# PRODUCT MANUAL

# bituBOND
## TANKING MEMBRANE

waterproofingsystems
KEEPING YOU WATERTIGHT

BRANZ Appraised
Appraisal No.558 [2007]

BRANZ Appraisals

Technical Assessments of products for building and construction

# BRANZ APPRAISAL No. 558 (2007)

Amended 31 January 2012

**bituBOND®**
**Self-Adhesive Damp-Proof Membrane**

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WFTAO

## Product

1.1 bituBOND® is a self adhesive damp-proof membrane (DPM) for basement retaining walls and floors. It is applied under floor slabs and foundations and to the exterior face of basement retaining walls to prevent water vapour penetrating to the interior face in spaces where moisture may cause damage.

1.2 The product is supplied as self-adhering, cold-applied, polymer-rubber modified bitumen sheets in roll form.

## Scope

2.1 bituBOND® has been appraised as a damp-proof membrane for use under floor slabs complying with NZS 3604 and as a damp-proof membrane behind concrete masonry basement walls and under floor slabs complying with NZS 4229.

2.2 bituBOND® has also been appraised for use as a damp-proof membrane on buildings subject to specific design within the following scope:

- where the design of the building will be the responsibility of the building designer; and,
- with clean, sound, continuous substrates of insitu or precast concrete complying with NZS 3101 and AS/NZS 1170 or concrete masonry complying with NZS 4230 and 4210; and,
- where the membrane is adequately protected against damage during backfilling and in service; and,
- where subsoil drainage and free draining granular backfill has been placed behind basement walls.

2.3 The product must be installed by Waterproofing Systems Ltd approved and trained installers.

## Building Regulations

### New Zealand Building Code (NZBC)

**3.1 In the opinion of BRANZ, bituBOND® if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:**

**Clause B2 DURABILITY:** Performance B2.3.1 (a) not less than 50 years. bituBOND® meets this requirement. See Paragraph 11.1.

**Clause E2 EXTERNAL MOISTURE:** Performance E2.3.3. bituBOND® meets this requirement. See Paragraphs 13.1 – 13.3.

**Clause F2 HAZARDOUS BUILDING MATERIALS:** Performance F2.3.1. bituBOND® meets this requirement and will not present a health hazard to people.

This is an Appraisal of an **Alternative Solution** in terms of New Zealand Building Code compliance.

# Contents

## THIS PUBLICATION

This manual provides the technical information necessary to correctly specify the bituBOND® damp-proof 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.

## TRADEMARKS

bituFLAME®, bituBOND®, epiROOF®, epiSPAN®, ecoTUFF®, dekMASTER®, are registered trademarks of Waterproofing Systems Ltd.




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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.

## BRANZ APPRAISED

The bituBOND® system has been BRANZ appraised as an Acceptable Solution in terms of New Zealand Building Code compliance and the products comply with NZBC Acceptable Solution E2/AS1 Paragraph 12.2

These products are also appraised as an Alternative Solution on buildings subject to specific design.

Please contact Waterproofing Systems Ltd for a copy of this BRANZ Appraisal Certificate.

You can also download the certificate on our website www.waterproofing.co.nz

BRANZ Appraised

acceptable solution E2/AS1

# Introduction

## PRODUCT DESCRIPTION

bituBOND® is a self-adhesive SBS modified bitumen damp-proof membrane (DPM) designed to protect concrete foundations and vertical walls from aggressive soil attack, dampness and vapour transmission.

bituBOND® is a flexible laminated sheet, comprised of a multi-layer high density cross laminated polyethylene film with a backing of self-adhesive rubber modified bitumen, protected with a silicon coated release film.

## WHY BITUBOND®

The bituBOND® membrane has extensive usage and a proven reputation in waterproofing. bituBOND® has excellent puncture resistance and adhesion properties.

bituBOND® is one of the few self-adhesive membranes that comes with a selvedge edge protected by a release paper. This paper ensures the lap area is kept perfectly clean to give an intimate bitumen-to-bitumen seal at the lap.

## IN PARTICULAR, BITUBOND®;

- Has excellent self-adhesive qualities.
- Is tear and puncture resistant.
- Is easy to apply.
- Has protected lap selvedge.
- Is BRANZ Appraised

## AREAS OF USE

bituBOND® is an ideal membrane for damp-proofing foundations and walls. bituBOND® can be used on both concrete and polystyrene substrates. It is also recommended for use under composite shingles and roof tiles.

bituBOND® can also be used where a concrete topping is applied. Contact WPS for technical details.

## PRODUCT LIMITATION

bituBOND®, as with any self-adhesive membrane, should not be used for high hydrostatic pressures.

When tanking under higher hydrostatic situations, the WPS bituFLAME® torch-on or rawMAT bentonite system should be used. Higher hydrostatic pressures are normally present in deep site excavations near known water sources such as ponds, lagoons, rivers, lakes, and springs and in coastal regions.

## BITUBOND® MATERIAL SPECIFICATIONS

| | |
|---|---|
| Membrane Thickness | 1.5mm |
| Roll Width | 1m |
| Roll Length | 20m |
| Carrier | cross laminated polyethylene |
| Softening Point (ASTM D-36) | 95°C |
| Cold Flexibility (UEA tc 31) | -25°C |
| Water Absorption (ASTM D570) | 0.14% after 24 hours<br>0.16% after 35 days |
| Water Vapour Transmission (ASTM E96:95) | less than 0.2g/hr/m² |
| Tensile Strength (ASTM D882:97) | 40N/mm² |
| Elongation (ASTM D882:97) | 490% |
| Puncture Resistance (ASTM E154:99) | 370N |
| Adhesion Strength (ASTM 1000:93) | 55N/25mm |

## DURABILITY

When fixed according to specification, the bituBOND® system will meet the NZBC B2.3.1(a) requirements of 50 year durability.

The durability opinion given by BRANZ for the bituBOND® system states that when installed and maintained in accordance with the certificate, the system is expected to have a service life of at least 50 years, provided it is protected from sunlight and UV radiation.

## PLEASE ALSO REFER TO:

- BRANZ Appraisal Certificate No. 558 (2007)
- BRANZ Bulletin No. 397 “Waterproofing Basements” published 2000.
- Compliance document for NZBC External Moisture Clause E2, Department of Building and Housing, Third Edition, July 2005.

## MAINTENANCE

Annual inspections of the membrane top termination point, back-fall capping and drainage pipe should be made to ensure all are functioning as originally designed.

# Introduction

## PRODUCT OVERVIEW

### BITUPRIME PRIMER

A solvent-based, fast-drying bituminous primer designed to penetrate concrete surfaces and provide a bondable surface. bituPRIME is available in a 20ltr metal pail.

bituPRIME is flammable and must be stored, transported and used with care. Refer to Material Safety Data Sheets for further information.

### BITUBOND® PRIMER

Water-based pressure-sensitive bitumen adhesive for use on polystyrene substrates, or when installing onto concrete or block substrates in cold conditions. bituBOND® is supplied in a 10ltr plastic pail.

