



Gas Membrane Installation
Validation Report
Caddick Construction
Gateway 36 Phase 2a
Shortwood Roundabout
Dearn Valley Parkway
Barnsley
S74 9DF



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1. INTRODUCTION

1.1 Purpose

ACS Linings are installing a gas protection membrane to the aforementioned site. MEC Environmental Ltd (MEC) has been appointed by ACS Linings to carry out independent validation of the installation of the membrane on the site as per our terms of engagement. The frequency of independent inspections has been determined by the client, comprehensive CQA should be forwarded by the installer to cover any data gaps for areas that have not been subjected to independent inspections.

The **SOLE** purpose of the works undertaken by MEC Environmental is to provide independent inspections and a factual report as and when requested to assist the client in gaining regulatory approval with regards to the gas membrane installation. This is as per the scope of work section within our term's engagement.

1.2 Limitations

This report is limited to providing lines of evidence to the regulatory authority for the areas components inspected by MEC only in support of the discharging of the relevant planning conditions only and cannot be used or relied upon for any other purpose. No professional liability shall be extended to any other parties by MEC, the report should explicitly not be relied on by any future vendor or tenant as proof that the gas protection measures are sufficient for the site and functioning at the time of purchase or start of any tenancy. Gas protection systems are not solely reliant on the gas membrane as points are scored under BS8485 for the floor slab, membrane and venting, these components work collaboratively to provide a gas protection system. This is as per the conditions within our term's engagement.

The report has been provided on the assumption that no damage or works that may have compromised the components and integrity of the gas membrane have been made after our inspections, failure to report any such occurrences will invalidate any liability and render the report and contents invalid. This is as per the conditions within our term's engagement.

This report has been prepared in accordance with the best available practice and the relevant guidance documents listed below of which the author of the report was a contributor and member of the steering committees:

Mallett H, Wilson S, Corban M (2014) "Good practice on the testing and verification of protection systems for buildings against hazardous ground gases". CIRIA Report C735

1.3 Compliance with Regulation 7 of Building Regulations

Regulation 7 of the building regulations requires that building work shall be carried out in a workmanlike manner. Approved document 7 suggests installation can comply with the regulation if workmanship is such that, where relevant, materials are adequately mixed or prepared and applied, used or fixed so as to perform adequately the functions for which they are intended.

A reasonable standard may be demonstrated by:

Compliance with a standard and independent certification - The relevant standard for gas protection measures is BS8485:2015 +A1:2019, Table 7 of the standard requires that gas membranes are verified as per CIRIA C735.

Past experience – The installers qualifications are checked by MEC Environmental to ensure that the installation supervisor holds the NVQ Level 2 in gas membrane installations.

Integrity Testing methods. – are carried out as prescribed in CIRIA C735, unless stated elsewhere
Frequency of Visits – MEC have not been employed to prepare a validation plan for this project, the frequency of visits is as per the instructions of the client, in essence MEC inspected the available membrane that could be inspected each time an inspection visit was requested. The area inspected on each visit is noted on the survey sheets in appendix 1. This report should be read in conjunction with the installers CQA report.

1.4 Method of Inspection (Per Visit)

All seams and non-seam areas of the available gas membrane were inspected/tested by the Validation Surveyor for identification of defects, protruding and penetrating objects, lack of subgrade support, overheating, holes, blisters, undispersed raw materials, scratches and gouges, and any sign of contamination by foreign matter.

Any portion of the gas membrane exhibiting a flaw or failing a visual inspection/testing was repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure was agreed upon between the Validation Consultant and the Installer at the time of the repair and is noted in the survey sheets.

Major repairs are visually inspected/tested, repairs passing the inspection/testing were considered acceptable. In some cases minor repairs maybe carried out under contractor CQA and photographic evidence supplied to the verifier for inclusion in the report.

1.5 MEC Staff Competency

All site inspections have been carried out by suitably qualified staff as defined in CIRIA C735, the qualification held by all MEC inspection surveyors is either the NVQ Level 4 in gas protection verification or the NVQ Level 2 in gas membrane installation

The author of this report is also a CL:AIRE accredited Specialist in Gas Protection Verification (SGPV) and holds both the NVQ Level 2 in gas membrane installation and the NVQ Level 4 in gas protection verification.

1.6 Conclusion

During our inspections to the areas denoted in Appendix 1 (Site Surveys Sheets) we witnessed the installer carrying out the installation in a workmanlike manner, the materials were adequately prepared and applied, used and fixed so as to perform adequately the functions for which they are intended as per Regulation 7 of the building regulations. In instances where 100% of the installation has not been independently inspected/tested then this report should be read in conjunction with the gas membrane installers CQA records.

The installers all hold the NVQ Level 2 "Gas membrane Installations" qualification and as such are classed as a qualified and experienced installer. MEC Environmental have checked the CSCS Trade Cards of the installers, which confirms the holder has attained the qualification.

