



40-46 Princess Street - Manchester



Conservation Samples Report

Rev	Date	Produced By	Checked/Approved By
6	09/05/22	Jonathan Sleigh Graduate PM	Lincoln Barrett Senior PM



Contents

1.0 Lime Plaster samples	4
1.1 Finishes (Listed Building Consent Condition 3)	4
1.2 Conservation Officer Comments	6
2.0 Window Repairs Condition (listed Building Consent Condition 5)	7
2.1 Introduction to window repairs	7
2.2 Courtyard Elevation Window Repair	7
Figure 4: Courtyard Window Repair location (Credit Bridge Architects 2022)	8
2.4 Internal Window repairs (Listed Building Consent Condition 5)	9
Figure 5: W2-049 Decorative finish (Credit CubicWorks Ltd.2022)	9
Figure 6 - Window painted after repairs (Credit CubicWorks Ltd.2022)	10
2.5 Proposed new Windows (Listed Building Consent Condition 3e)	12
2.6 Conservation Officer Comments	16
3.0 Doff clean (listed building Consent Condition 6)	17
3.1 This section of the report covers the sample doff clean that has been implemented in the courtyard area.	17
3.2 Before and After	20
Figure 8: Before Doff Clean (Credit CubicWorks Ltd. 2022)	20
Figure 9: After Doff Clean Courtyard (Credit CubicWorks Ltd.2022)	21
3.3 Conservation Officer Comments	22
4.0 Brick Repairs (listed Building Consent Condition 6)	23
4.1 Introduction to Brick Repairs	23
Figure 12: Parapet wall face to be built located on the Mansard Roof (Credit CubicWorks Ltd.2022)	26
4.3 NBS Specification of Brick Repairs	27
4.4 Conservation Officer Comments	30
5.0 Existing Slate (Listed Building Consent Condition 6)	31
Figure 13 – Sample slates (Credit CubicWorks Ltd.2022)	31
Figure 14: Slate removed from the original Mansard roof to be reused (Credit CubicWorks Ltd. 2022)	32
5.1 Conservation Officer Comments	33
6.0 Roof windows (Listed building Consent Condition 3e)	34
6.1 FAKRO Technical data sheet	35
Figure 15: Fakro Conservation Roof Window example used in the multi-award winning Advocate's Close project in Edinburgh (Credit Fakro 2022)	36
6.2 Conservation Officer Comments	37
7.0 Decoration to Masonry Walls Condition (Listed Building Consent Condition 3)	38



7.1 Introduction	38
7.2 Graphenstone Sample Card	39
Figure 16: Graphenstone - Sample Card (Credit Graphenstone 2022)	39
Figure 17: Graphenstone - Sample Card (Credit Graphenstone 2022)	40
Figure 18: Graphenstone - Sample Card (Credit Graphenstone 2022)	41
Figure 19: Graphenstone - Sample Card (Credit Graphenstone 2022)	42
Figure 20: Graphenstone - Sample Card (Credit Graphenstone 2022)	43
7.3 MDF Sample	44
Figure 21: Graphenstone - Sample Card (Credit CubicWorks Ltd. 2022)	44
7.4 Paint to Masonry	45
Figure 22 : Paint to Lime plaster wall – Level 5 - GRAPHENSTONE GLACIER GRAFCLEAN INT (Credit CubicWorks Ltd.2022)	45
7.6 Specification of GRAFCLEAN INT paint use	46
7.7 Paint to Ceiling	49
Figure 23: Samples to Burnt and clean wood with lime ratios (Credit CubicWorks Ltd.2022)	49
7.8 Ceiling Limewash Ratio plotted	50
7.9 Brick Piers - brick piers to be left exposed / unpainted	51
	52
Figure 25: Brick Piers 2 (Credit CubicWorks Ltd.2022)	52
Figure 26: Brick Piers 3 (Credit CubicWorks Ltd.2022)	53
7.10 Conservation Officer Comments	54
END OF DOCUMENT	55

1.0 Lime Plaster samples

1.1 Finishes (Listed Building Consent Condition 3)

This section of the report shows the different finishes that can be achieved, figure 1 shows both the sponge and trowel finish.

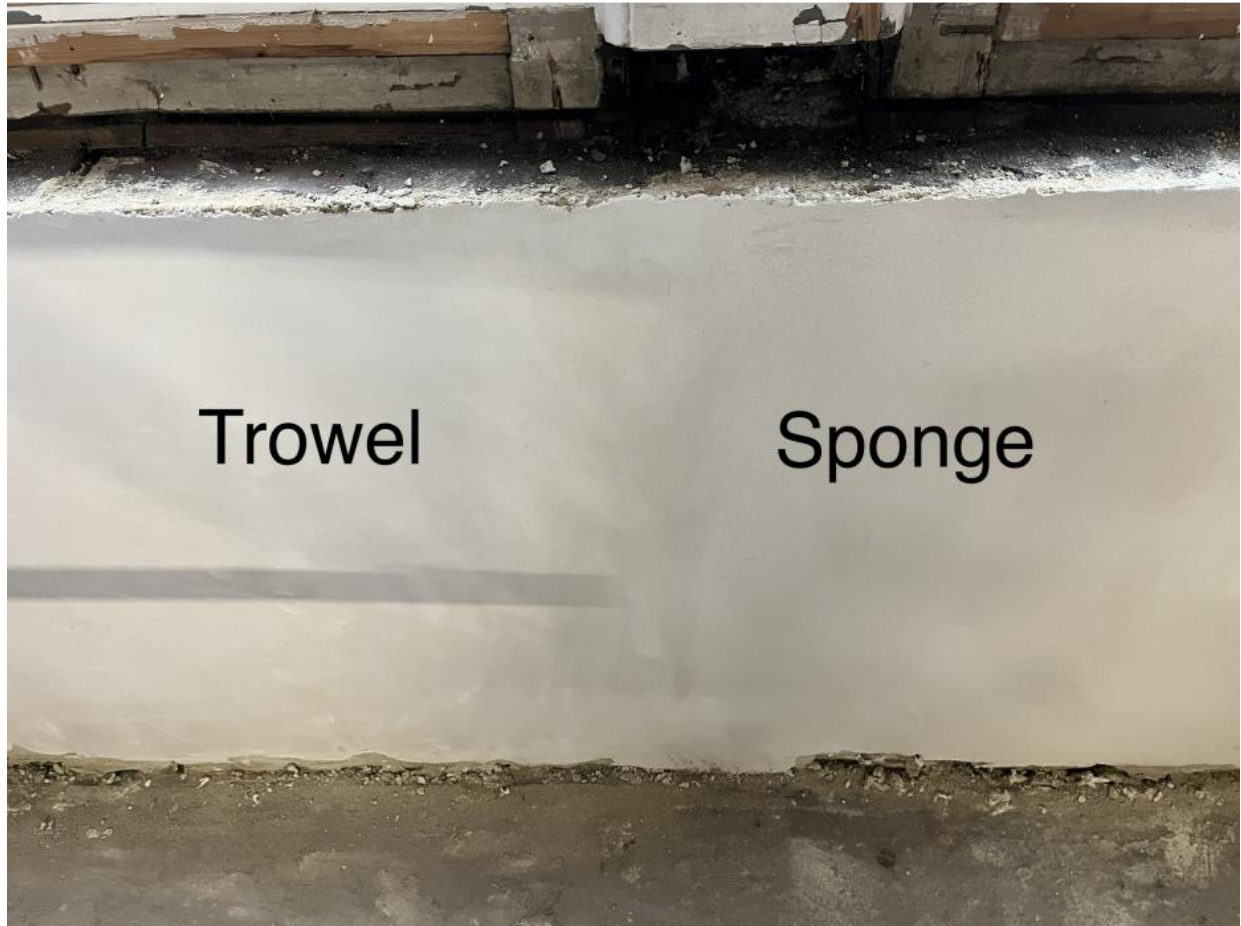


Figure 1: Sponge and Trowel Lime plaster Finish side by side comparison (Credit CubicWorks Ltd 2022)

