones without fines should be used.

EXPANSION JOINTS

Expansion joints must be custom designed to meet the specific stresses expected. Expansion joints which require the RawMAT membrane to be compatible must be approved by WPS.

GRIPSET 11Y ADDILINE PRIMER

A single component of liquid primer, mixed with Gripset DM Powder to form a slurry primer

GRIPSET 2P

A Water based, 2 part rubberized liquid membrane used for transition detailing where the tanking is required to extend above the Rawmat tanking system

Introduction

STORAGE AND HANDLING

Products must be stored in a clean and dry location, free of material that may damage the products during storage. Keep rolls individually wrapped to ensure that they do not dry out.

Do not lift the rolls by inserting forks under the rolls or by forcing the forks into the cardboard cores, as this will damage the membrane.



Prior to installing a roll, check that the wrapping is intact and that the material has not dried out

MANAGING THE INSTALLATION

It is important to adequately drain the area where the membrane is being installed. We recommend 150mm away from the tanking membrane and 200mm below the floor surface. To drain the area, dig a hole next to the installing area to position the pump. The hole should be deeper than the area to be drained. Use the pump to take water from the installation area. In large construction situations a full site dewatering system may be required.

Co-Ordination between the membrane installers, steel-fixers and concrete contractor is important to minimise the likelihood of damage to the membrane.

WPS recommend that you brief the concrete contractors prior to concrete placement to ensure that they are aware of how the membrane works, and the importance of getting confinement.



Note that while dry substrates are not required it is important not to lay the membrane in standing water unless it can be covered immediately

COVERAGE AND CONFINEMENT

Rawmat® membranes must be covered each day by concrete (floor applications) or back-fill (wall applications), or if this is not possible, by DPC sheeting. This acts as a temporary protection to prevent the membrane from drying out, or swelling in the event of constant heavy rain.

Rawmat® must be confined in order to provide waterproofing protection. This confinement can be with a minimum 200mm concrete or 300mm compacted soil.

In hydrostatic situations where the floor slab is below the water table, and engineers calculation is necessary for specifying the required floor slab thickness, steel reinforcement and concrete strength. Back-fill is placed in layers around the building, to the engineer's requirements, and compacted to a min. 95% proctor.



Concrete cover should be vibrated in such a way to eliminate voids. It is critical that the bentonite is fully confined so a fair-face finish in the concrete cover is required



Pipes or Services running through a floor slab should be positioned on chairs prior to pouring the floor. The concrete can then be placed over the membrane, confining it. Pipes or services coming out of the floor must be at least 50mm away from walls/columns so concrete can be placed behind, confining the membrane.

Installation

QUALITY CONTROL AND INSPECTIONS.

Quality control & inspection forms are downloadable from our website www.waterproofing.co.nz

SUBSTRATE REQUIREMENTS

CONCRETE / BLINDING

Make sure that the concrete / blinding onto which the membrane is being installed is sound, smooth and clean.

Ensure all up stands and internal junctions have CJ2025 water stop fillets installed with all sharp edges chamfered 45°. Fill any voids over 10mm.

COMPACTED SUB-BASE

Make sure that the sub-base is smooth and compacted with fines free from voids in excess of 10mm and free from items such as rocks and sharp stones that could tear the membrane.

RawMAT type P membrane should be used when installing onto compacted sub-base. Ensure the grey non-woven fabric is placed face down.

PRECAST PANELS

For information on pre-cast concrete panels please see the next page.

SACRIFICIAL SHUTTERS OR STEEL SHEET PILES

Make sure that the rawMAT membrane is installed directly onto these prior to constructing walls, provided running water through the shutter / piles is purged.

CONCRETE BLOCKS

Ensure that the mortar is pointer flush to provide a smooth surface where the tanking membrane will be subsequently applied. This will prevent water from tracking behind the membrane.

In all cases, all voids in excess of 10mm in the substrate shall be filled using the Cemix repair mortar, or Rawpaste Mastic.

CONSTRUCTION JOINTS

Ensure all construction joints are tightly formed with the RawSeal water stop equally confined into each slab through the joint. Vibrate concrete to ensure maximum confinement.

CRACKS

Shrinkage or movement cracks in walls and floors must be tightly closed to ensure Rawmat confinement, repair any unacceptable or open cracks identified. Live cracks must be repaired to confine the rawMAT membrane.

SLAB CURL

Concrete Slabs which are not cured correctly or remain with live external edges, may create concrete slab curl creating non confinement. It is important that structural engineers ensure slab curl is avoided ensuring Rawmat confinement is maintained.

FORMING LAPS

For the Rawmat type P membrane, peel the non-woven grey fabric back to expose the clay core and ensure direct contact with the black geotextile. Ensure the non-woven fabric is peeled back the width of the lap (100mm) only.

Do not peel the grey non-woven fabric back more than the 10mm width of the lap.



When forming laps it is critical to ensure there is no debris or contamination in the lap area.

INSTALLING FLOOR SLAB MEMBRANE

Ensure the excavation is well drained and free from standing water at all times, until the floor slab has been completed.

- ☑ Remove the film encapsulating each roll
- ☑ Lay the rolls onto the blinding or compacted sub-base
- ☑ On blinding substrate, make sure the membrane is rolled out with the black woven geotextile side up
- ☑ When laying onto compacted sub-base, lay the Rawmat Type P with the grey geotextile side facing down, cover with a 50mm blinding
- ☑ Lap each roll using a minimum of 100mm overlap at the side and 150mm overlap at the end. Stagger the sheets of Rawmat to prevent concentration of laps at any particular point. Walk along lap areas to ensure good contact.
- ☑ Extend the Rawmat a minimum of 150mm outside the perimeter of the building line and shutters to enable a clean lap to be achieved when the vertical Rawmat is in place.



Protect this 150mm extension from weather / damage by wrapping the edge in a strip of polythene and cover with protective blinding, concrete or other suitable material.

Installation

INSTALLING WALL MEMBRANE

Ensure walls are free from voids, dust and debris. Install the membrane with 100mm side laps and 150mm end laps, and pull membrane tight to provide close contact to the walls.

Prior to fixing the wall membrane, place the RawSeal CJ2025 water stop on the horizontal membrane. (at the floor-wall junction) and push tightly into the concrete. The lengths of the CJ2025 should be butt jointer and kneaded together to form a continuous length of fillet.

When installing directly onto the wall to be waterproofed apply the vertical rawMAT type P membrane with the grey woven geotextile outermost and the thin perforated black scrim side against the concrete.

When installing onto sacrificial shutters or onto the rock-face, make sure that the thin perforated scrim is outermost and the grey woven geotextile is in direct contact with the shutter/rock-face.

Install the vertical membrane horizontally around the structure ensuring the first sheet extend 150mm out over the CJ2025 water stop and under slab membrane.

