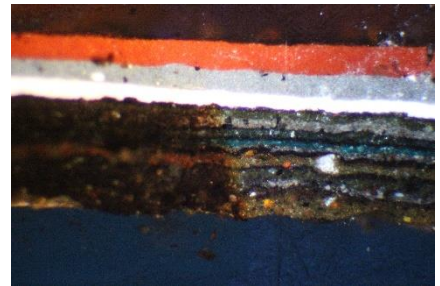
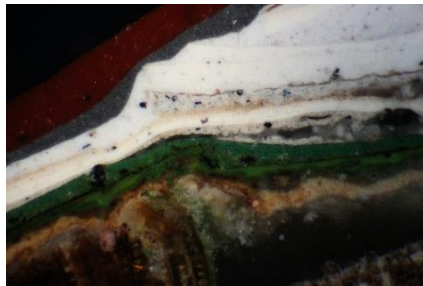
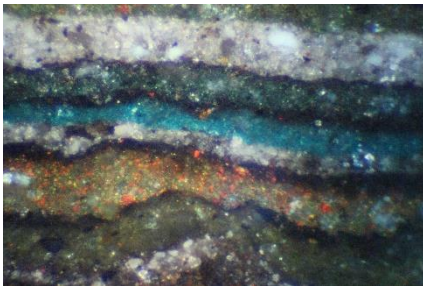


Freetrade Exchange Paint Analysis



Report on Findings Report No HPMFT01

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1.0 Introduction

Heritage Project Management were requested to undertake paint analysis of the external decorative coatings applied to the windows of the Grade II listed Freetrade Exchange (Harvester House) building located on Peter Street in Manchester.

The analysis was to identify the paint schemes that had originally been applied to the window details. The analysis will be used to inform the development of new decorative paint coatings as part of the refurbishment works being undertaken.

The samples were taken on site on the 10th January 2023, the building was a construction site at that time and access to the external façade was available through use of the external scaffold.

The sample works were intrusive although this was very minor and only very small samples of the existing paint finishes were removed for analysis.

The works were deemed not to fall under the definition of *demolition*, *alteration* or *extension*, in terms of Section 7 of the Planning (Listed Buildings and Conservation Areas) Act 1990, as they will not affect the character, architectural or historic interest of the listed building.

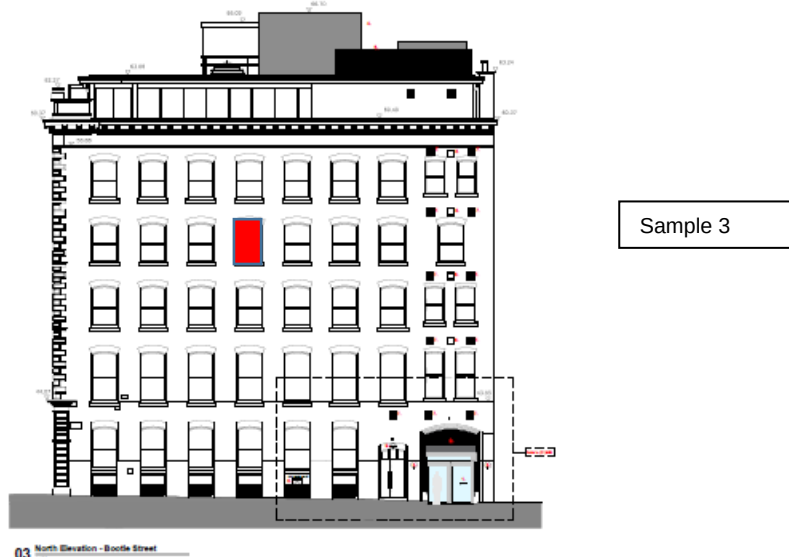
2.0 Sample Locations

A total of 6 paint samples were taken from the external elevations of the buildings. The following schedule notes the locations of the samples:

Sample Ref:	Location:	Comment
01	Window – level 1, South elevation	
02	Window – level 2, East elevation	
03	Window – level 3, North elevation	
04	Window – level 4, East elevation	
05	Window – level 0, East elevation	
06	Window – level 0, East elevation	

For the ground floor, only the east elevation had the original windows fitted. A selection of samples was taken that gave the best representation of the coatings applied to the different windows on the building.

The location of the samples is noted on the following elevation drawings:



North Elevation

3.0 Analysis Methodology

Samples were collected from the external windows. However, it should be noted that the windows to the north elevation had been completely replaced with new double glazed windows and much of the original ground and basement floor areas also had replacement windows fitted.