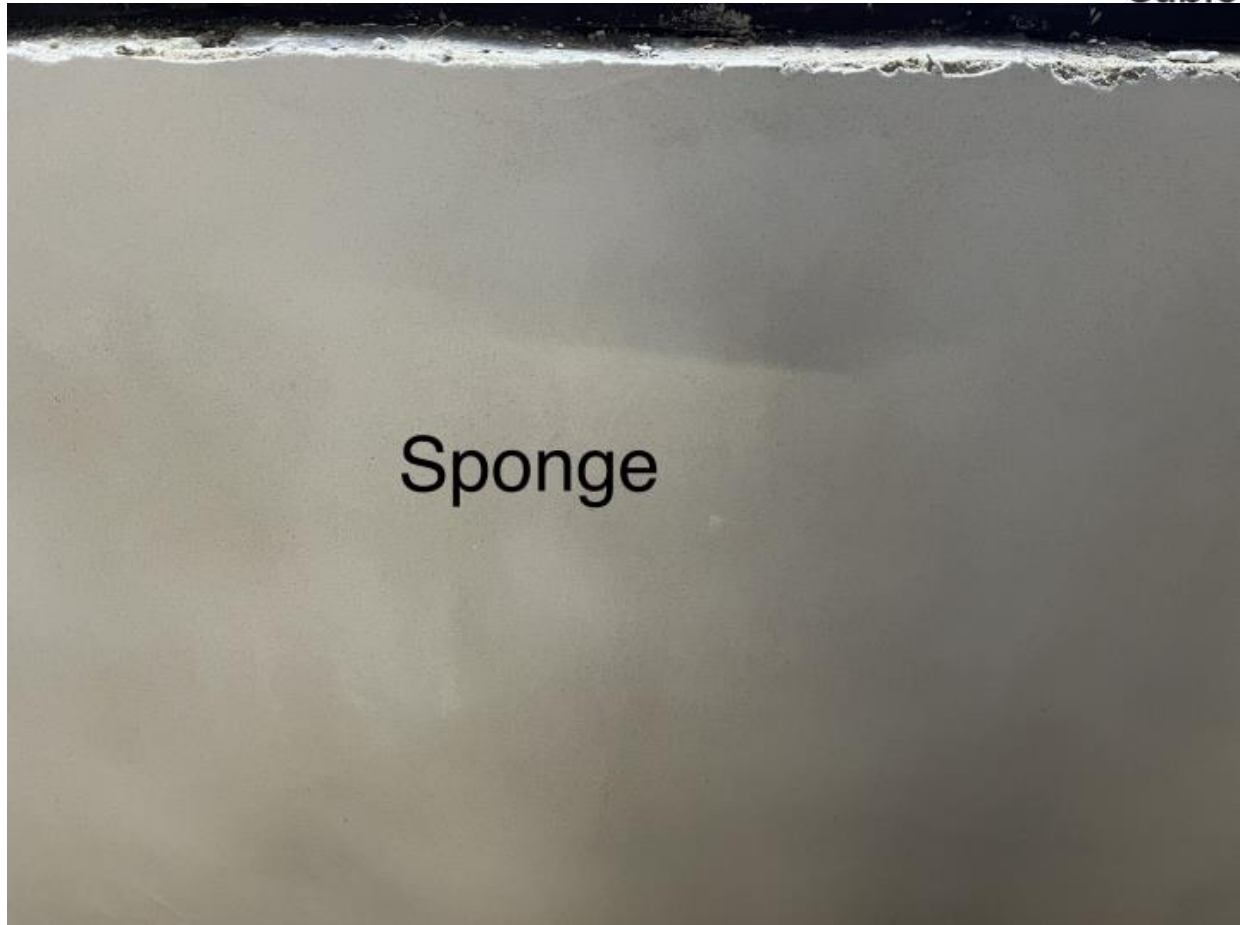


Figure 2: Sponge Lime Plaster Finish (Credit CubicWorks Ltd 2022)

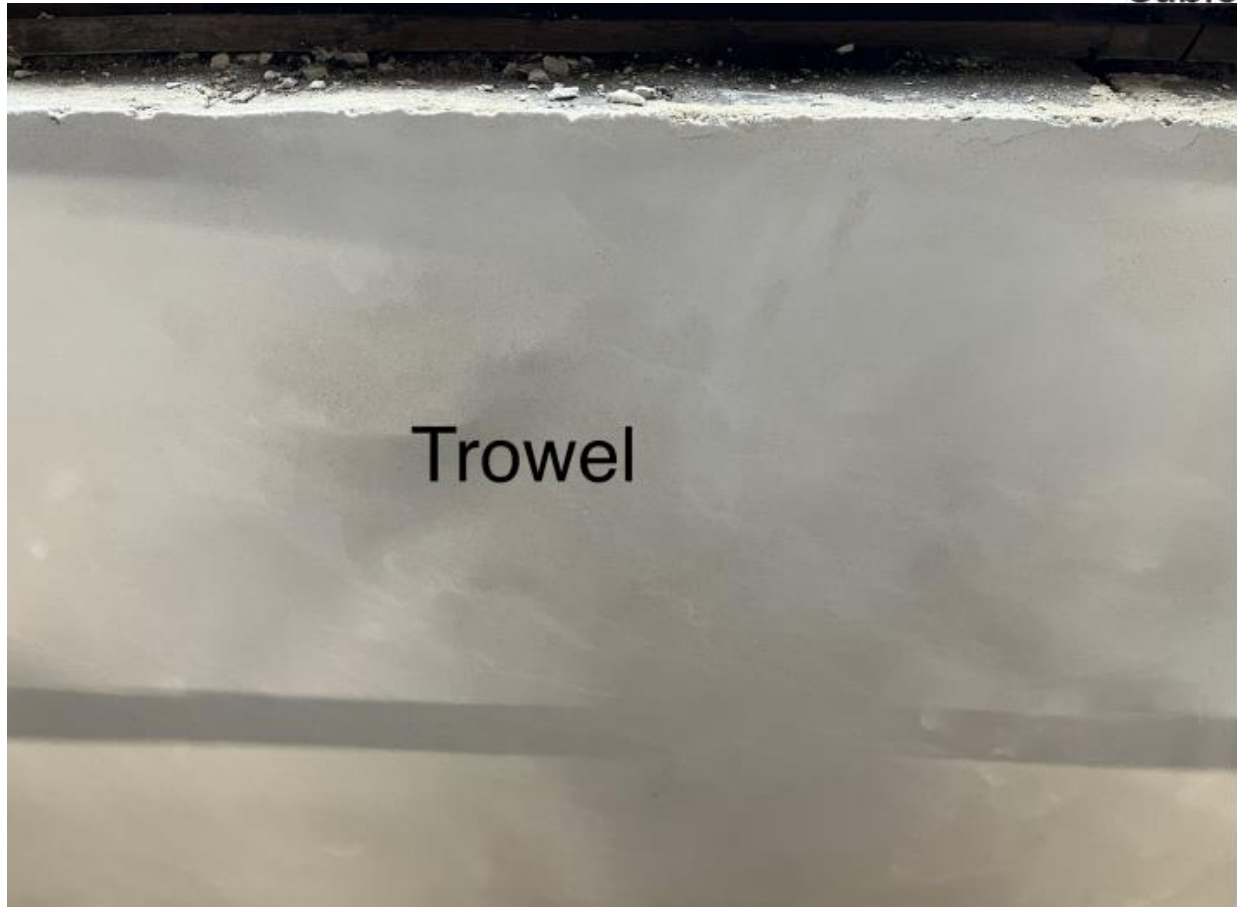


Figure 3: Trowel Lime Plaster Finish (Credit CubicWorks Ltd 2022)

1.2 Conservation Officer Comments

This section of the report contains the comments made by Manchester City Council's Design & Conservation Manager Paul Mason during an onsite meeting on the 20 April 2022.

Lime Plaster Finishes	
Paul Mason was satisfied the Lime plaster process undertaken by CubicWorks Specialist Subcontractor, he was happy both the sponge and trowel finish its all dependant on the Client/Architects decision. The architect has decided to progress with the trowelled finish as this best matches the smooth nature of the existing original plaster.	
Approved Status:	
Review date:	



2.0 Window Repairs Condition (listed Building Consent Condition 5)

2.1 Introduction to window repairs

This section of the report shows the repair work of the heritage windows located on the courtyard elevation (section 1.0), keeping in mind windows of historical interest should be made good with an accurate like for like repair carefully matched to the original item carried out by a heritage contractor.

Section 2.5 highlights the importance that all window repairs are carried out to the national building specification to ensure the integrity of the original features are kept.

The process for the repair works is as followed.

- Clean out and remove of existing debris
- Repair using 2-part filler
- Sand down and preparation
- Repeat process until smooth finish is achieved
- Decoration/paint can be applied.

2.2 Courtyard Elevation Window Repair

Figure 4 shows the location of Window w2-049 that has been repaired on the courtyard elevation.

Images of the repair work can be seen in section 2.3.



Figure 4: Courtyard Window Repair location (Credit Bridge Architects 2022)

2.4 Internal Window repairs (Listed Building Consent Condition 5)

Section 2.4 shows examples of internal window repairs carried out by the specialist heritage subcontractor.



Figure 5: W2-049 Decorative finish (Credit CubicWorks Ltd.2022)



Figure 6 - Window painted after repairs (Credit CubicWorks Ltd.2022)



Figure 7: W2-049 Window painted after repairs (Credit CubicWorks Ltd.2022)



2.5 Proposed new Windows (Listed Building Consent Condition 3e)

To ensure that all repairs are done to the correct standard the NBS specification as shown below indicates the importance of carrying out repairs to the National Building Specification, the approved specialist heritage contractor has ensured the correct procedures have been undertaken in the window repair and replacement (Section 6.0) process.

250 Replica hardwood windows to existing openings

1. **General:** Custom, heritage windows to match in style the surrounding assemblies to include casement and sliding sash types
2. **Standard:** Non-fire rated window to BS EN 14351-1 and BS 644
3. **Manufacturer:** Ventrolla or equal approved
4. **Operation and strength characteristics:** To BS 6375-2.
5. **Timber:** Generally to BS EN 942.
6. **Species:** Hardwood as Table NA.2
7. **Appearance class:** J10 for glazing beads, drip mouldings, etc. J40 or better for all other members.
8. **Moisture content on delivery:** 12-19%.
9. **Preservative treatment:** Organic solvent as section Z12 and WPA Commodity Specification C5; **Desired service life** 30 years
10. **Finish as delivered:** Prepared and primed as section M60
11. **Thermal performance (U-value maximum):** Not applicable
12. **Acoustic performance rating:** Not required
13. **Frame details:** Timber frame profiles and sections to replicate original windows. Sub contractor to allow for on site templating.
14. **Glazing details:** Depending on location; Glass shall be a specialist heritage style drawn glass and match the existing in thickness and appearance.
All new glazing to a height of 2400mm (or if otherwise accessible) must incorporate an internal pane of glass with a 1.5mm PVB interlayer (e.g. 7.5mm laminated glass), or a glass rated as P4A under EN 356. The remaining external pane in a double glazed unit may be toughened glass.
All upper floor glazing should be to EN 356 P1A.
15. **Beading:** To profiles to match original
16. **Ironmongery/ Accessories:** To match original
17. **Fixing:** To specialist sub-contractor recommendations
18. **Other requirements:** Specialist subcontractor drawings to be provided for Employer/ Local Planning Authority approval prior to manufacture.



