



1 Croft Stairs
Newcastle upon Tyne
NE1 2HG

Ref: 211108.L.001
11 February 2022

Patrick Casey
Senior Site Manager – Civils Division
Chartrange
Wharf Street
Dukinfield
Cheshire
SK16 4NJ

Dear Patrick,

Re: Gas Membrane Validation – Teaching Block, Belle Vue Coop Academy

This letter has been produced in order to report and advise on the validation of the installation gas protection measures in line with the Visqueen Design (Enclosure 1) at the following site:

- **Belle Vue Coop Academy, Manchester M12 5AL**

It is our understanding that gas protection measures are required within each of the school blocks at the abovementioned site in line with Characteristic Situation 2 ground gas classification (BS8485:2015+A1:2019).

Validation inspections have recently been carried out at the **Teaching Block** (as shown in Enclosure 1) and details relating to the inspections are provided in the following table:

Date of inspection	Inspecting Engineer	Inspected				Pass/Fail	Comments
		Membrane	Joints/seals	Service entry points	Dowel Entries		
05.01.2022	RJ	✓	X	X	X	Fail	Partial Validation and assessment of underlying sand/insulation.
14.01.2022	RJ	✓	✓	✓	X	Fail	Partial Validation
25.01.2022	RJ	✓	✓	✓	X	Fail	Final Membrane Validation
10.02.2022	RJ	✓	✓	✓	✓	Pass	Dowel Validation and re-validation of membrane following steel work

See Enclosure I: Site Photograph Sheet for visual evidence.



Additional comments

Failed inspections were due to penetrations in the membrane and/or incomplete membrane coverage. Emails are included within Enclosure 3, detailing findings of Visits 2 and 3, with advice provided by REL to Chartrange following the Visit 3 in January 2022, detailed in Enclosure 3. This letter report confirms the final validation of the Teaching Block after Visit 4.

The membrane should be protected from any follow-on work, any damage must be repaired prior to concrete pouring.

Conclusion

The overall installation of the Visqueen gas protection design was satisfactory within the Teaching Block and **the gas protection measures at the inspected properties are considered to have been installed in accordance with the agreed Visqueen Design (Enclosure 1).**

We trust that these comments and attachments are to your satisfaction and if you require any further information or clarification, please do not hesitate to contact us.

