

TECHNICAL NOTE – GROUND GAS PROTECTION

Project Name: Plot J2, Kingsway, Rochdale
 BWB Project No: 220810
 Revision: C01
 Reference: G1174-BWB-ZZ-XX-RP-S-01000
 Date: 12.08.2024
 Author: Joseph Hackwell

This technical note is to advise on the design solution dealing with the ground gas found on development Plot J2 at Kingsway, Rochdale.

The relevant clauses from the Geo-Environmental and Geotechnical Assessment Report dated February 2022 are as follows noting the classification for this site:

Ground Gas and Assessment Outcome

The minimum and maximum steady state concentrations recorded for borehole flow, oxygen, carbon dioxide and methane are summarised below.

Table 8 Summary of Recorded Ground Gas Results

Borehole ID	Targeted Geology	Steady Flow (l/hr)		Carbon Dioxide (%v/v)		Methane (%v/v)	
		min.	max.	min.	max.	min.	max.
BH01	HGD	<0.1	5.1	0.3	4.7	<0.1	<0.1
BH02	HGD	<0.1	<0.1	0.9	1.8	<0.1	<0.1
BH03	HGD	<0.1	2.6	2.9	4.0	<0.1	<0.1
BH04	HGD	<0.1	0.1	2.3	3.9	<0.1	<0.1
BH05	HGD	<0.1	<0.1	1.8	3.3	<0.1	<0.1
BH06	HGD	<0.1	-0.3	<0.1	13.1	<0.1	<0.1

During the monitoring programme completed at the site the atmospheric pressure ranged between 976mb (recorded on 18/01/2018) and 1005mb (recorded on 29/01/2018). Steady flow rates ranged between <0.1l/hr (recorded at multiple locations on multiple occasions) and 5.1l/hr (recorded at BH01 on 29th January).

Three monitoring visits were undertaken when atmospheric pressure was recorded below 1000mB, representing a low-pressure event and the worst-case scenario for the site.

The pressure was recorded as rising during one monitoring visit, as static during two monitoring visits and falling during one monitoring visit.

On this basis, the monitoring is considered likely to have captured the worst-case gassing scenario at the site as generally, ground gas emissions tend to increase when atmospheric pressure falls and particularly when the pressure drops below 1000mB.

Steady carbon dioxide concentrations recorded ranged between <0.1% v/v (recorded at BH06 on 29th January) and 13.1% v/v (recorded at BH06 on 18th January).

Steady methane concentrations were not recorded above <0.1%v/v and hydrogen sulphide concentrations were not recorded above the limit of detection of the equipment during the

monitoring visits.

Carbon monoxide concentrations were generally not recorded above the limit of detection of the equipment during the monitoring visits with the exception of BH06 (10ppm on 18th January). 8.14 PID concentrations were not recorded above <0.1ppm (the limit of detection of the equipment).

A maximum gas screening level of 0.66l/hr (for carbon dioxide) was recorded, giving a classification of Characteristic Situation 2. Based on this data, gas protection measures are required to be included within all new structures.

Based on current guidance in BS 8485 the design criteria have therefore been set as follows:

Warehouse	Type D Building (low risk) – 1.5 points for CS2
Office	Type C Building (medium/low risk) – 2.5 points for CS2

Warehouse

In accordance with BS 8485 Clause 7.2.1 for low sensitivity buildings on low-risk sites it is possible to rely solely on a membrane or slab; for example, where internal ventilation provides secondary protection. As per annex A.2.2.3 in BS 8485 the industrial ground floor slabs will be formed of a well reinforced ground bearing slab. It will be designed for minimal total and differential settlement and with widely spaced construction joints. There are limited services entering through the floor slab. The combination of all these factors, together with the large inter-connected space of most or all the building, provides a low gas risk situation. All construction joints in the floor slab and all service penetrations through the floor slab are to be well sealed.

A standard 2000 gauge DPM beneath the slab, lapped and sealed is appropriate protection for the warehouse.

Office/Undercroft

The main office is a jointed concrete ground bearing slab, nominally mesh reinforced. This provides a points score of 0.5 and therefore additional gas protection measures are required. The use of a validated proprietary gas membrane provides an additional 2 points, see Table 7 in BS8485:2015. The perimeter of the building has a gravel strip so any gas can flow laterally and vent to atmosphere.

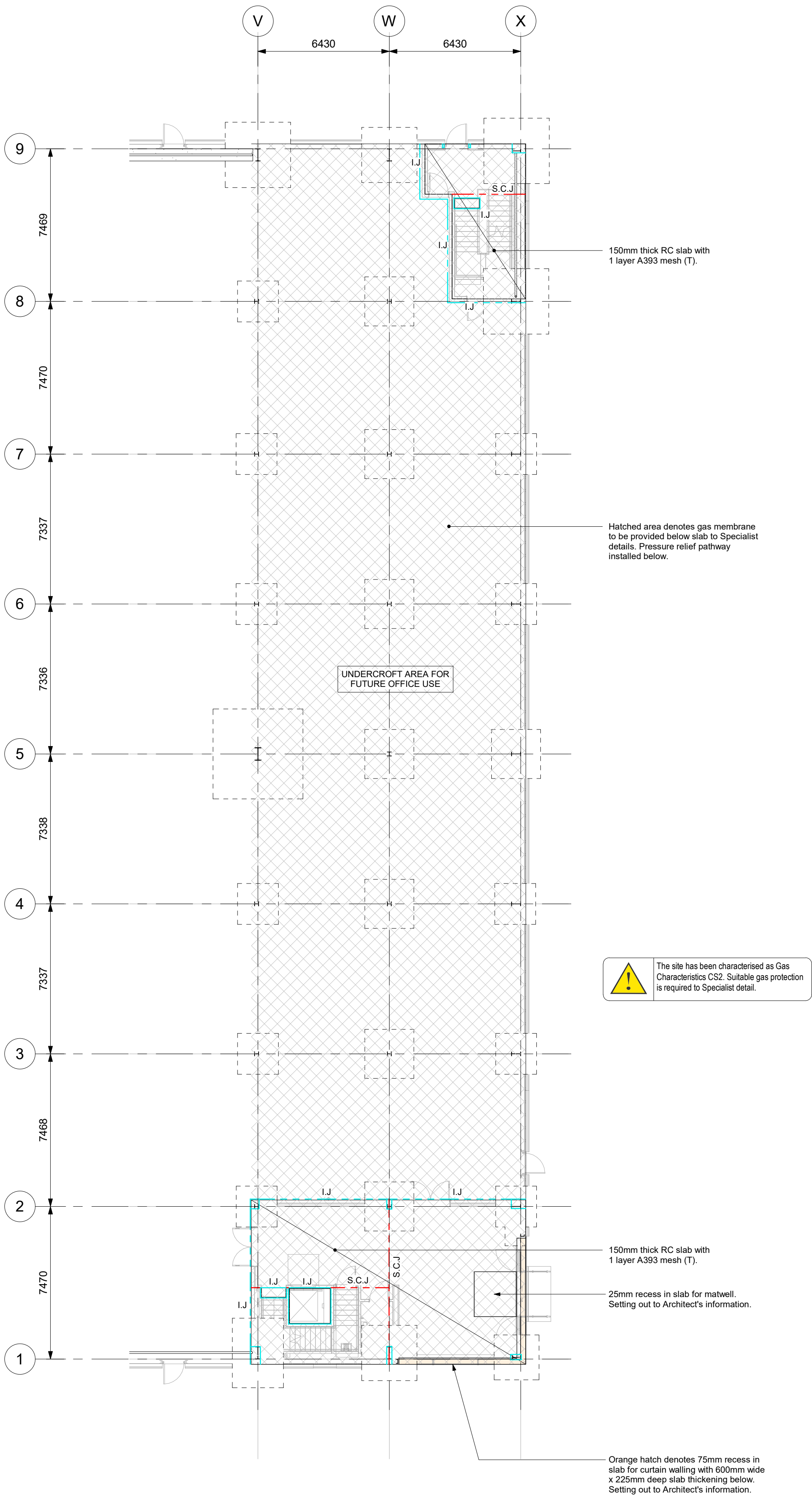
The selected membrane must meet the following criteria:

- Be verified in accordance with the manufacturer's specialist details and CIRA Report C735 and BS8485:2015
- Be sufficiently impervious to the gases with a methane gas transmission rate $\leq$ 40.0ml/day/m²/atm (average) for sheets and joints (tested in accordance with BS ISO 15105-1 manometric method)
- Be sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions
- Be sufficiently strong to withstand in service stresses (e.g. settlement if placed below a flood slab)
- Be sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres and /or reinforcement ties, tearing due to operatives, dropping of tools etc)
- Be capable after installation of providing a complete barrier to the entry of the relevant gas

- Have all penetrations sealed all in accordance with the manufacturer's specialist details and CIRA Report C735 and BS8485:2015
- Not be ordered without prior approval from BWB

Appendix A

Drawings



Office Ground Floor G.A
1 : 150

- Notes
1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
 2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
 3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
 4. Any discrepancies noted on site are to be reported to the engineer immediately.

