Date: 15th March 2024
Reference: 15-974 V5

GAS MEMBRANE VALIDATION – BENNETT STREET

Project Name:	Bennett Street
Project Number:	15-974
Client:	Countryside
Date:	14-02-2024
Project Manager:	M. Dee
E3P Engineer:	J. Beer
Ground Gas Risk Assessment:	Vapour Membranes Required
Gas Membrane Installers Name & Qualifications:	JCW Gas Membranes Ltd, NVQ Level 2 – Installation of Gas Membranes in Construction
Plot:	Apartment Block 1

OVERVIEW

The membrane comprised a Juta TITANFLEX (black) gas and hydrocarbon barrier, in line with the required specification set out in the agreed Build Phase Contamination Risk Mitigation Strategy (report ref: 15-974-R5). E3P can confirm there were no holes or rips at the inspection time. Upon being laid, the membrane is to be covered with a Celotex (closed cell) floor insulation material which is considered to provide a high degree of protection.

E3P inspected all external joints, and E3P can confirm that the membrane was overlapped and welded. Corners and patch repairs were sealed with a GP TITAN butyl tape, resistant to vapour and bulk ground gas. Plots have service duct(s) located at the outer edge of the property. E3P inspected each one and can confirm that the top hats have been adequately sealed against the membrane using a self-adhesive gas style product and fixed with a layer of GP TITAN butyl tape.

As per the Build Phase Contamination Risk Mitigation Strategy (report ref: 15-974-R5), sub-floor voids require inspection and validation at 50% ratio of substructures completed. E3P undertook subfloor void inspections for Apartment Block 1, inspections confirmed there was a minimum void space of 150 mm for each plot. Validation photographs included within this letter.

Based on the information provided within this report, the site inspection and validation checklists, E3P can confirm that Apartment Block 1 has been installed with gas & vapour protection measures in line with the agreed Build Phase Contamination Risk Mitigation Strategy (report ref: 15-974-R5) to an acceptable level of workmanship.

A list of plots requiring validation and their associated validation letters is presented in Table 1.

MEMBRANE SPECIFICATION: JUTA TITANFLEX (BLACK)