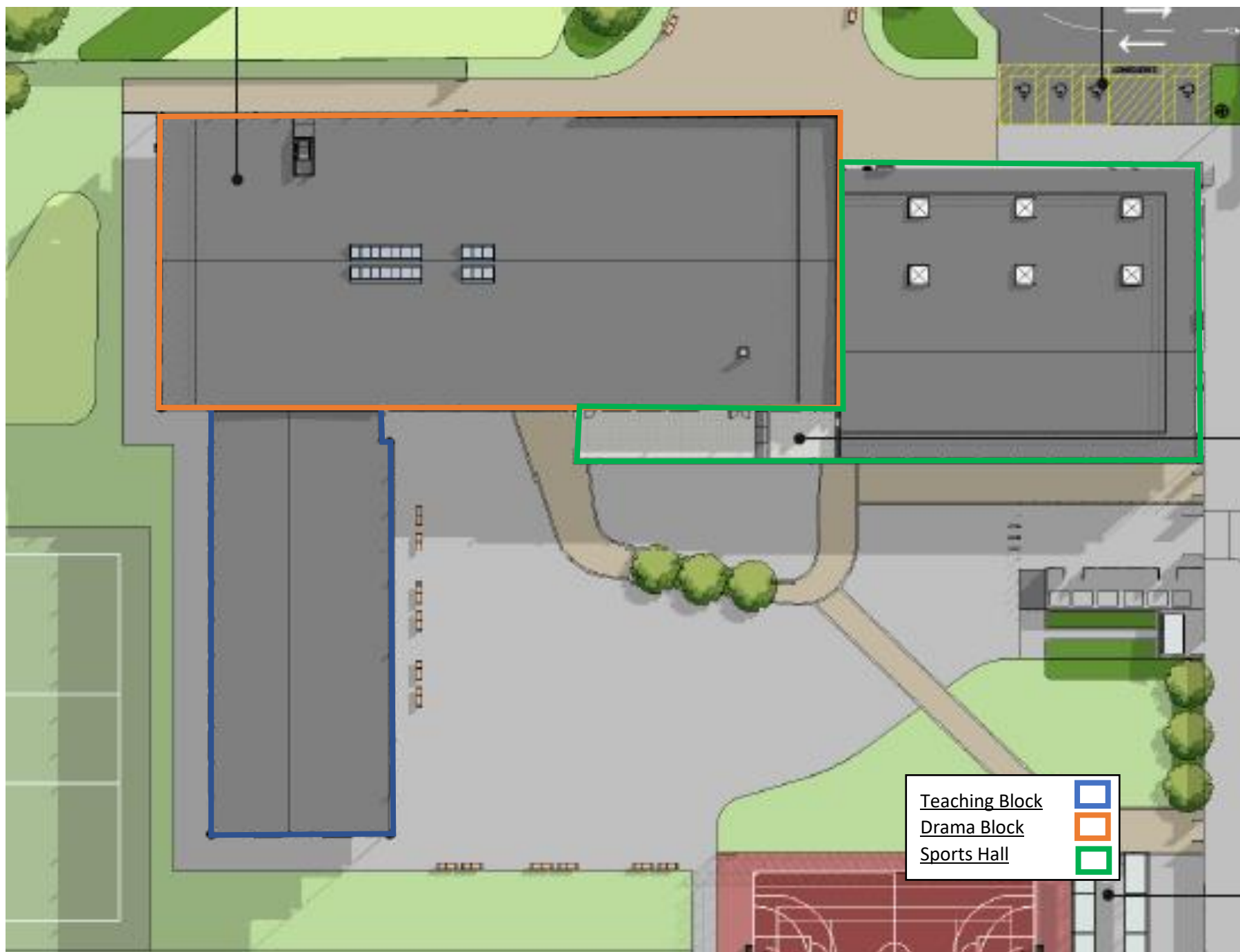
Yours sincerely,

**Rebecca Jordan BSc (Hons) MEnv M.I. Soil Sci
Consultant**

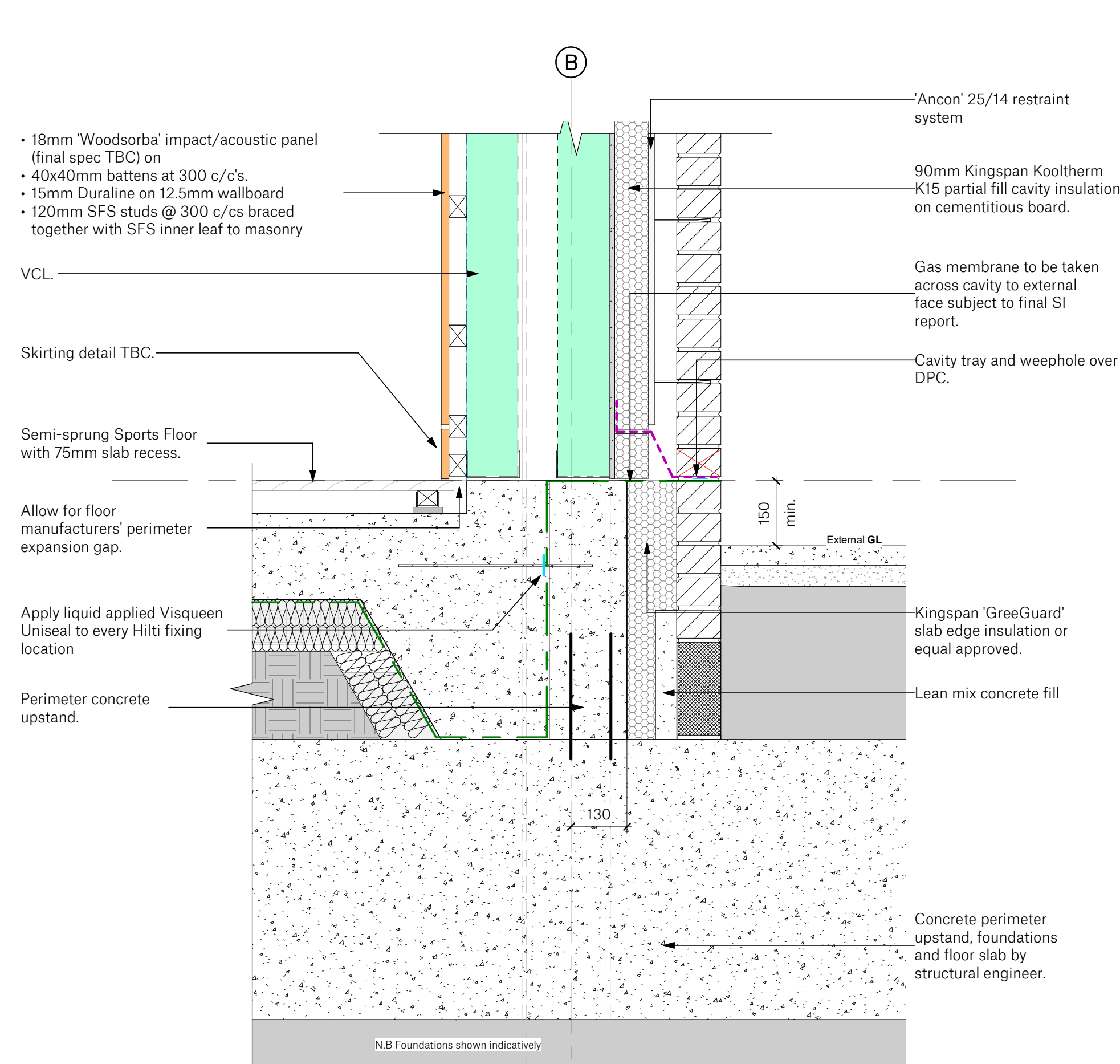
For and on behalf of Roberts Environmental Ltd
Tel: 0191 230 4521
Mobile: 07904 533 938