130 Opening up

1. **Purpose:** To reveal previously concealed areas of structure or fabric not recorded during initial surveys.
2. **Extent:** Submit proposals
3. **Timing:** Give notice before starting opening up.
 - 3.1. **Period of notice:** At least two working days
4. **Retained building structure/ fabric:** Do not damage or destabilize.

150 Timber procurement

1. **Timber (including timber for wood-based products):** Obtained from well-managed forests and/ or plantations in accordance with:
 - 1.1. The laws governing forest management in the producer country or countries.
 - 1.2. International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
2. **Documentation:** Provide either:
 - 2.1. Documentary evidence (that has been or can be independently verified) regarding the provenance of all timber supplied.
 - 2.2. Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood-based products.
3. **Certification scheme:** UK Timber Procurement Policy Category A evidence certification scheme.
 - 3.1. **Other evidence:** None

160 Timber supplier

1. **Supplier:** Contractor's choice

Structural repairs/ alterations - Not Used

Products - Not Used

Execution

600 Workmanship

1. **Skill and experience of site operatives:** Appropriate for types of work on which they are employed.
 - 1.1. **Documentary evidence:** Submit on request.

610 Temporary supports/ propping

1. **General:** Provide adequate temporary support at each stage of repair work to prevent damage, overstressing or uncontrolled collapse of any part of the structure.
2. **Bearings for temporary supports/ propping:** Suitable to carry loads throughout repair operations.

620 Protection of timber and wood components before and during installation

1. **Storage:** Keep dry, under cover, clear of the ground and with good ventilation. Support sections/ components on regularly spaced, level bearers on a dry, firm base.
2. **Handling:** Do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing.

630 Material samples

1. **Representative samples of designated materials:** Submit before placing orders.
 - 1.1. **Designated materials:** To be agreed with the Local Authority Conservation Officer



650 Dimensions generally

1. **Site dimensions:** Take as necessary before starting fabrication.
 - 1.1. **Discrepancies with drawings:** Report without delay and obtain instructions before proceeding.

660 Cross section dimensions of structural softwood and hardwood

1. **Dimensions:** Dimensions in this specification and shown on drawings are target sizes as defined in BS EN 336.
2. **Tolerances:** The tolerance indicators (T1) and (T2) specify the maximum permitted deviations from target sizes as stated in BS EN 336, clause 4.3:
 - 2.1. Tolerance class 1 (T1) for sawn surfaces.
 - 2.2. Tolerance class 2 (T2) for further processed surfaces.

665 Cross section dimensions of non-structural softwood

1. **Dimensions:** Dimensions in this specification and shown on drawings are finished sizes.
2. **Maximum permitted deviations from finished sizes:** As stated in BS EN 1313-1, clause 6 for sawn sections.

670 Cross section dimensions of non-structural hardwood

1. **Dimensions:** Dimensions in this specification and shown on drawings are finished sizes.
2. **Maximum permitted deviations from finished sizes:** As stated in BS EN 1313-2:
 - 2.1. Clause 6 for sawn sections.
 - 2.2. Clause NA.3 for further processed sections.

690 Processing treated timber

1. **Cutting and machining:** Carry out as much as possible before treatment.
2. **Extensively processed timber:** Retreat timber sawn lengthways, thickened, planed, ploughed, etc.
3. **Surfaces exposed by minor cutting and/ or drilling:** Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

710 Reuse of timber sections/ wood components

1. **Sections/ components scheduled to be removed but not reused in existing locations:** Agree extent of retention for reuse elsewhere in the works.
 - 1.1. **Treatment following removal:** To specialist sub contractor recommendations
 - 1.2. **Storage:** Protect against damage, and store until required.
 - 1.2.1. **Storage location:** On site.
2. **Reuse:** Adapt sections/ components, as necessary, and install in agreed locations.

750 Cleaning dirty or stained wood

1. **Generally:** Scrub with neutral pH soap and clean, warm water.
2. **Old varnish:** Remove using mixture of turpentine (not turpentine substitute) and acetone in proportions determined by experiment, followed by washing down.

770 Repair of compression members – piecing in

1. **Defective wood:** Remove only decayed or defective wood. Finish cut-outs to clean, regular profiles.



2. Timber inserts: Cut accurately to fit. Glue and pin in place. Lie of grain to match as closely as possible that of parent timber.
3. Joint profile:

780 Repair of distorted timber members

1. Generally: Repair to shape that member has assumed.

790 Pegs for mortise and tenon joints in structural timber

1. Wood species: Oak.
2. Condition: Dry, preferably oven 'baked' before use.
3. Shape: Round and tapered.
4. Second hand pegs: Do not use.
5. Peg holes: Slightly offset such that when pegs are driven home, sections being joined are pulled together.

800 Condition of dowels to be bonded into timber

1. Condition at time of installation
 - 1.1. Dowels generally: Free from corrosive pitting, loose mill scale, loose rust and contaminants that may adversely affect dowels, adhesive, or bond between the two.
 - 1.2. Carbon steel dowels: As above, and free from corrosive pitting, loose mill scale and loose rust.

810 Bolted joints with connectors

1. Connector location: Where not otherwise shown, spacings, end and edge distances are to be not less than Standard values to BS EN 1995-1-1, section 8.9 for split ring and shear plate connectors, and BS EN 1995-1-1, section 8.10 for toothed plate connectors.
2. Centres of bolt holes: Not more than 2 mm from positions shown on drawings.
3. Assembly: Do not crush timber, deform washers or overstress bolts.

830 Critical dimensions for fasteners

1. Critical dimensions:

840 Fixing framing anchors and cleats

1. Before installation: Submit details if joint geometry prevents installation to manufacturer's recommendations.
2. Installation: Secure using not less than number of fasteners recommended by manufacturer.

860 Moisture content checking

1. Procedure: Check moisture content of timber sections with an approved electrical moisture meter.
2. Test results: Keep records of all tests. If moisture content falls outside specified range, obtain instructions.

870 Moisture content testing

1. Procedure: Test timber sections with an electrical moisture meter with deep probes. (A meter that has been carefully calibrated against oven drying tests or otherwise guaranteed by an independent testing authority).
2. Test sample: Test 5% but not less than 10 lengths of each cross-section in the centre of the length.
3. Test results: 90% of values obtained to be within the specified range. Provide records of all tests.



2.6 Conservation Officer Comments

This section of the report contains the comments made by Manchester City Council's Design & Conservation Manager Paul Mason during an onsite meeting on the 20 April 2022.

Internal Window Repairs	
The Conservation Officer confirmed he is satisfied with the window repair process undertaken by CubicWorks specialist subcontractor.	
Steps taken – Prepare/Clean area, sand down, fill with approved filler, sand and finish with coats of paint.	
Approved Status:	
Review Date:	

3.0 Doff clean (listed building Consent Condition 6)

3.1 This section of the report covers the sample doff clean that has been implemented in the courtyard area.

See below THE THERMATTECH® 'SUPERHEATED WATER' SYSTEM technical information sheet explaining the process that has been used to clean the brickwork in the courtyard area.

Technical Information Sheet

RESTORATIVE TECHNIQUES

THERMATTECH

THE THERMATTECH® 'SUPERHEATED WATER' SYSTEM

Explanation

Unlike a conventional hot water pressure washer, the ThermoTech system combines continuous **high temperature** and **pressure** and **lower water volume**. This is delivered as a **liquid spray**, even at temperatures close to 155°C. This is referred to as '**Superheated Water**'.

It achieves this by using less water, high heat capacity and specific nozzle design and specification.

Description

The 'standard' ThermoTech system comprises pump, 'heater module', high pressure hoses and 'gun'. The system is modular, the pump and fuel tank can be lifted away to aid vehicle loading and site mobility. Selection of lances and nozzles and the adjustment of temperature and pressure are made to suit the substrate and soiling or coating. A gauge on the pump and digital display on the Module, register the working pressure and temperature.

Cold water from a tap or water tank is pressurised by the pump and passes through a blue high pressure hose to the Heater Module. Heated by diesel or kerosene, hot water exits through flexible red high pressure hoses to the gun.

For vertical surfaces, a short lance can be used more accurately for surface detail or paint and coating removal.

For increased performance, it is possible to connect the pump to two Heater Modules and back to one gun. This provides full temperature at the full pressure rating.

All ThermoTech systems have been built with Digital Temperature Control. The critical feature of this is not that it provides a digital instantaneous display of the temperature, but that the temperature fluctuation is kept to a minimum. Conventional hot machines (including many other superheated/steam types) use capillary thermostats, which result in a wide temperature range at lower operating pressures and thus equally wide changes in the spray shape and intensity through the heating cycle (the thermostat regulates the temperature by switching the boiler in and out). The controls built into the ThermoTech maintain much tighter temperature control and therefore spray shape over the cycle. The standard 110v system and trigger arrangement has a water flow rate of 4-8.5 litres min⁻¹. Standard option pressure is adjustable from 30-140bar*.

However alternative, additional options allow for, ThermoTech systems being used on delicate substrates that can routinely be operated in conjunction with pressure reducing guns. This enables a maximum pressure to be set at the pump but then the same or a reduced pressure to be set on demand at the gun. Whilst the minimum pressure at the pump is normally 30bar, setting at the gun can be as little as 0bar. At low pressures (≤50bar), a ThermoTech can also be set up and used to supply 2 operators simultaneously at full temperature, whilst allowing each operator to select a different pressure if required.

Specification

The **standard electric pump** is 110v and has a water flow rate of 4-8.5 litres min⁻¹. Pressure is adjustable from 30-140bar*. The optional 230v pump has a maximum pressure of 180bar*.

The **standard heater module** is 110v but is made 'dual voltage' by use of the optional 'drop in' transformer. The fuel is red or white diesel, or central heating oil (kerosene). Kerosene should be used with a combustion additive to prevent 'sooting up'. With adjustment, cooking oil is also permitted.