C01	12/01/24	Issued for Construction	LN	JH
P03	13/09/23	Issued for Comment	MP	PD
P02	25/11/22	Tender Issue	MAK	JH
P01	16/11/22	Preliminary Issue	MAK	JH
Rev	Date	Details of Issue / Revision	Dwnn	Rwd

ISSUES & REVISIONS



A CAF GROUP COMPANY

☐ Birmingham | 0121 233 3322

☐ Leeds | 0113 233 8000

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☒ Manchester | 0161 233 4260

☐ Nottingham | 0115 924 1100

www.bwbconsulting.com

Client



Contractor



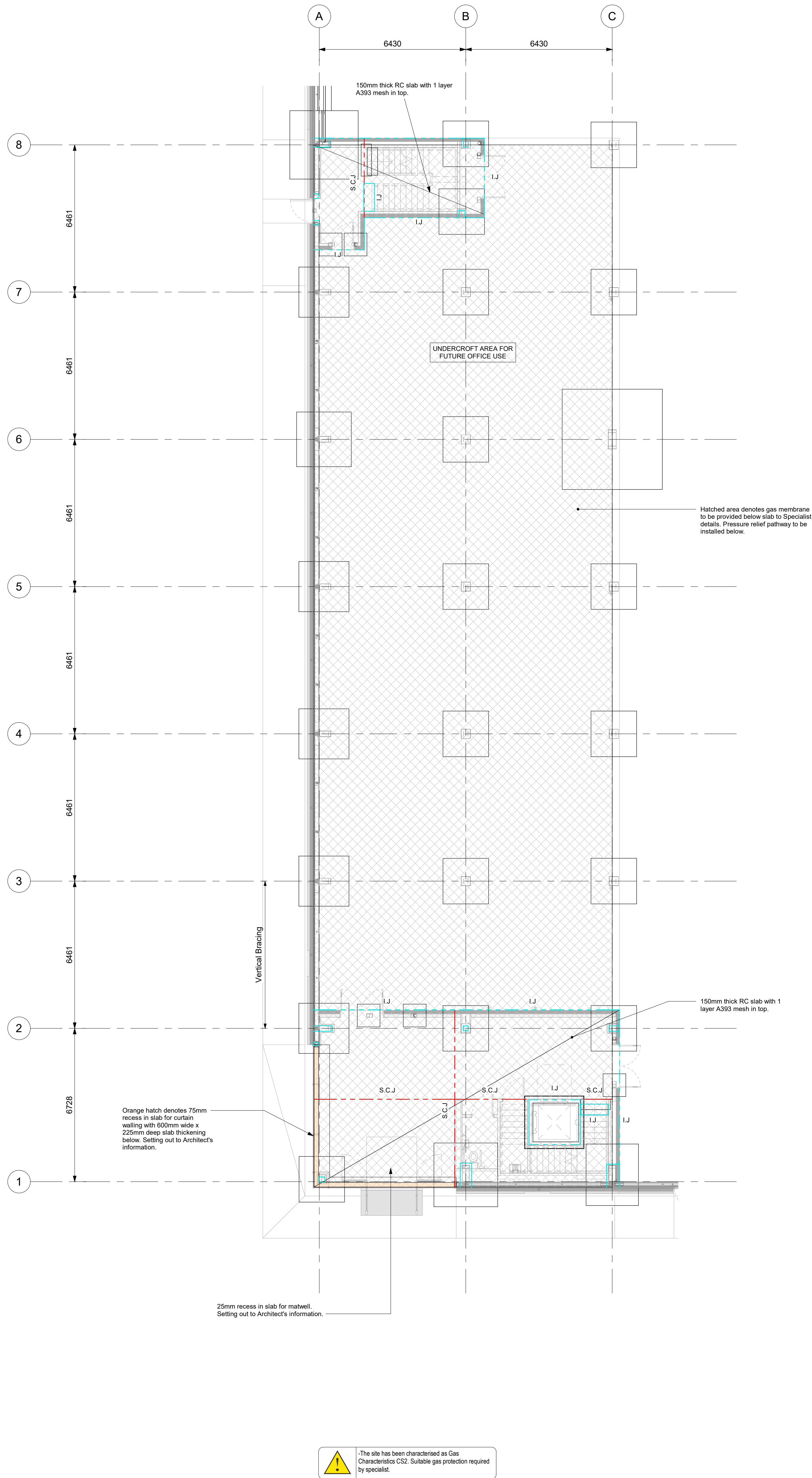
Project Title

Plot J2 - Kingsway Buisness Park

Drawing Title

Unit J1 - Ground Floor Office GA

Drawn	MAK	Reviewed	JH
BWB Ref	220810	Scale @A1	1 : 150
Purpose of Issue			Status
For Construction			A5
Project-Originator-Zone-Level-Type-Role-Number			Rev.
G1174-BWB-J1-00-DR-S-01001			C01



Ground Floor Office GA
1 : 100

- Notes
1. Do not scale this drawing. All dimensions must be checked/verified on site. If in doubt ask.
 2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
 3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
 4. Any discrepancies noted on site are to be reported to the engineer immediately.
 5. Column and joint layout TBC following receipt of Fabricators column setting out information.

Rev	Date	Details of Issue / Revision	Drawn	Reviewed
CD1	06/05/24	Amended to latest steelwork layout	LN	JH
MA1	09/05/24	Issued for comment	LN	JH
PO1	13/06/23	Issued for comment	MP	PO
MA2	26/11/22	Ende issue	MAK	JH
PO1	18/11/22	Preliminary issue	MAK	JH

ISSUES & REVISIONS

BWB
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Client Locations:
☐ Birmingham | 0121 233 3322
☐ Leeds | 0113 233 8000
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☒ Manchester | 0161 233 4260
☐ Nottingham | 0115 924 1100
www.bwbconsulting.com

Client: **Wilson Bowden Developments**

Contractor: **Glencar CONSTRUCTION**

Project Title:
Plot J2 - Kingsway Buisness Park

Drawing Title:
Unit J2 - Ground Floor Slab GA

Drawn	MAK	Reviewed	JH
BWB Ref	Z20810	Scale @A3	1 : 100
Purpose of Issue	FOR COMMENT		Status S3
Project Originator/Zone/Level/Type/Role-Number	G1174-BWB-J2-00-DR-S-01001		Rev. C01

				Notes			
				1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.			
				2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.			
				3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.			
				4. Any discrepancies noted on site are to be reported to the engineer immediately.			
Vibro Compaction Notes:-				Structural Steelwork Notes:-			
1.	In the absence of a project specific specification the base specification for vibro works shall be the Specification for 'Ground Treatment' & associated 'Notes for Guidance' published by the ICE and BS EN 1997-1 Eurocode 7 'Geotechnical Design - General Rule'.			1.	The base Specification for structural steelwork shall be BS5950 'Structural Use of Steelwork in Building' and the 'National Steelwork Specification' produced by the B.C.S.A.		
2.	For details of ground conditions refer to the Ground Investigation Report			2.	Structural steelwork to be grade S355JR unless noted otherwise.		
3.	The Vibro Sub Contractor shall be responsible for the design of the vibro system and shall be deemed to have taken due account of the proposed loads and any effects on adjacent structures, services or features, especially with respect to vibrations during the installation of the piling system. Prior to entering into a contract, the Vibro Sub Contractor shall calculate total settlements, differential settlements over stated distances & slab gradients which may occur over a 50 year period taking into account any possible ground water level variations.			3.	All connections shall have a minimum of 2 No bolts and be designed for end reaction unless noted otherwise.		
4.	Due regard shall be taken of all relevant information noted within the ground investigation report for the design of the vibro system. Should the Vibro Sub Contractor consider the information contained within the report to be inconclusive or deficient in any way, then his tender must include for any additional ground investigation considered necessary. The Vibro Sub Contractor shall inspect trial holes prior to entering into contract to ensure that the proposed vibro technique is suitable for the prevailing ground conditions (undisturbed or disturbed).			4.	The minimum specification for bolts shall be 8.8 and zinc plated.		
5.	The nature, extent and level of the vibro platform shall be agreed with the Principal Contractor.			5.	Baseplate and holding down bolts to be designed and detailed by the Steelwork Sub Contractor unless noted otherwise.		
6.	The Vibro Sub Contractor shall prepare a drawing setting out the position of all Vibro works.			6.	Holding down bolts and washer plates are to be supplied by the Steelwork Sub Contractor unless noted otherwise.		
7.	The following safe working (characteristic) loads shall be available, following completion of ground treatment by vibro:- Foundations - 150 kN/m² Ground Slabs - 50 kN/m² (not including slab self weight) Wing Walls - 150 kN/m²			7.	All beams/stanchions shall be located symmetrically on grid lines unless noted otherwise.		
8.	The Principal Contractor is responsible for removing any known obstructions prior to vibro operations and backfilling resultant excavations as directed by the Engineer. Should unknown obstructions be encountered, then the Engineer shall be informed immediately so that he may consider any necessary remedial work. The Principal Contractor & Vibro Sub Contractor shall liaise to ensure that all backfilling operations are compatible for the vibro technique to be adopted.			8.	All plan dimensions are shown to centre lines of beams or stanchions unless noted otherwise.		
9.	Vibro pile testing to be agreed with the Engineer.			9.	All levels shown thus (TOS 133.450m) are to tops of beams or stanchions unless noted otherwise.		
10.	Formation to be prepared in accordance with Clause 616 of the Specification for Highway Works upon completion of Vibro works and prior to installation of foundation and ground slab construction.			10.	For details of fire protection to steelwork refer to Architect's details.		
				11.	Design of all temporary works, propping and bracing shall be the responsibility of the Steelwork Sub Contractor.		
				12.	The Steelwork Sub Contractor shall not form any holes through steel members other than those for connections without the written approval of the Engineer.		
				13.	Where dissimilar steels are to be connected a suitable isolating material shall be incorporated.		
				14.	Unless otherwise noted in the project specific specification, protection treatment of steelwork shall be in accordance with British Steels 'Prevention of Corrosion of Structural Steelwork' appropriate system. A minimum structural life of 50 years and a first major maintenance of 15 years is to be assumed.		
				15.	All steelwork faces above ground slab level which are hidden and therefore cannot be maintained (eg. steelwork built into cavity walls) to be given 2 coats of R/W Liquid Asphaltic Compound' by the Principal Contractor. Refer to the Architects drawings for the extent of R/W coatings. R/W not to be used on steel surfaces which receive intumescent or other coatings.		
				16.	All external steelwork to be blast cleaned and hot dipped galvanised to BS 729 unless noted otherwise.		
				17.	The Steelwork Sub Contractor is to ensure that any shop or site applied primers are compatible with any finishing, intumescent or R.I.W. coatings which may be applied by the Principal Contractor.		
				18.	The Steelwork Sub Contractor shall submit copies of his drawings to both the Architect and Engineers for comments a minimum of 7 days prior to manufacture.		
				19.	At all column splice locations the bolt head must be on the visible external surface of steel members.		
				20.	Refer to the Architect for clear opening requirements to ensure no interference from bolt heads/nuts/shanks etc.		
				21.	The minimum metal thickness of any cold rolled member shall be 1.5mm.		
				22.	Fire Protection to the steel frame to be via intumescent paint and not 'Constrado' bases.		