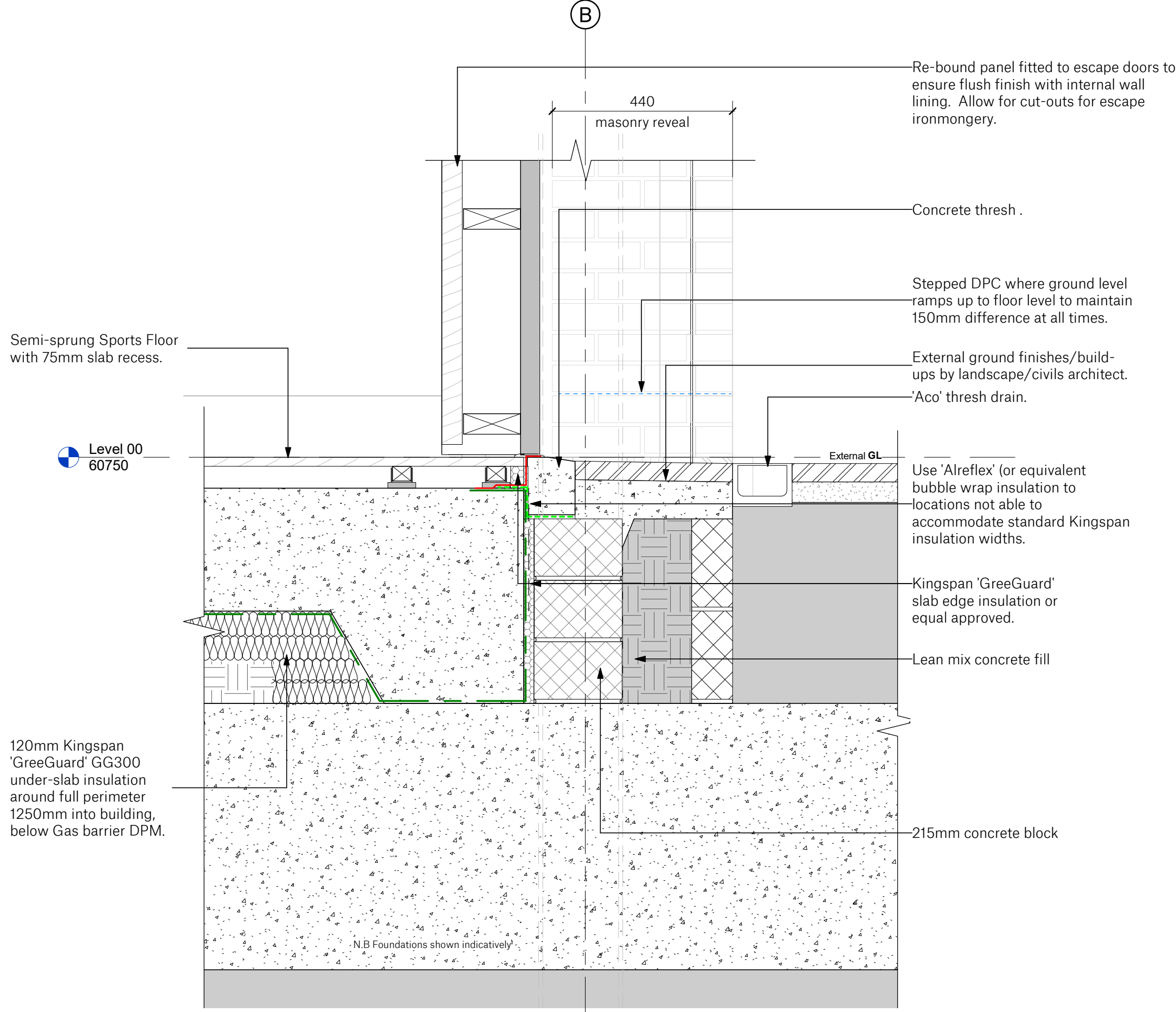
Enclosure I - Drawings



Revision	Description	Author	Checker	Date
P01	First Issue	AWA	LB	08/06/21
P02	Details amended following changes to BDP slab & substructure design	AWA	LB	30/09/21
P03	Waterproofing to base of upstand wall to re-bar locations amended , sports hall internal lining updated, extent of sports slab recess updated	RG	AWA	02/08/21
C01	Updated following further developments between SRM & BDP. Issued as CONSTRUCTION	AWA	RG	20/09/21
C02	Details updated in line with Roberts assessor comments and markup following inspection	RG	SPE	07/02/22