Temperature is adjustable from 30-155°C. With one Heater Module, 155°C can be maintained at pressures up to 90bar*, 120°C up to 120bar* and 100°C up to 155bar*.

High pressure hoses are twin wired and supplied red, in 10m or 20m length. For lengths longer than 30m, it is recommended that the additional hosing be located between pump and Heater Module to minimize temperature loss.

*One 'bar' is a unit of pressure equivalent to 14.5 pounds per square inch (P.S.I.).





Cleaning

The intensity of cleaning for delicate substrates is reduced by (a) Reducing the pump pressure setting (b) Changing the nozzle specification e.g. a nozzle of wider spray angle exerts a lower surface pressure at a given distance (c) Increasing the temperature so that the spray becomes diffuse (d) Increasing the working distance of nozzle to surface.

For delicate surfaces, full temperature but reduced pressure is used (see the explanation under 'paint/coating removal' below). The minimum practical pump pressure is 30bar*.

The temperature at which the spray becomes diffuse varies one nozzle design to another and so one with a lower diffusion temperature but operated at a higher temperature, will provide a 'softer' (diffuse) clean (see nozzle selection).

For tenacious soiling, it will be found advantageous to develop 'the clean' in stages, leaving an interval between. This 'dwell' period often acts to soften or release deposits more readily e.g. for removal of light sulphation, or deep organic soiling from wall copings.

Prolonged or close contact is unable to raise the temperature higher than the setting which, at a maximum of 155°C, is regarded as well below that which will induce chemical or physical change in most mineral substrates. However, direct contact with glass must be avoided. The use of hot water greatly accelerates drying. Precautions must prevent wet substrates being subjected to frost.

Paint/Coating Removal

The closer a nozzle operates to the surface, the higher the temperature but also the higher the surface pressure (because the water exits the aperture in a 'fan' shape). In general, it is high pressure (and/or volume) that will potentially damage a substrate and not the temperature. Therefore, if a given temperature/pressure setting proves to be too aggressive, one should lower the pump pressure and use the nozzle closer to the surface. The pressure effect that would be induced by moving the nozzle closer is counteracted by reducing the pump pressure. The reduced distance will, however, raise the temperature at which the water strikes the surface thus aiding the yield of the coating.

If the coating proves too resistant, or the substrate is too weak, a chemical to soften the coating should be employed. This will allow the nozzle to be operated at a greater distance (lower surface pressure) and to reduce the action time.

Nozzle Selection

Choice of nozzle is important. For the ThermoTech system, we presently have a number of nozzle types. *The standard nozzle (Lechler type) loses sharpness at temperatures greater than 140°C. This produces an even spray with good cleaning and paint removal characteristics. The spray angle used for cleaning is normally 40° but a nozzle of 25° can be used where the substrate allows.*

An alternative nozzle ('Spraying Systems' type) causes the spray to become diffused once the water temperature significantly exceeds 100°C. This is used selectively to generate a very soft and hot vapour for the most delicate cleaning. This is not normally necessary for sound surfaces and is generally inappropriate for paint removal.

Health and Safety and Documentation

The ThermoTech system has been designed and built in the U.K specifically for use with restoration and conservation projects and for all kinds of site work generally.

The design utilises 110v as standard. The Heater Module is fitted with twin safety relief valves, twin temperature controllers, direct temperature readout and the controls are 24v. It uses a jerry-can tank to reduce site fuel handling. Fuel tank 'bundling' and 'drip tray' options are available. The switches of both the pump and the Heater Module have current overload **and** low voltage cut-out protection.

Hot high pressure hoses have been manufactured in red, specifically for the ThermoTech, to denote high temperature. External plugs and connectors are of IP67 'watertight' construction.

In addition to this **'Technical Information Sheet'**, Restorative has produced a family of documents to support project specification and management. These are for general guidance and include the **'ThermoTech Risk Assessment'** and **'ThermoTech Safe Working Procedure'**. These have been written in conjunction with our independent health and safety advisors, the NFU, and are reviewed by them and re-issued on an annual basis. These are available for architects, specifiers and contractors for the use of equipment and products supplied by Restorative Techniques Ltd.

Where applicable, **'Health and Safety Data Sheets'** are issued for products used in conjunction with this equipment such as that for 'ThermoTech Descaler Concentrate'.

Restorative can be engaged to produce on-site trials and reports and to aid decision making in specification and implementation.

04/07/2012.

Neither Restorative Techniques Limited, nor the author, can accept liability for the relevance of this information and how it is used. Users and specifiers shall determine for themselves if the technique is applicable, and the parameters for use.



CubicWorks



Dear CubicWorks

Ref: 40 – 46 Princess St.

Subject: ThermoTech Cleaning Sample,

GADBROOK HOUSE
GADBROOK PARK
RUDHEATH
NORTHWICH
CHESHIRE CW9 7RG

T: 01606 330888
F: 01606 330777

E: info@quadrigaltd.com
W: www.quadrigaltd.com

Further to your request, we have carried out a sample cleaning of the external glazed bricks to the 'Courtyard Elevation'.

(See before and after photos issued via email dated 28/02/22)

The sample was carried out using the 'ThermoTech' cleaning system (see attached data sheet) using the settings/processes as stated below:

- 115psi
- 140* c temperature
- 150mm lance clearance from wall face approx.
- 3no passes carried out

We trust the above and attached are helpful and await your further comment/instruction in order to progress this element of the works.

Yours sincerely

Simon Thulborn

Contracts Manager



3.2 Before and After



Figure 8: Before Doff Clean (Credit CubicWorks Ltd. 2022)



Figure 9: After Doff Clean Courtyard (Credit CubicWorks Ltd.2022)

3.3 Conservation Officer Comments

This section of the report contains the comments made by Manchester City Council's Design & Conservation Manager Paul Mason during an onsite meeting on the 20 April 2022.

Doff Clean	
Paul Mason is satisfied regarding the process and works undertaken by CubicWorks specialist subcontractor. Steps taken – ThermaTech Cleaning System: • 115psi • 140* c temperature • 150mm lance clearance from wall face approx. • 3no passes carried out	
Approved Status:	
Review Date:	



4.0 Brick Repairs (listed Building Consent Condition 6)

4.1 Introduction to Brick Repairs

This section of the report focuses on the individual brick repairs to be carried (Figure 4) out by a heritage contractor on the courtyard elevation. This method of repair encourages the reclamation process rather than replacing.

Section 4.3 highlights the importance that all brick repairs are carried out to the national building specification to ensure the integrity of the original features are kept.

4.2 Brick Repairs Photographs



Figure 11: Parapet Wall rebuild (Credit CubicWorks Ltd.2022)

Proposed brick to be used for parapet wall rebuild by a heritage contactor, process explained in section 4.1.



Figure 10: Off White Credit CubicWorks Ltd.2022)



Figure 12: Parapet wall face to be built located on the Mansard Roof
(Credit CubicWorks Ltd.2022)



4.3 NBS Specification of Brick Repairs

To ensure that all repairs are done to the correct standard the NBS specification as shown below indicates the importance of carrying out repairs to the National Building Specification, the approved specialist heritage contractor has ensured the correct procedures have been undertaken in the brick repair process .

365 Replacement of bricks

1. **Description:** To be in accordance with External Facade Survey 40-46 Princess Street, and associated scoping drawings, schedule and photographic survey by Quadriga Contracts Limited, April 2020
2. **Bricks:** Clay/ Glazed as clause 260
3. **Mortar:** As section Z21.
 - 3.1. **Standard:** BS EN 998-2
 - 3.2. **Mix:** To be agreed through sampling
 - 3.3. **Sand source/ type:** To be agreed through sampling
4. **Fixings:** To specialist sub-contractor recommendations
5. **Joints:** To match existing
6. **Other requirements:** None

385 Laying replacement masonry units

1. **Exposed faces of new material:** Keep to agreed face lines.
2. **Faces, angles and features:** Align accurately. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.
3. **Joint surfaces:** Dampen to control suction as necessary.
4. **Laying units:** On a full bed of mortar, all joints filled.
5. **Exposed faces:** Keep clear of mortar and grout.

390 Grouting joints

1. **Grout mix:** To be agreed through sampling
2. **Joints that cannot be fully filled with bedding mortar:** Grout thoroughly around replacement masonry units.
3. **Grouting:** Keep grout back from exposed face to allow for the depth of pointing, using an approved temporary sealing material. Prevent grout staining exposed face.

395 Installing stone inserts

1. **Pockets to receive inserts**
 - 1.1. **Cut out accurately.** Undercut sides of pocket where necessary to provide space for bonding material.
 - 1.2. **Adjust depth** so that insert stands proud of existing stone for finishing in situ.
 - 1.3. **Clean out thoroughly.**
2. **Inserts:** Cut to the smallest rectangular shape necessary to replace the defective area and provide a firm seating. Install accurately and securely.
 - 2.1. **Exposed faces:** Keep clear of bonding material.
3. **Existing joint widths:** Maintain. Do not bridge joints.

405 Bonded dowels

1. **Description:** For stone repairs and replacement
2. **Standard:** To BS EN 1090-1
3. **Dowels:** To specialist sub-contractor design
4. **Adhesive:** To specialist sub-contractor design
5. **Holes for dowels:** Suitably sized and accurately aligned in masonry background and in rear of replacement/ insert stone; clean and dry.
6. **Other requirements:** Do not use adhesive to bond stones at joints unless instructed.



Tooling/ dressing stone in situ

450 Weathering ledges at joints

1. **Locations:** Where stones project or are recessed.
2. **Requirement:** Carefully weather the ledge, to approval.
3. **Method:** Suitably graded carborundum blocks or tooling as appropriate.