Fix the membrane by using masonry nails and 30mm washers or track master gun washers and pins, or Hilti nails and washers fired through a 75mm x 75mm hardboard pad as a washer. Fix all nails or pins 150mm below the top of each sheet. This will leave sufficient membrane to ensure an overlap from above. On subsequent rows make sure the upper sheet overhangs the lower sheet by 100mm, place additional fixings through the joint to secure.

Where the membrane is installed directly to the rock face and the wall constructed against it, ensure the membrane is protected from drying out by covering with polythene during fixing of the rebar. Remove polythene sheet immediately prior to pouring the concrete.

SHOTCRETE WALLS

The formation of a shotcrete substrate and as confinement concrete for Rawmat a special specification is to be developed specifically for the project.

CONSIDERATIONS

There should be no running water leaching from the shotcrete substrate at the time of Rawmat installation.

An engineer to calculate shotcrete which will confine the Rawmat thickness and strength directly relating to hydrostatic pressure and any other relevant elements for

the shotcrete substrate and for the confining shotcrete.

It is important an experienced nozzleman applying the shotcrete fully understands the confinement requirements, issues like shadowing, hand packing behind beams and metal structures ensuring no areas remain unconfined. Shotcrete droppings are removed at the wall floor junction so an excellent bond is made. The shotcrete specification is correct and is not diluted with water for convenience of application. Hand pack the shotcrete behind any beams and any voids

The shotcrete must be of a standard to confine Rawmat Membrane without having live cracks form. If any live or open cracks form these must be confined immediately with a repair system such as 996 injection or similar

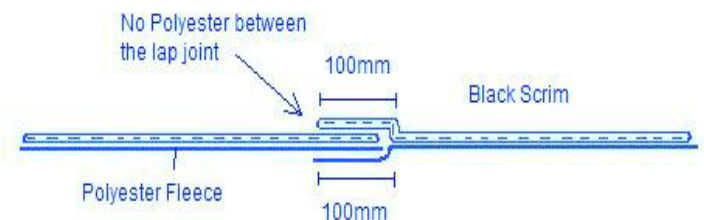
INSTALLING ONTO PRE-CAST PANELS

Have the panels delivered to site and located where the membrane can be installed. Cut the Rawmat® to the size of the panel allowing for 100mm side laps and 150mm end laps. Place the membrane and fix to the panel using Hilti / Ramset masonry nails and washer. Mechanically fix coreflute protection boards over the Rawmat prior to lifting the panel into place.

Install a CJ2025 water stop between the panel and foundation slab, ensure the water stop is thicker than and higher than the shim height to guarantee connection.

Lower the panel into position seated and located on shims and held permanently into position. Ensure the membrane extends 150mm below the bottom of the panel and ensure intimate junction with the under slab membrane. Also ensure side laps are effectively created with an adjacent panel. Use Mastic in the lap areas to help ensure that sound laps are formed,

Make sure the vertical tilt slab joints have a water stop (CJ2025) installed before forming the stitch joint.



*Polyester Fleece is peeled back and folds under adjoining Type P membrane

Type P Lap System

Installation

DRESSING PILE CAPS

Clean off all dirt and debris and apply a 2mm thick layer of Rawpaste to the first 100mm face of the pile. Place a length of CJ 2025 water stop around the pile and push into Rawpaste, moulding into the contour of the pile circumference.

VERTICAL MEMBRANE TERMINATION

Cut strips into the Rawmat® so the membrane fans out when pushed into the face of the pile cap. Press into the Rawpaste. Repeat from the opposite side of the pile, allowing for a 150mm overlap of the two sheets. Trim the membrane to the pile and discard off-cuts. Apply an additional layer of Rawpaste to seal all cuts in the membrane.

If the membrane is to be terminated at ground level, trim the membrane to a minimum of 100mm below the finished ground level. Apply Gripset 2p liquid rubber membrane to substrate as a transition membrane from 200mm below the top of the Rawmat termination point to above ground level terminating beneath external cladding. Coat the exposed duroQIK with Gripset RD membrane. Turn the Rawmat® membrane vertically up the face of the concrete wall or up-stand and continue over the liquid flashing material. Fix the membrane with Hilti nails or drill / plug fixings through a rigid termination bar of galvanised steel or aluminium. Make sure the fixings are at 200mm centres and the bar is placed at the top of the membrane.

If using proprietary polyethylene DPC, dress same into brickwork and drape down over the Rawmat® prior to fixing of membrane to the termination bar. Then fix the termination bar through the Rawmat® and DPC.



Water stops must be installed in all construction joints. CJ2025 is used in any internal construction joints.

PIPE PENETRATIONS

Secure the pipe or duct firmly within the shuttering. Wrap a length of CJ2025 around the pipe centrally within the wall and fix into place.

Once the concrete has been poured and shuttering struck, wrap a length of CJ2025 around the circumference of the pipe, against the face of the concrete wall. Apply Rawpaste around the penetration and the water stop.

Place a collar of Rawmat® membrane over the pipe, black geotextile layer outermost. Make sure the collar is 300mm

wider than the diameter of the penetration. Apply Rawpaste liberally over the collar and install the main Rawmat® sheet by making a star cut in the sheet and feeding over the pipe. Apply more Rawpaste. Where pre-cast panels have penetrations installed afterward, contact WPS for a job specific detail.

INSTALLING CONSTRUCTION CAPS

Tightly butt-join lengths of water stops, kneading joints to ensure a continuous strip. Ensure the water stop is located within the preformed rebate. Where no rebate has been formed, nail into place so the joints cannot be dislodged when concrete is poured.

Locate water stops 50mm from the rebar to allow 50mm of concrete cover. This will provide adequate confinement of the bentonite. Call WPs if the 50mm cover is not possible.

Cover the construction joint with 500mm wide lengths of Rawmat membrane, centred over the joint and with the black geotextile outermost. Ensure the back-fill is thoroughly compacted against these construction joints.

BACK-FILL AND DRAINAGE

Use Soil, sand or aggregate and compact in layers to a minimum of 95% proctor. Note that the ideal back-filling materials compromise fine granular with 25% fines or cohesive soils which compact easily.