Slab Edge Detail 04
1:10



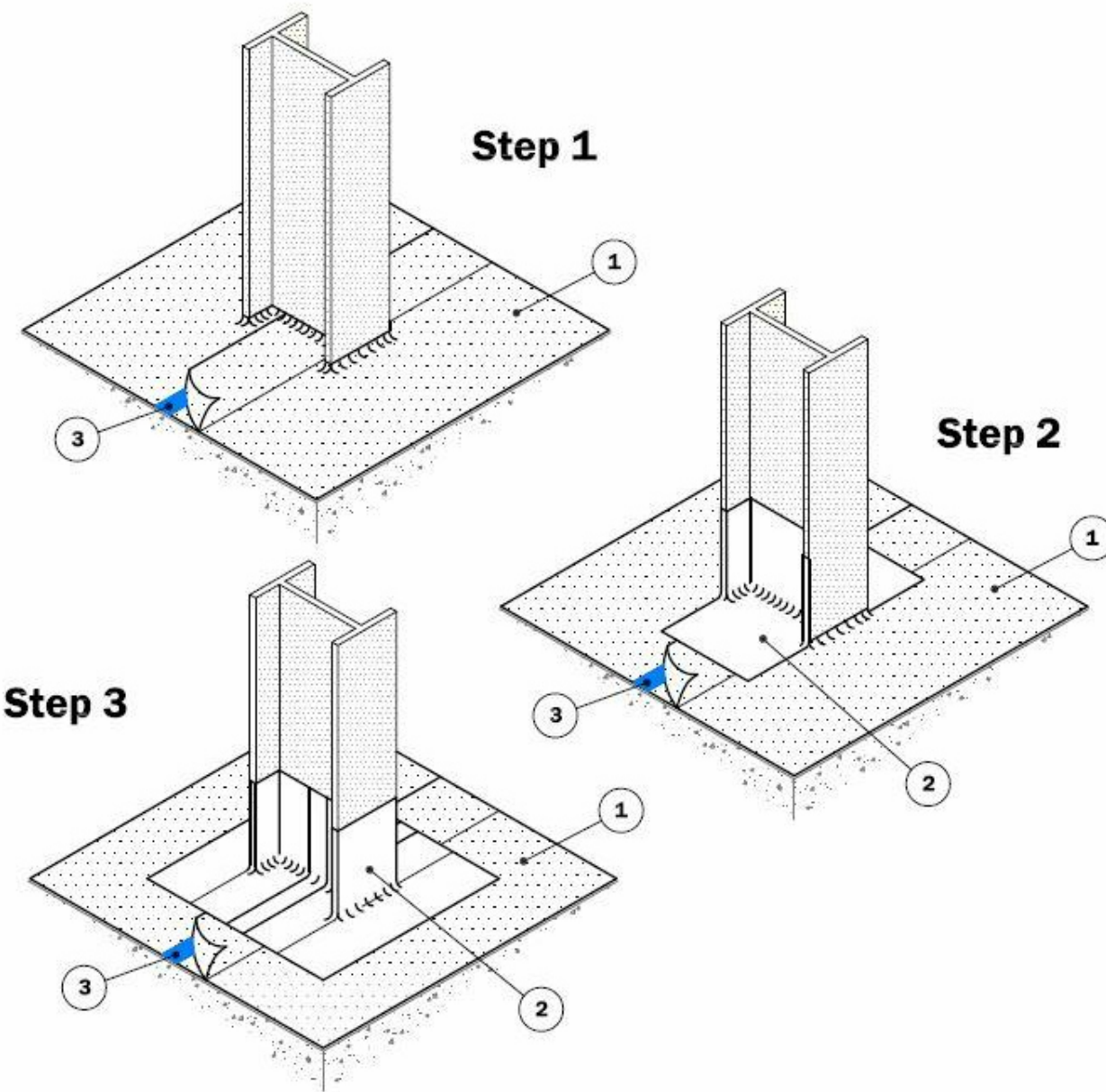
Slab Edge Detail 05
1:10

KEY TO MATERIALS :-	
1	Visqueen Gas Barrier.
2	Visqueen 300mm / 500mm Detailing Strlp.
3	Visqueen Double Sided Tape (10m x 50mm).

Step 1.
Install Visqueen Gas Barrier DPM on a suitable smooth & well compacted blinding layer. All laps to be 150mm minimum & fully sealed using Visqueen Double Sided Tape & Visqueen Gas Resistant Foli Tape. Neatly cut the DPM around the profile of the steel column.

Step 2.
Ensure steelwork is clean & dry before applying Visqueen Detailing Strip (300mm or 500mm). Ensure that the Detailing Strip extends 150mm minimum horizontally onto the DPM & 150mm minimum vertically onto the steel column. Ensure all laps are fully sealed.

Step 3.
Apply more Detailing Strip to the remaining exposed steel flanges ensuring all laps are 150mm in all directions & fully sealed.