### BITUBOND® MEMBRANE

A self-adhesive elastomeric bitumen membrane with high adhesive properties. bituBOND® has a black finish on the top side with a polyethylene foil, and has a siliconised release paper backing on the bottom side and along the lap edge.

- Nominal thickness: 1.5mm.
- Nominal roll size: 1m x 20m.

### SEPARATION LAYERS

Polyethylene film at least 150 microns thick.

### PROTECTION BOARDS

Protection boards must be 3mm core flute over lapped 50mm sheet joints and seal taped

### BACKFILLING MATERIALS

Includes a granular with 25% fines, free-draining sand or natural soil, free from stones larger than 30mm in size. The back fall material is capped with impervious clay.

### EXPANSION JOINTS

The expansion joint covering must be custom-designed to meet the specific stresses expected, and be compatible with bituBOND® self-adhesive membranes.

### RAWSEAL WATERSTOPS

A high density sodium bentonite water stop. Installed into preformed rebates within the concrete joint, or nailed/glued into position. rawSEAL is available in the following sizes;

- CJ2025 - 20mm x 25mm

### BITUBOND SEALANT

A single component sealant based on bitumen and rubber. Cures to a plastic-elastic seal by evaporation of the solvents.

## STORAGE ON SITE

Store rolls vertically on ends on a fat surface in a dry ventilated area. For best results, rolls should not be laid fat until ready for installation. Rolls should be unrolled and allowed to 'relax' before installation.

Rolls should be stored above 5°C for 48 hours before laying. Ensure rolls are not crushed by incorrect storage and transport. Low ambient temperatures may affect the membrane adhesion. In this situation, use a hot air gun to heat the membrane gently during application, or use the bituBOND® priming system.

## RELAXING ROLLS

Unroll the material and leave to relax for 30 minutes or more. In cooler conditions it may take some time for the material to relax adequately. If rolls are not relaxed properly, they may wrinkle badly once installed.
Inspect the roll carefully to ensure there are no defects, and that the material is suitable to install.

## HEALTH & SAFETLY

The bituPRIME primer used in the bituBOND® system are Class 3 flammable goods. Contractors should be aware of the Health & Safety precautions identified in the Material Safety Data Sheets.

Ensure you display appropriate signage, as shown below. Keep well away from fame and heat sources and use only in ventilated areas with suitable safety equipment.


# Installation

## QUALITY CONTROL AND INSPECTIONS.

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

## MANAGING THE INSTALLATION

It is important to adequately drain the area where bituBOND® is being installed. To drain the area, dig a hole next to the installation area to position the pump.

The hole should be deeper than the area to be drained. Use the pump to remove water from the installation area.

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

## WEATHER

The bituBOND® system can only be applied in dry conditions. Note that a temperature of at least 5ºC is required before installation of the membrane.

## TOOLS REQUIRED

- Measuring tape.
- Stanley knife.
- Large stainless steel scissors.
- Stiff bristle broom.
- Hot air gun.
- Chalk line.
- Paint roller & brush.
- Kerosene for clean-up.
- Lap roller.
- Gloves.
- First aid kit.
- Sealant gun.

Block Wall Mortar must be flush pointed where the bituBOND membrane is to be installed.

Only prime what you can cover in day. If you prime too far, then re-prime before installing the bituBOND.

## SUBSTRATE PREPARATION

The substrate to which the membrane is attached is a significant factor that determines the performance of the system, particularly adhesion. It is important that all dirt, loose or soft concrete and contamination are removed. Ensure mortar fillets are formed to all up stands and that the substrate is smooth with all holes filled with Gripset C Plug repair mortar. On block substrates the mortar must be flush pointed so water cannot track behind the membrane. Internal angle fillets made from Gripset 11Y DM mortar system.

## SUBSTRATE REQUIREMENTS

**CONCRETE SHOULD:**

- Be sound, smooth, clean and dry.
- Have mortar fillets installed to internal junctions and all sharp edges chamfered to 5mm radius.
- Have any cracks or surface defects repaired with Gripset C-Plug repair mortar.
- Have surface free from contamination or chalking to ensure adhesion.
- Be smooth to prevent water from tracking behind the membrane.

**FOR BLOCK WALLS:**

- The mortar should be pointed flush to give a smooth surface finish where the bituBOND® membrane will be subsequently applied.
- Where the substrate is polystyrene blocks, the blocks must be clean and sound and ready to receive the bituBOND® primer.
- Have mortar fillets installed to internal junctions and all sharp edges chamfered to 5mm radius.

## PRIMING

Stir the bituPRIME then apply by brush or roller. Apply a full coat of bituPRIME at a rate of 0.2-0.3ltr/m² (70 -100m²pail) ensuring full coverage and absorption into the substrate. Alternatively, bituBOND® may be used as the priming system, applied at a rate of 3m²/ltr.

For polystyrene blocks, prime by applying one coat of bituBOND® at a rate of 3m²/ltr.

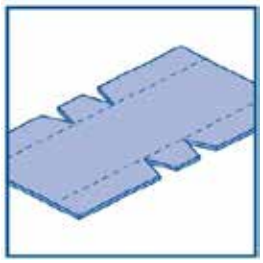
You may have to re-prime substrates if there is a delay in installing the membrane. These delays increase the likelihood of adhesion problems due to contamination of the primer.

# Installation

## FLASHING

Drawings: Page 10

Ensure that all internal and external corners, up stands and penetrations have a bituBOND® underfashing membrane installed prior to installing the membrane system. Underfash the junctions between the footing and wall by installing a 150mm wide strip of bituBOND®.



Cutting Pattern For Corners

## INSTALLING BITUBOND®

Pre-cut the required quantity of bituBOND® to length and lay out close to the installation area. This will allow the bituBOND® to relax. Do not install bituBOND® when temperatures are below 5°.

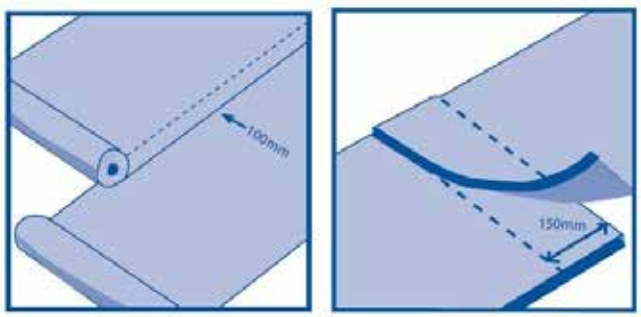
Pull the release paper back approximately 200mm and apply one of the top corners to the substrate. Plumb the bituBOND® and rub across the top edge sticking the bituBOND® to the substrate.

Carefully pull the release paper downwards rubbing the bituBOND® into place, continuing until the bituBOND® drop is completely installed. Roll or broom over the bituBOND® surface to ensure good contact with the substrate. Ensure there are no creases.