GROUND GAS PROTECTION
GP® TITANFLEX®
TECHNICAL DATA SHEET

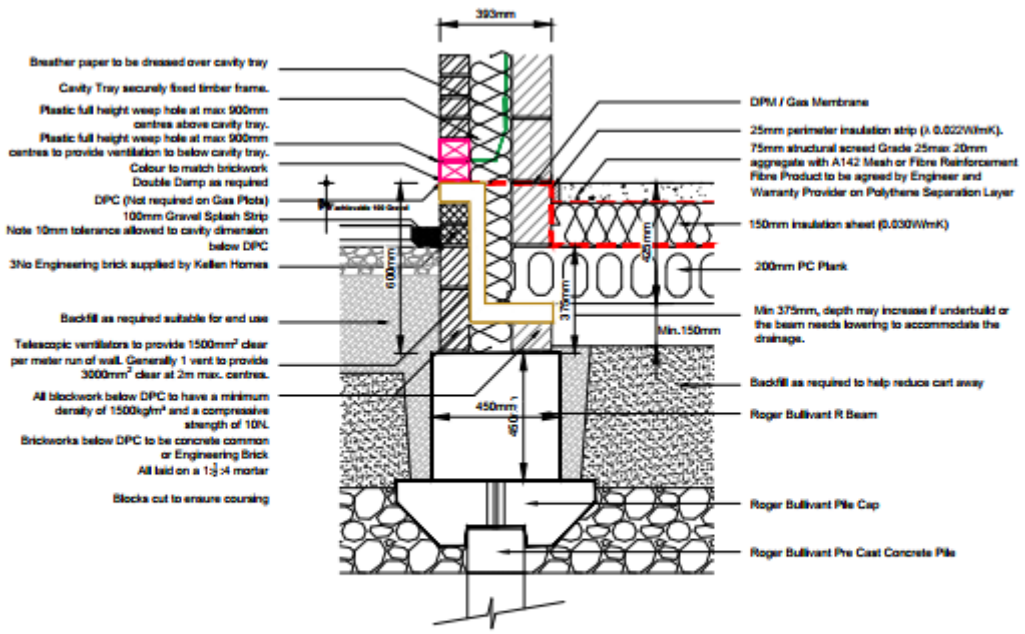
GP® TITANFLEX®

Feature	Characteristics	Test Method	GP® TITANFLEX®
Physical Properties	Thickness	EN 1849-2	0.5 mm
	Width	EN 1849-2	2 m
	Length	EN 1849-2	50 m
	Weight	EN 1849-2	500 g/m²
Hydraulic Press	Water Vapour Transmission Rate	EN 1931	0.11 - 0.18 g/m²/day
	Water Tightness (60 kPa)	EN 1928	Pass
	Water Tightness (196 kPa - 20 m Water Head) (Basement Application)	EN 1928	Pass
Mechanical Properties	Resistance to Static Load	EN 12730-B	≥ 20 kg
	Puncture Resistance	EN 12236	≥ 2.0 kN
	Tensile Strength (MD)	EN 12311-1	> 550 N/50mm
	Tensile Strength (CMD)	EN 12311-1	> 400 N/50mm
	Tensile Elongation (MD/CMD)	EN 12310-1	> 550 %
	Tear Resistance (MD/CMD)	EN 12310-1	> 300 N
	Resistance to Impact	EN 12691-B	650 mm
	Reaction to Fire	EN 13501-1	E Class
	Resistance to Artificial Ageing	EN 1296/EN 1928	Pass
	Resistance to Chemicals	EN 1296/EN 1928	Pass
Compliance and Certification	CE Mark - EN13967:2012		
	NHBC Standards Compliant		
	CIRIA C748 Compliant		
	BS 8485:2015 Compliant		
Vapour Permeability 100% Concentration	Transmission Rate of Benzene	EN ISO 15105-2	< 3.6 mg/m²/day
	Transmission Rate of Toluene	EN ISO 15105-2	< 13.8 mg/m²/day
	Transmission Rate of Ethyl Benzene	EN ISO 15105-2	< 2.7 mg/m²/day
	Transmission Rate of Xylenes (M,P,O)	EN ISO 15105-2	< 7.7 mg/m²/day
	Transmission Rate of Hexane	EN ISO 15105-2	< 0.6 mg/m²/day
	Transmission Rate of Vinyl Chloride	EN ISO 15105-2	< 0.05 mg/m²/day
	Transmission Rate of Trichloroethene (TCE)	EN ISO 15105-2	< 54.7 mg/m²/day
	Transmission Rate of Tetrachloroethene (PCE)	EN ISO 15105-2	< 26.2 mg/m²/day
	Transmission Rate of Naphthalene	EN ISO 15105-2	< 0.0006 mg/m²/day
	Transmission Rate of CIS-1,2-Dichloroethylene	EN ISO 15105-2	< 1.1 mg/m²/day
Gas Permeability	Methane Permeability	EN ISO 15105-1	0.13 ml/m²/day/atm
	Methane Permeability (Jointed)	EN ISO 15105-1	1.00 ml/m²/day/atm
	Carbon Dioxide Permeability	EN ISO 15105-1	3.01 ml/m²/day/atm
	Vinyl Chloride Gas Permeability	EN ISO 15105-1	0.04 ml/m²/day/atm
	Radon Permeability	K124/02/95	1.0×10^{-12} m²/S