The original windows and frames had been previously refurbished at some time which had generally stripped the paint coatings from the timberwork. It was necessary therefore to identify areas of retained finishes where the

stripping had been incomplete to determine the paint coatings that had been applied to the timberwork.

Each sample was removed by the most appropriate methods to retain as far as practicable all paint layers within the sample. Each sample location was photographed, sample identified and bagged for analysis.

4.0 Sample Preparation

Each sample was visually inspected in the workshop to identify any salient features and pieces selected for sectional analysis.

The samples were set in a clear coat polyester resin and then cut and polished to enable them to be inspected under microscope. The resin holds the paint layers together and allows a polished flat plane for viewing at high magnification.

Samples were also viewed under UV magnification to identify high fluorescent materials such as historic resins and zinc oxide based paints.

In addition, a proportion of the samples were physically tested for lead content. Samples were tested with a solution of Sodium Sulphide which in the presence of lead turns dark brown in colour.

The interpretation was carried out by Richard Baister of Heritage Project Management.

5.0 Historical Context

Given the age of the building (1868) there would have been a limited choice of materials that could be used for the decorative coatings and the majority of original paints would have been individually mixed by the painters based on traditional recipes and techniques.

Coating systems typically available for the early decorative coatings were:

Lime Washes – these are made from pure white lime mixed with water. They were used for common walls and ceilings especially where for sanitary reasons a frequent fresh application was required. Lime washes were readily removed when rubbed, will not stand rain and do not adhere well to smooth or non-porous surfaces.

Distempers – were made of whiting (lime whiting - limewash with added tallow) mixed with size which was allowed to become jellylike before application. Although more durable this coating was easily removed and used for interior decoration. Prior to redecoration the distempers would typically be fully removed before new coats were applied. The addition of oil with an emulsifier such as borax (sodium borate) created a more durable and often washable distemper depending on its formulation, which can be considered a

predecessor of modern resin based emulsions. It became popular as an interior paint in the early 19th century when a number of manufacturers began to produce it commercially, and it remained in common use until after the Second World War when it was finally superseded by vinyl and acrylic emulsion paints.

White Lead Based Paints – Lead carbonate (white lead) was extensively used as the basis for white and light coloured paint coatings. Being either mixed with Whiting or Linseed oil it was a more durable coating than distempers and was able to provide good coverage and opacity.

Red Lead Based Paints – Lead tetroxide (red lead) paints were also extensively used for darker colours where they offered good opacity and the ability to carry darker pigments well. Typically mixed with oils including linseed, they were used on metalwork and joinery. Also often used as a primer coat on metalwork.

Iron Oxides – Red iron oxide was also seen in the period as a good protective coating for ironwork over lead based paints as they did not set up any perceived galvanic action as was believed to occur between lead paints and iron surfaces. Often cheaper than lead tetroxide due to it being extracted and processed in the UK it was very popular for metalwork and joinery.

Zinc oxides – these were being introduced in the 1870's as a replacement for the more injurious white lead bases as they provided a good level of whiteness and were comparable in cost. They were however, considered not to combine so well with oils and were not favoured by many decorators.

Lithopones (Barium Sulphide) – these were introduced at the turn of the twentieth century as alternative to white lead due to its good covering properties however it was only used internally as it is not durable externally as it darkens and rapidly chalks away.

Varnishes – these were a solution of resin in either oil, turpentine or alcohol. The oil dries, the alcohol evaporates leaving a solid transparent film of resin over the surface varnished.

Lead based paints were known to be injurious to health. However, their use was extensive until alternative materials such as zinc oxides could offer the same workability and coverage to that of the traditional lead paints. Even after this time the lead paints were preferred by traditional decorators.

In addition to the paint coatings, wall papers were also extensively used at this time. These were typically pre-finished with a raised pattern.

The investigations took a total of 6 samples of paint from the building. These have been analysed to identify the nature and colours of the original and subsequent paint layers that have been applied.

6.0 Summary of Findings

General:

The building was originally constructed in 1868 and has undergone a number of alterations since that time including a major refurbishment which is understood to have been completed in 2007.

Paint samples have been taken that best detail the different paint layers that have been applied to the building features and where possible these show the most original / earliest paint coatings that were applied.

External Windows

The glazing to the north elevation has been replaced with new double glazed hardwood timber units. It is assumed that these works were completed in 2007 during the last refurbishment.

The windows to the south elevation are original to the building construction although all glazing to the ground and basement levels has been replaced with modern units.

The windows to the east elevation of the building are original to the building construction although the basement level windows have been replaced with modern units.