455 Descaling stone

1. **Requirement:** Carefully remove loose scaling and powdering from stones to the extent agreed.
2. **Method:** Suitable bristle brushes or carborundum blocks. Do not use wire brushes.

458 Redressing stone

1. **Requirement:** Carefully dress back stones to the extent agreed.
2. **Method:** Suitably graded carborundum blocks or tooling as appropriate.

Mortar repairs

510 Preparation for mortar repairs

1. **Repair area:** Scribe area of masonry to be removed using straight horizontal and vertical lines parallel to joints. Where repair area abuts joints, maintain existing joint widths and do not bridge joints.
2. **Decayed masonry:** Cut back carefully to a minimum depth of 20 mm to a sound background. Where the depth of removal exceeds 50 mm, seek instructions.
3. **Precautions:** Do not weaken masonry by removing excessive material. Do not damage adjacent masonry.
4. **Top and vertical reveals of repair area:** Undercut.

515 Reinforcement for mortar repairs

1. **Material:** Austenitic stainless steel, phosphor bronze or copper alloy wire, 2 mm diameter.
2. **Armatures:** Form to suit profiles of mortar repair and provide effective reinforcement.
3. **Cover to reinforcement:** Not less than 18 mm.
4. **Installation:** Drill holes into background to receive reinforcement, and bond firmly with a suitable epoxy resin.

520 Mortar repairs

1. **Description:** To be in accordance with External Facade Survey 40-46 Princess Street, and associated scoping drawings, schedule and photographic survey by Quadriga Contracts Limited, April 2020
2. **Undercoats:** As section Z21.
 - 2.1. **Standard:** BS EN 998-2
 - 2.2. **Mix:** To be agreed through sampling
 - 2.3. **Sand source/ type:** To be agreed through sampling
 - 2.4. **Building up:** In layers where necessary, each layer not exceeding 12 mm.
3. **Finishing coat:** To match approved samples.
 - 3.1. **Standard:** BS EN 998-2
 - 3.2. **Mix:** To be agreed through sampling
 - 3.3. **Sand source/ type:** To be agreed through sampling
 - 3.4. **Finished thickness:** To be agreed through sampling



- 3.5. Finish: To match existing
- 4. Reinforcement: To specialist sub-contractor design

530 Proprietary mortar repairs

- 1. Description: To be in accordance with External Facade Survey 40-46 Princess Street, and associated scoping drawings, schedule and photographic survey by Quadriga Contracts Limited, April 2020
- 2. Mortar
 - 2.1. Standard: BS EN 998-2
 - 2.2. Manufacturer: To be agreed through sampling
 - 2.2.1. Product reference: To be agreed through sampling
 - 2.3. Undercoats: Use when total thickness of mortar repair exceeds limit for finishing coat thickness recommended by mortar manufacturer. Build up in layers as necessary, each layer not to exceed thickness recommended by manufacturer.
 - 2.4. Finishing coat: To match approved samples.
 - 2.4.1. Finished thickness: To match existing
 - 2.5. Finish: To match existing
- 3. Reinforcement: To specialist sub-contractor design

540 Applying mortar

- 1. Surfaces to receive mortar: Clean, and free from dust and debris. Dampen to control suction.
- 2. Applying coats: Build up in layers to specified thickness. Apply mortar firmly, ensuring good adhesion with no voids. Form a mechanical key to undercoats by combing or scratching to produce evenly spaced lines.
- 3. Allow each layer to achieve an initial set before applying subsequent coats. Prevent each layer from drying out rapidly by covering immediately with plastics sheeting and/ or dampening intermittently with clean water.
- 4. Finishing mortar coat: Form accurately to required planes/ profiles, and finish flush with adjacent masonry.
- 5. Protection: Protect completed repairs from adverse weather until mortar has set.

550 Scraped finish to mortar repairs

- 1. Procedure: Finish final coat of repair mortar proud of existing masonry face. When mortar is set, but not too hard, scrape back to required face line using fine saw blade or other suitable means, to achieve required finish.

555 Float finish to mortar repairs

- 1. Procedure: Use a wood float and/ or a felt faced float to give an even overall texture. Do not use steel floats.

Crack repairs/ ties/ reinforcement

610 Mortar repair of cracks

- 1. Description: To be in accordance with External Facade Survey 40-46 Princess Street, and associated scoping drawings, schedule and photographic survey by Quadriga Contracts Limited, April 2020
- 2. Mortar: As section Z21.
 - 2.1. Standard: BS EN 998-2
 - 2.2. Mix: To be agreed through sampling



4.4 Conservation Officer Comments

This section of the report contains the comments made by Manchester City Council's Design & Conservation Manager Paul Mason during an onsite meeting on the 20 April 2022.

Brick Repairs	
Paul Mason is content with the repair/reclamation process undertaken by CubicWorks Specialist Subcontractor for the external brick repairs.	
Approved Status:	
Review Date:	

5.0 Existing Slate (Listed Building Consent Condition 6)

Proposed slate for the Mansard Roof (existing), these slates have been carefully removed ready to be reused.



Figure 13 – Sample slates (Credit CubicWorks Ltd.2022)



Figure 14: Slate removed from the original Mansard roof to be reused
(Credit CubicWorks Ltd. 2022)



5.1 Conservation Officer Comments

This section of the report contains the comments made by Manchester City Council's Design & Conservation Manager Paul Mason during an onsite meeting on the 20 April 2022.

Existing Slate	
Paul Mason has seen the reclamation process undertaken by CubicWorks Specialist Subcontractor for the reuse of the existing slates and is satisfied with the process so far.	
Approved Status	
Review Date	



6.0 Roof windows (Listed building Consent Condition 3e)

Section 7.1 of the report contains the Fakro roof technical data sheets located in the mansard, relevant to conservation aspect. Figure 15 shows an example Fakro roof light on a listed building in Glasgow, Scotland . CubicWorks intends to install the Fakro roof lights with a replica timber look in-keeping with the historical character of the building .

Princess St: Conservation
Samples Report
Issue: 006
10-06-2022
6.1 FAKRO Technical data sheet

TECHNICAL SPECIFICATION



PTP-V, PTP-V/PI, PTP-V/GO, ALUMINIUM-CLAD PLASTIC ROOF WINDOW – PIVOT

I. APPLICATION

	Pivot window
	Installed in roofs with pitches 15-90°

II. FEATURES

	Multi-chamber in white colour (RAL 9010)
	TopSafe system
	V35 air inlet
	Quadruple sealing system
	Installation at two depths: N,V
	Warm TGI spacer
	White Handle Elegant

IV. OPTIONS

	External cladding elements painted in any RAL colour or manufactured to match even the most unusual roofing colours (CU, TC)
	Window with a mullion bar
	Non-standard glazing unit
	Available in veneer: golden oak and pine

V. DECLARATION OF PERFORMANCE

Harmonized standard	EN 14351-1:2006+A1:2010
Number of Declaration of Performance	XXX/CPR/14351/xx (Individual numbers of Declaration of Performance are to be found in the table with technical parameters)

III. ADDITIONAL PRODUCTS USED WITH WINDOWS

	Flashings standard special combination
	Control manual electric
	Mounting accessories insulation sets linings auxiliary rafters bands frame extensions
	External accessories awning blinds roller shutters
	Internal accessories blackout blinds roller blinds standard roller shutters awning blinds pleated blinds
	Other accessories insect screen

VI. TECHNICAL PARAMETERS

Technical parameters	Glazing unit type								standards	
	U3	P2	U5	U5 + EHV AT	Thermo	P5	R1	G2	G61	normy
- Window heat transmittance coefficient Uw [W/m²K]	1,3	1,3	***0,95/1,1	***0,68	1,1	1,3	1,3	1,3	1,3	EN 12967-2, EN 10077
- Glazing heat transmittance coefficient Ug [W/m²K]	1,0	1,0	0,5	0,5	0,5	1,0	1,0	1,0	1,0	EN 673
- Acoustic performance Rw [dB]	32 (-1;-4)	33 (-1;-4)	34 (-2;-6)	34 (-2;-6)	36 (-1;-3)	39 (-2;-5)**	33 (-1;-4)	39 (-2;-5)**	39 (-2;-5)**	EN ISO 717-1
- max. capacity of air inlet [m³/h] - 10Pa	up to 41									EN 13141
- air permeability class	3									EN 1028, EN 12207
- light permeability vt	0,76	0,76	0,73	0,73	0,63	0,75	0,40	0,40	0,40	EN 410
- solar factor (g)	0,53	0,52	0,53	0,53	0,48	0,51	0,23	0,23	0,23	EN 410
- permeability UV	0,26	0,01	0,01	0,01	0,01	0,02	0,01	0,01	0,01	EN ISO 10077-1
- frame thermal insulation Uf [W/m²K]	1,500*	npd	1,80	1,4	npd	npd	npd	npd	npd	EN ISO 10077-2
- thermal insulation of window frame connection with glazing v [g/s] [W/mK]	0,053*	npd	0,047	0,048	npd	npd	npd	npd	npd	EN ISO 10077-2
Number of Declaration of Performance	P01/CPR/14351/xx	P70/CPR/14351/xx	P40/CPR/14351/xx	P42/CPR/14351/xx	P41/CPR/14351/xx	P60/CPR/14351/xx	P12/CPR/14351/xx	P18/CPR/14351/xx		EN 14351-1:2006+A1:2010

* Result of FAKRO internal tests

** Parameter for the window without air inlet PTP R1, G61 (For the window PTP-V R1, G61 Rw= 37;-1;-4)

*** Parameter for the window PTP-V U5 (For the window without air inlet PTP U5, Uw=1,1 [W/m²K])



Figure 15: Fakro Conservation Roof Window example used in the multi-award winning Advocate's Close project in Edinburgh (Credit Fakro 2022)

6.2 Conservation Officer Comments

This section of the report contains the comments made by Manchester City Council's Design & Conservation Manager Paul Mason during an onsite meeting on the 20 April 2022.