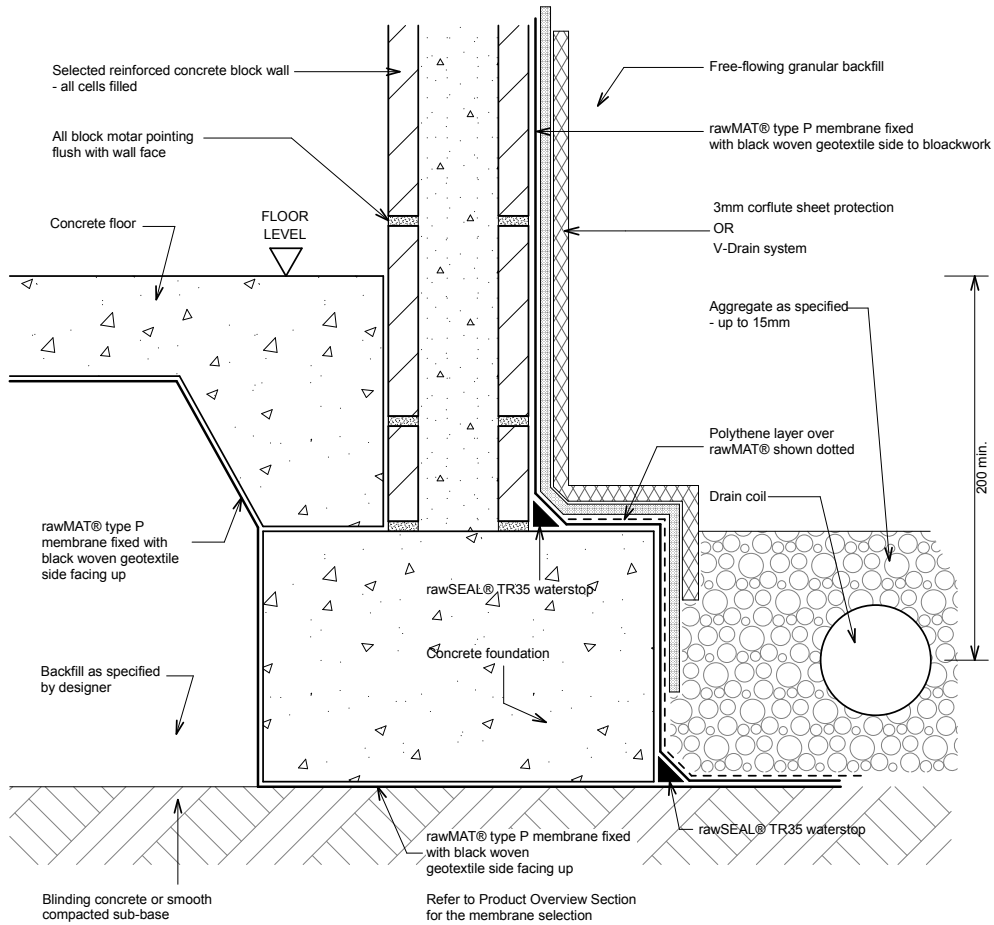
When backfilling wall installations, work horizontally around the building to make compaction more effective. If good compaction is not possible, install a rigid protection board to ensure the equal distribution of the necessary confinement to the membrane.

A compliant drain must be installed around the perimeter of the building. Ensure that the drainage system is sufficient to effectively remove anticipated water volumes on the site. Ensure the drain is positioned below the footing or 150-200mm below floor level out from the Rawmat membrane and make sure it cannot be pushed back against the membrane during back filling. Install a plastic sheet between the drain and the Rawmat membrane.



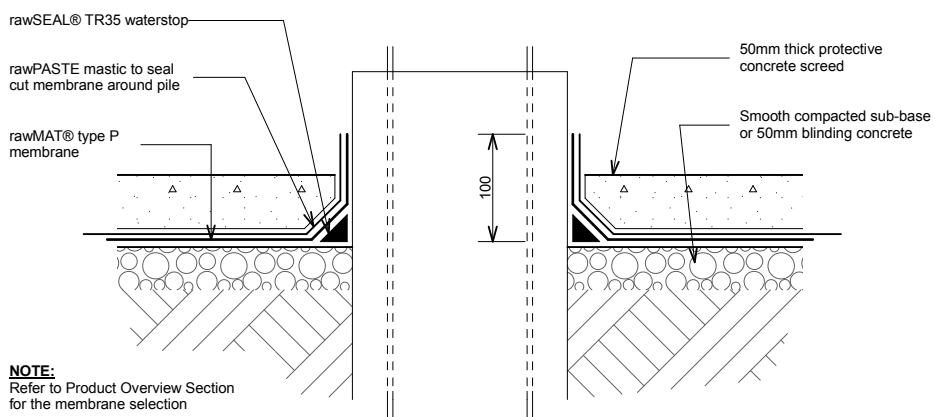
Ensure the drain is kept at least 150 – 200mm below floor level from the membrane to prevent washout of the bentonite. Ensure the Rawmat type P is fully confined both faces and all edges.