All of the original windows to the building have been refurbished with the majority of existing paint coatings removed as part of the refurbishment process. The samples that were collected on site were generally taken from areas where original paint appeared to be more intact for example in corners of the framework and the more difficult to access areas. From the different samples taken it is possible to determine:

The most complete samples taken from the building were samples 5 and 6 which each showed that 31 separate paint layers were present. These showed similar application of paint coatings which were also reflected, in part, in the less complete samples (samples 1, 2, and 4).

The original decorative paintwork applied to the timber windows was a dark green oil paint. This had a matt finish and contained both red and white lead within its composition. This colour was replicated on a further two occasions together with the use of a grey intermediate paint layer based on white lead and carbon black. Each of these paint layers shows a significant amount of dirt on the surface of the paintwork showing that the paintwork was present for some time.

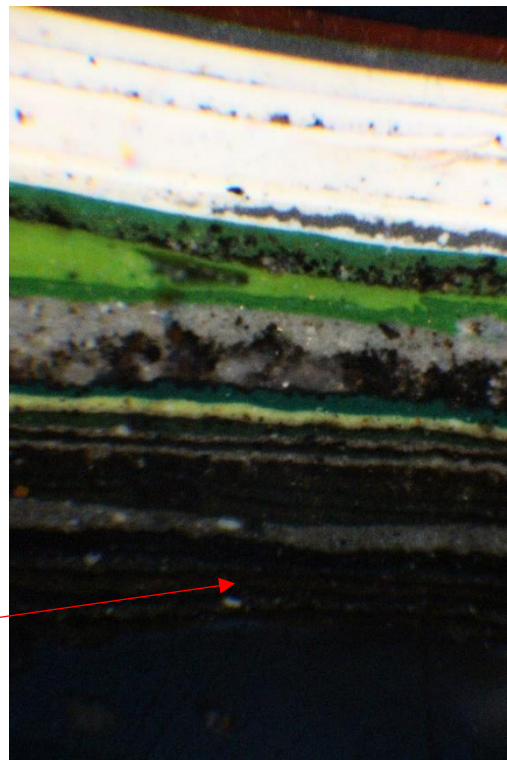
Following the initial green paint colours the windows were redecorated for a single occasion in a blue finish before returning to a similar dark green for a further four redecorations.

After this the windows were redecorated for a single occasion in a blue green (turquoise) colour. All of these earlier paint layers contained either red or white lead.

After this time (post WW2) more modern alkyd paints were used and three separate applications of dark and light green are present before the scheme completely changed and modern Titanium whites were introduced. These white decorations were applied on 4 separate occasions before the current red paint scheme. This most recent scheme was applied as a white primer layer, a grey intermediate and red alkyd gloss paint.

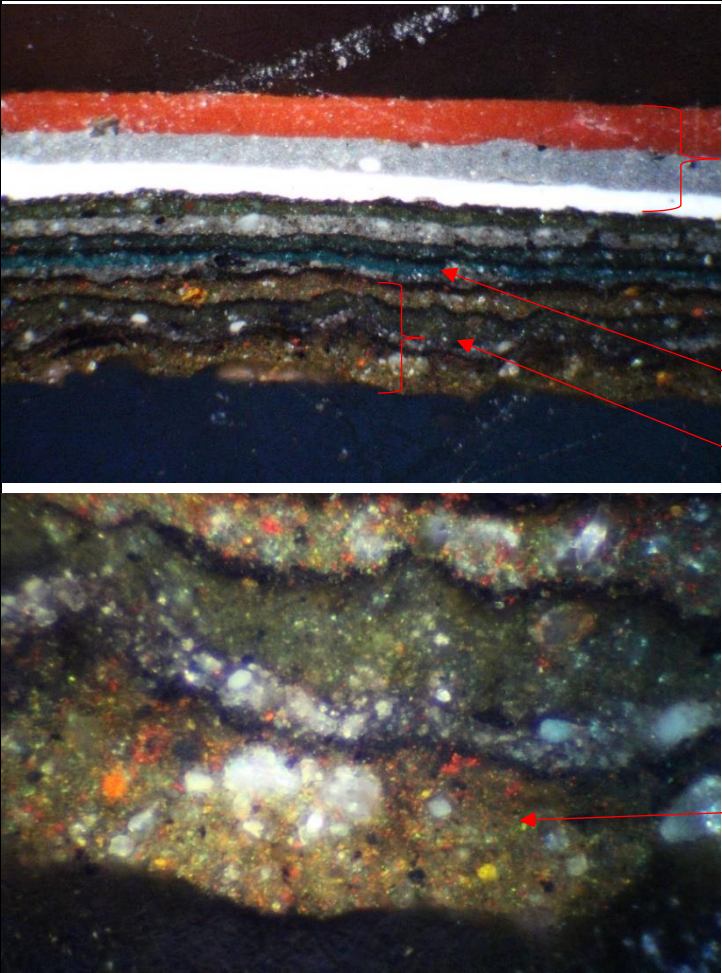
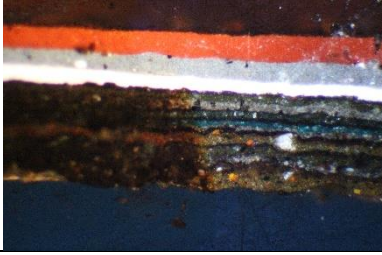
Extract from sample 5 analysis – showing the 31 separate paint layers applied to the timber windows.