GB-52 Detail
N.T.S

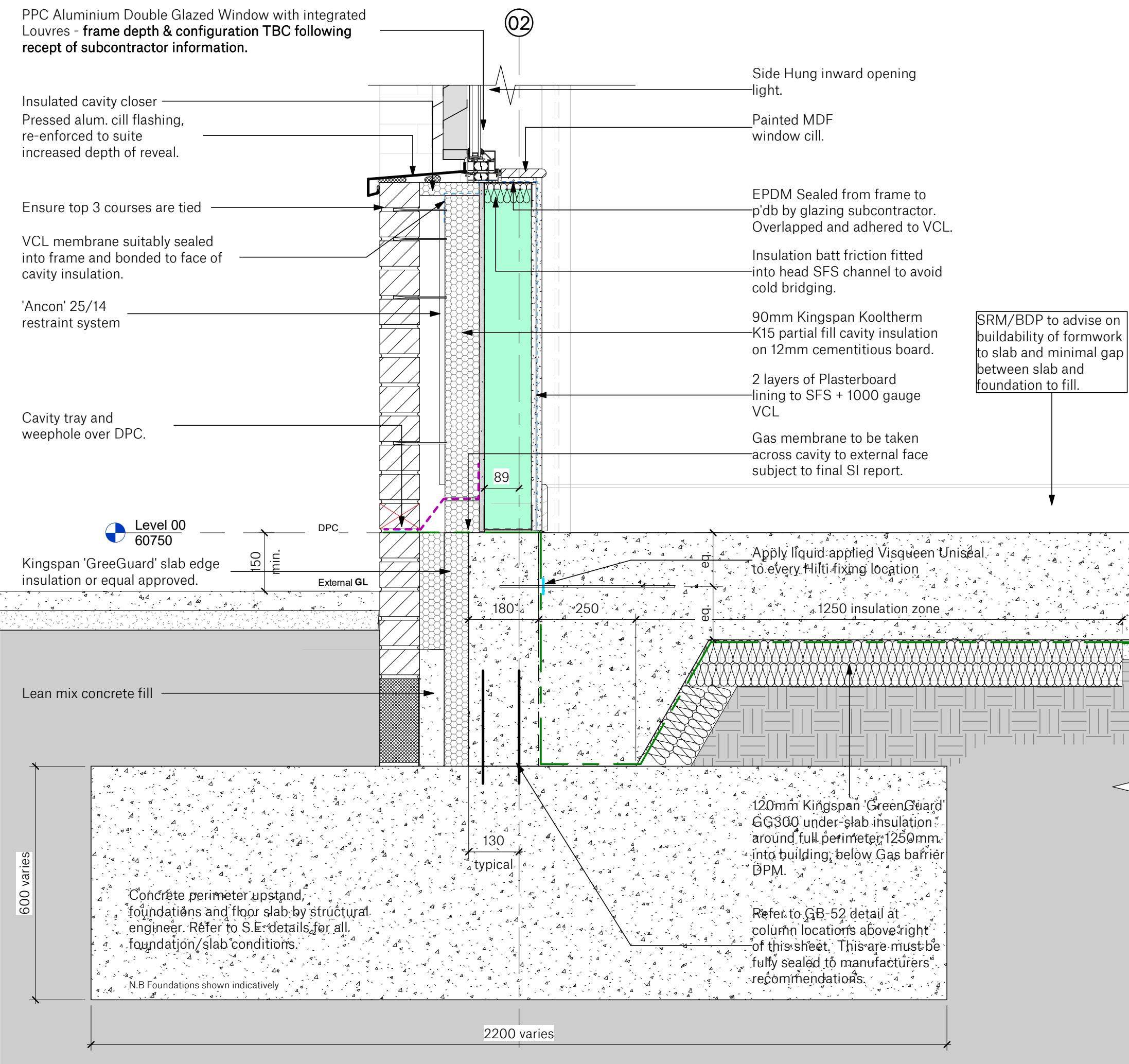
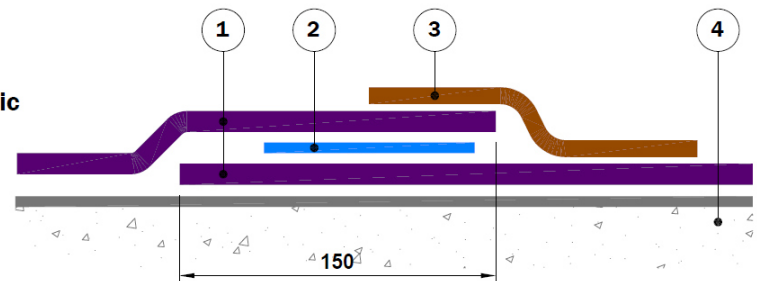
Visqueen Jointing Details

N.T.S

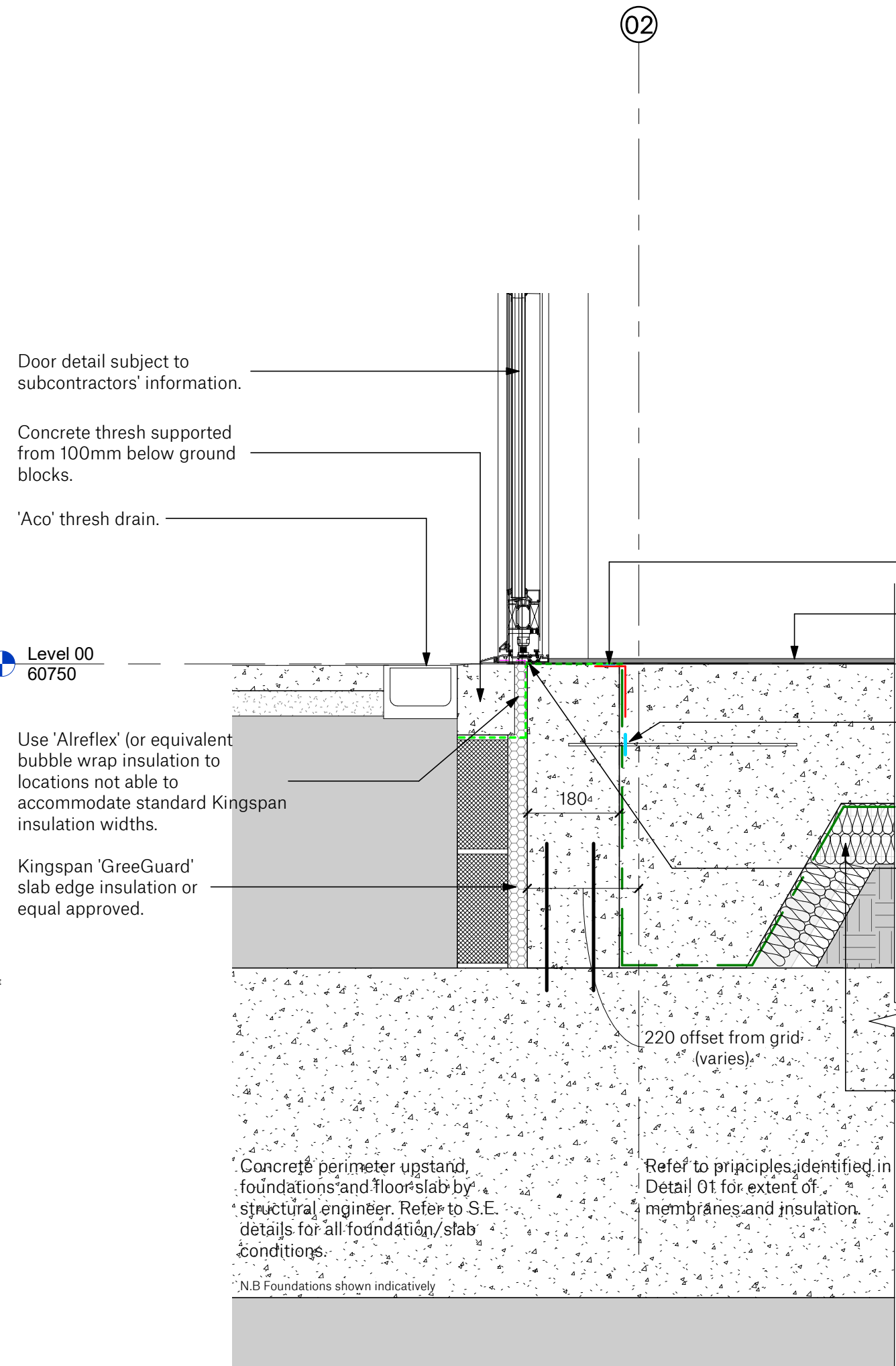
KEY TO MATERIALS :-	
1	Visqueen Ultimate GeoSeal or loose laid membrane
2	Visqueen Ultimate Double Sided Tape.
3	Visqueen Ultimate Lap Tape.
4	Smooth slab or blinding layer.