Roof Windows	
Jonathan Towers from Bridge Architects has presented the data sheet for the Fakro Conservation roof windows, explaining to Paul Mason the specifications and ascetics etc.	
Confirmation that this product is acceptable is requested from MCC.	
Approved Status:	
Review Date:	

7.0 Decoration to Masonry Walls Condition (Listed Building Consent Condition 3)

7.1 Introduction

The paint to be used on the masonry walls is a Graphenstone branded breathable specified sustainable paint. This will be applied to lime plaster and exposed masonry within the office suites. Sample areas will be available to view on Level 5 (See Section 7.4 below).

With regards to the reception area, 4 no. light grey Graphenstone samples are currently being considered by the design team (See Section 7.2 below) and will be confirmed in due course.

7.2 Graphenstone Sample Card



Figure 16: Graphenstone - Sample Card (Credit Graphenstone 2022)



Figure 17: Graphenstone - Sample Card (Credit Graphenstone 2022)

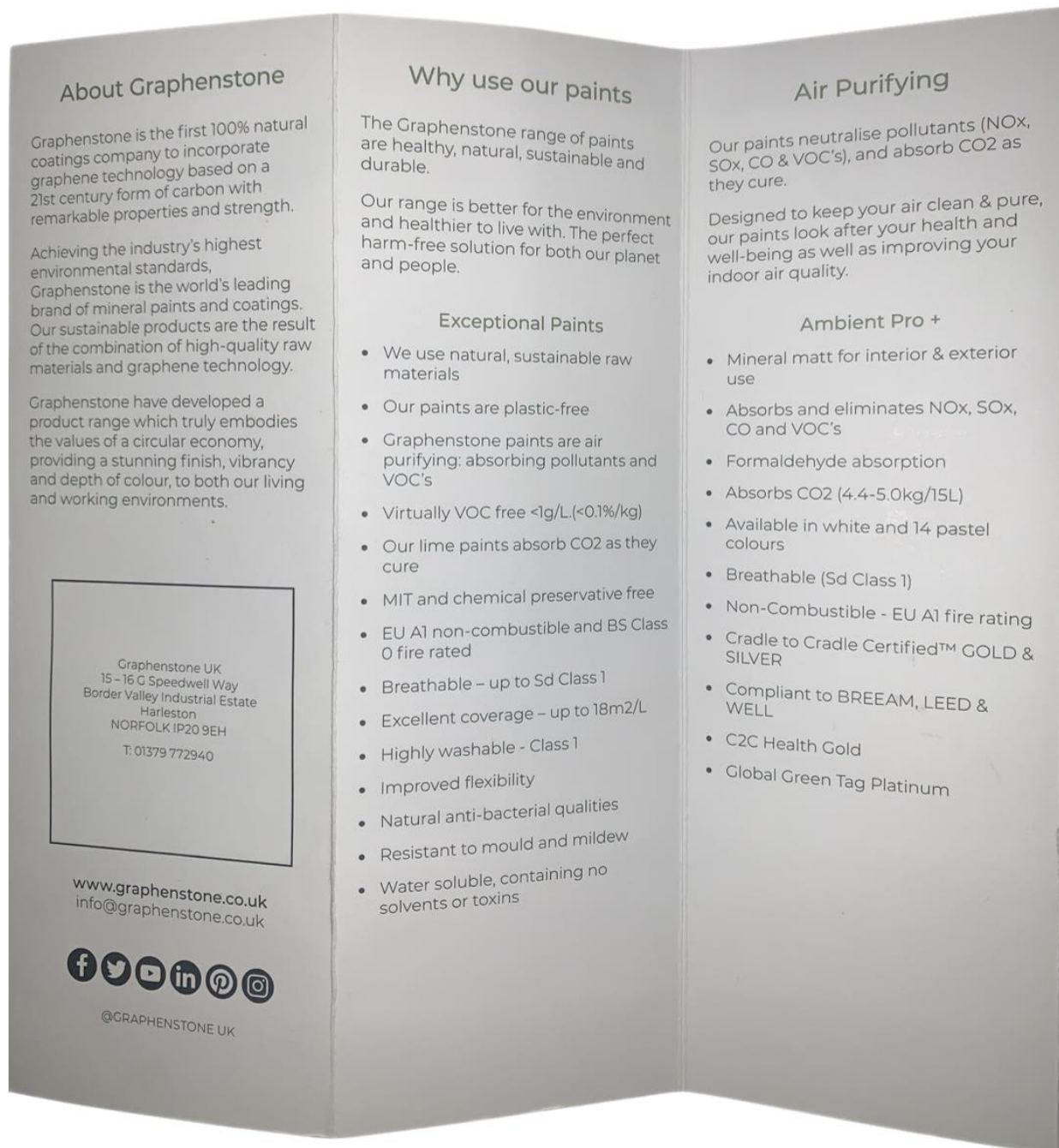


Figure 18: Graphenstone - Sample Card (Credit Graphenstone 2022)

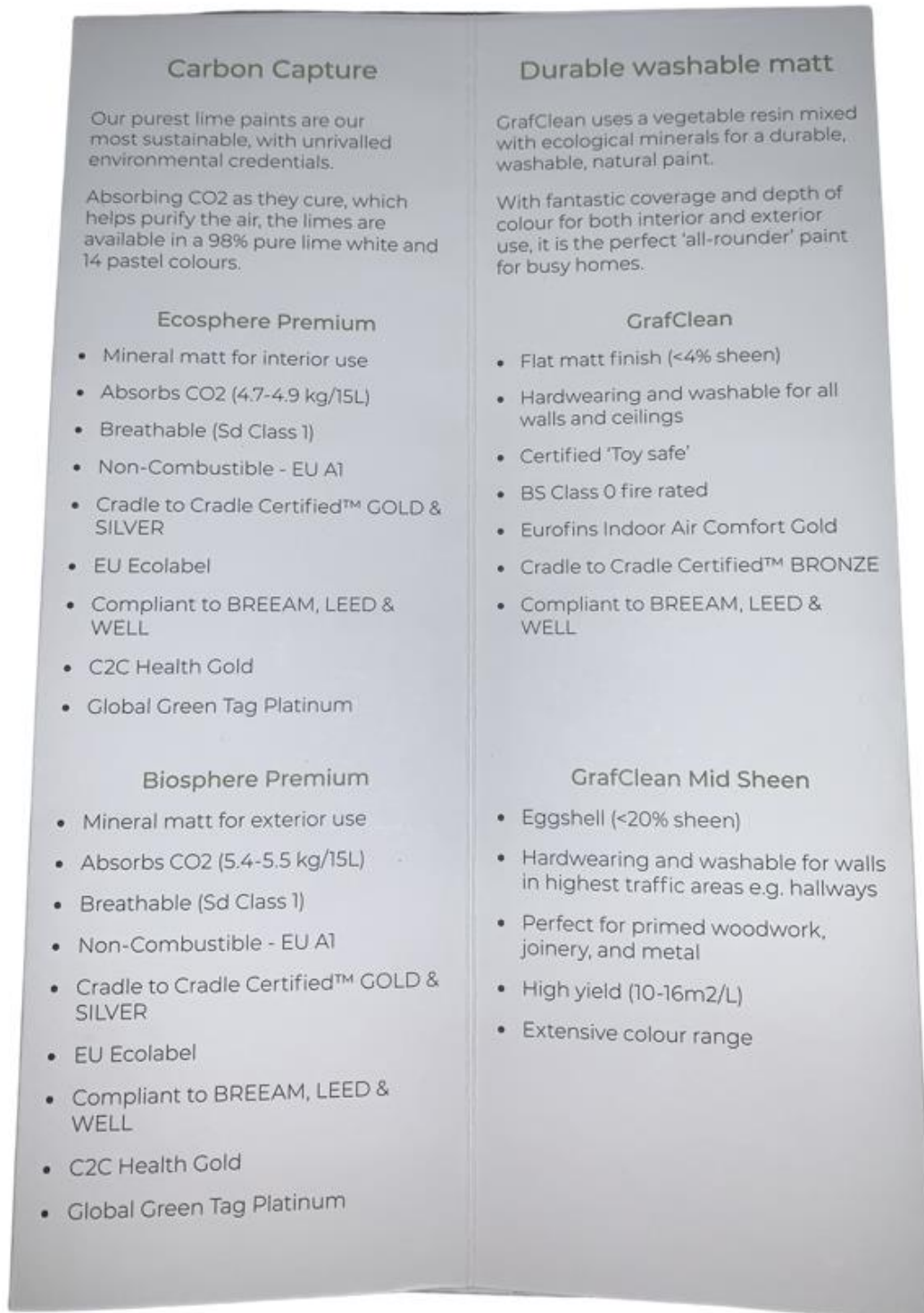


Figure 19: Graphenstone - Sample Card (Credit Graphenstone 2022)