Signed



Date: 02/09/2022

Michael Corban S.G.P.V.

Director

MEC Environmental Ltd

Appendix 1 – Site Survey Sheets

Site name: Caddick Construction. Gateway 36, Phase 2a, Shortwood Roundabout, Dearn Valley Parkway, Barnsley.		Units/ plots checked: Unit 3. Pour 2 of 4. Approx 20% TFA. Gridlines E-J / 6-10	
Postcode: S74 9DF			
Installers Name: ACS			
Date: 25/07/2022			
Inspection by: Dan Squire		Weather: 14°C Dry	
	Item	Comments	
	Sub-floor void	N/A	
	Ventilation Inlets and Outlets	N/A	
	Number Of Vents	N/A	
	Materials used:	Membrane – ACS Gas Membrane Self-Adhesive Membrane ☒ Yes Preformed Top hats ☐ Yes Double Sided Butyl Tape ☒ Yes Preformed Corners ☐ Yes Others Please List: N/A	
	Installation Notes	<u>(brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u> MEC Environmental carried out a thorough visual inspection of the membrane that was laid on a just in time basis in front of a laser pour, during our inspection we witnessed the installer carrying out their own CQA repairs as the pour progressed. The membrane is lined across the main footprint and is joined to the perimeter edge using double sided butyl tape. Butyl tape is used on all membrane joints and to seal to the membrane left extended from pour 1. All penetrations and patch repairs sealed using SAGM.	
	Type of Joint	Tape Joint ☒ Auto Weld ☐ Hand Weld ☐ Extrusion Weld ☐	
	Jointing/Detailing Testing	☐ Air Lance (ASTM D4437) ☒ Probe Test (ASTM D4437)	
	Laps, welds and detailing	Have all joints passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
		Have all pipes passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
	Ventilation Inlets & Outlets	Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
		Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes ☐ No ☒ N/A

Has all other detailing work passed inspection	☐ Yes	☐ No	☒ N/A
<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: 8no patch repairs made by the installers using SAGM.</p> <p>Have any defects identified above been satisfactorily rectified ☒ Yes ☐ No ☐ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Dan Squire Date: 25/07/2022</p>			