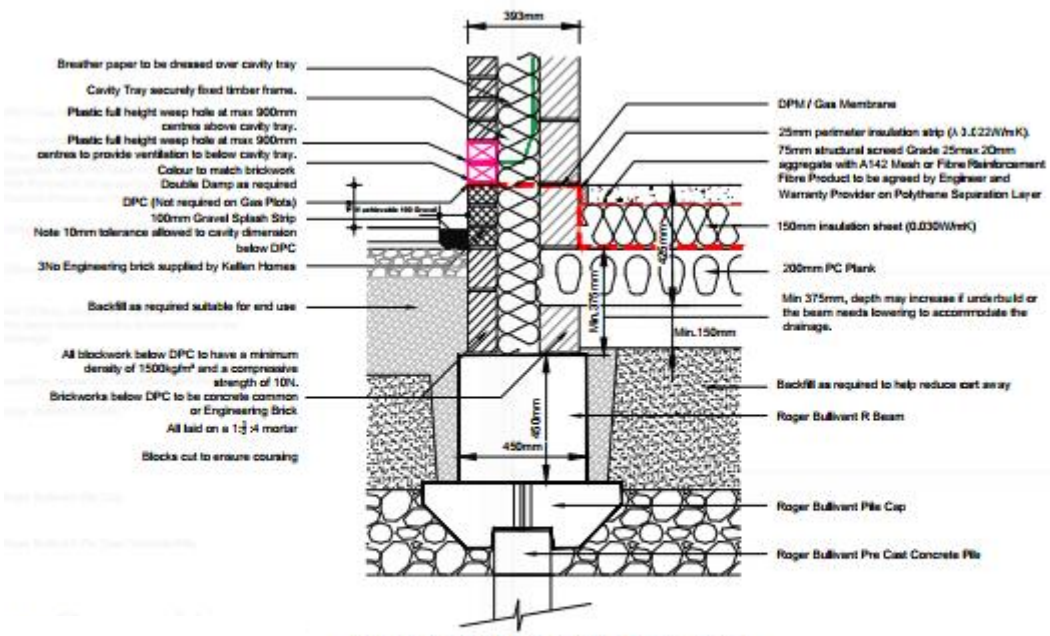
JUTA | TITANTECH

Juta.co.uk

STRUCTURAL ENGINEER'S SUBSTRUCTURE DESIGN



BENNETT STREET SUBSTRUCTURE DETAIL
APARTMENTS
Locations with Telescopic Vents



BENNETT STREET SUBSTRUCTURE DETAIL
APARTMENTS
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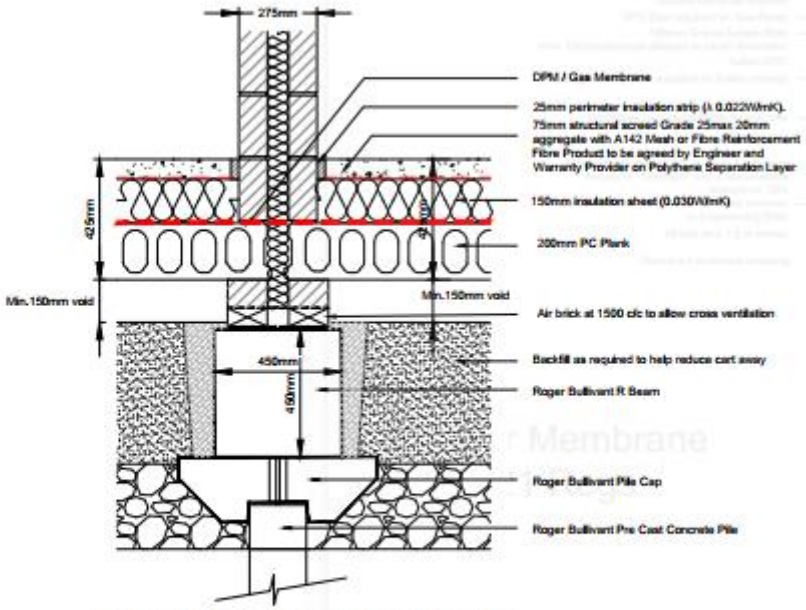

BENNETT STREET SUBSTRUCTURE DETAIL
APARTMENTS
Party Wall

PROPOSED DEVELOPMENT PLAN

The gas membrane validation photographs are enclosed within this letter. For information, Table 1 includes references and validation dates of previously validated plots.