Remove the selvedge release paper on the bituBOND® just installed, to get ready for the next sheet. Install the next sheet by removing 200mm of the release paper and place on the exposed selvedge. Use the selvedge as a guide to ensure subsequent sheets are plumb. Over-roll with the lap area with a hand roller to ensure a good seal.

bituBOND® must be fully bonded onto the concrete with 100mm side laps and 150mm end laps, and seamed by a roller. Make sure that foreign matter does not contaminate these laps.

Ensure contaminants do not get into the laps. Roll the laps fully to ensure full lap integrity. Over flash if in doubt.




All side Laps to be 100mm

End laps to be 150mm

The slab membrane should extend 150mm beyond the footing, and be protected from damage. Once the walls have been struck, this is adhered to the wall so when the wall membrane is installed a sound seal is formed.

Use a hot air gun to seal and patch any cuts, and if required to seal any creases, or when installing in very cold conditions.

## WATERSTOPS

For added protection, rawSEAL water stops can be installed at construction joints in the floor slab and at floor-to-wall junctions.
Water stops should be installed into a preformed rebate. Where no rebate has been formed, nail them into position so that the water stops cannot be dislodged.
Locate the water stop at least 50mm from the rebar to ensure there will be at least 50mm cover of concrete over the water stop.
Butt join the lengths of water stop, wetting if necessary, and thumb together making a continuous strip.

WPS recommend that all construction joints have a rawSEAL® CJ2025 water stop installed, particularly where hydrostatic pressure is expected.

During very cold climate conditions, mechanically fix the sheet top edges onto the termination bar installed, to ensure the vertical cold weight remains firmly in place

# Installation

## OVERFLASHING

In critical areas, or anywhere you have concerns about lap integrity due to contamination, ensure these areas are overfashed by installing a 200mm wide bituBOND® strip. Overflash any areas where you have concerns about damage to the membrane. Use WPS bitumen Sealant to seal any cut edges.

## FLOOR-TO-WALL JUNCTIONS

Detail Drawings: Page 14

Pay special attention to the completion of the horizontal / vertical connection of the bituBOND® system. Ensure that the underfloor slab membrane skirt is folded up the vertical wall and that the bituBOND® membrane is brought down over the top and sealed. Ensure that the wall-to-floor membrane join is sound and that there is good adhesion. Where polythene is the underfloor slab membrane, bring the 150mm overlap up over the face of the installed bituBOND® wall membrane, and seal with polythene tape. Alternatively, bring the under slab polythene 150mm up the face of the foundation slab, glue into place. Bring the bituBOND® wall membrane sheet over the face of the polythene to the base of the footing. (Refer to "floor-to-block wall details 1 & 2" on page 14)

## MOVEMENT JOINTS

Detail Drawings: Page 11

It is important that consideration is given to the potential for substrate movement. All construction joints should be underflashed with bituBOND®. Expansion joints allowing for significant movement should be specifically designed by an engineer. Examples of typical movement joints are given on Page 15.

## MEMBRANE TERMINATION

Detail Drawings: Page 13

Terminate the bituBOND® membrane with a compression or chase flashing 50mm below finished ground level, ensuring a watertight seal. Alternatively the membrane can be dressed into a 20mm x 10mm chase. Seal the bituBOND® membrane termination into the chase with WPS Bitumen sealant. Apply protection boards onto the damp-proofing system and install drainage to remove water from the building perimeter. Gripset 2P can be used as a transition of the tanking system to above ground level.

The membrane termination must be protected from future damage and UV exposure. Water must not be able to get in behind the membrane.

## PROTECTION AND DRAINAGE

Install 3mm core flute protection boards, next to the bituBOND® damp-proofing tanking system. A certified drainage system should be installed 200mm below the footing to remove water from the building perimeter. The drainage system should be able to cope with the anticipated volumes of water likely on site and be covered with a geotextile filter fabric to prevent it from blocking with fines. Drainage should be placed 150mm from the membrane, and have a minimum 1:200 falls to a drainage discharge outlet.

## BACKFILL

Once the free draining backfill has been placed, this should be capped with impervious clay and sloped to a minimum 1:30 fall away from the wall. Top soil can be placed on the clay if required.

## PATCHING AND REPAIR

Should the bituBOND® membrane becomes damaged before pouring the floor or backfilling, the membrane should be repaired by patching. The patch must be 100mm wider than the area being repaired. Cut edges of the patch should be seated with a fillet of WPS bitumen sealant.

## COMPLETION INSPECTION

During the installation, the QC sheet is to be used by the installer to ensure that the work complies with WPS specifications.

On completion, and prior to covering, inspect all work making good as required. Pay particular attention to penetrations, floor-to-wall junctions and other critical details and laps. Ensure that the QC sheets are completed and signed off, preferably with the main contractor.

Before covering the bituBOND® membrane, ensure you undertake a thorough QC check, preferably with the main contractor. Fill in the QC sheet fully.

## WARRANTY

When installed by an approved applicator in accordance with WPS specifications, a material warranty for up to 15 years is available.

# Installation

## LIQUID DAMP-PROOFING

Liquid damp-proofing is appropriate for non-hydrostatic conditions, or for non-critical situations only. As with any liquid system, obtaining the correct film thickness is critical for the performance of the system. Applications include; planter boxes, block walls, ponds and water features.

## PRODUCT OVERVIEW

### GRIPSET 51 SBR BITUMEN

A water-based liquid bitumen rubber membrane, used in non- hydrostatic damp-proofing applications such as retaining walls, planter boxes and water features. Supplied in 15ltr plastic pails.

### GRIPSET GP PRIMER

A water-based, fast-drying, two-in-one primer and waterproof bonding agent; designed for optimum adhesion of water-based membranes to a variety of substrates.
Supplied in 15L Pails

### SEALANTS

MS Sealant to be used in chase terminations. Available in 600ml Sausages. BituBOND bitumen sealant is to be used in sealing all cut edges around penetrations and small width bituBOND sheets.

### RF FABRIC

A polypropylene material available in 100mm and 200mm tapes for reinforcing plywood joints, up stands and detailing corners and penetrations.
Available in 100m rolls.

### BUTYLFLASH™ TAPE

A butyl rubber-based flashing tape with a polypropylene surface, available in 80mm and 150mm wide tapes.

### GRIPSET C-BED

A premium cement based screed.
Suitable for 80mm to zero screed applications.
Supplied in 15kg bags

### GRIPSET C-1P

A high performance single component flexible polymer cementitious membrane designed for a range of positive and negative waterproofing applications. Suitable for basements, retaining walls, lift pits, immersed, and subterranean situations.
Avaliable in 15kg bags

Areas over 20mm thick will take 48 hours to cure (longer if on a nonporous substrate

## GRIPSET 51

Gripset 51 SBR Bitumen liquid will bond to concrete, render, masonry, fibre cement, plasterboard, timber, clay, concrete blocks, bricks, and polystyrene and bitumen products.