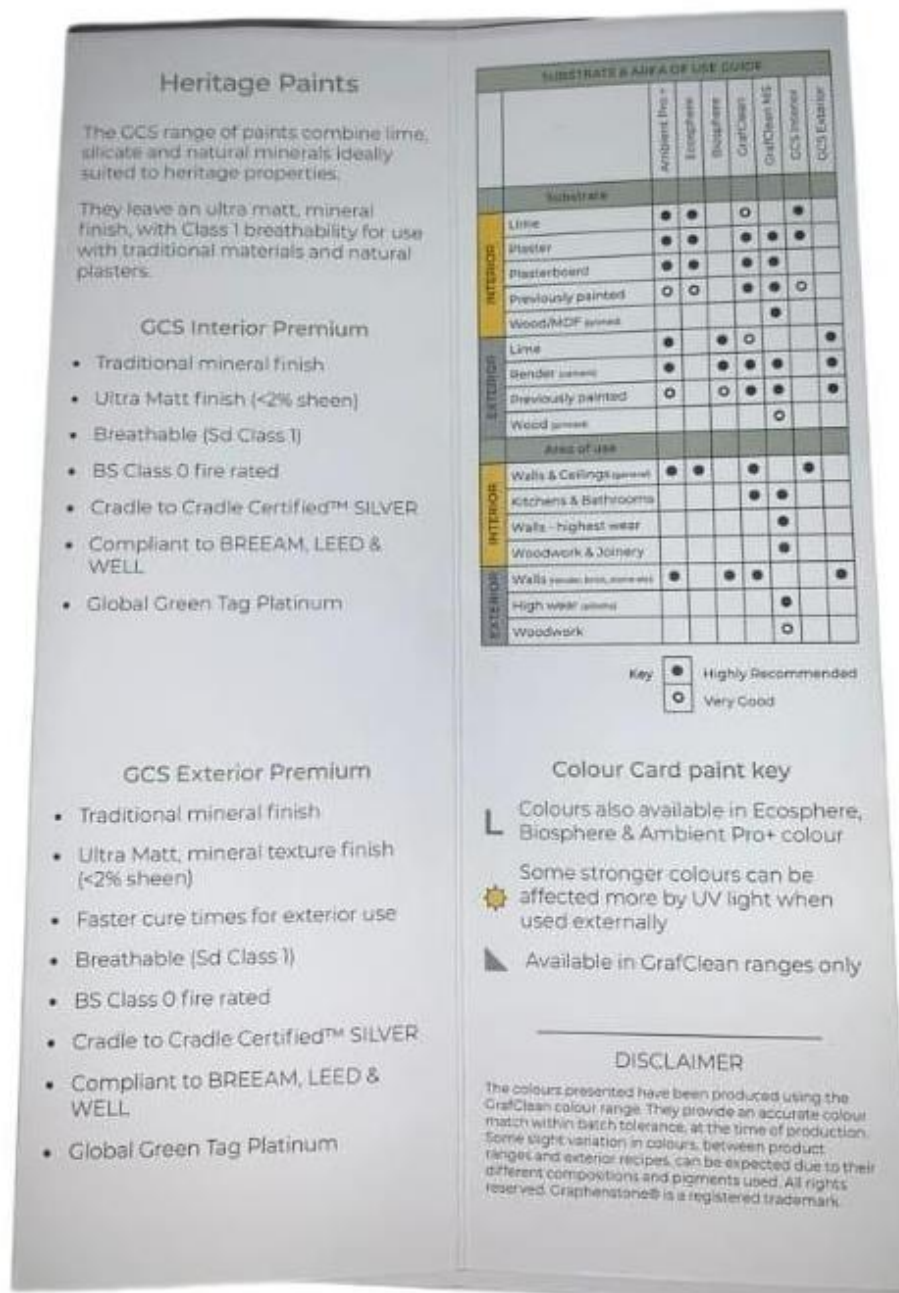


Figure 20: Graphenstone - Sample Card (Credit Graphenstone 2022)

7.3 MDF Sample



Figure 21: Graphenstone - Sample Card (Credit CubicWorks Ltd. 2022)



7.4 Paint to Masonry



Figure 22 : Paint to Lime plaster wall – Level 5 - GRAPHENSTONE GLACIER GRAFCLEAN INT (Credit CubicWorks Ltd.2022)



7.6 Specification of GRAFCLEAN INT paint use



Product may thicken without losing its efficacy. Shake well before use.

APPLICATION METHOD

Substrate Types:

Plaster, gypsum, mortars, old paint, prefabricated panels and un laminated wallpaper, brick or perlite.

Substrate Condition:

The substrate must be dry, firm, well adhered, even and free of any impurities that could hinder the perfect bonding of the product.

Substrate Preparation:

Any organic growth and/or other impurities should be removed by thorough cleaning using specific products for this purpose.

Depending on the nature of the surface, the actions prior to application of the paint vary as follows:

- Old glossy or satin paints and putties: clean the surface and sand softly.
- Absorbent substrates (e.g. concrete block or brick): apply *AmbientPrimer Premium*.
- Very absorbent substrates (clay, adobe or rammed earth): apply *Minerseal Premium*.
- If the substrate is wood, metal (without corrosion or oxidation) or non-porous (e.g. glazed tiles, phenolic panel, epoxy or polyurethane paints): apply *Four2Four Premium*.

If the substrate presents any complications, check the Graphenstone Application Manual or contact our Technical Department.

Product preparation:

Shake and dilute with water using 10-15% per litre of product (Approx. 150-200ml water p/L or 19-26 fl. oz. of water p/Gal of paint). Ensure good mixing. Avoid excessive shaking to minimise bubble occlusion.

Application Method:

Apply 2 or 3 coats evenly. Paint in sections, starting with borders. Without overloading the roller, dip it lightly into the paint to spread evenly. Do not paint over areas that are drying and avoid splices. Please note that an excess of product per coat can generate micro-fissures.

Drying:

At 25 °C (77°C) and 60% relative humidity: 2-4 hours between coats and 24-hour drying time per coat.

Total curing occurs after 30 days, presenting good hardness and resistance. It is advisable not to clean and/or scrub during this period.

Ambient conditions:

The working temperature (ambient and substrate) must be between +5 °C and +40 °C (41 °F and 104 °F). Do not apply under direct sunlight or on surfaces heated by the sun.

Tools:

Roller, brush, airless or other type of projection.

Tool cleaning:

Clean tools after use with warm water.

Notes:

Mineral substrates must be at least 28 days old.

Graphenstone Headquarters / Pol. Ind Polviso/C/ Carpinteros, 25. 41520. El Viso del Alcor, Seville, Spain / info@graphenstone.com / P: (+34) 955 529 435 / www.graphenstone.com



GRAPHENSTONE

THE ORIGINAL AND AUTHENTIC

PAINTS FOR THE GENERATION #PaintDifferent

GrafClean Premium

Version: mar-21

GrafClean Premium is ecoGreen paint with a matte finish suitable for both interior and exterior walls. It is free of all toxic substances and also highly breathable. The product contains lime which acts as a natural preservative thus eliminating the use of harmful chemicals and/or carcinogenic materials. Manufactured with Graphenstone technology, providing resistance and durability.

PRODUCT DESCRIPTION

Features:

- Exceptional washability.
- Available in dark colours.
- High covering power.
- Matte finish.
- Contains Graphenstone technology.
- Breathable.
- Outstanding adherence, resistance and durability.
- Excellent flexibility. No Cracking.
- Suitable for interiors and exteriors.
- Free of VOC emissions.





Technical properties:

Specific weight	
· White	1.52 ± 0.05 g/cm ³
· Pastel	1.65 ± 0.05 g/cm ³
· Medium	1.63 ± 0.05 g/cm ³
· Transparent	1.46 ± 0.05 g/cm ³
pH	9.5 ± 1
Viscosity	[80 - 120] U.K.
Volume Solids	65 ± 5 %
Washability (UNE EN ISO 11998)	Class 1
Environment	Emulsion free of VOCs and APEO
Appearance	Dense liquid
Finish	Matte
VOC content	< 1 g/l

CE marking:

EN1504-2 Surface protection system for concrete - Moisture control:

CE

Adhesion strength	≥ 0.8 N/mm ²
Permeability	Class 1
Water absorption from capillarity	w < 0.1 kg/m ² · h ^{0.5}
Fire resistance	B-s1, d0

Finish:

White matte and colours (Color chart GCS 980 for interiors and pastel tones from GCS 322 for exteriors).

Yield/Coverage:

- White
5-7 m²/L or 200-285 Sq.Feet p/Gal (2 coats)
- Pastel
6-8 m²/L or 245-325 Sq.Feet p/Gal (2 coats)
- Medium
6-8 m²/L or 245-325 Sq.Feet p/Gal (2 coats)
- Transparent
6-8 m²/L or 245-325 Sq.Feet p/Gal (2 coats)

However, exact yield depends on type and condition of substrate, as well as tools used. Exact consumption should be determined by making onsite sample.

Pack Size:

0.75L, 1L, 1Gal, 4L, 12.5L, 15L and 5Gal.

Storage:

Store in original container. Keep tightly sealed in cool, dry place. Do not store in extremes of temperature, avoid direct exposure to sunlight and protect from frost. Unopened, storage stability is 36 months from date of manufacture.

Graphenstone Headquarters / Pol. Ind Polivivo C/ Carpinteros, 25. 41520. El Viso del Alcor, Seville, Spain / info@graphenstone.com / P: (+34) 955 529 435 / www.graphenstone.com





The surfaces to be painted must be resistant to high alkalinity.

Do not apply to surfaces in permanent contact with water.

In case of rain, let the surface dry completely before application.

It is recommended to protect the treated surface from the rain for 4 days.

For decorative glazing and/or the application of self-adhesive templates or other types of masking, please allow 36 hours to elapse.

Parts that are not going to be treated should be protected (glassware or carpentry).

Should there be any strict aesthetic requirements, it is recommended to carry out preliminary tests.

Do not mix with other brands to maintain product efficacy.

Complementary products:

It is recommended to use the Graphenstone® product range for complementary actions according to the application, repair and/or finish required. Please refer to the corresponding Technical Data Sheets.

DECLARATIONS

The manufacturer declares that, due to the composition of the product, it contains no hazardous materials, no plasticizers and is free of VOC emissions.

For further information please check our website:

<http://graphenstone.com/Graphenstone-Global-Certificados.html>

ADDITIONAL INFORMATION

Usage warnings:

None, particularly in situations where normal product application is expected and by people without any specific medical conditions. Alkaline product, protect skin and eyes especially. Do not inhale the product. Keep out of reach of children.