Detail Drawings



b-RAW01 - Block Foundation/ Drain

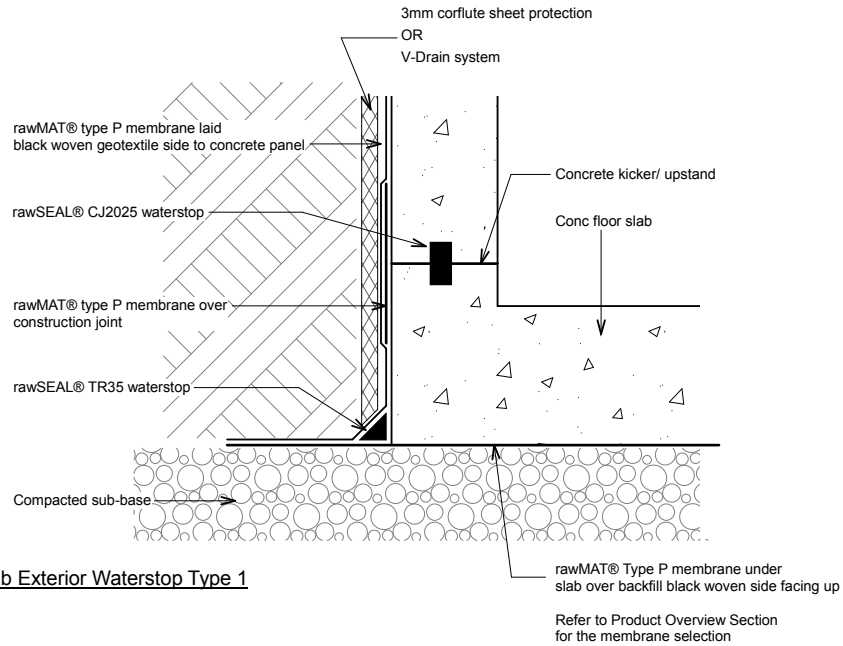
REVISION: 15 Sept 2014



b-RAW02 - Pile Cap

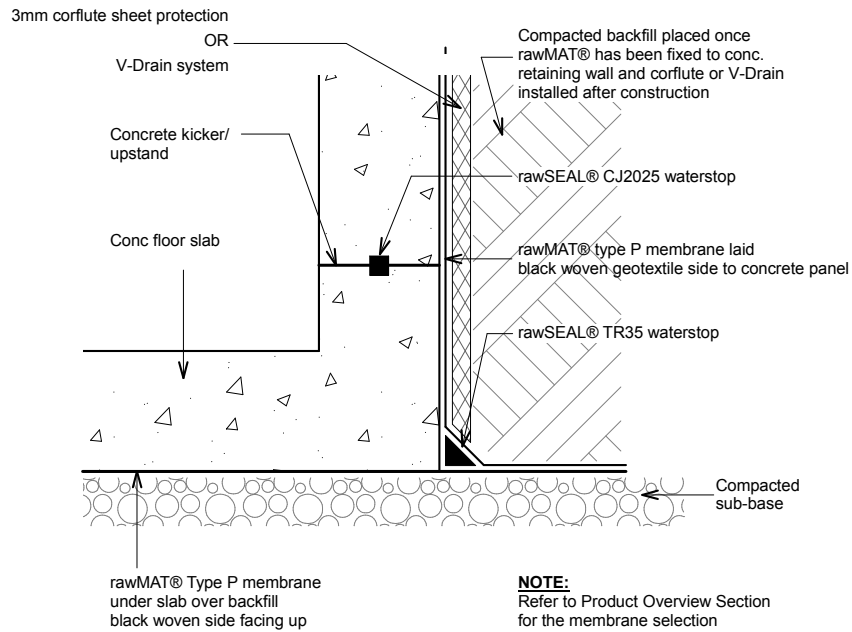
REVISION: 15 Sept 2014

Detail Drawings



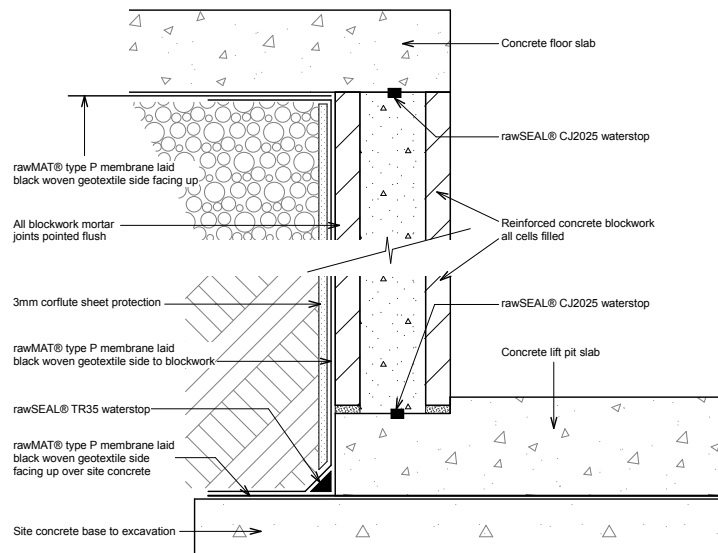
b-RAW03 - Wall/Slab Exterior Waterstop Type 1