Appendix B

Gas Membrane Data Sheets

PRODUCT SPECIFICATION SHEET



RTEC 4

BS:8485:2015 + A1:2019 Compliant Ground Gas Resistant Membrane

COMPATABILITY TABLE

	CIRIA 665 CS2	CIRIA 665 CS 3-6	BS8485: 2015	NHBC Amber 1	NHBC Amber 2	BRE 211 Radon	VOC & Hydrocarbons
Radon			*	*	*	*	N/A
Carbon Dioxide	*	*	*	*	*	*	N/A
Methane	*	*	*	*	*	*	N/A
VOC / Hydrocarbons Vapours	*	*	*	*	*	*	*

TECHNICAL DATA

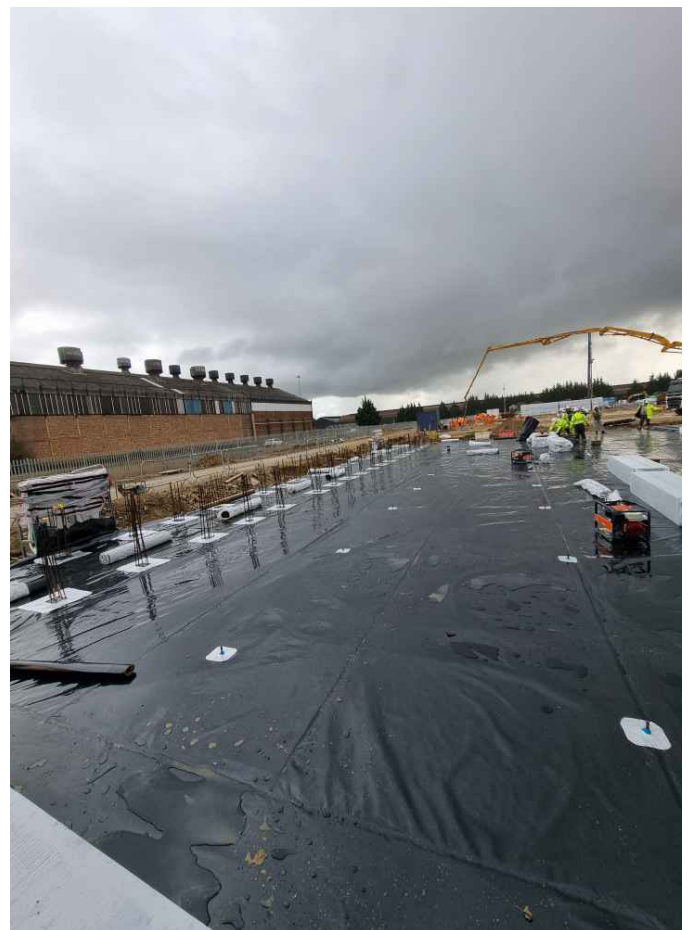
	Value	Units	Test Method
Width	2	M	EN 1849-2
Length	Various	M	EN 1849-2
Thickness	0.4	mm	EN 1849-2
Radon Perm	1.0X10 ⁻¹²	m ² /s	K124/02/95
Methane Perm	<10	ml/m ² /day/atm	BS EN ISO 15105-1
Carbon Dioxide Perm	<9	ml/m ² /day/atm	BS EN ISO 15105-1
weight	400	g/m ²	EN 1849-2
Oxygen Perm	0.08	ml/m ² /day/atm	BS EN ISO 15105-2
Petrol	(ave.)3.4x10 ⁻¹³	mol/m ² .s.pa	BS EN ISO 15105-2
Diesel	(ave.)3.4x10 ⁻¹³	mol/m ² .s.pa	BS EN ISO 15105-2
Resistance to static load	>20	kg	EN 12730
Tensile strength (md)	>300	N/50mm	EN 12311-2(A)
Tensile strength (cmd)	>300	N/50mm	EN 12311-2(A)
Tear strength (md)	>230	N	EN 12310-1
Tear strength (cmd)	>230	N	EN 12310-1
Resistance to impact	500	mm	EN 12691-B
Resistance to Puncture	>175	N	ASTM D 4833
Resistance to Puncture	1.7	KN	EN 12236
Reaction to Fire	E	-	EN 13501-1
Resistance to water penetration	pass	-	EN 1928(A)
Durability watertightness after artificial ageing	pass	-	EN 1926
Durability watertightness against chemicals	pass	-	EN1926

DESCRIPTION

RTEC 4 is a high-performance Ground Gas resistant membrane. The membrane is extremely robust and provides protection from moisture therefore negates the need for a separate DPM. Suitable for hot-air and wedge welding.

Complies to BS 8485:2015 & A1:2019. CE Certification standard EN13967:2012 EN13249:2016





Appendix C

Gas Membrane Validation Reports



GeoShield Verification Report 1



PROJECT REFERENCE: GEO104598 R01

PROJECT: Unit J1, Plot J2

PROJECT ADDRESS: Kingsway Business Park

off James Kearns Avenue, Rochdale

OL16 4NZ

SPECIFICATION: Verified in accordance CIRIA 735.

Design in accordance with BS8485 2015 + 2019 for Methane and Carbon Dioxide.

Substrate prepared in-accordance with manufacturers instructions

RTEC 4 Membrane

RTEC GR SAM



GeoShield Verification Report



NAME OF SURVEYOR:

Niall Hogan

VERIFICATION COMPANY:

GeoShield Limited

Icon Business Centre

4100 Park Approach

Thorpe Park

Leeds

CONTACT NUMBER:

07423 116951

EMAIL ADDRESS:

nhogan@geoshield.co.uk

ORDER NUMBER:

To be confirmed

PER VISIT:

YES:



NO:



PROJECT:

YES:



NO:





GeoShield Verification Report



CLIENT DETAILS

CLIENT CONTACT:	Nick Birch
CONTACTS ROLE:	Business Development Manager
MOBILE PHONE:	07704 987 988
EMAIL ADDRESS:	nick.birch@dance-reeves.co.uk

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	



GeoShield Verification Report



APPLICATOR'S DETAILS

APPLICATOR NAME: Paul Langridge

COMPANY: Dance Reeves

APPLICATOR TEL: 07487 893174

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY: Dance Reeves

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES: At least one member of each team group will have a NVQ Level 2 qualification in the gas membrane installation.

All installers are competent and skilled to complete gas membrane installation.



GeoShield Verification Report



AREA SURVEYED:

Core Area 1, gridlines 1-2/V-X

SITE CONDITIONS:

WEATHER:

Sunny

TEMPERATURE:

14°C

RELATIVE HUMIDITY:

N/A

MEMBRANE TEMPERATURE:

N/A

TIME:

13:30 - 15:00

DATE:

08.05.2024

REPORT NUMBER:

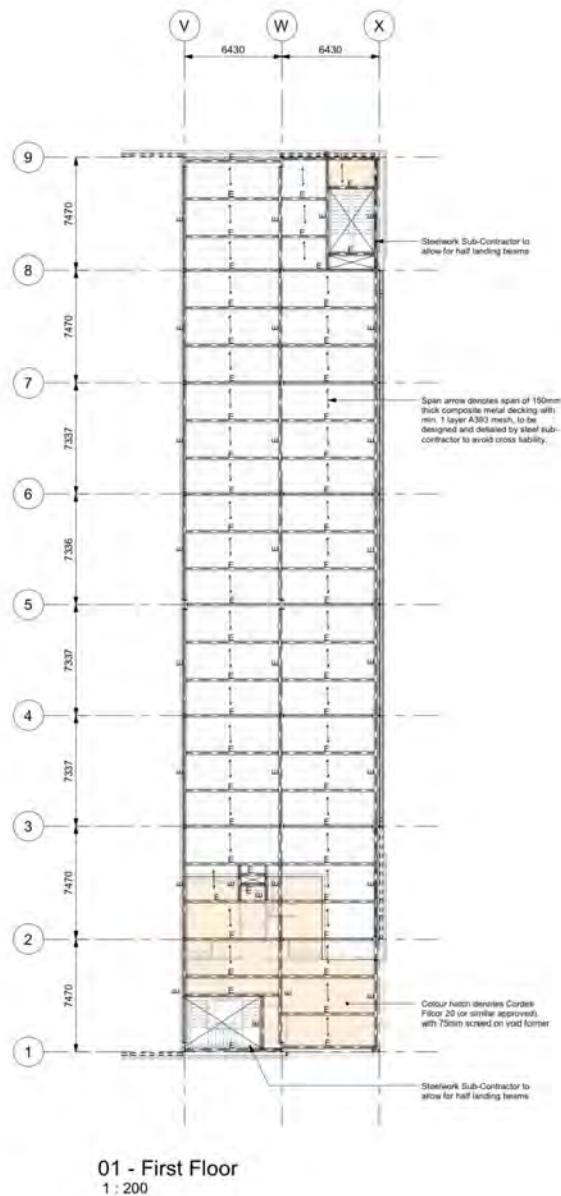
001

ACCOMPANIED BY:

Paul - Dance Reeves

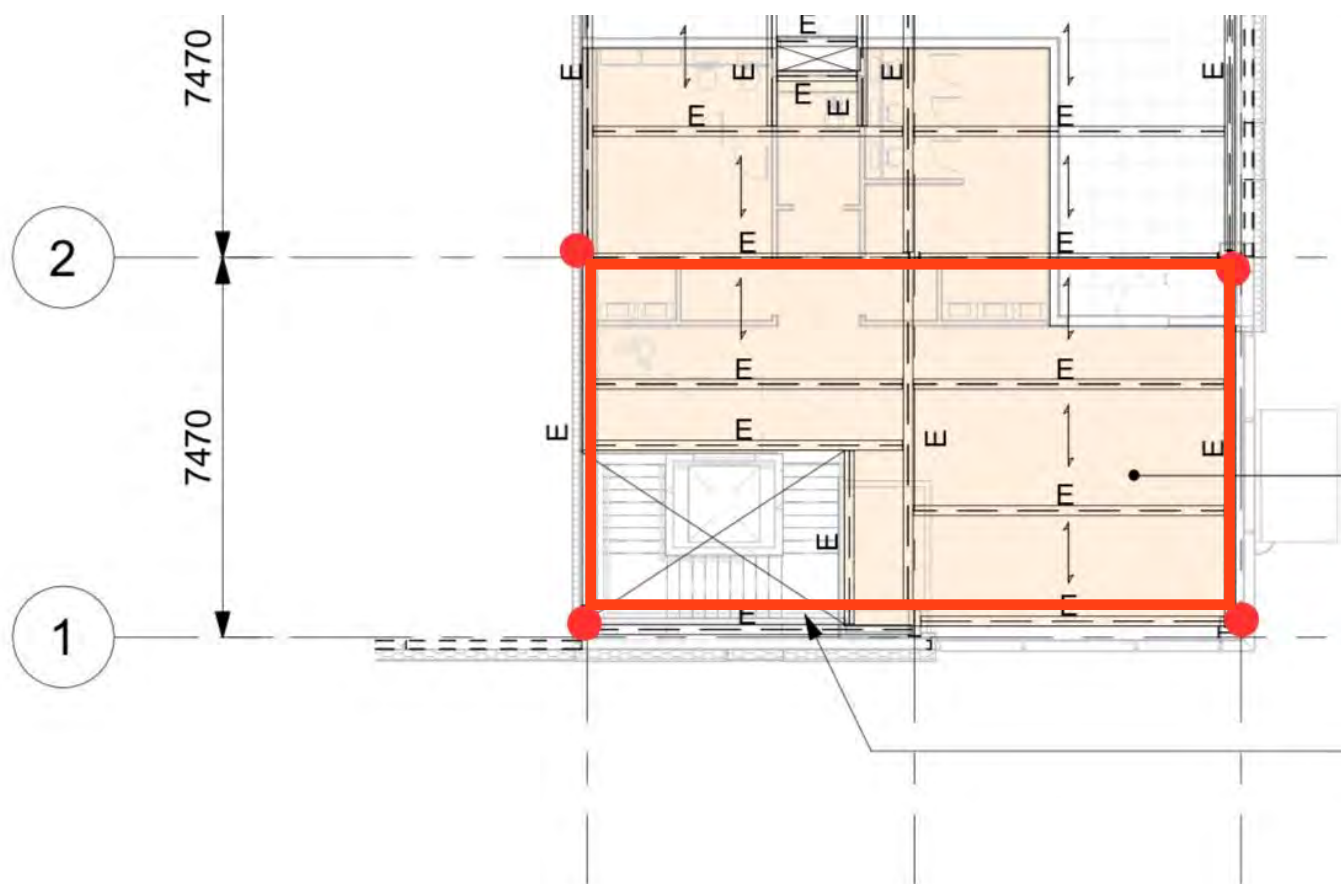
GeoShield Verification Report

Verification Layout



The photograph above shows a plan layout of the site.