- Mortar fillets to internal corners and external edges are chamfered.
- General surface is flush and smooth.
- Surface is dry. PRIMING Ensure the substrate is clean and properly prepared, prime with duroPRIME direct from the pail by brush or roller. Drying time is 10 - 20 minutes depending on weather. GP Primer can be applied at a rate of 8-10m²/ltr, or on porous substrates; at 6-8m²/ltr.

## INSTALLATION

Reinforce all internal corners, junctions and construction joints using RF Fabric. Apply Gripset 51 SBR Bitumen slightly wider than the reinforcing mesh width and lay the RF Fabric embedded into the Gripset 51 SBR Bitumen. Apply further Gripset 51 SBR Bitumen over-coating the fabric. Allow 24 hours to dry. Alternatively these areas can be flashed with butyl FLASH™ P underfashing tapes.

Apply a further two full-bodied Gripset 51 SBR Bitumen coats to give a total application rate of 1.5ltr/m². This will give a dry film thickness of 1.2mm. These coats are to be applied in opposite directions to each other.

## PROTECTION

Where Gripset 51 SBR Bitumen will be exposed above ground level, protect the area with a reinforced Duroscreed (see next section). Brush over the total exposed area. This provides a more durable finish. For below ground, duroscreed must be protected with 5mm thick screed or alternatively with protection boards.

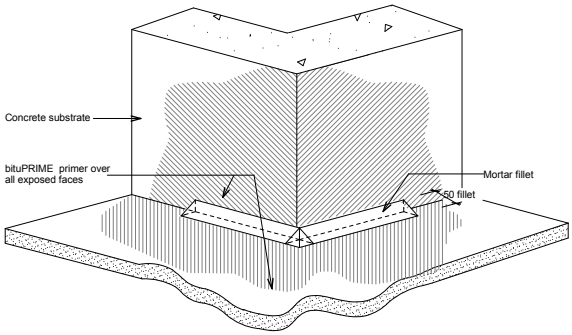
## GRIPSET C-BED SCREEDS

### APPLY THE SCREED

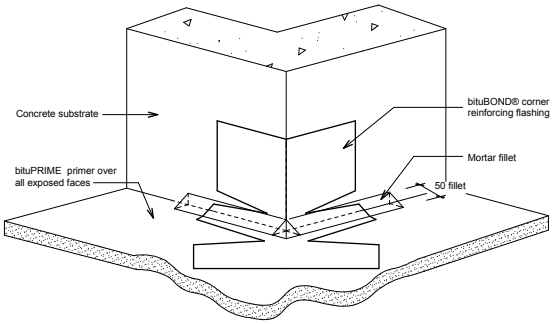
Use standard mortar tools such as steel or wooden floats, straight edges and a large sponge for surface finish. Apply the screed to falls using standard solid plastering methods, having already set out the falls prior to application.

Have a pail of clean water handy to clean the tools during screed application. Once the screed has been laid to falls and has semi-cured, use a wet sponge to lightly sponge over the surface to remove all screed marks, lines and defects.