REVISION: 15 Sept 2014



b-RAW04 - Wall/Slab Interior Waterstop

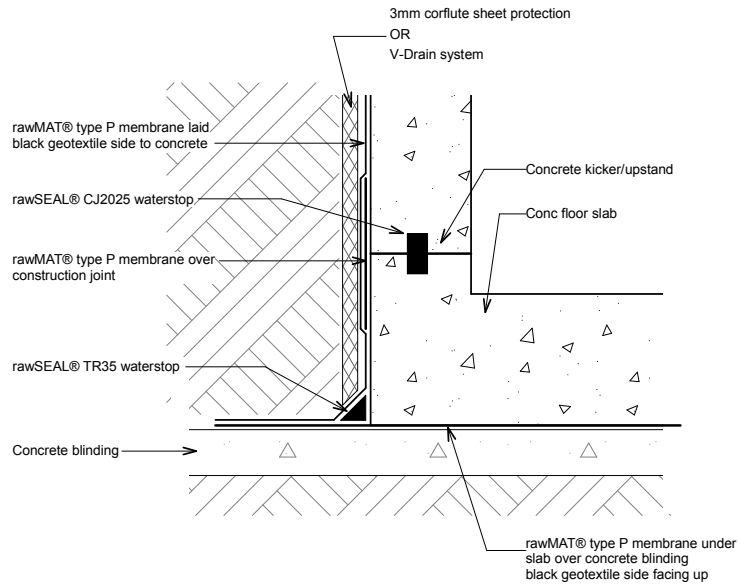
REVISION: 15 Sept 2014



b-RAW05 - Lift Pit

REVISION: 15 Sept 2014

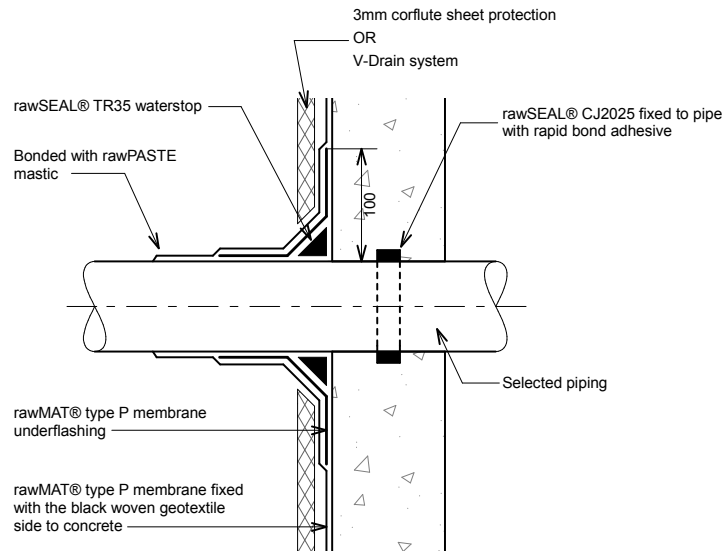
Detail Drawings



b-RAW06 - Wall/Slab Exterior Waterstop Type 2

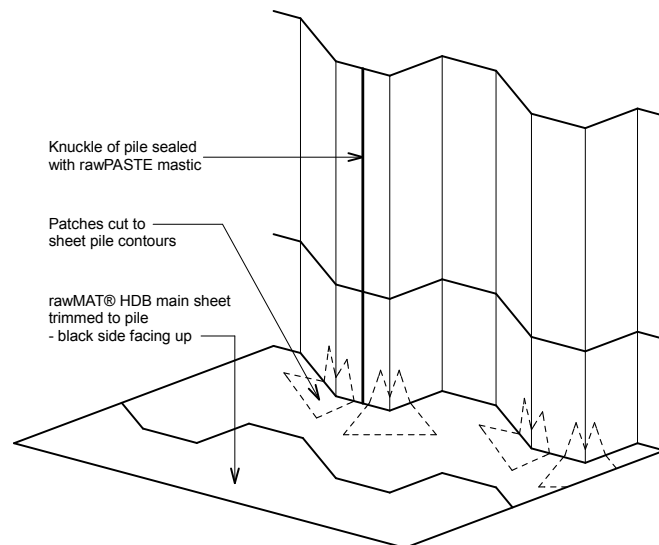
REVISION: 15 Sept 2014

Refer to Product Overview Section for the membrane selection