Table 1 – Validation Letter Reference

PLOT NUMBER	DATE	REPORT REFERENCE
9-15	19-10-2023	V1
16 & 17	24-10-2023	V2
18 & 19	01-11-2023	V3
Apartment Block 3	08-03-2024	V4
Apartment Block 1	14-03-2024	V5

GAS MEMBRANE VALIDATION

Complete

Site Name	Bennett Street
Location	Bennett St Manchester England M12 5NZ United Kingdom (53.469021319177116, -2.2074353318803226)
Project Manager	Matthew Dee
Project number	15-974
Developer	Kellen Homes
Site representative Signature	[redacted] 14 Mar 2024 4:08 PM GMT
Conducted on	14 Mar 2024 3:35 PM GMT
Prepared by	Jonny Beer
Have you got the correct Gas Membrane detail (attached to the job in synergist)?	Yes

Inspection Gas Membrane

Plot Inspection

Plot Inspection 1

Plot Number	Apartment 1
Type of Development: Other add note	Apartment
Foundation Type: Other add note	Suspended Floor
Gas Membrane Type: Manufacturer, gauge, and colour.	Black
Gas Membrane Condition: Open punctures, tears, rips, stretching, Presence of debris, Repairs, Signs of weakness such as raised or sunken indentations, Protection plan in place to restrict access to lain gas membrane?	Pass

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

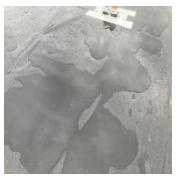
Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

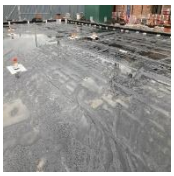
Photo 13

Laps, welds, and joints seals: Joints lapped and sealed in accordance with manufacturer's requirements/ specification? Minimum overlap insured? Sections taped twice? Are welds complete? Appropriate joining/double-sided tape used, Folds running in line with joints? (no joints cutting across folds)	Pass

Photo 14

Photo 15

Photo 16

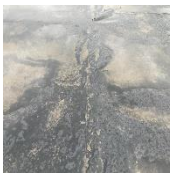
Photo 17

Photo 18

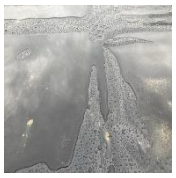
Photo 19

Service entries seals: Top hats seal arrangements fixed around service entries? Use of Jubilee clips? — Yes

Photo 20

Photo 21

Photo 22

Photo 23

Photo 24

Photo 25

Photo 26

Photo 27

Photo 28

Photo 29

Photo 30

Photo 31

Photo 32

Photo 33

Photo 34

Photo 35

Type of joints/ Lapping — Welded

Corners / Internal joints: Check all corners are correctly formed or contractor has used preformed corners. — Pass

Photo 36

Photo 37

Photo 38

Photo 39

Photo 40

Photo 41

Photo 42

Photo 43

Photo 44

Photo 45

Extent of Coverage: Is the membrane covering the entire plot? Does membrane span over outside walls? — Yes

Photo 46

Photo 47

Photo 48

Photo 49

Photo 50

Photo 51

Condition of sub-grade and underside of gas membrane: Check that the subgrade does not contain rough/uneven surfaces, is appropriately clean and that there are no hard/sharp objects. That protective sand blinding or geotextile (if specified) is present and meets the design criteria.

Pass

Photo 52

Photo 53

Photo 54

Photo 55

Slab / membrane condition (is membrane clear of debris or insulation): Can membrane be fully seen and photographed – ask contractor to remove an debris so membrane can be fully seen an inspected – this is a requirement of NHBC and local authorities.

Pass

Photo 56

Photo 57

External Wall Air bricks: Numbers, size. positions as design drawing? (Minimum of 3 walls)

Pass

Photo 58

Photo 59

Photo 60

Photo 61

Photo 62

Photo 63

Photo 64

Photo 65

Photo 66

Passive Venting

Sub-floor Void: Is a check possible on future plots (insert Plot number or NO in text box)