Waste management:

According to local legal regulations. The containers are made of polypropylene. Please contribute to the protection of the environment, do not throw waste down the drain and use the nearest recycling point.

Sustainability gesture:

Minimise product waste by carefully estimating the amount you will need. Store any unused product for future use according to the "Storage" guidelines.

Safety information:

For information regarding safety, physical, ecological and toxicological details please see the latest version of the product's Material Safety Data Sheet.

Technical Support:

For further information, please contact your local distributor or manufacturer.

technicalsupport@graphenstone.com



7.7 Paint to Ceiling

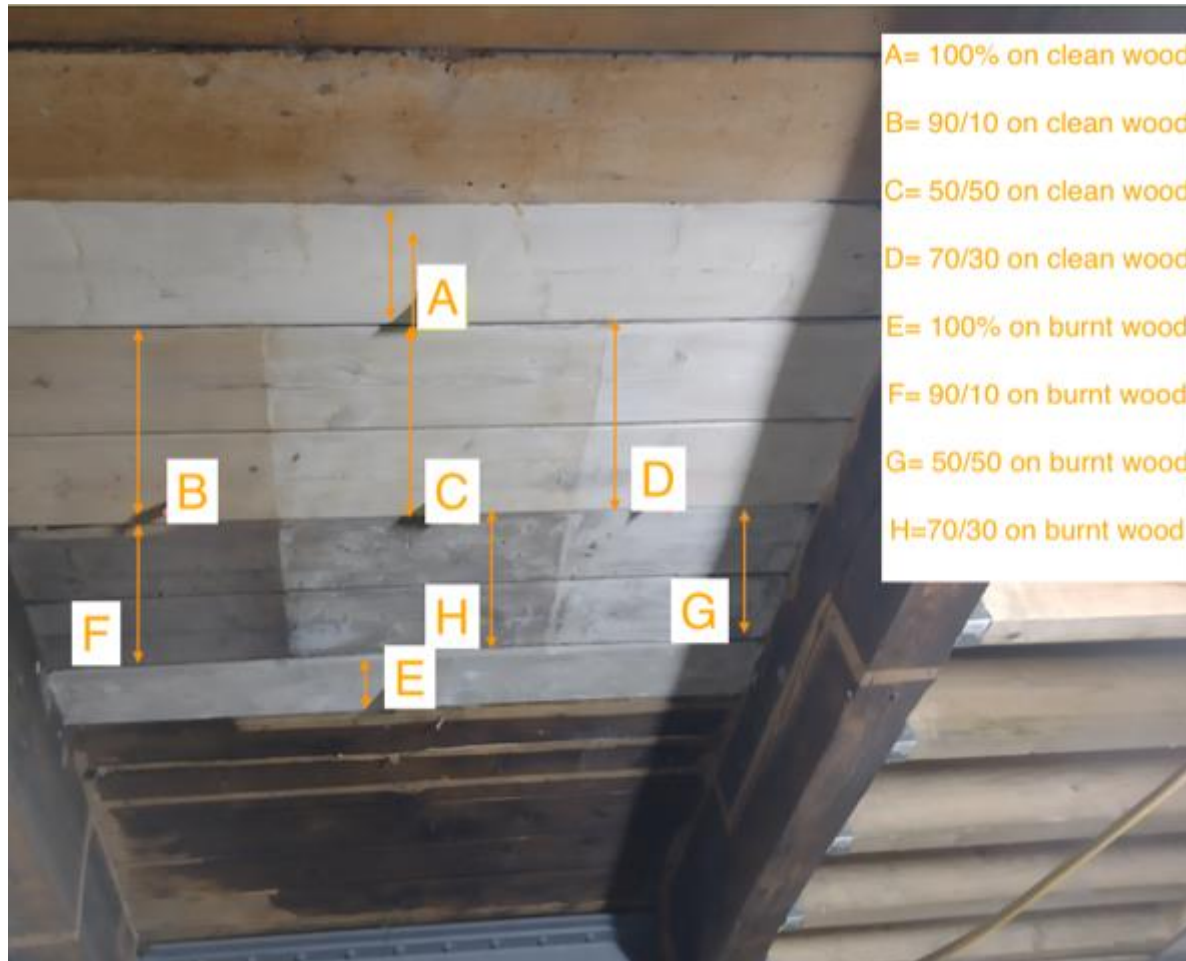


Figure 23: Samples to Burnt and clean wood with lime ratios (Credit CubicWorks Ltd.2022)

The floorplan below shows the ratio of limewash to be used on floor 00 – 01.

The 90/10 ratio has been previously approved on 23 November 2021 by MCC via the partial discharge of Condition 3(i). The reception area is to have a ratio of 50/50 which is yet to be approved. Confirmation that this is acceptable is requested.

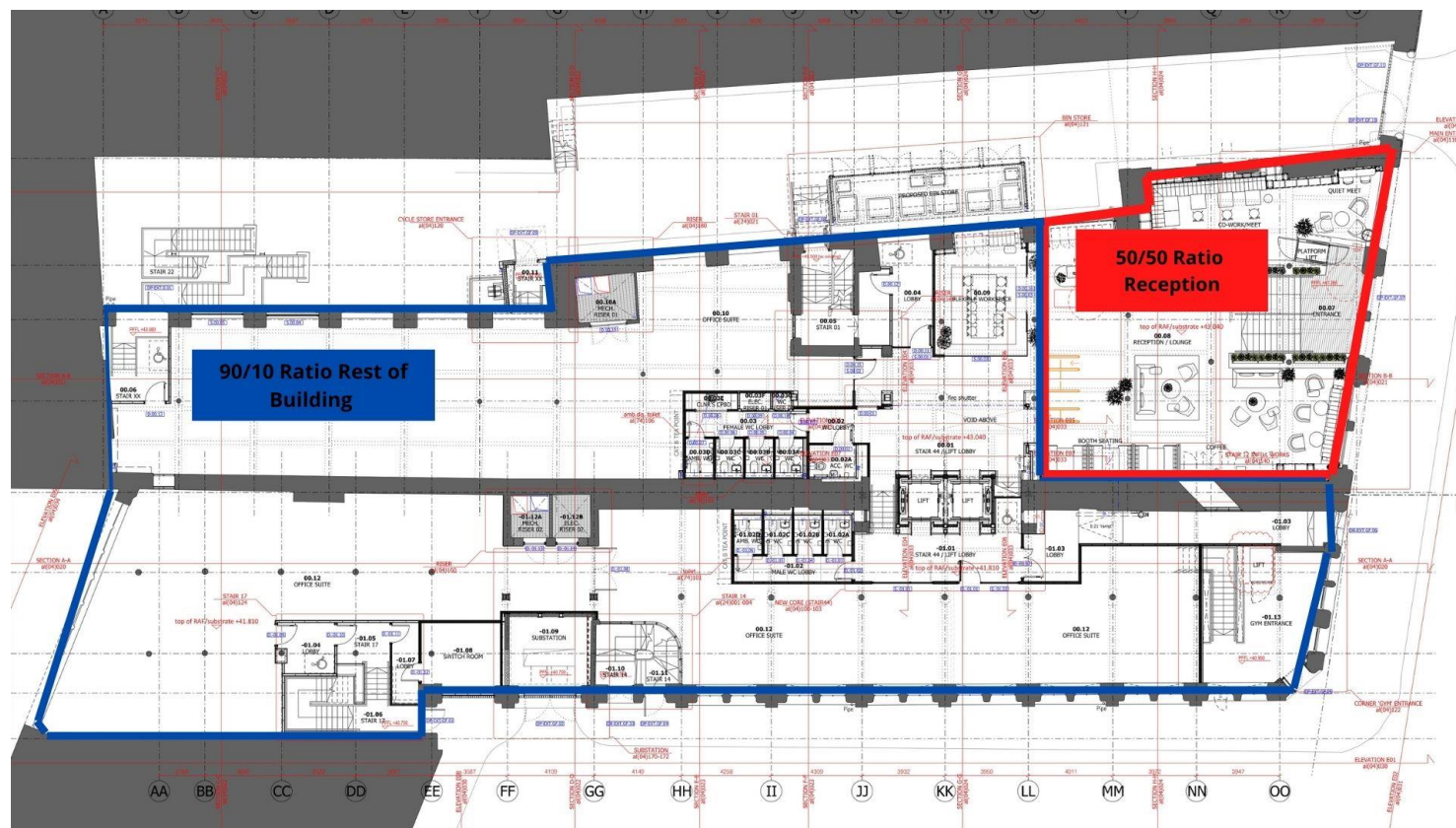


Figure 24: Lime Ratio Locations Credit Cubicworks Ltd & Bridge Architects 2022

7.9 Brick Piers - brick piers to be left exposed / unpainted



Figure 25: Brick Piers 1 (Credit CubicWorks Ltd. 2022)



Figure 26: Brick Piers 2 (Credit CubicWorks Ltd.2022)



Figure 27: Brick Piers 3 (Credit CubicWorks Ltd.2022)

7.10 Conservation Officer Comments

This section of the report contains the comments made by Manchester City Council's Design & Conservation Manager Paul Mason during an onsite meeting on the 20 April 2022.

Paint to Masonry Walls	
The Conservation Officer confirmed he was satisfied with the proposed approach to the painting of masonry walls with the lime based specialist paint that has been used, approval dependant on colours etc chosen by Architect/Client.	
Approved Status	Pending
Review Date	

Exposed Brick Piers	
The Conservation Officer confirmed he was satisfied with the proposed approach to leaving some brick piers exposed	
Approved Status	Pending
Review Date	

Paint to Ceilings	
The Conservation Officer confirmed he was satisfied with the proposed approach to the painting of ceilings	
Approved Status	Pending
Review Date	

END OF DOCUMENT