Verification Layout



The photograph above shows a plan layout of the site. The area highlighted in red shows where the verification inspection took place on site today.

OVERVIEW



The photograph above displays an overview of the area where today's verification inspection took place on site.

GeoShield Verification Report



VERIFICATION ITEM ONE

LOCATION/GRID LINE: Core Area 1, gridlines 1-2/V-X

Installation of RTEC 4 Gas Barrier



NOTES:

The RTEC 4 Gas Barrier has been installed across a well compacted substrate to the Core Area, gridlines referenced. All lap joints between the adjacent sheets of the RTEC 4 Gas Barrier have been overlapped a minimum of 100mm and heat welded using a hot air leister and silicone



NOTES:

roller with adequate pressure applied to ensure a continuous gas tight seal is achieved. Thorough visual inspections, supported by mechanical point stress testing, also known as pick and probe testing, identified a number of miswelded lap joints.



VERIFICATION ITEM ONE

REMEDIATIONS:

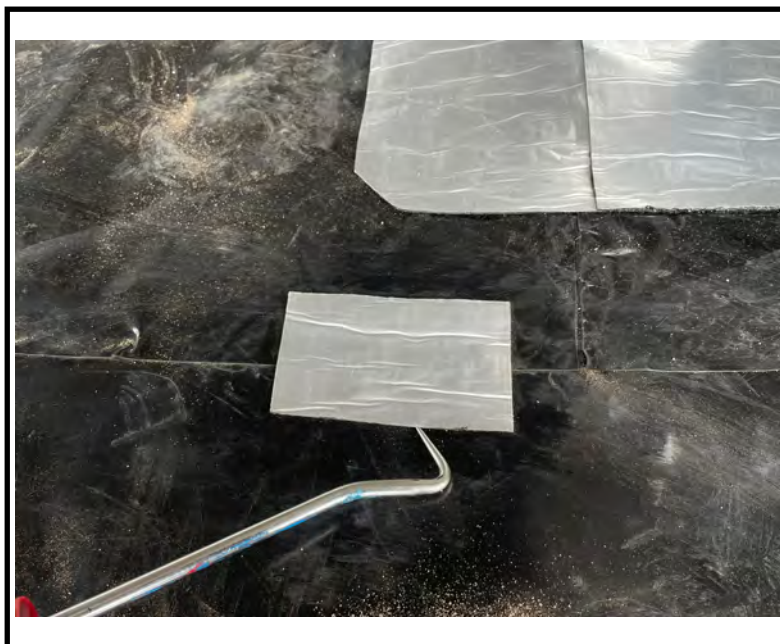


Miswelded Lap Joints - Remediated Faults



NOTES:

As mentioned, a number of miswelded lap joints were identified during the testing procedures conducted today. The faults were brought to the attention of the installers and remediated on site in the presence of GeoShield. The installers opted to remediate



NOTES:

the faults by applying 150mm patches of Rtec GR SAM over the affected areas with heat and rolled pressure applied to activate the bitumen backing. No further faults or defects were identified during the testing of the lap joints.

GeoShield Verification Report



VERIFICATION ITEM TWO

LOCATION/GRID LINE: Core Area 1, gridlines 1-2/V-X

Pipe Penetrations



NOTES:

Throughout the installation of the RTEC 4 Gas Barrier to the referenced area, there were a number of pipe penetrations that have been sealed in accordance with manufacturer's specifications and design guidelines. This has been achieved using RTEC GRSAM, which is a gas resistant self adhesive membrane.



NOTES:

The installers have first cut the RTEC 4 Gas Barrier tight around the base of each pipe penetration to minimise voided areas. Next, patches of RTEC GRSAM are placed intricately in a top hat formation around the pipe penetration and onto the RTEC 4 Gas Barrier. Heat and rolled pressure is applied to activate the bitumen

GeoShield Verification Report

VERIFICATION ITEM TWO



backing, creating a secure bond between the pipe penetration and the RTEC 4 Gas Barrier. All pipe penetrations throughout the referenced core area were subjected to thorough mechanical point stress testing where a probe was run along all edges of the RTEC GRSAM detailing. No faults or defects were identified with the pipe penetrations during these testing procedures.

GeoShield Verification Report



VERIFICATION ITEM THREE

LOCATION/GRID LINE: Core Area 1, gridlines 1-2/V-X

Steel Stanchions & Retrofit Detailing



NOTES:

Several areas throughout the installation required retrofit detailing using strips of RTEC GR SAM. These areas were primarily perimeters, although included steel stanchions, lift pit and staircases as well. The perimeter and base of the stanchions and staircase were firstly coated in primer. Once cured, the RTEC 4



NOTES:

Gas Barrier is cut tightly up to the perimeters and strips of RTEC GRSAM are installed onto the primed surface, lapping 150mm up and returned 150mm onto the RTEC 4 Gas Barrier. Heat and rolled pressure is applied to activate the bitumen backing to ensure a secure bond is achieved.

VERIFICATION ITEM THREE



As with the pipe penetrations, a probe was run along all edges of the RTEC GRSAM within the retrofit detailing to validate that a gas tight seal had been achieved throughout. No faults or defects were identified during the testing procedures. Tested and verified in accordance with CIRIA 735.



The installer sealing a steel stanchion.



A puncture hole identified in the RTEC 4 Gas Barrier.



Typical lift shaft retrofit detailing.



Typical stanchion and retrofit perimeter detailing.



GeoShield Verification Report



VERIFICATION SUMMARY

This was the first visit to the site where verification was required for the installation of RTEC 4 Gas Barrier to the Core Area 1, gridlines 1-2/V-X.

All lap joints between the adjacent sheets of RTEC 4 Gas Barrier have been heat welded using a hot air leister and silicone roller with adequate pressure applied.

All details, such as steel stanchions, pipe penetrations and retrofit detailing have been sealed using RTEC GRSAM, a gas resistant self adhesive membrane.

Thorough mechanical point stress testing was conducted throughout the inspection today. A total of eight miswelded lap joints and one puncture were identified, all of which were successfully remediated either using additional patches of RTEC GRSAM applied over the affected areas or by applying additional heat and firm rolled pressure to reinstate the gas tight seal. Further pick and probe testing was conducted upon all remediated faults, no further issues were identified.

This was passed and verified in accordance with CIRIA 735 and installed to BS8485:2015+2019.

GEOSHIELD SIGNATURE:

DATE:

08-May-2024



GeoShield Verification Report 2



PROJECT REFERENCE: GEO104598 R02

PROJECT: Unit J1, Plot J2

PROJECT ADDRESS: Kingsway Business Park

off James Kearns Avenue, Rochdale

OL16 4NZ

SPECIFICATION: Verified in accordance with CIRIA 735.

Design in accordance with BS8485 2015 + 2019 for Methane and Carbon Dioxide.

Substrate prepared in accordance with manufacturer's instructions

RTEC 4 Membrane

RTEC GR SAM



GeoShield Verification Report



NAME OF SURVEYOR:

Michael Dodd

VERIFICATION COMPANY:

GeoShield Limited

Icon Business Centre

4100 Park Approach

Thorpe Park

Leeds

CONTACT NUMBER:

07555 214679

EMAIL ADDRESS:

mdodd@geoshield.co.uk

ORDER NUMBER:

To be confirmed

PER VISIT:

YES:



NO:



PROJECT:

YES:



NO:





GeoShield Verification Report



CLIENT DETAILS

CLIENT CONTACT:	Nick Birch
CONTACTS ROLE:	Business Development Manager
MOBILE PHONE:	07704 987 988
EMAIL ADDRESS:	nick.birch@dance-reeves.co.uk

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	



GeoShield Verification Report



APPLICATOR'S DETAILS

APPLICATOR NAME: Paul Langridge

COMPANY: Dance Reeves

APPLICATOR TEL: 07487 893174

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES: At least one member of each team group will have a NVQ Level 2 qualification in the gas membrane installation.

All installers are competent and skilled to complete gas membrane installation.



GeoShield Verification Report



AREA SURVEYED:

Building J1 & J2 Undercroft Area

SITE CONDITIONS:

WEATHER:

Sunny

TEMPERATURE:

14°C

RELATIVE HUMIDITY:

N/A

MEMBRANE TEMPERATURE:

N/A

TIME:

12:15 to 14:00

DATE:

18.07.2024

REPORT NUMBER:

002

ACCOMPANIED BY:

Paul - Dance Reeves

OVERVIEW



The image above displays an overview of the undercroft area within Building J1 where today's verification inspection took place on site.

OVERVIEW



The image above displays an alternative overview of the undercroft area within Building J1 where today's verification inspection took place on site.

OVERVIEW



The image above displays an alternative overview of the undercroft area within Building J1 where today's verification inspection took place on site.

OVERVIEW



The image above displays an alternative overview of the undercroft area within Building J1 where today's verification inspection took place on site.

GeoShield Verification Report

OVERVIEW



The image above displays an overview of the undercroft area within Building J2 where today's verification inspection took place on site.

OVERVIEW



The image above displays an alternative overview of the undercroft area within Building J2 where today's verification inspection took place on site.

OVERVIEW



The image above displays an alternative overview of the undercroft area within Building J2 where today's verification inspection took place on site.

OVERVIEW



The image above displays an alternative overview of the undercroft area within Building J2 where today's verification inspection took place on site.