NB : Ensure careful placement of steel reinforcement to avoid damage to the DPM.

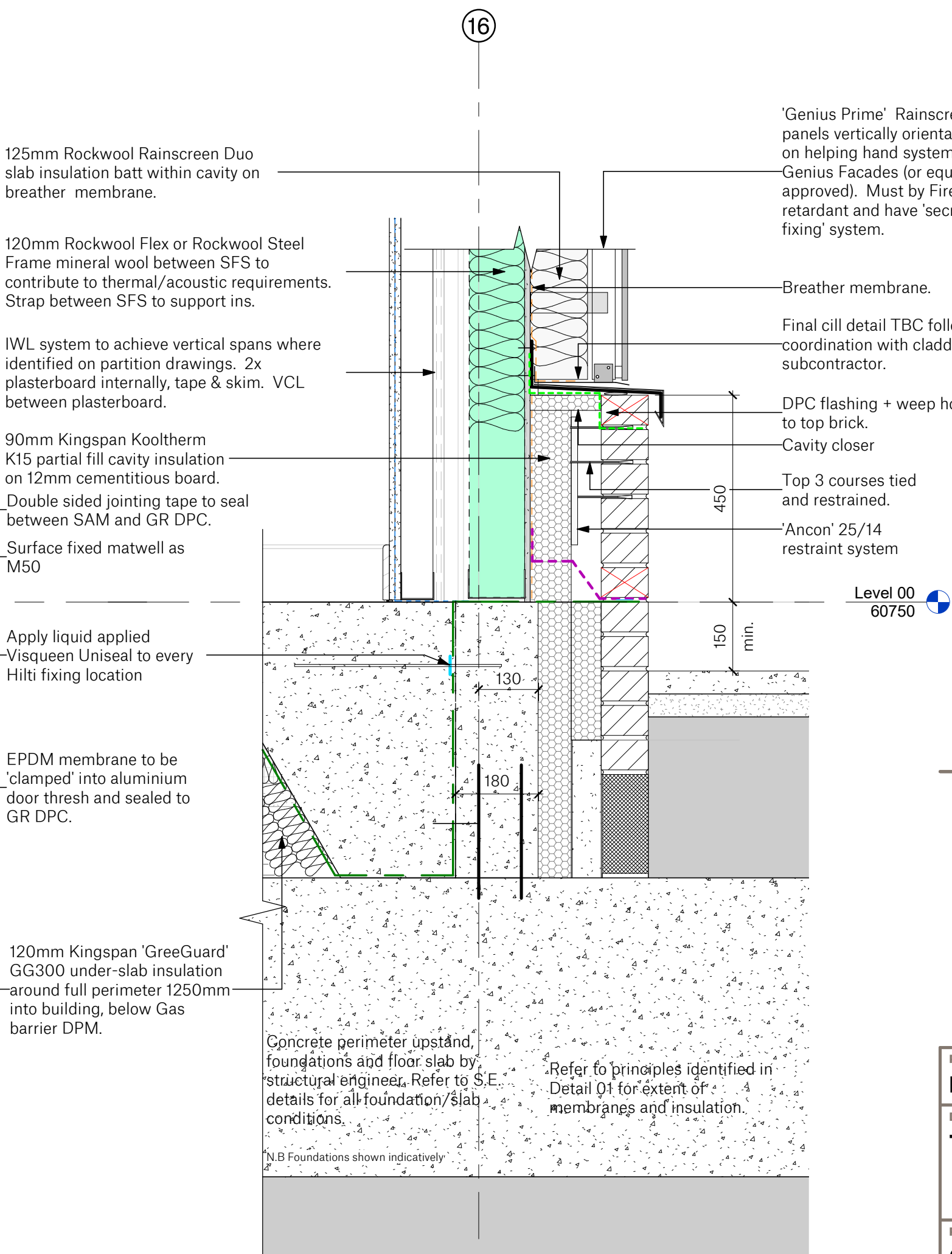
TAPED JOINT :
LOW RISK of hydrostatic water pressure