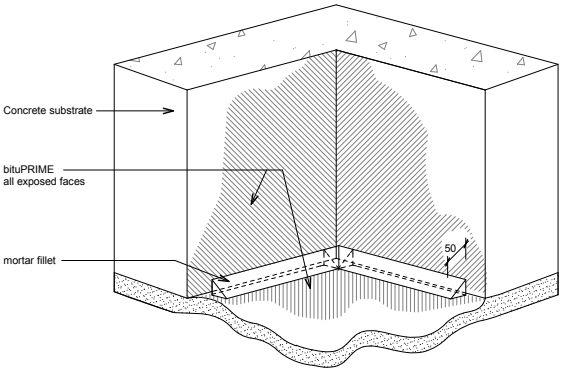
# Detail Drawings



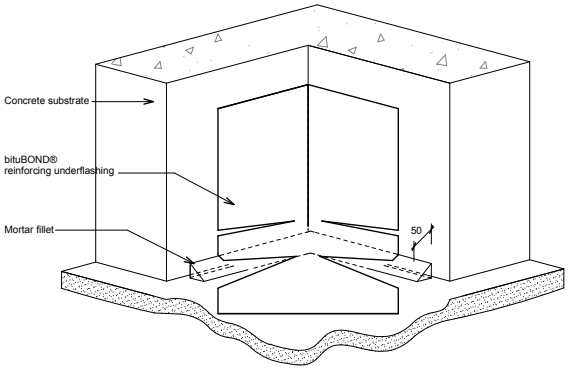

bitu-B14 - Exterior Corner Step 1
REVISION: 23 JUNE 2014



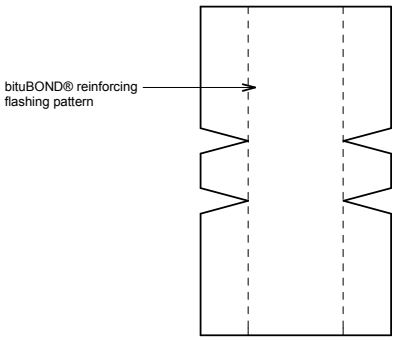

bitu-B15 - Exterior Corner Step 2
REVISION: 23 JUNE 2014



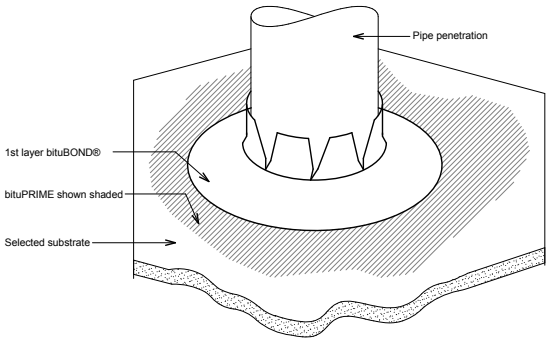

bitu-B16 Interior Corner Step 1
REVISION: 23 JUNE 2014



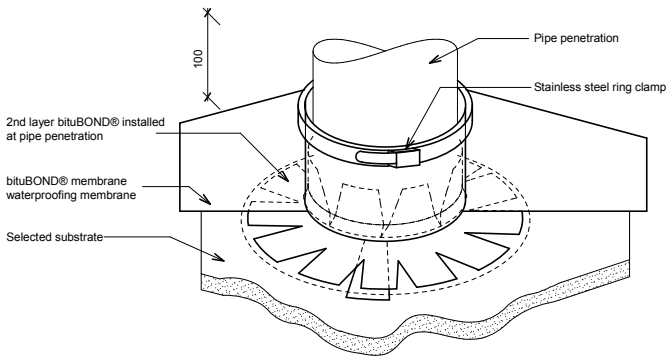

bitu-B17 Interior Corner Step 2
REVISION: 23 JUNE 2014




bitu-B18 - Flashing Pattern
REVISION: 23 JUNE 2014

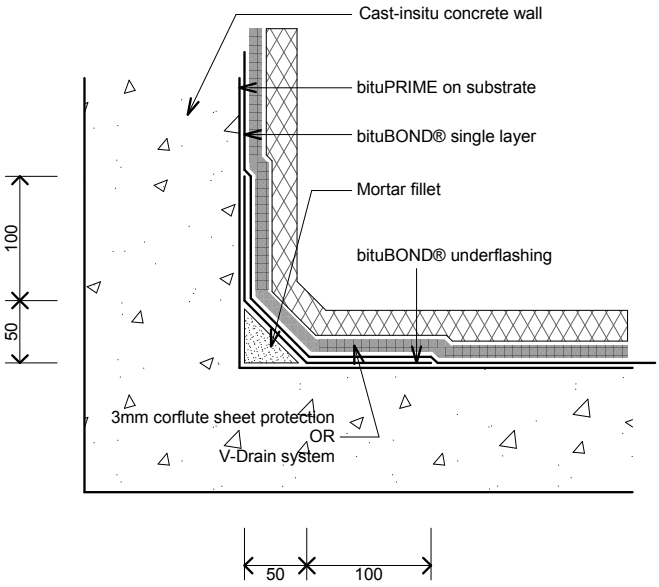



bitu-B19 - Pipe Penetration 1
REVISION: 23 JUNE 2014