GeoShield Verification Report



LIMITATIONS

SURVEYED AREA: Building J1 - Lift Pit Base

RESTRICTIONS AND LIMITATIONS:

This is a view showing the Lift Pit base which had been installed but not subjected to verification and therefore unaware of any damage, punctures, mis-welded lap joints and incomplete steel pin detailing in this report.





GeoShield Verification Report



LIMITATIONS

SURVEYED AREA: Building J1 - Lift Pit Walls

RESTRICTIONS AND LIMITATIONS:

This is a view showing the Lift Pit Base/Walls which had been installed but not subjected to verification and therefore unaware of any damage, punctures, mis-welded lap joints and incomplete steel pin detailing.





GeoShield Verification Report



LIMITATIONS

SURVEYED AREA: Building J2 - Lift Pit Walls

RESTRICTIONS AND LIMITATIONS:

This is a view showing the Lift Pit base which had been installed but not subjected to verification and therefore unaware of any damage, punctures, mis-welded lap joints and incomplete steel pin detailing in this report.





GeoShield Verification Report

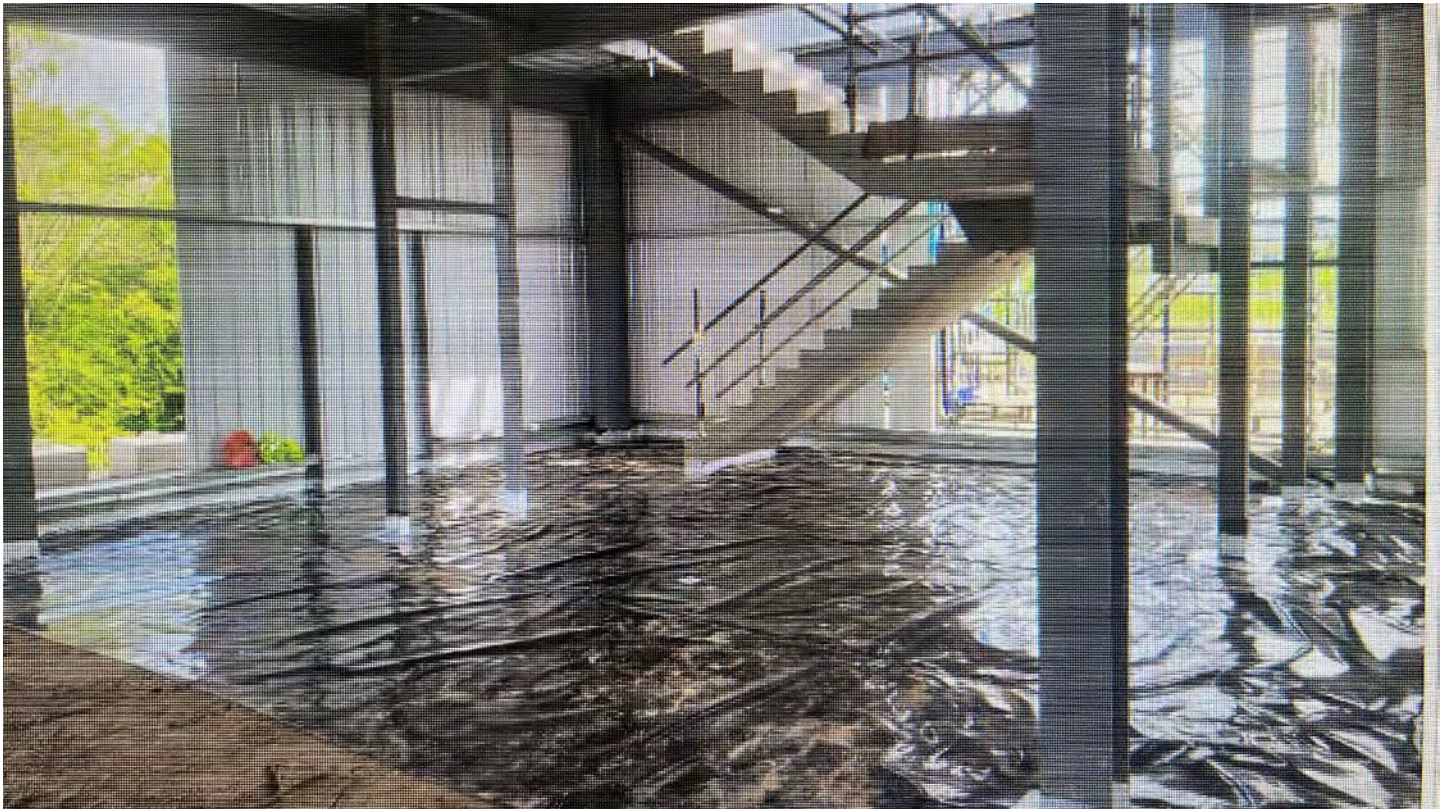


LIMITATIONS

SURVEYED AREA: Building J2 - Core Area

RESTRICTIONS AND LIMITATIONS:

This is a view showing the Core Area which had been installed but not subjected to verification and therefore unaware of any damage, punctures, miswelded lap joints and incomplete steel pin detailing in this report.



GeoShield Verification Report



VERIFICATION ITEM ONE

LOCATION/GRID LINE: Building J1 & J2 - Undercroft

Stanchion Detailing



NOTES:

The various stanchions were sealed using strips of RTEC GR Self Adhesive Membrane. The images show the Mechanical Point Stress Test being undertaken along one of the edges of the RTEC GR Self Adhesive Membrane used to seal the stanchions. The left image shows the seal being checked



NOTES:

with the stanchion itself whereas the right image shows the seal being checked with the RTEC 4 Gas Membrane. All stanchions were fully bonded at all elevations. The bond was aided by combining both heat and pressure and this was evident during the verification.

GeoShield Verification Report

VERIFICATION ITEM ONE



The overview image shows various perimeter stanchions which were all subjected to the Mechanical Point Stress Test. The test revealed no issues throughout the verification process and therefore no potential capillary leak risks were identified as a result.

GeoShield Verification Report



VERIFICATION ITEM TWO

LOCATION/GRID LINE: Building J1 & J2 - Undercroft

RTEC 4 Gas Membrane Installation-Lap Joints



NOTES:

The RTEC 4 Gas Membrane Gas Membrane had been installed upon rolled earth substrate which provided a suitable soft but protective and low risk substrate against potential punctures. The RTEC 4 Gas Membrane sections had been welded together ensuring the minimum lap of 100mm was maintained throughout. The



NOTES:

images show the Air Lance Integrity Test being undertaken along the edges of the RTEC 4 Gas Membrane. The images show the lance being directed along typical RTEC 4 Gas Membrane lap joints where the left image shows a perimeter lap whereas the right image shows a typical infill lap joint.

VERIFICATION ITEM TWO



The overview image shows the Air Lance Integrity Test being undertaken along one of the various RETEC4 Gas Membrane lap joints.

The test involved directing compressed air set at 50psi along the edges of each and every available lap joint at no more than 51mm away.

There were no mis-welded lap joints identified throughout.

GeoShield Verification Report



VERIFICATION ITEM THREE

LOCATION/GRID LINE: Building J1 & J2 - Undercroft

Perimeter Retrospective Detailing



NOTES:

The perimeters had all been initially formed using sections of RTEC 4 Gas Membrane before being sealed using strips of RTEC GR Self Adhesive Membrane. The images show the Air Lance Integrity Test being undertaken along the edges of the RTEC GR Self Adhesive Membrane.



NOTES:

In all cases, it was noted that all perimeter stanchion and perimeter detailing had been subjected to both heat and pressure ensuring a secure bond with the RETEC4 Gas Membrane and the buildings cladding rail. The Air Lance Integrity Test did not reveal any issues throughout the verification process.

VERIFICATION ITEM THREE



The overview shows one of the typical perimeters which had been subjected to verification. The visual and physical testing identified no issues and the retrospective detailing proved to have been securely bonded with both the perimeter base and the RTEC 4 Gas Membrane.



GeoShield Verification Report



GAS MEMBRANE TESTING

VISUAL /PICK & PROBE:	☒	SMOKE TEST:	☐
AIR LANCING:	☒	DILECTIC:	☐
DESTRUCTIVE:	☐	OTHER:	☐
INERT GAS TEST:	☐	SPECIFY:	
Testing checklist attached:	YES	☒	NO
			☐

Gridline/Plot Sign off

Gridline/Plot Sign off	Core Area 1, gridlines 1-2/V-X	☒
Gridline/Plot Sign off	Building J1 - Undercroft Area Only	☒
Gridline/Plot Sign off	Building J2 - Undercroft Area Only	☒
Gridline/Plot Sign off	Lift Pit Base & Walls - Building J1 - deemed a limitation	☒
Gridline/Plot Sign off	Lift Pit Base & Walls - Building J2 - deemed a limitation	☒
Gridline/Plot Sign off	Core Area - Building J2 - deemed a limitation	☒
Gridline/Plot Sign off		☐
Gridline/Plot Sign off	Project Handover	☒
Gridline/Plot Sign off		☐
Gridline/Plot Sign off		☐
Gridline/Plot Sign off		☐



GEOSHIELD Verification Report



REMEDIATION LOG

Date	Nr	Remediation Description	Y/N
08/05/2024	001	Eight miswelded lap joints and one puncture identified in the RTEC	✓
		4 Gas Barrier, all were successfully remediated.	✓
18/07/2024	002	There were no mis-welded RETEC 4 Gas Membrane lap joints	
		identified throughout.	✓
		Building J1 - Lift Pit Base & Walls - deemed limitations as not	
		physically verified - only photographic evidence provided.	✓
		Building J2 - Lift Pit Base & Walls - deemed limitations as not	
		physically verified - only photographic evidence provided.	✓
		Building J2 - Core Area - deemed a limitation as not physically	
		verified - only photographic evidence provided.	✓
		There were no punctures and/or damaged upon completion of the	
		verification process.	✓
		The project can be handed over to the client.	✓



GeoShield Verification Report



VERIFICATION SUMMARY

This was the second and final site visit where the undercroft areas to Buildings J1 & J2 had been lined out using RETEC 4 Gas Membrane. The verification process is summarised as follows:-

- ∴ Air Lance Integrity Test to all RETEC 4 Gas Membrane lap joints where no issues were identified throughout.
 - ∴ Air Lance Integrity Test to sampled perimeter retrospective detailing where no issues were identified.
 - ∴ There were numerous limitation areas where the following had not been physically verified meaning that possible issues such as mis-welded lap joints, punctures and/or damage and unsealed detailing to stanchions, pipe penetrations and retrospective perimeter detailing:-
 - > Lift Pit Base & Walls - Building J1.
 - > Lift Pit Base & Walls - Building J2.
 - > Core Area - Building J2.
- Project can be handed over to the client.