Area Inspected

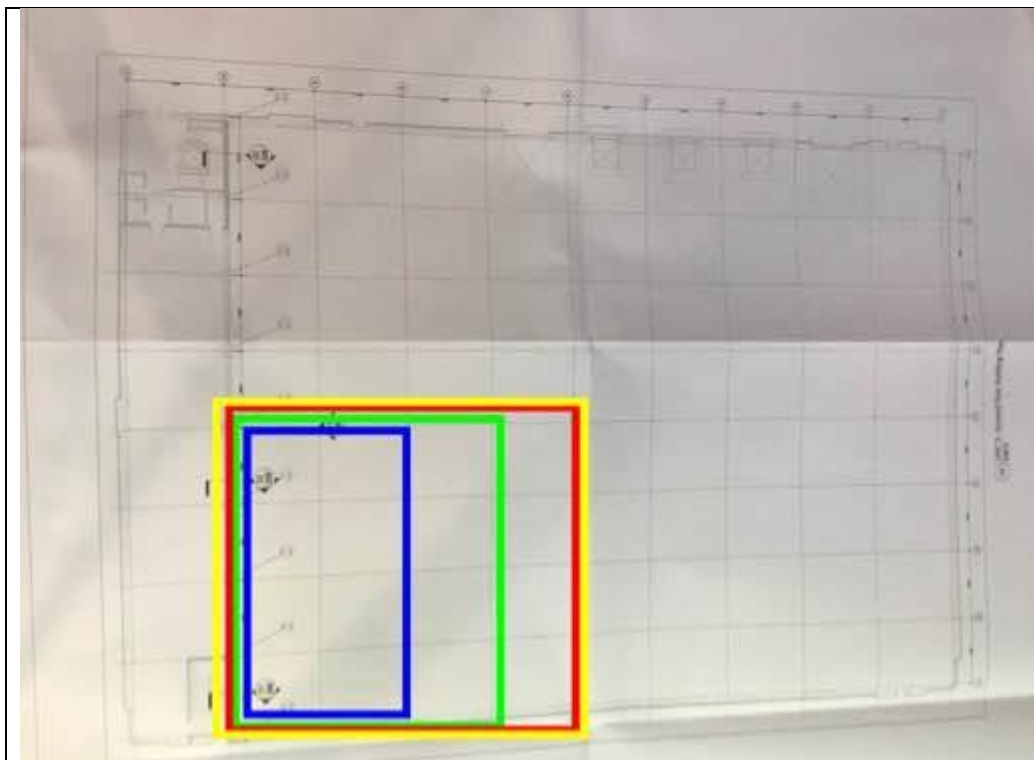


Photo 25/07/2022



Unit 3 pour 2 laser screed installation



Sealed SAGM patch repairs



Sand blinding sub grade prior to being rolled



Sealed stanchion detail



Sealed double sided tape joint



Sealed perimeter detailing

Site name: Caddick Construction. Gateway 36. Phase 2a. Shortwood roundabout, Dearn Valley Parkway, Barnsley.		Units/ plots checked: Unit 3. Pour 3 of 4. Approx 20% TFA. Gridlines E-J / 1-6		
Postcode: S74 9DF				
Installers Name: ACS				
Date: 27/07/2022				
Inspection by: Dan Squire		Weather: 14°C Dry		
	Item	Comments		
	Sub-floor void	N/A		
	Ventilation Inlets and Outlets	N/A		
	Number Of Vents	N/A		
	Materials used:	Membrane – ACS Gas Membrane		
		Self-Adhesive Membrane ☒ Yes	Preformed Top hats ☐ Yes	
		Double Sided Butyl Tape ☒ Yes	Preformed Corners ☐ Yes	
		Others Please List: N/A		
Installation Notes	<p><u>(brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u></p> <p>MEC Environmental carried out a thorough visual inspection of the membrane that was laid on a just in time basis in front of a laser pour, during our inspection we witnessed the installer carrying out their own CQA repairs as the pour progressed. The membrane is lined across the main footprint and is joined to the perimeter edge using double sided butyl tape. Butyl tape is used on all membrane joints and to seal to the membrane left extended from pour 2. All penetrations and patch repairs sealed using SAGM.</p> <p>Site installed miothene strips surrounding all pipes and stanchions prior to the concrete pour.</p> <p>Marked up drawing key:</p> <p>Area in yellow is the full pour area</p> <p>Area in red is completed membrane work during our inspection.</p> <p>Area in green is how far the pour had progressed during our inspection.</p> <p>Area in blue is how far the pour had come and covered the membrane prior to our inspection.</p>			
Type of Joint	Tape Joint ☒	Auto Weld ☐	Hand Weld ☐	Extrusion Weld ☐
Joining/Detailing Testing	☐ Air Lance (ASTM D4437)		☒ Probe Test (ASTM D4437)	

Laps, welds and detailing Ventilation Inlets & Outlets	Have all joints passed testing prior to surveyor leaving site?	☒ Yes	☐ No	☐ N/A
	Have all pipes passed testing prior to surveyor leaving site?	☐ Yes	☐ No	☒ N/A
	Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes	☐ No	☐ N/A
	Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes	☐ No	☒ N/A
	Has all other detailing work passed inspection	☐ Yes	☐ No	☒ N/A
	<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: 15no patch repairs made by the installers using SAGM.</p> <p>Have any defects identified above been satisfactorily rectified ☒ Yes ☐ No ☐ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Dan Squire Date: 27/07/2022</p>			