b-RAW07 - Pipe Penetration

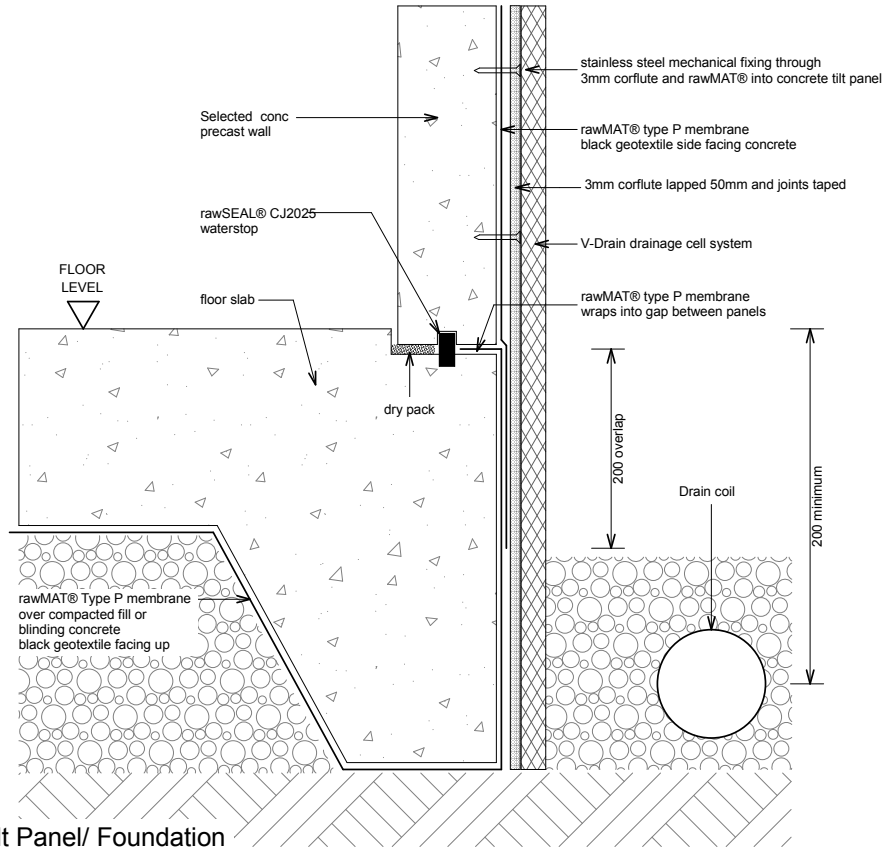
REVISION: 15 Sept 2014



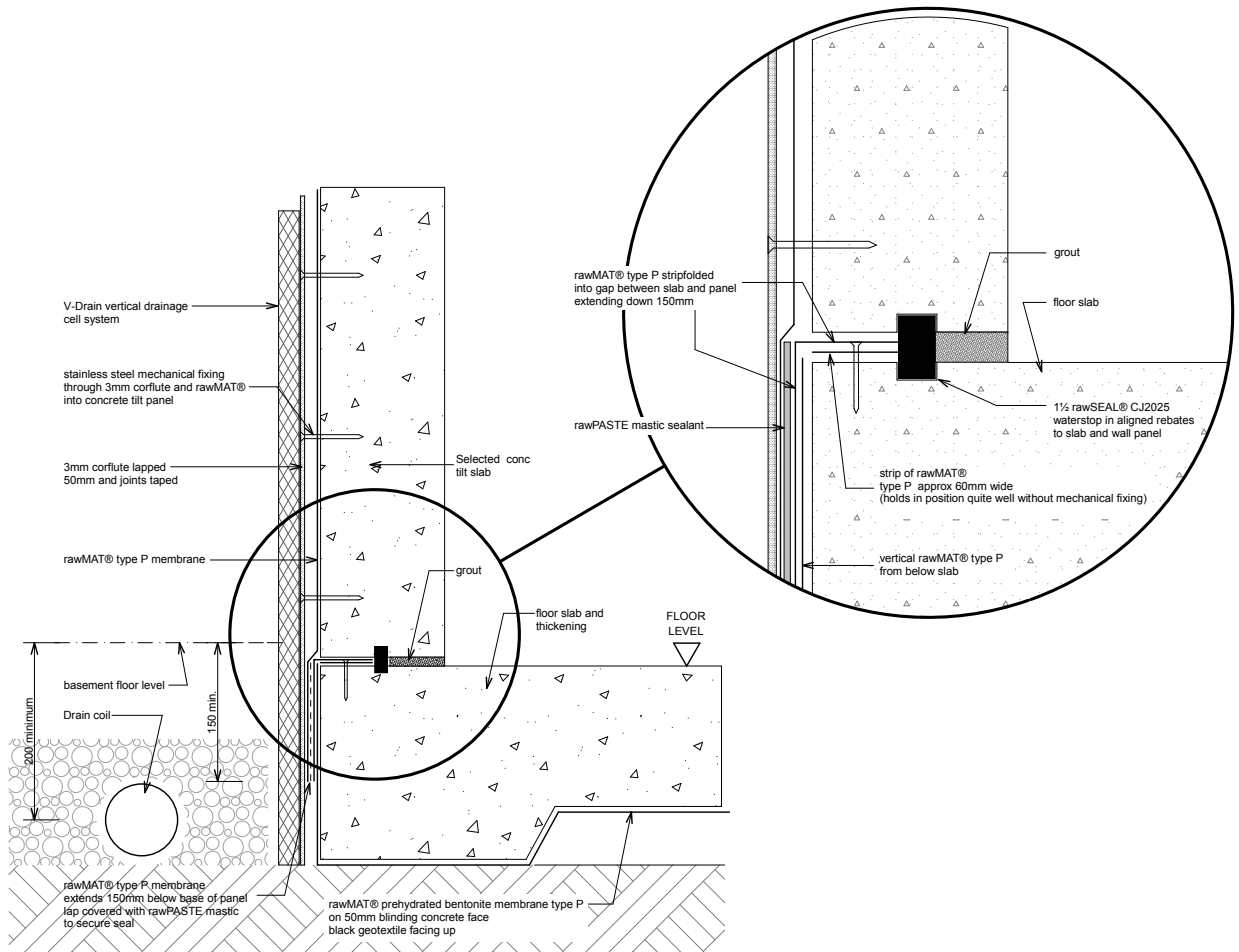
b-RAW09 - Steel Sheet Piles

REVISION: 15 Sept 2014

Detail Drawings

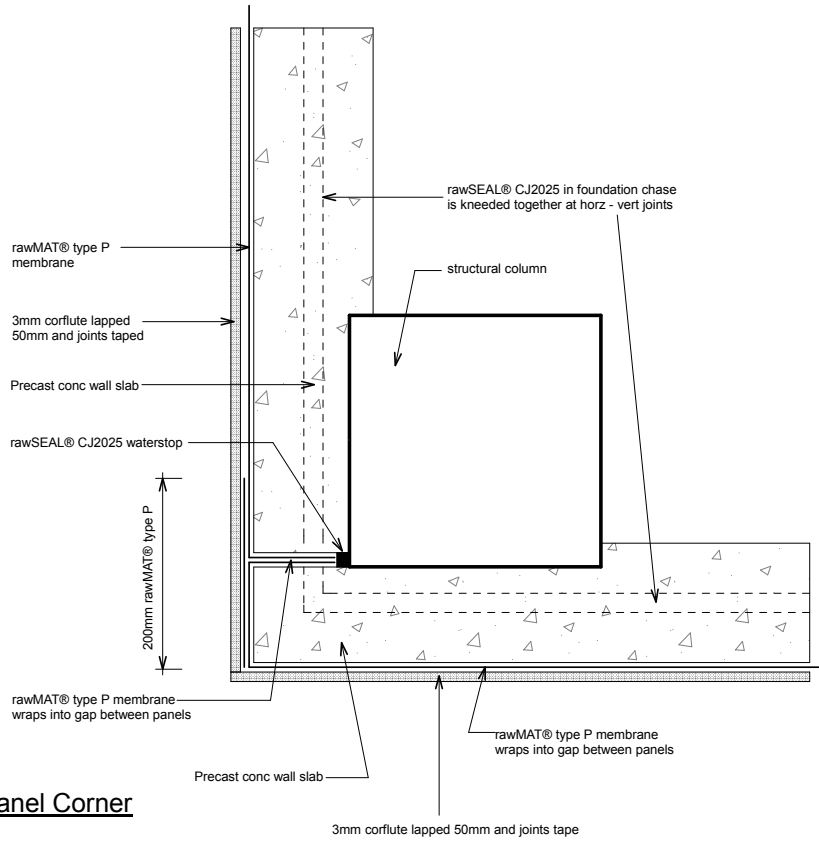


b-RAW10 - Tilt Panel/ Foundation
 REVISION: 15 Sept 2014



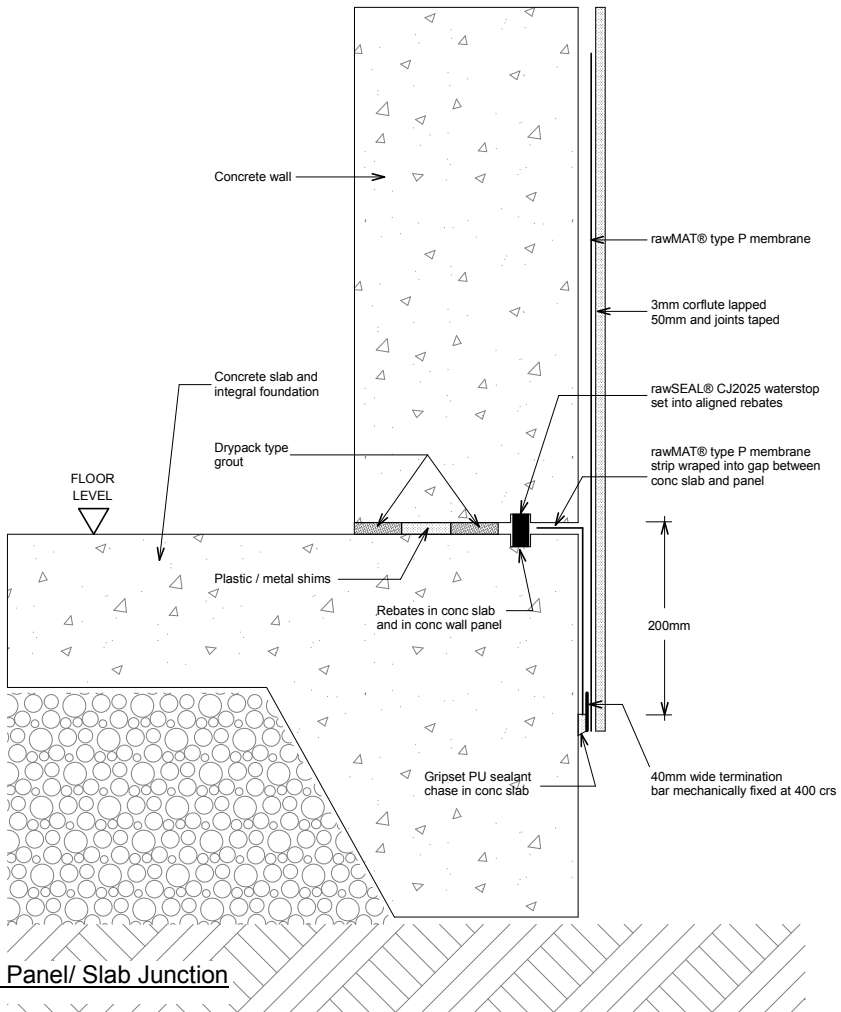
b-RAW11 - Tilt Panel/ Basement Slab
 REVISION: 15 Sept 2014