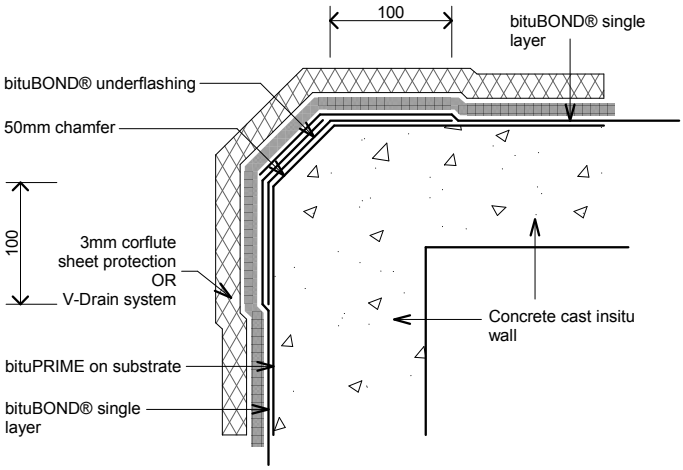

bitu-B19 - Pipe Penetration 2
REVISION: 23 JUNE 2014

# Detail Drawings



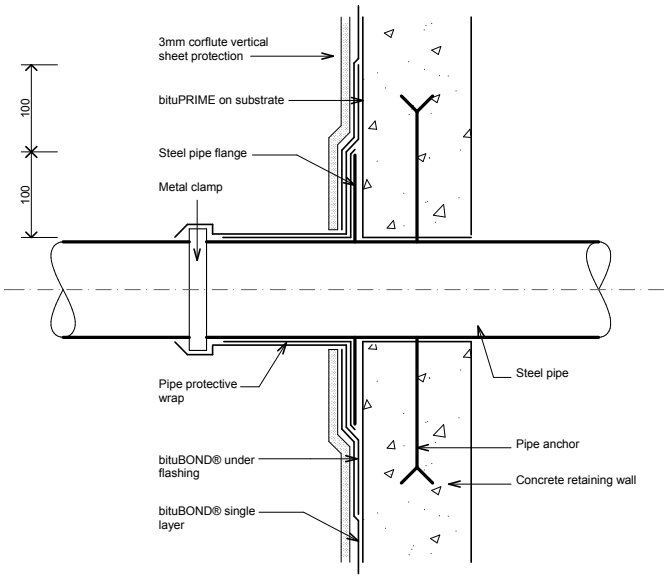

bitu-B01 - Interior Concrete Corner

REVISION: 23 JUNE 2014



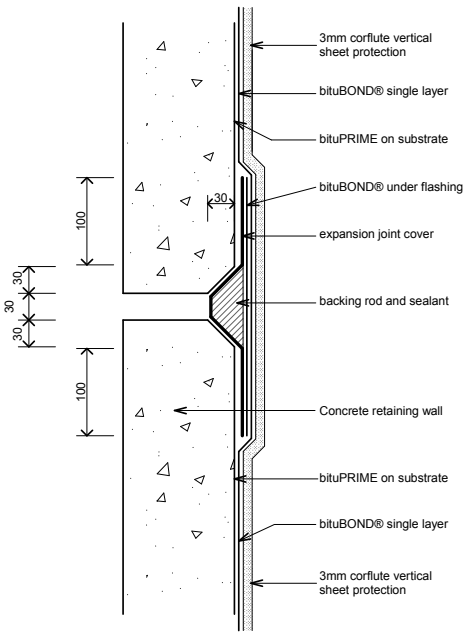

bitu-B02 - Exterior Concrete Corner

REVISION: 23 JUNE 2014




bitu-B03 - Concrete Pipe Penetration

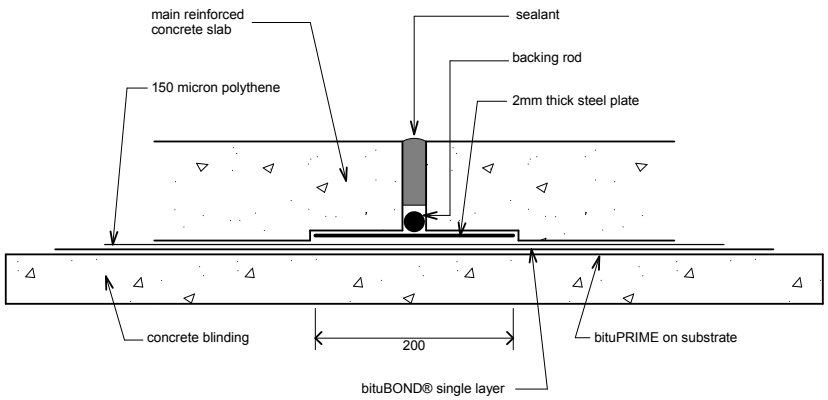
REVISION: 23 JUNE 2014




bitu-B04 - Expansion Joint

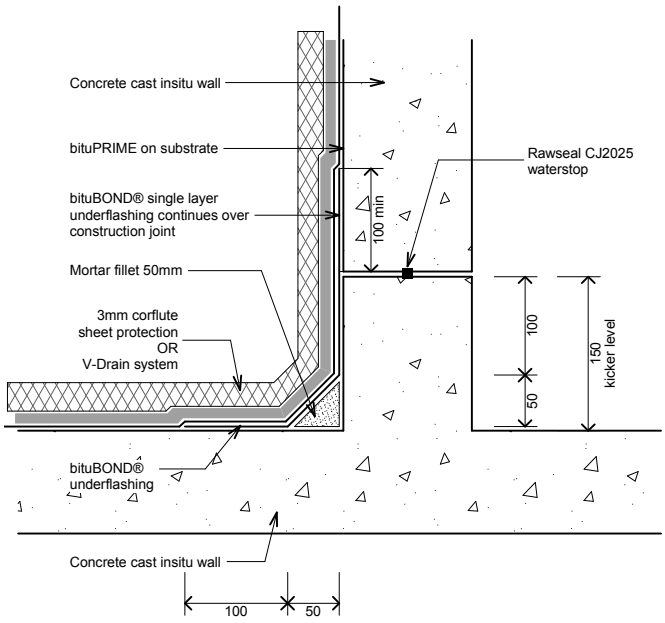
REVISION: 23 JUNE 2014

# Detail Drawings



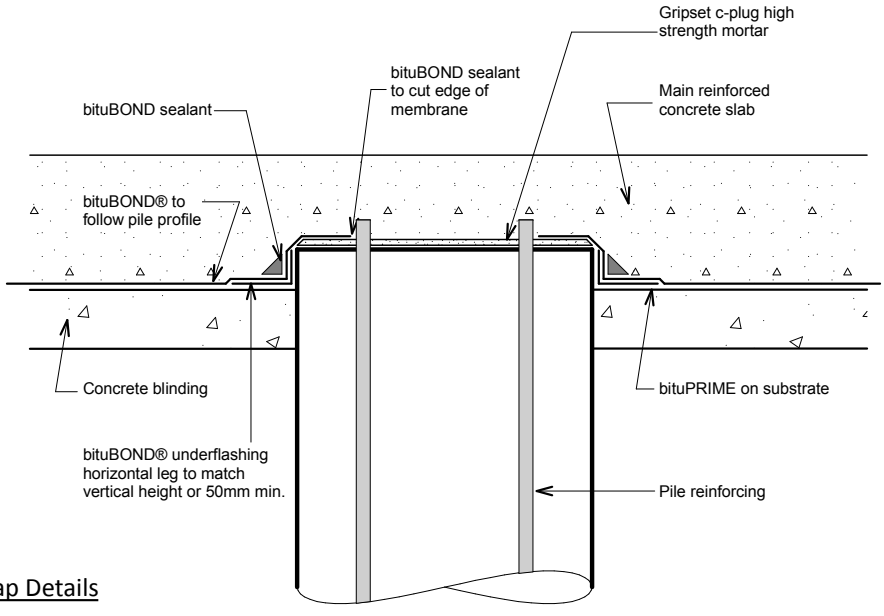

bitu-B05 - Expansion Joint 2