Area Inspected

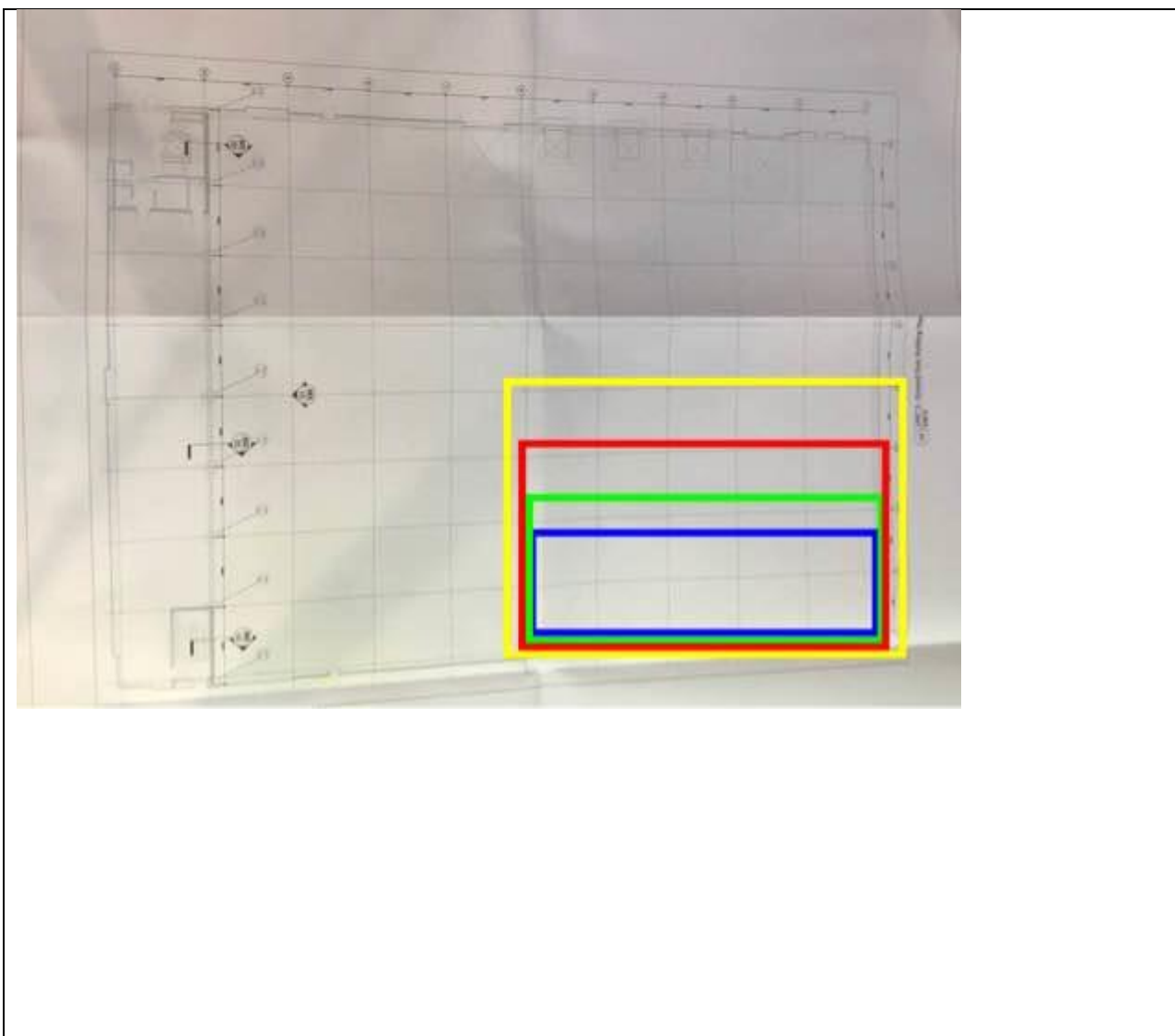


Photo 27/07/2022



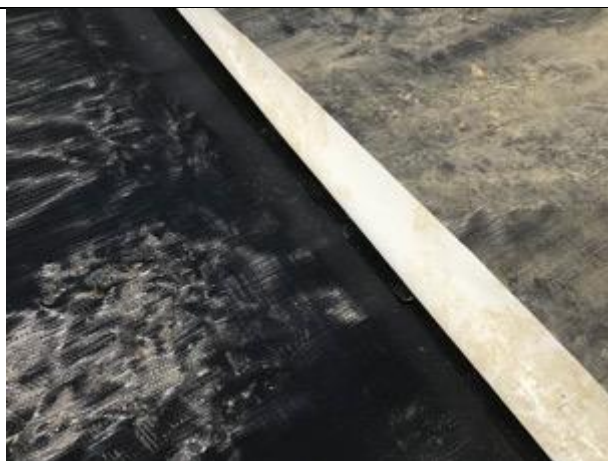
Sub grade prep



Pour 3 of 4 laser screed installation



Sealed perimeter detailing



Butyl tape membrane joint



Sealed SAGM patch repair



Sealed stanchion detail



Pour 3 of 4 laser screed installation

Site name: Caddick Construction. Gateway 36. Phase 2a. Shortwood Roundabout. Dearn Valley Parkway. Barnsley.		Units/ plots checked: Unit 1. Pump Pour 1 of 3	
Postcode: S74 9DF		Approx 25% TFA. Gridlines 1-5 / A-E	
Installers Name: ACS			
Date: 12/08/2022			
Inspection by: Dan Squire		Weather: 21°C Dry	
	Item	Comments	
	Sub-floor void	N/A	
	Ventilation Inlets and Outlets	N/A	
	Number Of Vents	N/A	
	Materials used:	Membrane – ACS Gas Membrane Self-Adhesive Membrane ☒ Yes Preformed Top hats ☐ Yes Double Sided Butyl Tape ☒ Yes Preformed Corners ☐ Yes Others Please List: N/A	
	Installation Notes	<p><u>(Brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u></p> <p>MEC Environmental carried out a thorough visual inspection of the membrane that was laid as a full line in preparation for the first pump pour. The membrane is lined across the main footprint and is joined together and to the perimeter membrane previously installed using double sided Butyl tape. All penetrations and patch repairs sealed using SAGM.</p> <p>Site installed miothene strips surrounding all pipes and stanchions prior to the concrete pour.</p> <p>MEC were unable to inspect the membrane which is installed under the perimeter blockwork. We were also restricted to an inspection in the thickening channels which had steel mesh installed prior to our inspection.</p>	
	Type of Joint	Tape Joint ☒ Auto Weld ☐ Hand Weld ☐ Extrusion Weld ☐	
	Jointing/Detailing Testing	☐ Air Lance (ASTM D4437) ☒ Probe Test (ASTM D4437)	
	Laps, welds and detailing	Have all joints passed testing prior to surveyor leaving site? ☒ Yes ☐ No ☐ N/A Have all pipes passed testing prior to surveyor leaving site? ☐ Yes ☐ No ☒ N/A	