Slab Edge Detail 01



Slab Edge Detail 02



Slab Edge Detail 03

LEGEND

- Extent of SFS
- Visqueen Liquid Gas Membrane
- Visqueen ZEDEX CPT DPC (cavity tray)
- Visqueen GR DPC
- Visqueen GR SAM
- Visqueen Gas Barrier
- Visqueen GR Lap Tape
- VisqueenPro Double Sided Jointing Tape (50mm x 10m)
- Visqueen Double Sided Jointing Tape (100mm x 15m)
- Visqueen Treadguard 1500
- Visqueen Protect & Drain 12mm
- Visqueen Pro 300/500mm Detailing Strip on HP Tanking primer
- Visqueen Ultimate GeoSeal
- EPDM
- VCL
- Breather Membrane

NOTE:

Always refer to slab edge setting-out plans for location of slab edge offset from gridlines.

SPACE

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Sir Robert McALPINE

MANCHESTER CITY COUNCIL

Project Belle Vue Co-op Academy, Manchester				
Drawing Title Typical Slab Edge Details - Sheet 01				
Project No. 009433	Drawing No. 01-XX-DR-A-100001	Status C02	Revision As indicated	Scale at A1
File Reference: 009433-SPA-01-XX-DR-A-100001				

This drawing is Copyright - Check all dimensions on site - Inform originator of any discrepancies - Work to figured dimensions only - Do not scale



Enclosure 2 – Photographs

Visit 1 – 5 January 2022

1.	View of area where membrane is to be laid.	
2.	View of the first portion of membrane installed, on southern edge of Teaching Block.	
3.	Penetrations within the membrane prior to insertion of dowels for steel works.	

Visit 2 – 14 January 2022

4.

View of the gas membrane confirming the joint was heat welded and suitably installed with a 150mm overlap present.



5.

View of the stanchions confirming the Visqueen design has been followed accordingly.

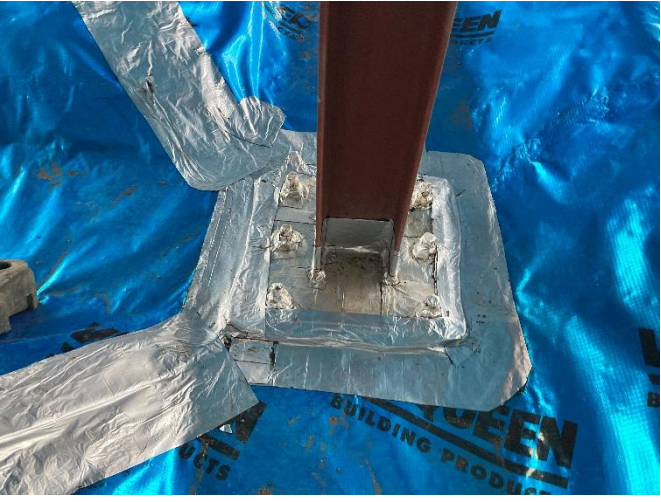


6.

View of ongoing work, with stanchion shown on the left and service entry on the centre of the photograph.



Visit 3 – 25 January 2022

7.	View confirming Visqueen membrane installation across the entire footprint of the plot. The membrane was installed to a suitable standard. Concrete blocks were placed on the surface, with the potential to cause damage. This was discussed with Chartrange (Enclosure 3).	
8.	Damage caused to membrane.	
9.	View of gas membrane and black single-sided bituminous tape used to form, seal and reinforce corners. The tape is also used, as per the Visqueen design, to seal the membrane to the stanchions.	

10.	View of damage caused by follow-on steel works.	
11.	View of repairs to membrane, undertaken after visit. Validated by photographs and on following visit.	
12.	View of repairs to membrane, undertaken after visit. Validated by photographs and on following visit.	

Visit 4 – 10 February 2022

13.	View confirming the dowels have been sealed using Liquid Axiom, as detailed by Visqueen.	
14.	View confirming the dowels have been sealed using Liquid Axiom, as detailed by Visqueen.	
15.	Damage to membrane beneath the steel rebar installed prior to concrete pour. Repaired during visit to site as confirmed by RJ.	

16.	View of gas membrane beneath the steel rebar.	
17.	View of gas membrane beneath the steel rebar.	
18.	Wall cavity confirmed as being free of debris.	

Above is a selection of relevant photographs, further photographs are available.



Enclosure 3 – Email Correspondence

Rebecca Jordan BSc(Hons) MEnv

From: Rebecca Jordan BSc(Hons) MEnv
Sent: 17 January 2022 12:41
To: Patrick Casey; David Keating
Cc: Richard Slater; Russell Samuels
Subject: Belle Vue Coop Academy - Follow on email (Part validation of Teaching Block 14.01)
Attachments: Validation to date 14.01.pdf

Good afternoon,

I hope you are well.

Following my visit to site on 14th January 2022 I can inform I have validated the areas as identified on the attached plan. The findings of my visit are as follows:

1) Areas of standing water were present within the validation area (Teaching Block)

When first arriving to site, it was noted areas of standing water were present within the troughs on the outer edges of the areas to validate. In addition, areas of muck/soil were present within the area to validate. I had requested on my previous visit all standing water and muck/soil be removed from the membrane surface by Chartrange in the areas to validate. Normally, as company policy we would not validate a membrane in this condition as it cannot be inspected to ensure no rips or holes are present.