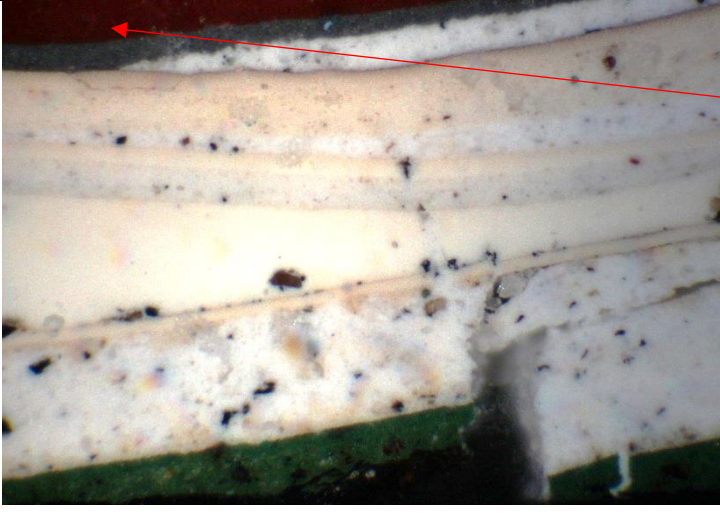
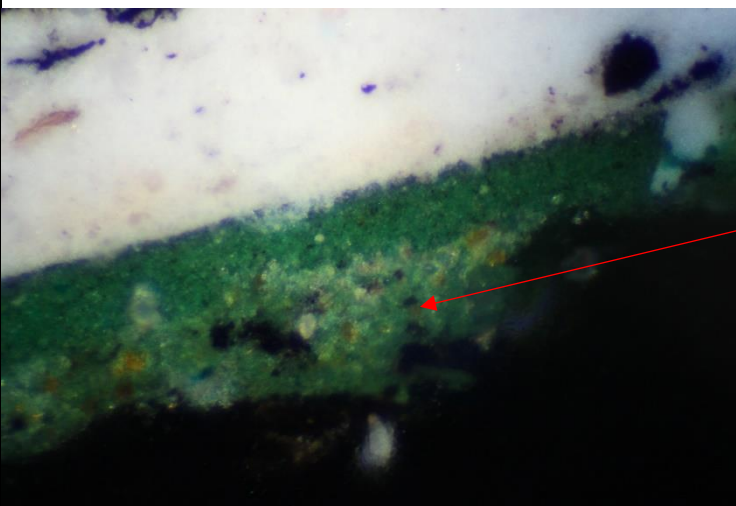
Earliest paint coatings – dark green oil paint (lead based) which had a matt finish.