Ventilation Inlets & Outlets	Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes	☐ No	☐ N/A
	Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes	☐ No	☒ N/A
	Has all other detailing work passed inspection	☐ Yes	☐ No	☒ N/A
	<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: 9no patch repairs made by the installers using SAGM.</p> <p>Have any defects identified above been satisfactorily rectified ☒ Yes ☐ No ☐ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Dan Squire Date: 12/08/2022</p>			

Area Inspected

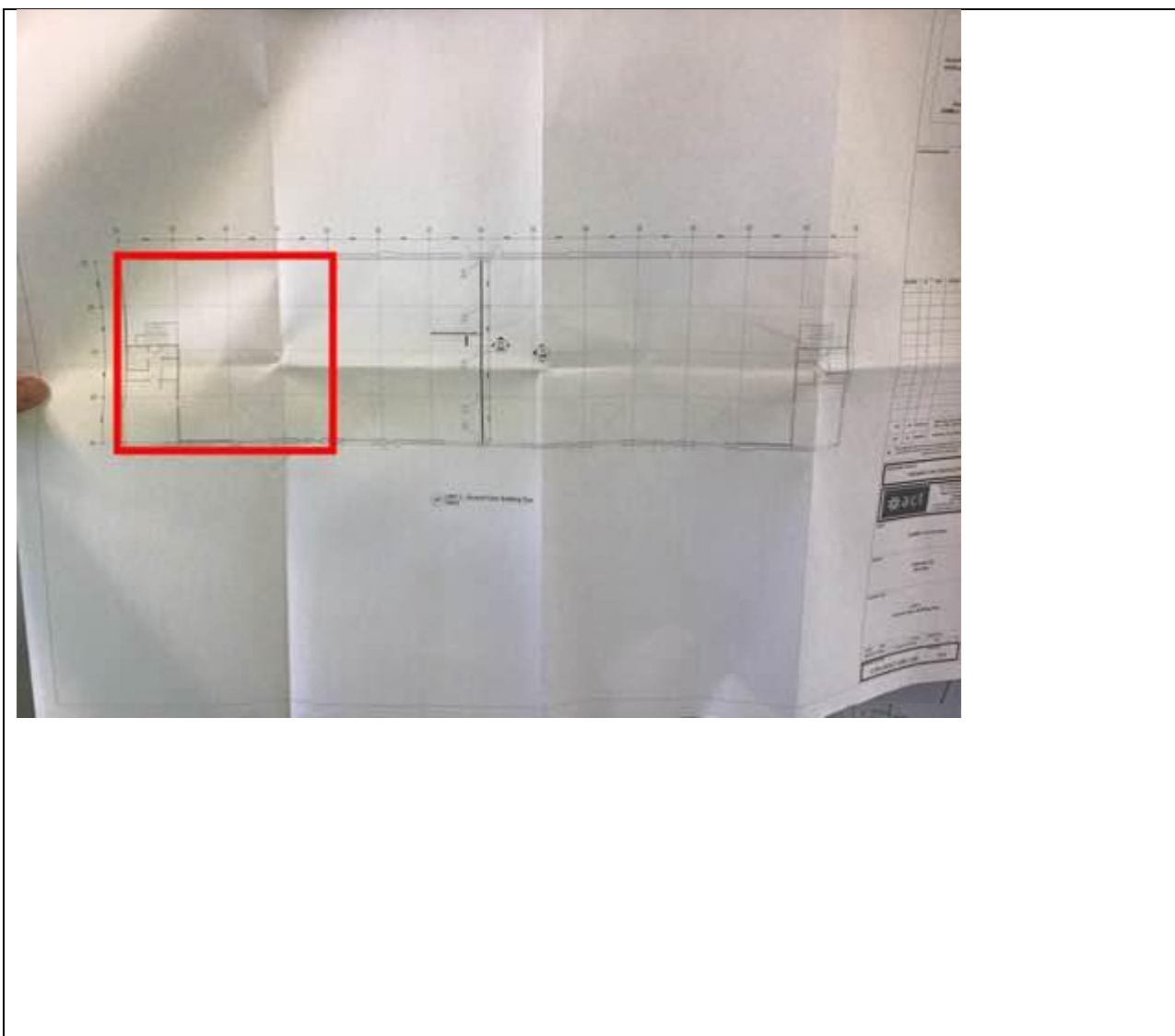
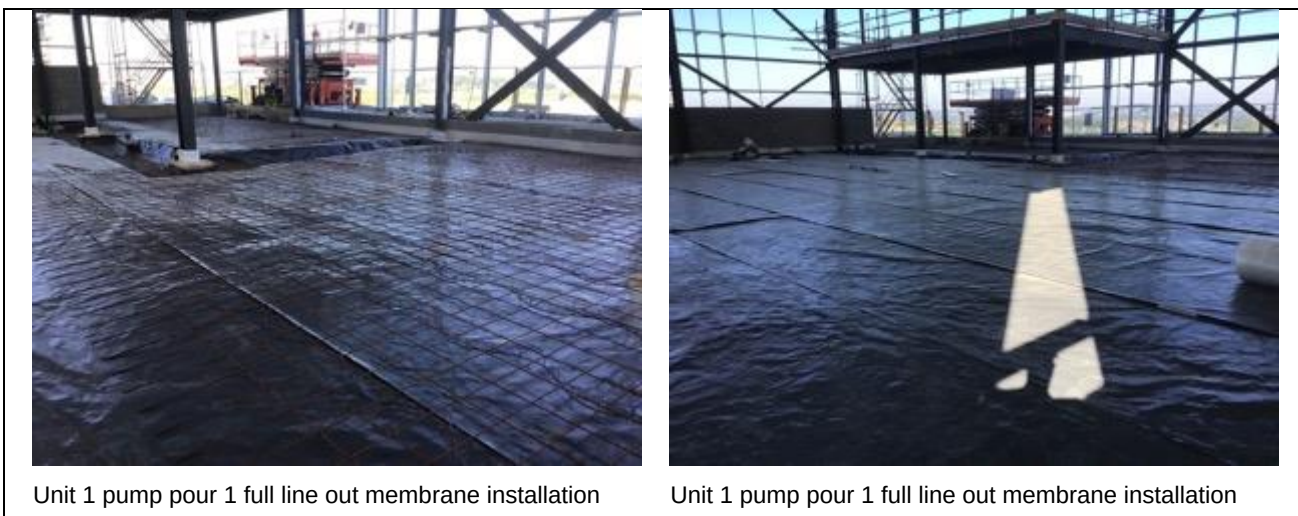