However, Elliot of Water8 Solutions aided in the removal of water and muck from the membrane surface to allow the validation to go ahead (although this is not part of his services agreed with Chartrange).

Please ensure standing water/muck is removed prior to my visit, as if the membrane is unable to be seen it cannot be validated and a return visit will be required, at cost to the client. Water8 will not always be present during the validation stage.

2) Membrane damage

Following my validation of the membrane installed (excluding the stair area, concrete edges where the dowels are to go and the northeast corner (as shown on the attached plan) approximately 75 failing points (comprising holes/tears/weak spots) were noted. Of these failing points, c.70-72 points were not caused by the installers.

The main cause for concern is the stone content of the underlying material on which the membrane was laid. The material beneath the membrane should comprise a layer of fine sand with a very low stone content, which is sufficient depth to create a cover over the underlying stony ground. When undertaking the validation, over 10 locations required the membrane to be cut to remove quarter bricks and large stones that were protruding through the sand to the surface and causing damage to the membrane. This should be rectified prior to the next round of membrane installation. During the next validation visit, if required I can provide RELs opinion of the material placed beneath the Drama Block (prior to membrane install). If required prior to my next visit, Water8 are qualified to make this decision.

Furthermore, foot traffic cutting through the site, combined the lack of protection over the already installed membrane (i.e. the implementation of protective membrane as included within the design by Visqueen) is also creating a large number of failing points. It is noted this is a serious issue, as following my validation of an area, any damage to the membrane is the responsibility of the client. If any damage occurs the membrane will not be fit for purpose (even a small pin hole can allow enough gas into a room to be a risk to human health), and it may result in the requirement for extra costs associated with membrane removal and relay or patching up and follow up validations. **It is RELs recommendation, protective measures should be implemented, as per Visqueen's design, as a matter of urgency to prevent any further damage resulting in unforeseen costs and delays to the project.**

3) Ongoing protection following validation

Following on from the above point, after validation **protection must be implemented for the membrane**, to protect from future works. As noted above, the design of the gas protection membrane by Visqueen includes the insertion of a protective geo-textile. If this is not to be used, Visqueen must be consulted as this may impact the ability to validate as this requires confirmation that gas protection meets the Visqueen design and confirms the integrity of the protection measures installed.

When installing the steel cages on the membrane, extra care should be taken to prevent damage to the underlying membrane. This is one of the reasons installing the geo-textile membrane will be beneficial.

4) Dowel Holes

In order to validate the sealing of the dowel holes, access to these areas will be required. Therefore, REL will need to visit the site prior to concrete pour in these areas to ensure no gaps are present. Russell from Water8 Solutions has confirmed Visqueen are in agreement for the use of the Uniseal in this area. **Please could the correspondence relating to the confirmation of this be forwarded for our inclusion within the validation statement.**

Please note, due to delays in getting the stair area ready for Water8 Solutions to install the membrane, this area was not available for validation during this visit. Furthermore, the dowel holes for the connection to the steel work will also require validation following installation of the steel and dowels. I aim to time my next validation visit to allow the validation of the remaining areas within the Teaching Block.

I trust the above is satisfactory, however if you have any queries, please contact myself on the below mobile number.

Kind Regards,
Rebecca



<u>Teaching Block (Blue)</u>	
Validated	
To be Validated	
<u>Drama Block (Orange) –</u>	
Validated	
To be Validated	
<u>Sports Hall (Green) –</u>	
Validated	
To be Validated	

Rebecca Jordan BSc(Hons) MEnv

From: Rebecca Jordan BSc(Hons) MEnv
Sent: 27 January 2022 15:34
To: Richard Slater; David Keating; Patrick Casey
Cc: Russell Samuels
Subject: Belle Vue Coop Academy - Teaching Block Validation

Good afternoon all,

Apologies for the delay in emailing following my validation visit on Tuesday.

I can confirm the full area excluding the dowels of the Teaching Block has now been validated. As discussed while I was on site, damage has been caused to the membrane by follow on works. As agreed, these locations are to be repaired by Water8 Solutions with a photographic record of repairs provided following completion of the works.

Once the dowels have been sealed with Uniseal, as required by Visqueen, I will undertake a return visit to validate these locations for the teaching block and confirm no other damage has been done to the membrane.

Going forward, as discussed, protection is required to be used by the follow-on works to prevent any further damage, with plastic boarding used to protect the membrane from the steel works.

To continue into the next blocks, the work surfaces must be prepared to the required standard prior to membrane installation, in order to prevent the issues we have had on the Teaching Block. This would include but not be limited to the sand layer at the correct thickness with no stones, sand over the pipes within the footprint of the building, insulation installed correctly, and surfaces cleaned of stones/residual sands etc. to allow cohesion of the materials).

Furthermore, to be commercially pragmatic and prevent re-validations of areas already validated on previous visits, the remaining two blocks should be undertaken in sections; with dowels, steel columns, pipes and all other details prepared as they are reached. This would prevent damage from stones/footfall/water ingress and negate the need to re-validate and relay areas of complex detail, saving both time and money for the Project (as Water8 Solutions and REL will only need to visit each area once). Following validation, damage must be limited and managed with any damage caused by the follow-on works reported and fixed prior to the concrete pour (which should occur in sections, if feasible).

I trust the above is satisfactory, however, please contact with any queries.

Kind Regards,
Rebecca