REVISION: 23 JUNE 2014




bitu-B06 - Construction Joint

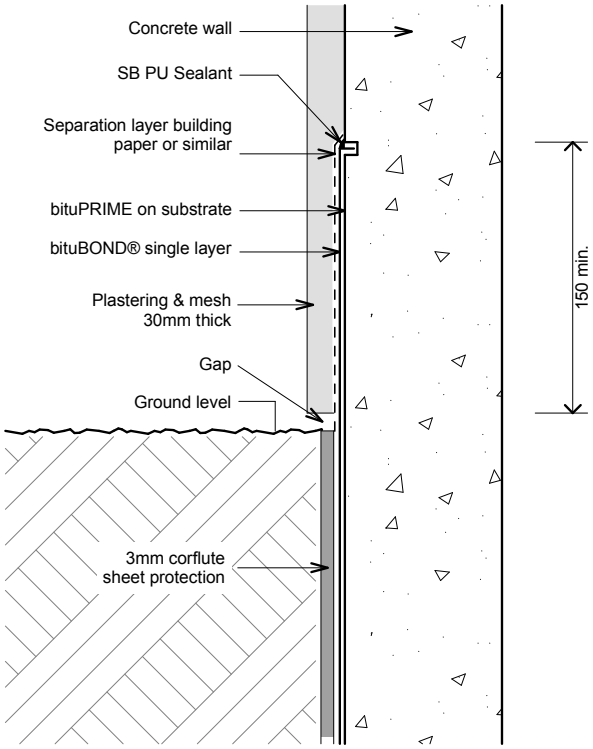
REVISION: 23 JUNE 2014




bitu-B07 - Pile Cap Details

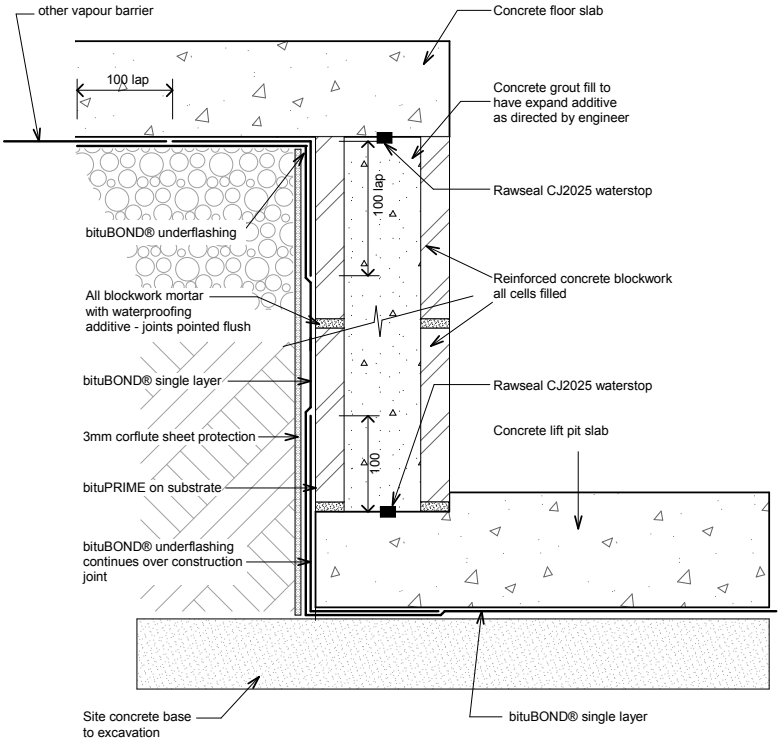
REVISION: 23 JUNE 2014

# Detail Drawings




bitu-B08 - Wall/Vertical Termination Type 1

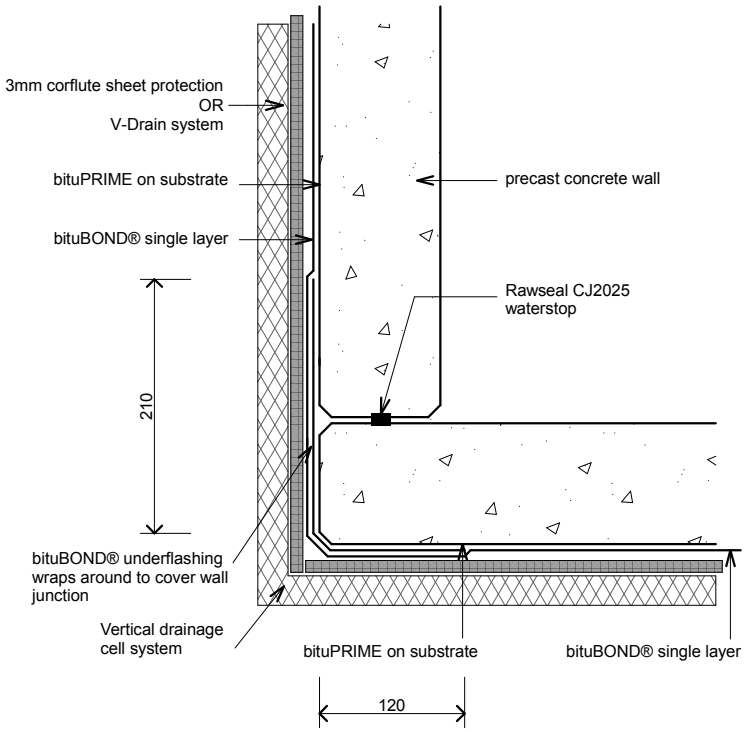
REVISION: 23 JUNE 2014




bitu-B09 - Lift Pit Section

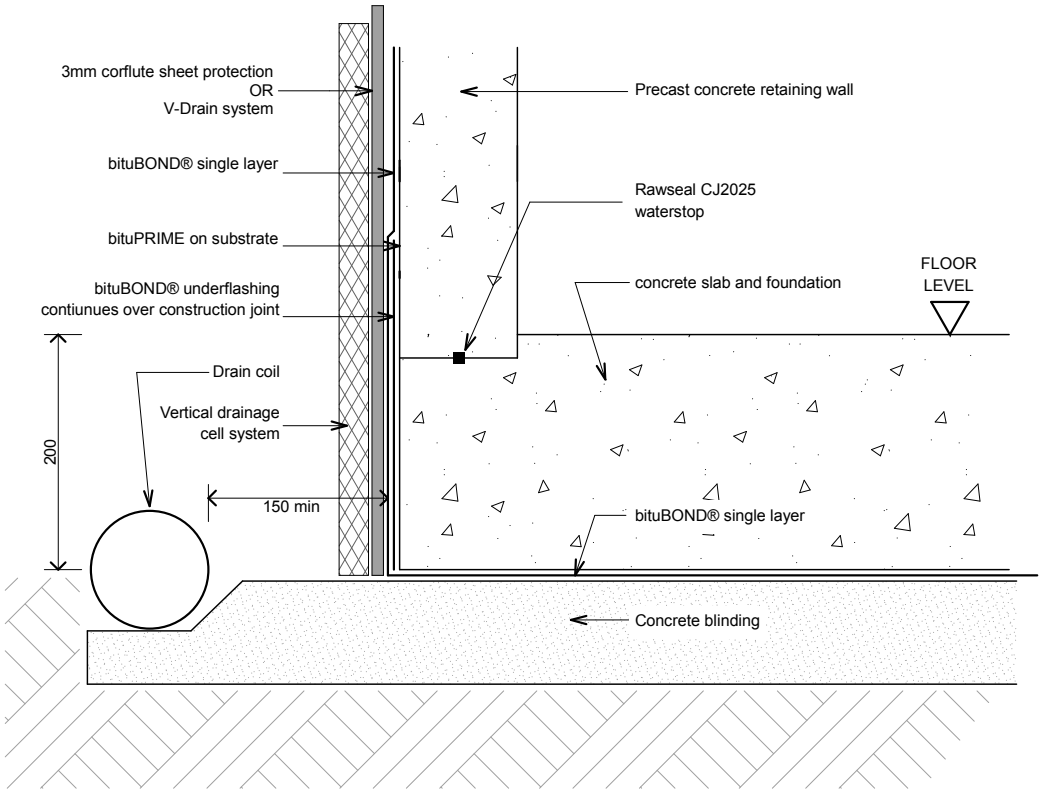
REVISION: 23 JUNE 2014

# Detail Drawings




bitu-B10 - Wall Junction

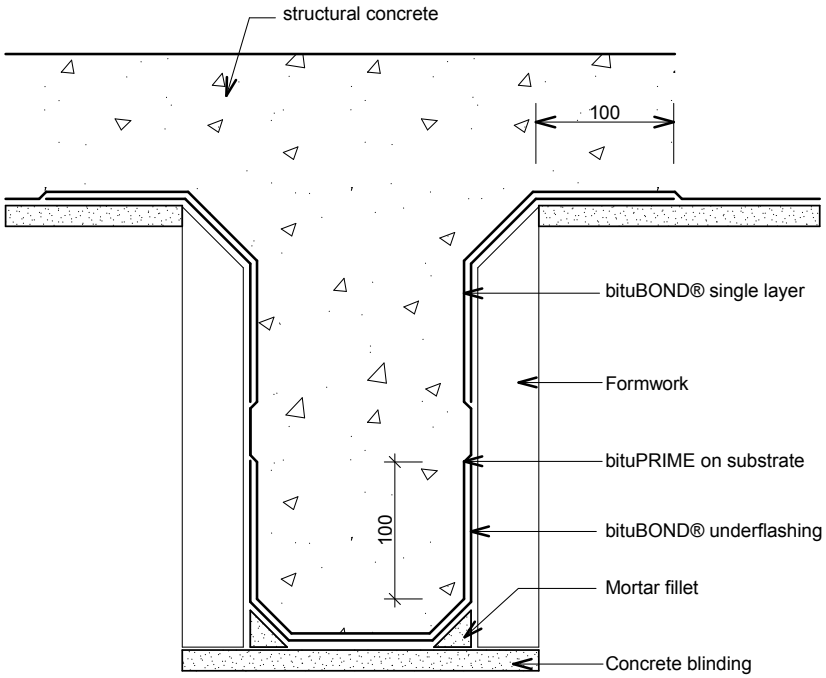
REVISION: 23 JUNE 2014




bitu-B11 - Wall/Floor Slab Junction