Photo 12/08/2022



Unit 1 pump pour 1 full line out membrane installation

Unit 1 pump pour 1 full line out membrane installation



Sealed pipe penetration



Thickening area restricted inspection



Sealed stanchion detail

Site name: Caddick Construction, Gateway 36. Phase 2a, Shortwood roundabout. Dearn Valley Parkway, Barnsley.		Units/ plots checked: Unit 2 (See marked up drawing)	
Postcode: S74 9DF			
Installers Name: ACS Linings			
Date: 30/08/2022			
Inspection by: Keith Barsby		Weather: 16°C Fine	
	Item	Comments	
	Sub-floor void	N/A	
	Ventilation Inlets and Outlets	N/A	
	Number Of Vents	N/A	
	Materials used:	Membrane – ACS Gas Membrane Self-Adhesive Membrane ☒ Yes Preformed Top hats ☐ Yes Double Sided Butyl Tape ☒ Yes Preformed Corners ☐ Yes Others Please List: Primer	
	Installation Notes	<u>(brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u> MEC Environmental carried out a thorough visual inspection of the membrane that was laid on a just in time basis in front of a laser pour, during our inspection we witnessed the installer carrying out their own CQA as the pour progressed. At the perimeter edge, the membrane has been sealed to the primed surface of the concrete base of the cladding walls, internally, the membrane has been joined to the previously installed membrane from an earlier pour. Stanchions have been sealed using SAGM which has been sealed to the primed surface of the stanchions and onto the membrane.	
	Type of Joint	Tape Joint ☒ Auto Weld ☐ Hand Weld ☐ Extrusion Weld ☐	
	Jointing/Detailing Testing	☐ Air Lance (ASTM D4437) ☒ Probe Test (ASTM D4437)	
	Laps, welds and detailing	Have all joints passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
	Ventilation Inlets & Outlets	Have all pipes passed testing prior to surveyor leaving site?	☐ Yes ☐ No ☒ N/A
		Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A

	Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes	☐ No	☒ N/A
	Has all other detailing work passed inspection	☒ Yes	☐ No	☐ N/A
<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: None recorded</p> <p>Have any defects identified above been satisfactorily rectified ☐ Yes ☐ No ☒ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Keith Barsby Date: 30/08/2022</p>				