Detail Drawings



b-RAW12 - Tilt Panel Corner

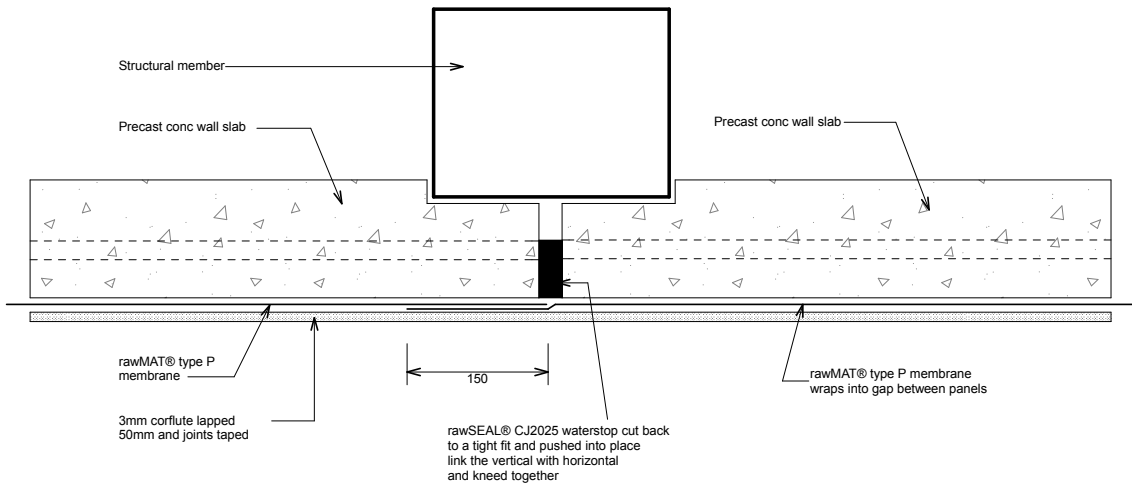
REVISION: 15 Sept 2014



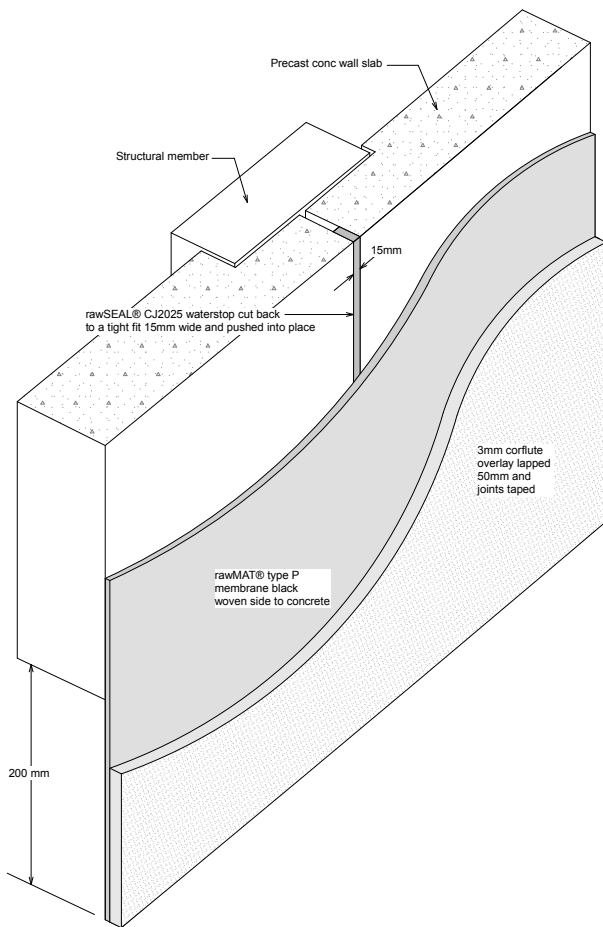
b-RAW13 - Tilt Panel/ Slab Junction

REVISION: 15 Sept 2014

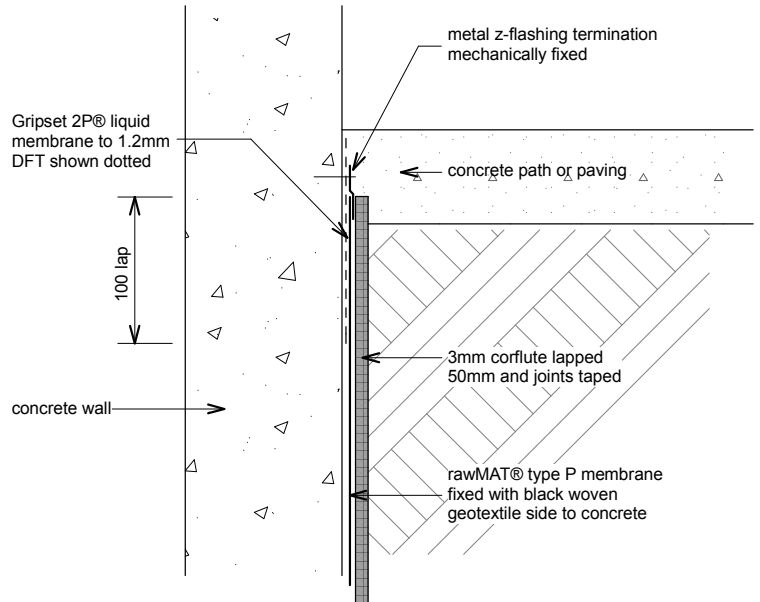
Detail Drawings



b-RAW14 - Tilt Panel to Panel Junction
REVISION: 15 Sept 2014

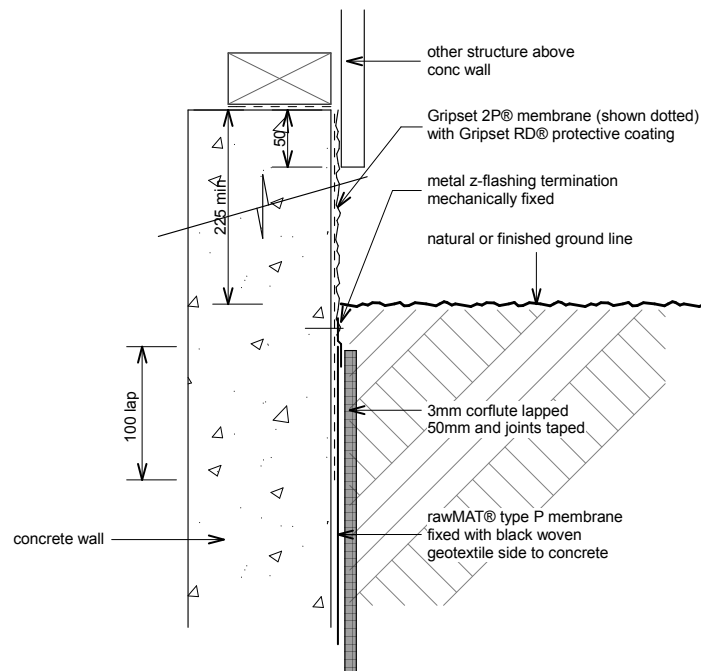


b-RAW15 - Panel to Panel Iso View
REVISION: 15 Sept 2014



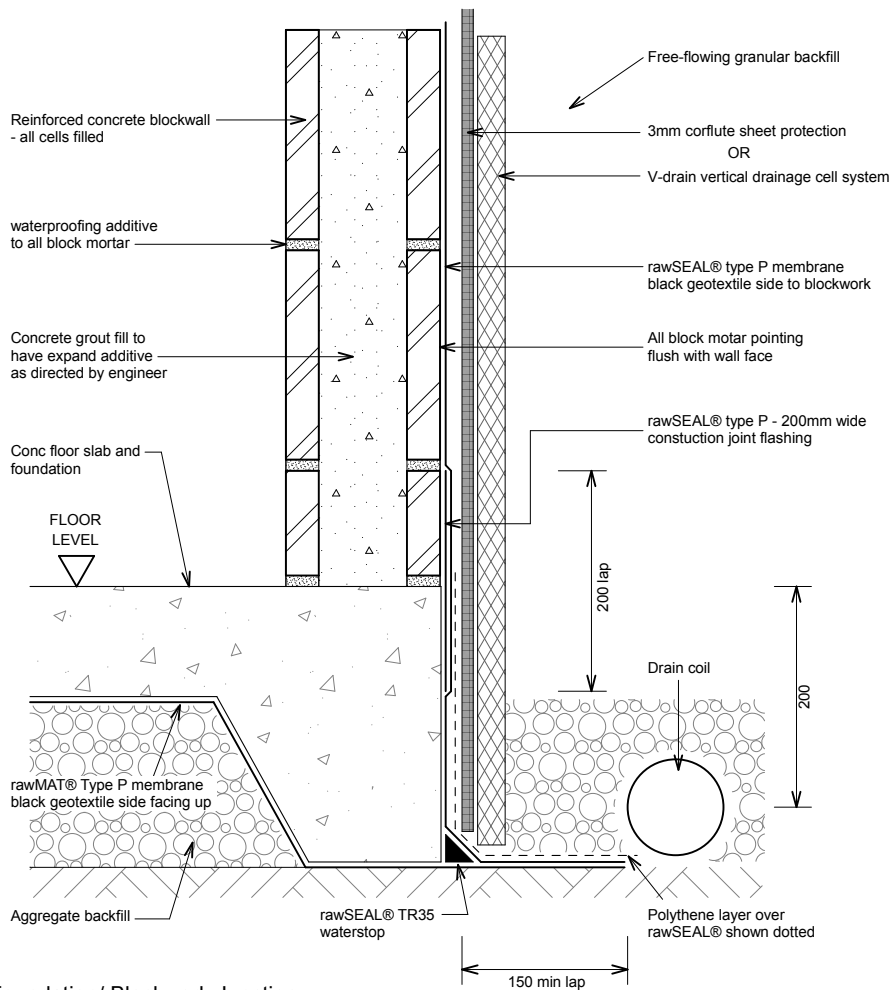
b-RAW16 - Vertical Termination type 1
REVISION: 15 Sept 2014