This was passed and verified in accordance with CIRIA 735 and installed to BS8485:2015+2019.

GEOSHIELD SIGNATURE:

DATE:

18-Jul-2024



GeoShield Verification Plan



PROJECT DESCRIPTION

GEO104598
Dance Reeves Limited,
Unit J1, Plot J2,
Kingsway Business Park,
off James Kearns Ave, Rochdale,
OL16 4NZ

The proposed development for which gas protection measures are required comprises Unit J1 (north) - a steel portal framed structure with ancillary office space.

Site has been classified as Characteristic Situation 2 under BS8485:2015 + A1 2019 by BWB (KPJ2-BWB-ZZ-XX-RP-C-0002-GDR). Unit J1 consists of two types of buildings - Warehouse (Type D) and the Office Area (Type C).

Warehouse area will meet the gas protection requirements for CS2 (1.5 points) by utilising a cast in situ monolithic reinforced ground bearing slab with minimal penetrations. Office area (2.5 point requirement) will require a validated proprietary gas membrane.

Geoshield have adopted the highest design and verification principles associated with BS8485:2015 + A1 2019, BR 211, Public Health England, NHBC Technical Extra April 2016 and CIRIA 735.

In summary, the proposed design does achieve a required level of attention to detail with its robust specific gas membrane design (2.0 points) and the structural barrier of a reinforced concrete slab (minimum 0.5 point).

The pre-verification plan confirms how the installation will be tested in accordance with CIRIA735. The verification visits will be documented in verification reports during the project that are suitable for submission to the local planning authority in order to satisfy and discharge planning consent.

All faults identified during inspection and the verification site visit of the ground gas system will be itemised as remediations which will need to be signed off in the remediation log for the proposed building.



GeoShield Verification Plan



PROJECT DESCRIPTION

Pre-Verification Plan

GeoShield are appointed by the Client to carry out independent validation, verification and integrity testing of the ground gas protection system on site. The Pre-Verification plan sets out the requirements and procedures that GeoShield will adopt to ensure that the installation is in line with the proposed design, relevant UK standards and guidance.

GeoShield take no responsibility for any warranties to third parties for the design of the system or the installation.

Limitations

The Pre-Verification plan prepared by GeoShield Limited is limited to the proposed ground gas protection measures installed. The Pre-Verification plan has been prepared in line with the relevant UK Standards and Guidance (BS8485:2015+A1:2019 & CIRIA 735) alongside the information made available to GeoShield by the Client. The conclusions made in the report are considered to be correct at the time of writing, but additional information provided/discovered may require amendments to the Plan. GeoShield recognises that changes to relevant standard and guidance may occur at any time which may cause the conclusions made to be incorrect - GeoShield do not accept any responsibility or liability for the implications of such changes.

The Pre-Verification plan does not in itself constitute verification that the membrane has been installed in accordance with this document. Validation and verification of the installed membrane will be covered in separate verification reports following physical inspection of the gas barrier and will include photographic evidence of the installation.

Waterproofing elements (where applicable) do not fall into the remit of this Pre-Verification plan or future inspections. GeoShield will provide the opinion on membrane's suitability for ground gas protection purposes – no liability is offered or implied for the waterproofing element which should be checked by others.



GeoShield Verification Plan



PROJECT REFERENCE:

GEO104598

PROJECT:

Unit J1, Plot J2

PROJECT ADDRESS:

off James Kearns Ave

Rochdale, OL16 4NZ

SPECIFICATION:

Verified in accordance CIRIA 735.

Design in accordance with BS8485 2015 + 2019 for Methane and Carbon Dioxide.

Substrate prepared in-accordance with manufacturers instructions.

RTEC 4 gas membrane

RTEC GR SAM



GeoShield Verification Plan



NAME OF SURVEYOR:

Paul Colbeck

VERIFICATION COMPANY:

GeoShield Limited

Icon Business Centre

4100 Park Approach

Thorpe Park

Leeds

CONTACT NUMBER:

07462 546 926

EMAIL ADDRESS:

pcolbeck@geoshield.co.uk

ORDER NUMBER:

To be confirmed

PER VISIT:

YES:

☐

NO:

☐

PROJECT:

YES:

☐

NO:

☐

GeoShield are members of CL:AIRE

CL:AIRE works with industry, through its membership to identify, common problems in the field of sustainable land management. Using its extensive experience of developing industry-led initiatives, it works with highly respected experts and government to develop solutions which are tested and critiqued by our Members to ensure they are fit for purpose.

The Gas Protection Verification Accreditation Scheme (GPVS) is a scheme that seeks to raise standards in membrane inspection, verification and reporting and provide all stakeholders involved in land contamination management with confidence that risks associated with ground gases have been adequately managed. The scheme applies to both the practical installation of the gas mitigation measures and to the verification reporting process. Recognising different personnel often undertake inspection and reporting, there are two separate accreditation routes to demonstrate competence 'Specialist in Gas Protection Verification' (SGPV) and 'Technician in Gas Protection Verification' (TGPV).

Objectives



Ensures that gas verification meets the necessary technical and regulatory standards



Increase the knowledge of gas mitigation verification across the development industry



Provide a list of competent individuals who undertake inspection of gas protection measures (membranes and venting) and prepare verification reports



Providing a process by which competency in gas protection verification can be demonstrated.

Accreditation Scheme

TGPV

Technician Level of accreditation is intended for field technicians who confine their work to inspections and do not prepare verification design or method statements (although they will follow ones prepared by others) and do not prepare verification reports (although they do prepare field records that form part of the validation report).

SGPV

Specialist Level of accreditation applies to those involved in the whole range of gas protection verification including design of the verification, preparation of method statements, inspections and validation reports.

ONLY SGPV can prepare and sign declaration of compliance.

Declaration



1. The work has been carried out to an acceptable standard
2. The work has been verified by suitably experienced and qualified personnel
3. The level of verification is proportionate to the level of risk identified in the site investigation report/gas risk assessment
4. The interpretations and conclusions are reasonable
5. The verification strategy is in line with industry guidance
6. I am competent to sign this Declaration and that
 - a. I am fully aware and comply with the Scheme's Code of Conduct
 - b. The work of this review and Declaration are within the limits of my knowledge, competence and professional capacity.

CERTIFICATE of ACCREDITATION

This is to certify that

Paul Colbeck

has been awarded the following accreditation

Gas Protection Verification Scheme (GPVS)

Specialist (SGPV)

Certificate No.: YQ7mZNE8x6

Issued: 4 December 2020

Valid for 4 years from the above date



Richard Froggatt
CL:AIRE Chairman



CL:AIRE is a Charitable Company Limited by Guarantee
Registered in England 3740059 / Entrust Enrolment No. 119820 / Registered Charity No. 1075611
Chiltern House, Haddenham Business Centre, Thame Road, Haddenham, Buckinghamshire, HP17 8BY
Telephone: +44 (0)1844 296112 | Email: enquiries@claire.co.uk | Website: www.claire.co.uk



GeoShield Verification Plan



INFORMATION INCLUDED

Geotechnical Assessment and Preliminary Design Report -KPJ2-BWB-ZZ-XX-RP-C-0002-GDR

23-020-I&L-S100 C2 Proposed Ground Floor Plan

KPJ2-BWB-J1-01-DR-S-2100 P02 - Unit J1 First Floor GA - Office

Material Specification Technical Data Sheets

Radon Maps UK - (Map 1) Site Location

Information presented to at the pre-verification stage assumed correct

Any change client will let GeoShield know or this Pre-verification Plan will be void.

BGA
British Geomembrane Association

GeoShield Verification Plan



SPECIFICATION

Plot J2, Kingsway Business Park, Rochdale
Geotechnical Assessment and Preliminary Design Report
November 2022
KPJ2-BWB-ZZ-XX-RP-C-0002-GDR

BWB

ENVIRONMENT

Wilson Bowden Developments
Plot J2
Kingsway Business Park, Rochdale
Geotechnical Assessment and Preliminary Design Report

Birmingham
Livery Place, 35 Livery Street, Colmore Business District, Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way, Leeds
LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11, Portland Street, Manchester M1 3HU
T: 0161 233 4260

Market Harborough
Harborough Innovation Centre, Wellington Way, Airfield Business Park,
Leicester Road, Market Harborough, Leicestershire, LE16 7WB
T: 01858 455020

Nottingham
Waterfront House, Station Street, Nottingham NG2 3DQ
T: 0115 924 1100

November 2022

Title Reference & Description:

Geotechnical Assessment and Preliminary Design Report -KPJ2-BWB-ZZ-XX-RP-C-0002-GDR

SPECIFICATION

Plot J2, Kingsway Business Park, Rochdale
Geotechnical Assessment and Preliminary Design Report
November 2022
KPJ2-BWB-ZZ-XX-RP-C-0002-GDR

 BWB

5. GENERAL CONSIDERATIONS

Ground Gas

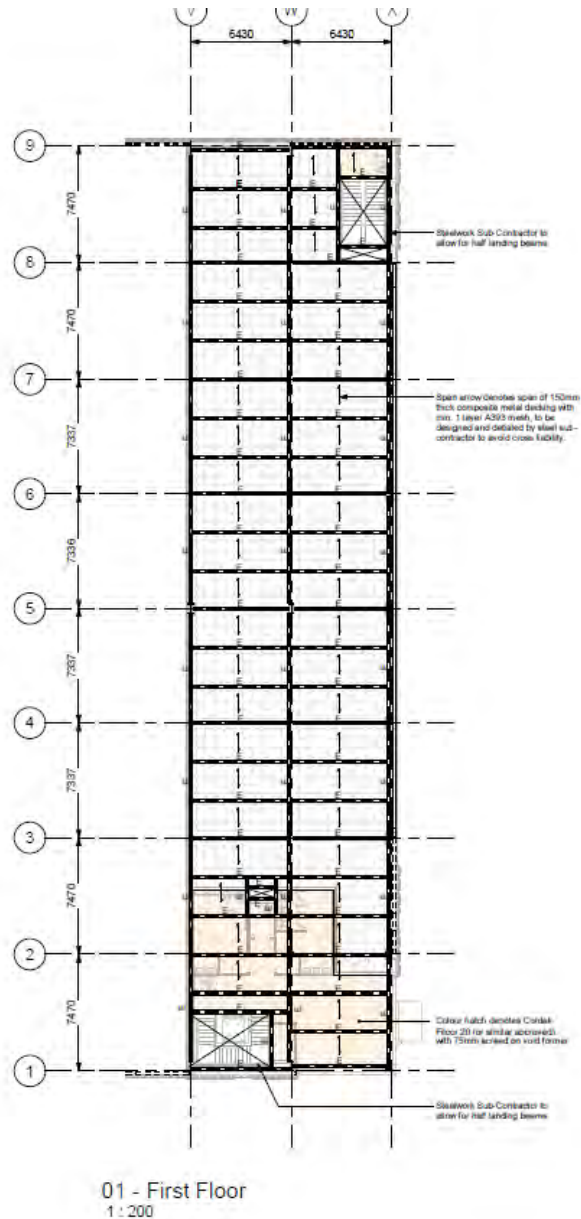
- 5.1 Ground gas monitoring and risk assessment is presented in BWB's Phase 2 report (Ref. 2); the site is classified as **Characteristic Gas Situation 2**.
- 5.2 Ground gas mitigation measures for buildings are required in all new structures. It should be noted that depending on the selected method of gas protection and risks posed to occupants of the proposed development, visual inspection and integrity testing of the gas membrane may need to be undertaken.
- 5.3 A gas verification plan should be produced and agreed with the regulators before gas protection is installed.