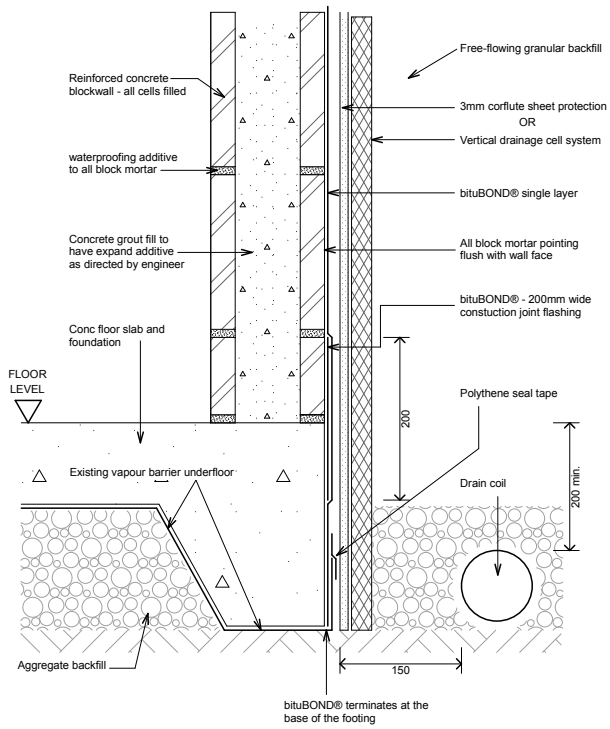
REVISION: 23 JUNE 2014

# Detail Drawings




bitu-B12 - Foundation Ground Beam

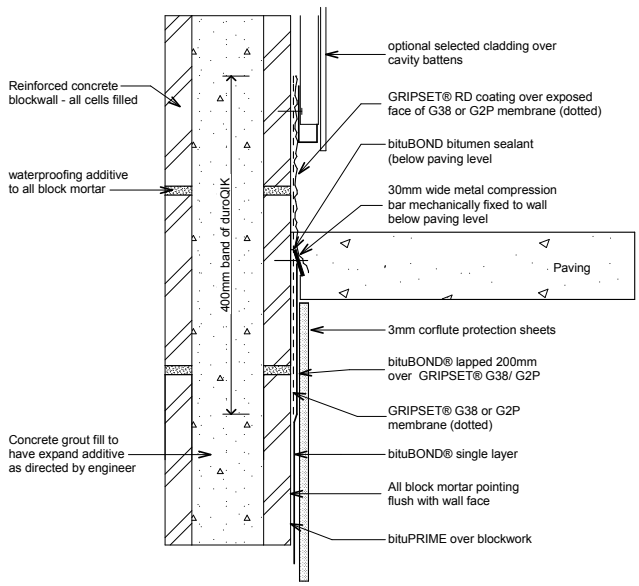
REVISION: 23 JUNE 2014




bitu-B13 - Blockwall Foundation type 1

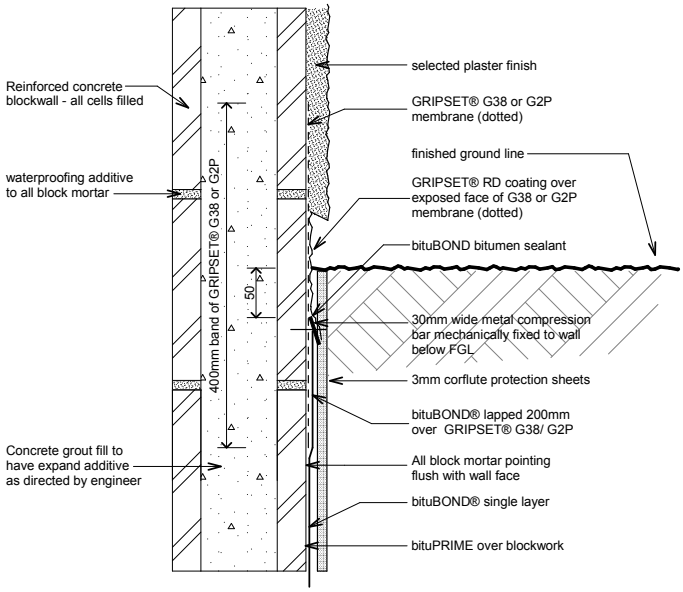
REVISION: 23 JUNE 2014

# Detail Drawings




bitu-B21 - Vertical Termination Type 2

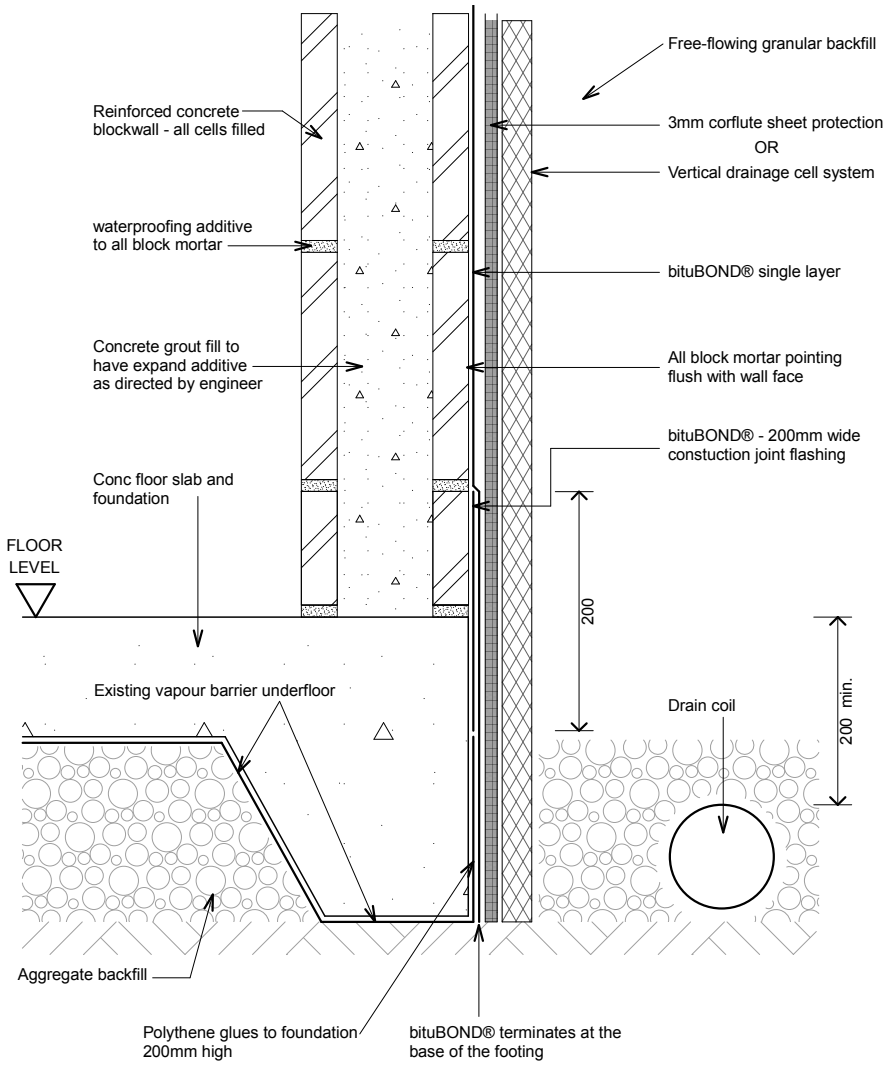
REVISION: 24 April 2015




bitu-B22 - Vertical Termination Type 3

REVISION: 24 April 2015

# Detail Drawings




bitu-B23 - Blockwall Foundation type 2

REVISION: 23 JUNE 2014

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