NO

Media summary

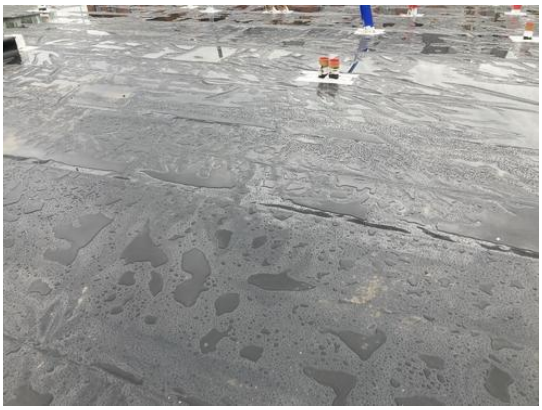

Photo 1

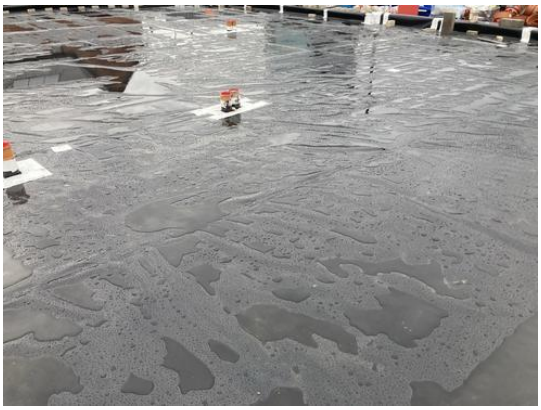

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

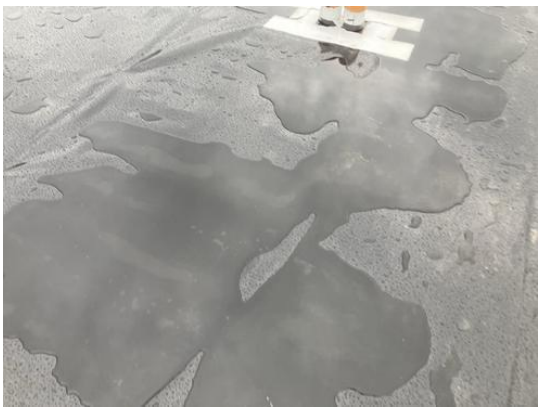

Photo 8

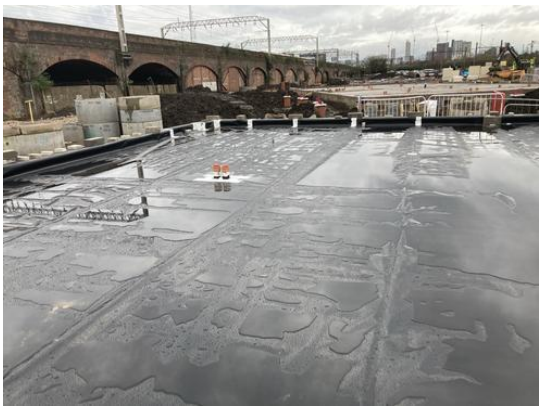

Photo 9

Photo 10

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Photo 12

Photo 13

Photo 14

Photo 15

Photo 16

Photo 17

Photo 18

Photo 19

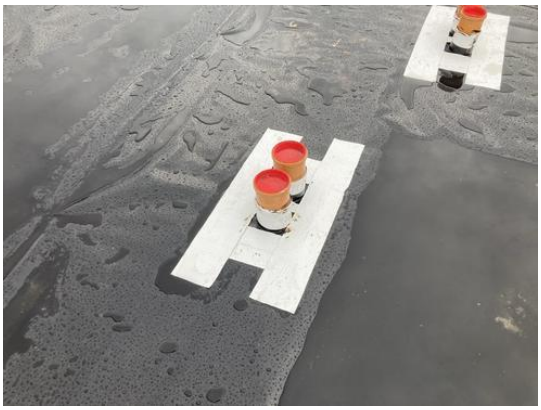

Photo 20

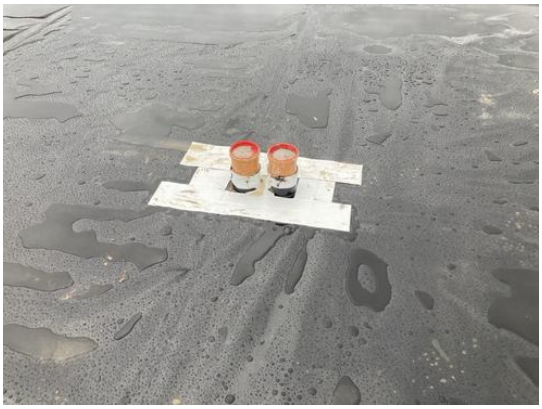

Photo 21

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Photo 51

Photo 52

Photo 53

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Photo 64

Photo 65

Photo 66

Apartment Block 1 Sub-floor Void Inspection