Title Reference & Description:

Geotechnical Assessment and Preliminary Design Report -KPJ2-BWB-ZZ-XX-RP-C-0002-GDR

Site classified as Characteristic Situation 2 (CS2)

SPECIFICATION



Title Reference & Description:

KPJ2-BWB-J1-01-DR-S-2100 P02 - Unit J1 First Floor GA - Office

SPECIFICATION



Product Specification Sheet

RTEC 4

BS:8485:2015 + A1:2019 Compliant Ground Gas Resistant Membrane

Compatibility Table

	CIRIA 665 CS2	CIRIA 665 CS 3-6	BS8485: 2015	NHBC Amber 1	NHBC Amber 2	BRE 211 Radon	VOC & Hydrocarbons
Radon	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Carbon Dioxide	*	*	*	*	*	N/A	N/A
Methane	*	*	*	*	*	N/A	N/A
VOC / Hydrocarbons Vapours	*	*	*	*	*	N/A	*

Technical Data

	Value	Units	Test Method
Width	2	M	EN 1849-2
Length	Various	M	EN 1849-2
Thickness	0.4	mm	EN 1849-2
Radon Perm	1.0×10^{-12}	m^2/s	K124/02/95
Methane Perm	<10	$\text{ml}/\text{m}^2/\text{day}/\text{atm}$	BS EN ISO 15105-1
Carbon Dioxide Perm	<9	$\text{ml}/\text{m}^2/\text{day}/\text{atm}$	BS EN ISO 15105-1
weight	400	g/m^2	EN 1849-2
Oxygen Perm	0.08	$\text{ml}/\text{m}^2/\text{day}/\text{atm}$	BS EN ISO 15105-2
Petrol	(ave.) 3.4×10^{-13}	$\text{mol}/\text{m}^2 \cdot \text{s} \cdot \text{pa}$	BS EN ISO 15105-2
Diesel	(ave.) 3.4×10^{-13}	$\text{mol}/\text{m}^2 \cdot \text{s} \cdot \text{pa}$	BS EN ISO 15105-2
Resistance to static load	>20	kg	EN 12730
Tensile strength (md)	>300	N/50mm	EN 12311-2(A)
Tensile strength (cmd)	>300	N/50mm	EN 12311-2(A)
Tear strength (md)	>230	N	EN 12310-1
Tear strength (cmd)	>230	N	EN 12310-1
Resistance to impact	500	mm	EN 12691-B
Resistance to Puncture	>175	N	ASTM D 4833
Resistance to Puncture	1.7	KN	EN 12236
Reaction to Fire	E	-	EN 13501-1
Resistance to water penetration	pass	-	EN 1928(A)
Durability watertightness after artificial ageing	pass	-	EN 1926
Durability watertightness against chemicals	pass	-	EN 1926

Title Reference & Description:

RTEC 4 Gas membrane Technical Data Sheet

SPECIFICATION



Description

RTEC 4 is a high-performance Ground Gas resistant membrane. The membrane is extremely robust and provides protection from moisture therefore negates the need for a separate DPM. Suitable for hot-air and wedge welding. Complies to BS 8485:2015 & A1:2019. CE Certification standard EN13967:2012 EN13249:2016

GeoGuard Limited

Title Reference & Description:

RTEC 4 Gas membrane Technical Data Sheet

SPECIFICATION



Product Specification Sheet

RTEC GRSAM

Aluminium Foil Gas Resistant Self-Adhesive Membrane

Technical Data

	Value	Units	Test Method
Width	1.05	M	EN 1848-2
Length	19.05	M	EN 1848-2
Thickness	1.5	mm	EN 1848-2
Mass	1700	g/cm ²	EN 1848-2
Water tightness to liquid water		pass	EN 1928
Resistance to Static Load	20	kg	EN 12730
Tensile Properties Maximum Tensile Stress CD	≥2	N/mm ²	EN12311-2
Tensile Properties Maximum Tensile Stress MD	≥2	N/mm ²	EN 12311-2
Elongation at Break MD	≥120	%	EN 12311-2
Elongation at Break CD	≥120	%	EN 12311-2
Durability of Water tightness against ageing		Pass	EN 1847 Method A60
Durability of Water tightness against Chemicals		Pass	EN 1847 Method 60
Resistance to Impact	≥700	J/m	EN 12691
Resistance to Tear (Nail Shank) CD	≥110	N	EN 12410-1
Resistance to Tear (Nail Shank)	>110	N	EN 12410-1
Reaction to Fire	Class F	Euro Class	EN- 13501
Joint Strength	≥45	N	EN 12417-2
Peel Strength	1.6	N/mm ²	
Water vapour Transmission (Density Flow Rate)	0.013	g/(day.m ²)	EN 1931
Methane GTR	≤10	m ³ /m ²	ISO 15105-1
Carbon Dioxide GTR	≤10	m ³ /m ²	ISO 15105-1
Radon Diffusion	5.0 x10 ⁻¹⁴	m ²	ISO 15105-1
Roll Weight	33	kg	

Description

RTEC GRSAM is a high-performance Aluminium Gas Resistant Self-Adhesive membrane. The RTEC GRSAM is extremely robust and provides protection from Ground Gases & Water.

CE Certification standard EN13967:2012 EN13249:2016

GeoGuard Limited

Company Registration No. 11172371 Registered in England



Title Reference & Description:

RTEC GR SAM Technical Data Sheet



GeoShield Verification Plan



CLIENT DETAILS

CLIENT CONTACT:	Nick Birch
CONTACTS ROLE:	Business Development Manager
MOBILE PHONE:	07704 987 988
EMAIL ADDRESS:	nick.birch@dance-reeves.co.uk

CLIENT CONTACT:	
CONTACTS ROLE:	
MOBILE PHONE:	
EMAIL ADDRESS	
NOTES:	



GeoShield Verification Plan



APPLICATOR'S DETAILS

APPLICATOR NAME:

COMPANY:

Dance Reeves Limited

APPLICATOR TEL:

APPLICATOR EMAIL:

APPLICATOR NAME:

COMPANY:

Dance Reeves Limited

APPLICATOR TEL:

APPLICATOR EMAIL:

NOTES: The name of the installers are unknown at this point so the installers will either be identified at the pre-verification meeting or the first site visit.

At least one member of each team group will have a NVQ Level 2

qualification in the gas membrane installation.



GeoShield Verification Plan



APPLICATOR'S DETAILS

TRAINING LEVEL:

SPECIALIST CONTRACTOR:	YES	☒	NO	☐
NVQ LEVEL 2:	YES	☒	NO	☐
COMPETENT APPLICATOR :	YES	☒	NO	☐

REASON FOR VISIT:

DURING INSTALLATION:	☒	UNDERSLAB VENTILATION	☐
PRE - POUR:	☒	DPC MEMBRANE CONNECTION	☐
TESTING:	☒	OTHER (PLEASE SPECIFY):	☐

NOTES: See method statement for breakdown of site visits.

NOTES: Having worked with Dance Reeves on numerous successful projects these applicators will be deemed to be at an appropriate skill level for the job of installing the ground gas protection measures.



GeoShield Verification Plan



In accordance with guidance from
CIRIA 735 & CIRIA C748.

Radon gas protection measures
specify to the guidance from the
BR 211 document:

VOC/Hydrocarbons

☐

RADON BASIC

☐

RADON FULL

☐

Characteristic Specification (CS) Rating

CS2

Building Type:

TYPE C

POINTS REQUIRED UNDER BS8485:2019

2.5 POINTS

POINTS GAINED FROM BS8485:2019

Score for Structural Barrier:

0.5 POINTS

Grade 2 Basement:

N/A

Grade 3 Basement:

N/A

Score for Venting:

N/A

Car Park:

N/A

Score for Membrane:

2.0 POINTS

POINTS ACHIEVED UNDER BS8485 2019:

2.5 POINTS



GeoShield Verification Plan



TESTING

VISUAL: PICK & PROBE/MECHANICAL POINT STRESS TEST:



NON-DESTRUCTIVE COMPRESSED AIR LANCE TEST:



NON-DESTRUCTIVE SMOKE TEST:



DESTRUCTIVE JOINT TESTING:



NON-DESTRUCTIVE TRACER GAS TESTING:



DIELECTRIC POROSITY TEST:



PUMP TEST FOR "Twinny" WELD



NOTES: From the risk assessment GeoShield will initially conduct a visual

NOTES: and pick and probe testing regime for this project.

NOTES: Air lance testing will be conducted to test the installed membrane in

NOTES: accordance with CIRIA 735.