Detail Drawings



b-RAW17 - Vertical Termination type 2

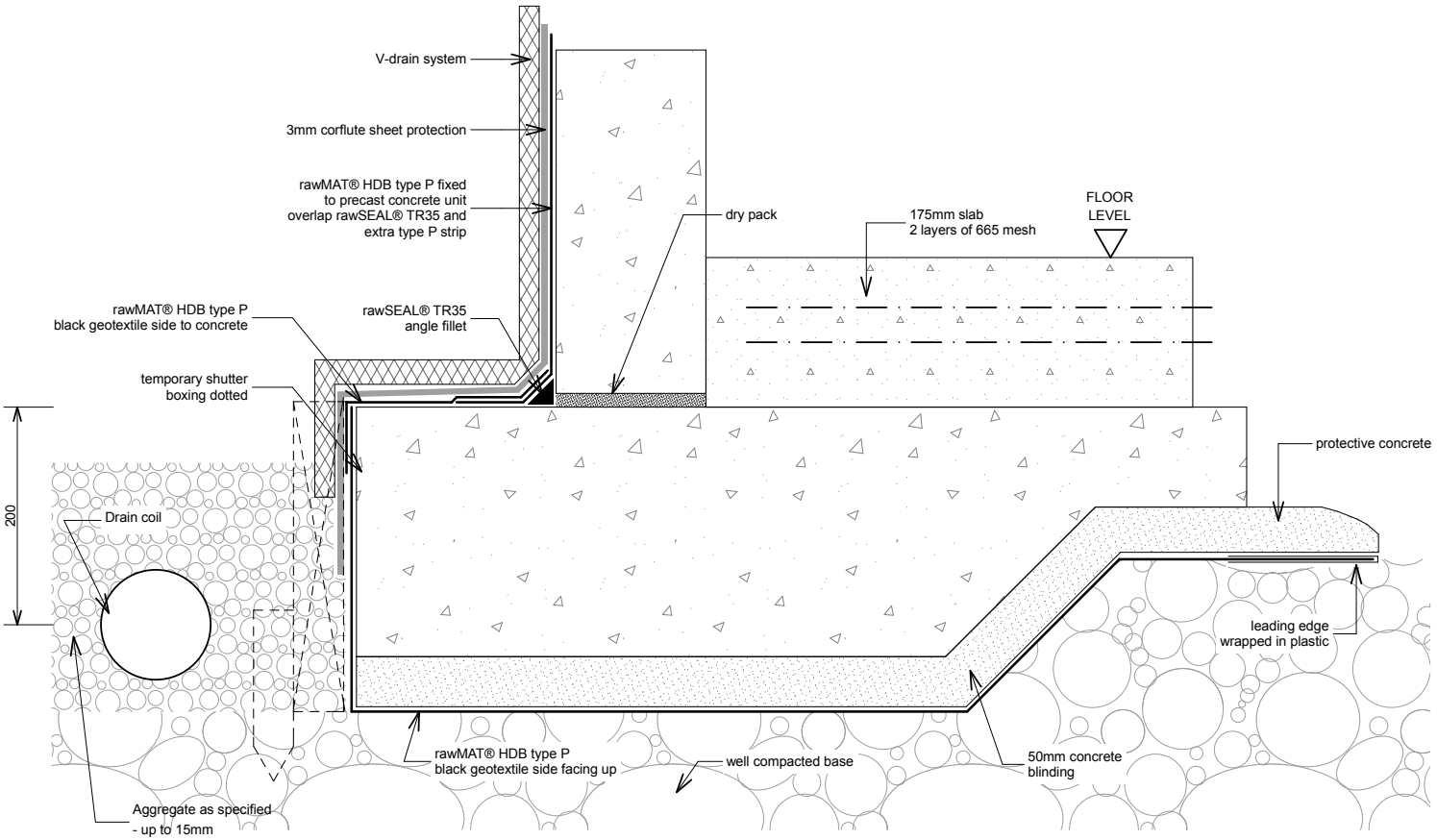
REVISION: 15 Sept 2014



b-RAW18 - Foundation/ Blockwork Junction

REVISION: 15 Sept 2014

Detail Drawings



b-RAW19 - Tilt Panel/ Heavy Foundation Junction

REVISION: 15 Sept 2014



Waterproofing Systems Limited

Auckland

Phone: 09 579 1460

Fax: 05 579 1461

Wellington

Phone: 04 589 7468

Fax: 04 589 7468

Christchurch

Phone: 03 366 9495

Fax: 03 3669496

PO Box 35-190

Shirley

Christchurch

www.waterproofing.co.nz