Area Inspected

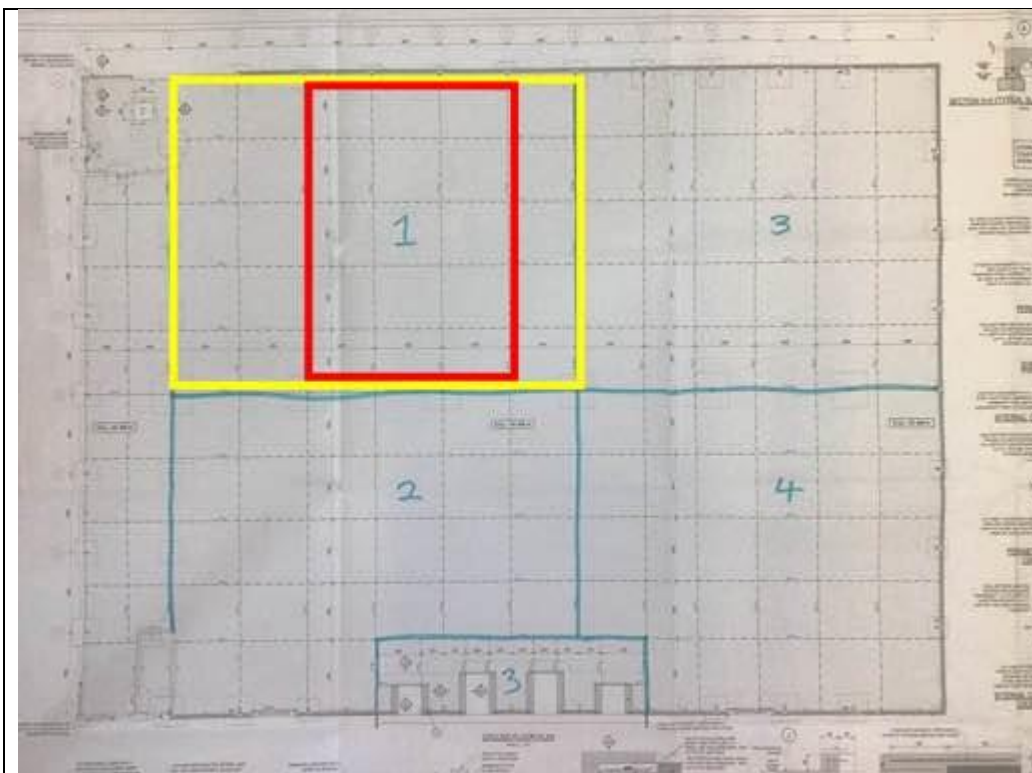


Photo 30/08/2022



Overview Unit 2, Pour 1 of 4



Ground being rolled, membrane laid



Membrane being rolled out



Stanchion seal using SAGM



Joint using double sided joint tape



Perimeter edge seal

Site name: Caddick Construction. Gateway 36. Phase 2a. shortwood roundabout. Dearn Valley Parkway. Barnsley.		Units/ plots checked: Unit 2. See marked drawing	
Postcode: S74 9DF			
Installers Name: ACS			
Date: 02/09/2022			
Inspection by: Dan Squire		Weather: 15°C Dry	
	Item	Comments	
	Sub-floor void	N/A	
	Ventilation Inlets and Outlets	N/A	
	Number Of Vents	N/A	
	Materials used:	Membrane – ACS Gas Membrane Self-Adhesive Membrane ☒ Yes Preformed Top hats ☐ Yes Double Sided Butyl Tape ☒ Yes Preformed Corners ☐ Yes Others Please List: N/A	
	Installation Notes	<p><u>(brief description of area/plots and list of defects/repairs identified to the main membrane sheet, excluding detailing and joints)</u></p> <p>MEC Environmental carried out a thorough visual inspection of the membrane that was laid as a full line in preparation for the first pump pour. The membrane is lined across the main footprint and is joined together and sealed to the perimeter walls using double sided Butyl tape. All penetrations and patch repairs sealed using SAGM.</p> <p>Site installed miothene strips surrounding all pipes and stanchions prior to the concrete pour.</p> <p>Marked drawing key</p> <p>Red - area of membrane inspected Yellow - full pour area</p>	
	Type of Joint	Tape Joint ☒ Auto Weld ☐ Hand Weld ☐ Extrusion Weld ☐	
	Jointing/Detailing Testing	☐ Air Lance (ASTM D4437)	☒ Probe Test (ASTM D4437)
	Laps, welds and detailing	Have all joints passed testing prior to surveyor leaving site?	☒ Yes ☐ No ☐ N/A
		Have all pipes passed testing prior to surveyor leaving site?	☐ Yes ☐ No ☒ N/A

Ventilation Inlets & Outlets	Have all stanchions/wind braces/columns passed testing prior to surveyor leaving site?	☒ Yes	☐ No	☐ N/A
	Have all piles and pile caps passed testing prior to surveyor leaving site?	☐ Yes	☐ No	☒ N/A
	Has all other detailing work passed inspection	☐ Yes	☐ No	☒ N/A
	<p><u>(List any defects to detailing work and joints):</u></p> <p>During our inspection the following defects and repairs were carried out: 15no patch repairs made by the installers using SAGM.</p> <p>Have any defects identified above been satisfactorily rectified ☒ Yes ☐ No ☐ N/A</p> <p>The Area has passed inspection ☒</p> <p>The Area has failed inspection and a corrective action sheet has been left with the contractor ☐</p> <p>The Area is incomplete as detailed above ☐</p> <p>Signed: Dan Squire Date: 02/09/2022</p>			