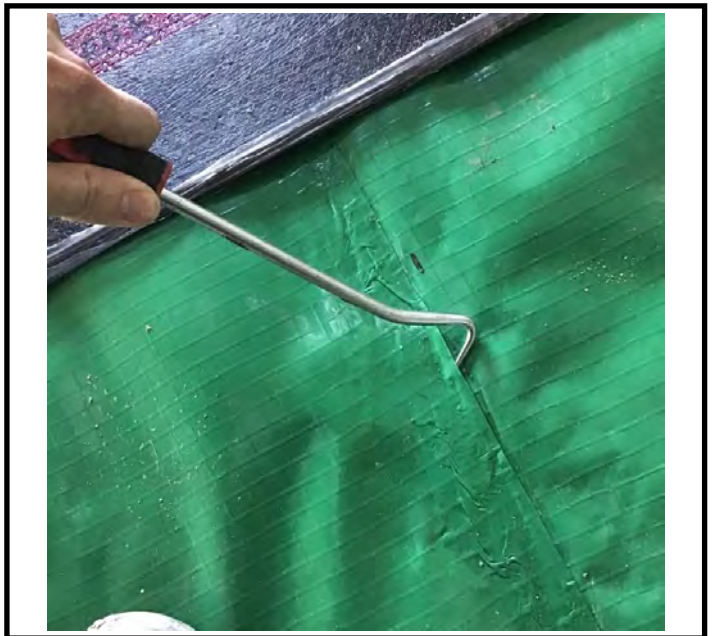
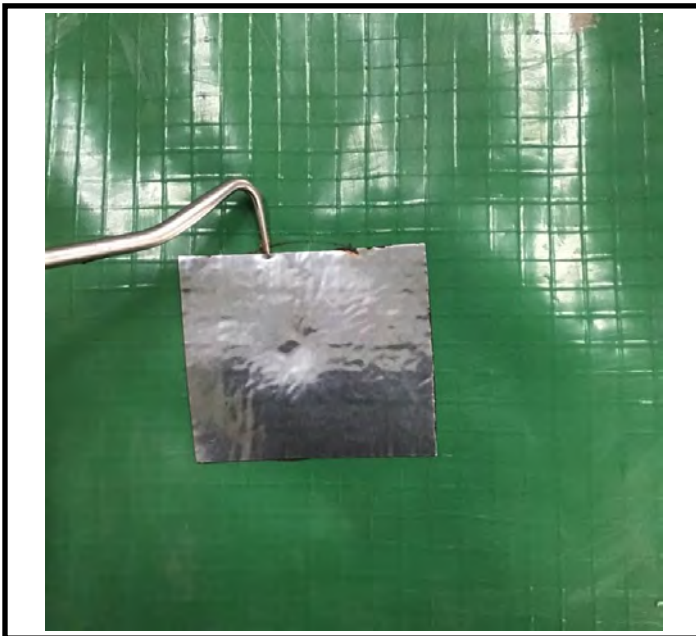
NOTES:

NOTES: Only if the application falls below the accepted standard will other testing

NOTES: be used.

SPECIFICATION

Mechanical Point Stress/ 'Pick and Probe' Testing



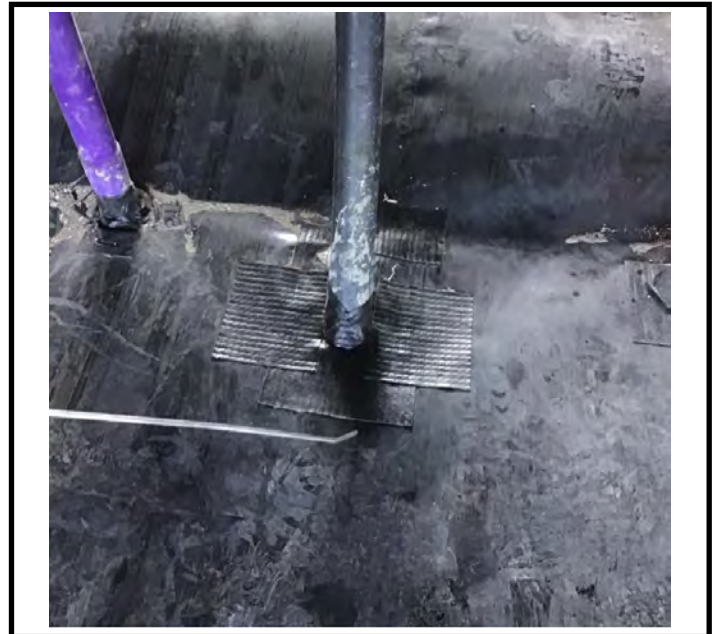
CIRIA 735

4.3.2 - Mechanical point stress tests involve running a blunt instrument (e.g. a screwdriver) along the edge of a seam to identify any unbonded seams. This method is not as effective as air lancing but it can be especially useful in hard to reach areas where it is not possible to air lance.

The instrument used should not puncture the gas membrane. This method is less appropriate for materials that are easily punctured where an air lance test is more suitable (although if a gas membrane can be easily punctured its suitability as a membrane is open to question).

SPECIFICATION

Air Lance Testing



CIRIA 735

4.3.3 - Air lance testing identifies unbonded areas of seam by directing a high pressure jet of air at the seam. The air is at a minimum pressure of 345kPa via a 4.8mm nozzle and is located no more than 50mm from the seam being tested.

In order to achieve the requirements of ASTM D4437-08:2013 bespoke specialist equipment is required to maintain the required pressure.



GeoShield Verification Plan



RISK ASSESSMENT

SITE SPECIFIC CIRCUMSTANCES	1	2	3	4	5
Complexity of Design	1	2 ✓	3	4	5
Repetition of design	1 ✓	2	3	4	5
Experience of workforce	1 ✓	2	3	4	5
Gas regime	1 ✓	2	3	4	5
Project management experience	1 ✓	2	3	4	5
Installation conditions (exposed?)	1	2 ✓	3	4	5
Robust Project specific gas design	1 ✓	2	3	4	5

TYPE OF RISK	RANGE	RISK
High Risk	23 - 30	
Medium High Risk	19 - 22	
Medium Risk	15 - 18	16
Medium Low Risk	11 - 14	
Low Risk	0 - 10	

GeoShield have classed this project as a medium risk.

GeoShield will lay all perimeters down for standards at the pre-verification meeting to assist both the installer and the main contractor.



GeoShield Verification Plan



METHOD STATEMENT - Page 1

EXPECTED VISITS:- 2 site visits is expected in line with the proposed phasing

programme, additional visits may be considered (if required) to achieve sign off.

Number of visits to be aligned with the build programme on site

TESTING:- Mechanical Point Stress (Pick & Probe) testing on welded areas.

Air lance testing will be carried out (as per CIRIA C735 Annex 1, Table A3).

Only if the application falls below the accepted standard will other testing be used.

This project will NOT achieve sign off for gas membrane installation unless

independent verification is carried out.

PURPOSE:- Geoshield are 3rd party gas membrane verifiers in accordance with

CIRIA 735 and for this project to be compliant with BS8485:2019, the gas system

must meet certain criteria from Tables 5, 6 & 7 to achieve mitigation of score for

verification. The chosen membrane must be verified by Geoshield to ensure the

materials have been installed in accordance with the manufacturer's specification.

REPORTING:- Each site visit be accompanied with a written and electronic report.

Any remediations either completed on the visit or outstanding will be recorded

and logged, sign off will not be achieved for each section area until all

remediations have been completed. This will be fully recorded at all times.



GeoShield Verification Plan



METHOD STATEMENT - Page 2

GROUND GAS RISK:- Geotechnical Assessment has classified this project

as Characteristic Situation 2 with Type C building. In accordance with

BS8485:2015+A1 2019 gas protection will need to score a minimum of 2.5 points.

This will be achieved by 3rd party verification of the gas membrane and the ground bearing slab where applicable to the site specific design.

A combination of which will achieve the necessary requirements.

GAS MEMBRANE PROTECTION:- It is advised that the substrate should be prepared

by removal of loose stone and debris. Other forms of protection could be in the

form of either a protection board, geotextile fleece and insulation. In addition labels

will be issued by Geoshield to restrict access to the installed area by follow on

trades and help raise awareness to encourage a better duty of care. This will help

to reduce the risk of potential damage caused to the gas membrane system.

FINAL:- Geoshield will liaise with the projects site supervision and all relevant

parties prior to the installation start. This plan will be presented and reviewed, all

points made clear as previously stated. Any alterations will be listed at the end of

this plan as an all party agreed way forward.



GeoShield Verification Plan



SUBSTRATE METHOD STATEMENT

SUBSTRATE TYPE:

Block and Beam Construction	Yes	☐	No	☒
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Minimum Preparation	Swept Clear	Yes	☐	No	☐
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Minimum Preparation	Vacuuming	Yes	☐	No	☐
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Minimum Preparation	Compressed air to remove	Yes	☐	No	☐
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Minimum Preparation	Remove Mortar Droppings	Yes	☐	No	☐
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Stone Substrate	Yes	☐	No	☐
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Minimum Preparation	Minimum 25mm Sand Blinding	Yes	☐	No	☐
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Minimum Preparation	Limestone Dust	Yes	☐	No	☐
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Minimum Preparation	Compacted Substrate	Yes	☒	No	☐
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Minimum Preparation	No large stones	Yes	☒	No	☐
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Concrete Substrate	Yes	☐	No	☒
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Minimum Preparation	No Hollows	Yes	☐	No	☐
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Minimum Preparation	Troweled Surface	Yes	☐	No	☐
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Remarks:	
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GPVS Declaration Reference: 0624-J0050
Gas Protection Verification Declaration

Gas Protection Verification Declaration

Site

Site Name	Kingsway Business Park
Site Address	off James Kearns Ave, Rochdale, OL16 4NZ
GPVS Declaration Reference	0624-J0050

Brief Description of Site

The proposed development contains two industrial units (J1 & J2)

Site Type	CommercialRetail
Building Unit	J1 & J2 / Lift pits & Undercroft areas

Document

Verification Report Title	GEO104598 Dance Reeves J1 Kingsway Business Park R02 Flat QC
Verification Report Identifier	N/A
Named Client	Dance-Reeves Ltd

Accredited Person Details

SGPV Name	Paul Colbeck
SGPV Registration No.	SGPV0005
Telephone	N/A
Email	pcolbeck@geoshield.co.uk
Organisation	Geoshield Limited
Address	

Declaration

I, Paul Colbeck, confirm that I am the person described in the Accredited Person details section and hold a current valid registration as a SGPV, Accreditation No. SGPV0005 under the Gas Protection Verification Accreditation Scheme.

I have reviewed the verification report described in the Document Details section and I am satisfied that:

1. The work has been carried out to an acceptable standard.
2. The work has been verified by suitably experienced and qualified personnel.
3. The level of verification is proportionate to the level of risk Identified in the site investigation report/Gas risk assessment.
4. The interpretations and conclusions are reasonable.
5. The verification strategy is in line with industry guidance.
6. I am competent to sign this Declaration and that
 - a. I am fully aware and comply with the Scheme's Code of Conduct
 - b. The work of this review and Declaration are within the limits of my knowledge, competence and professional capacity.

Note: The document that has been reviewed was prepared by the organisation named for the benefit of the named Client who has reliance upon it. Any professional liability arising from any proven negligent act or omission by the Company carrying out the work and publishing the document rests with that Company and not with the SGPV Accredited Person or the GPVS.

Signed:



Date:

30/07/2024

Name:

PAUL COLBECK

[Block capitals]



0624-J0050