Area Inspected

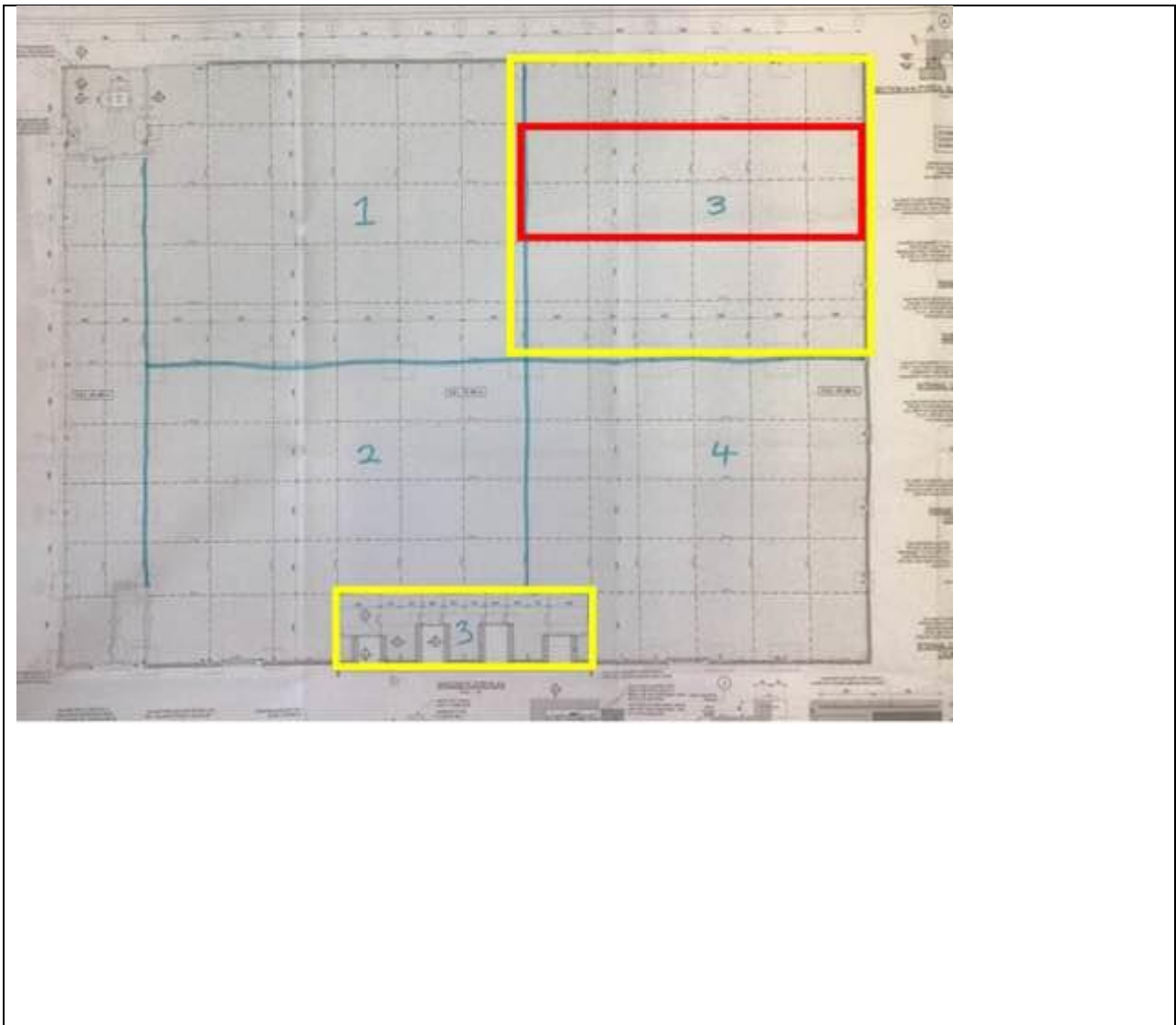


Photo 02/09/2022

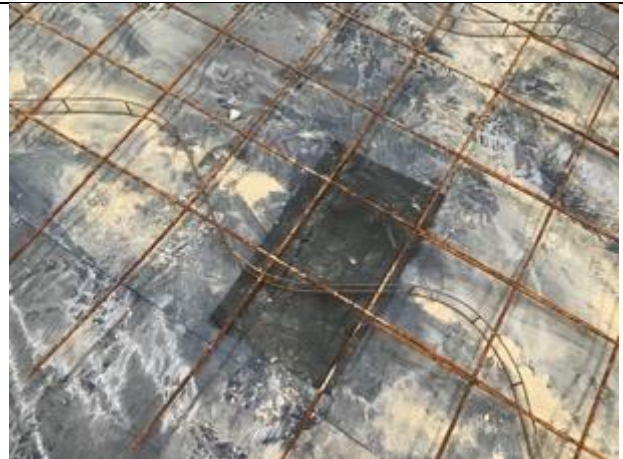


Blinding to sub grade

Unit 2 - pour 3 of 4



Dock levellers poured prior to our arrival



Sealed SAGM patch repair



Sealed stanchion detail with miothene installed by others



Sealed perimeter detailing



Sealed pipe penetration



Sealed membrane tape joint