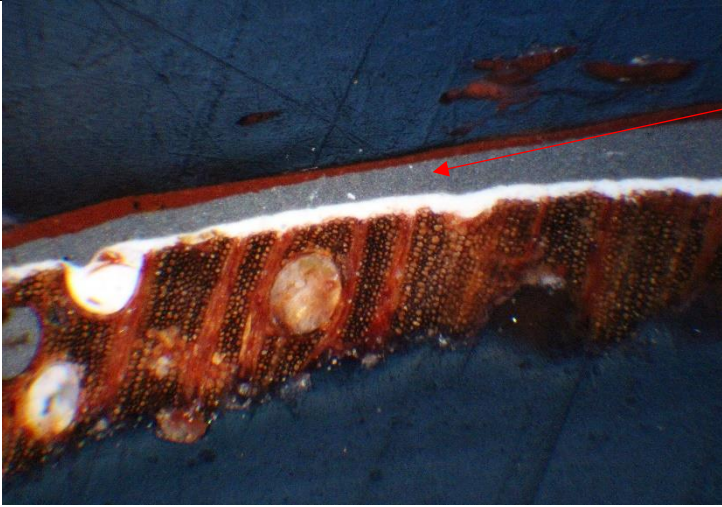
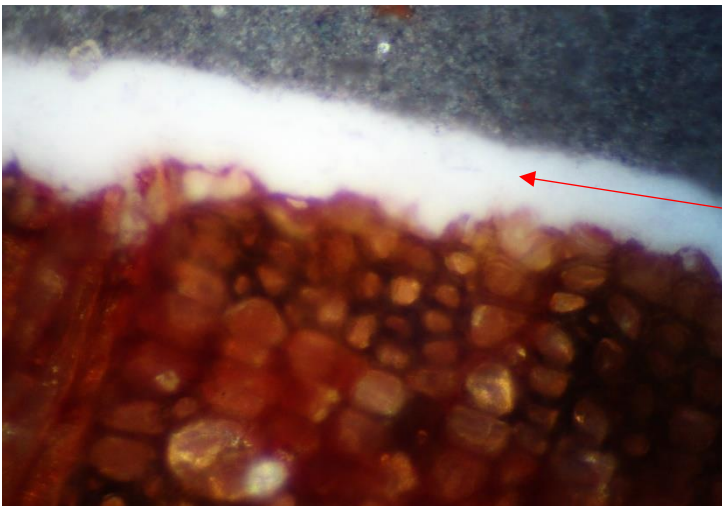


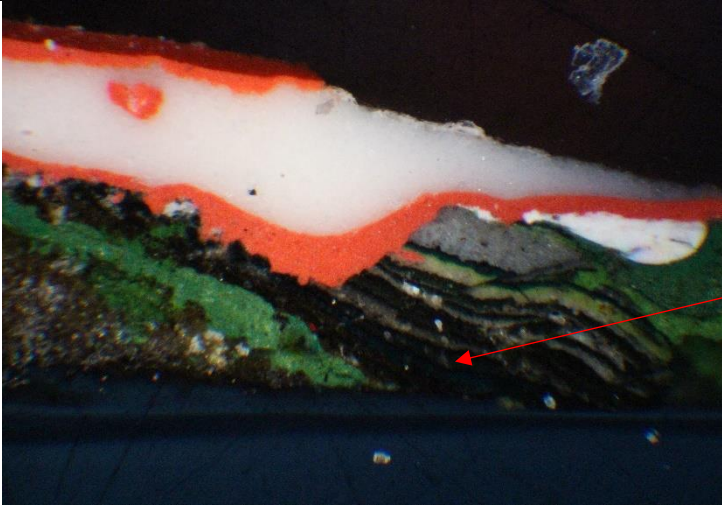
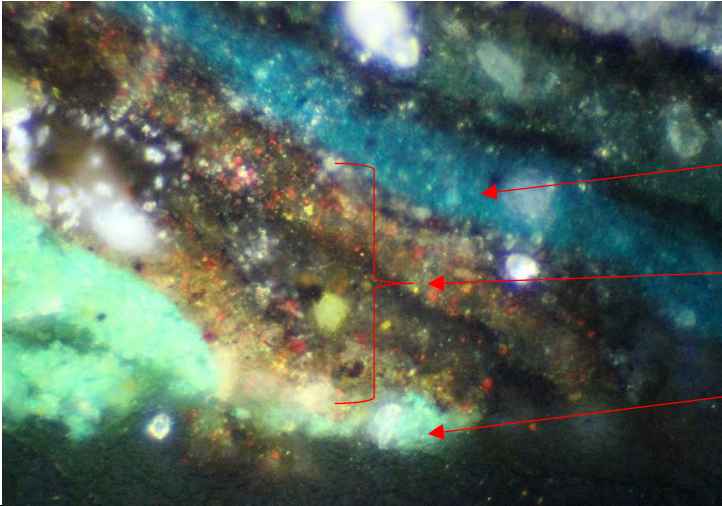
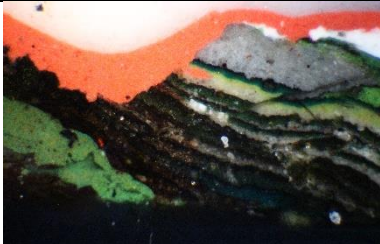
The current red decorative scheme was applied in 2007 following replacement and refurbishment of the building windows. This was the first time that the windows had been decorated in a red colour. The works were undertaken under Listed Building Consent approval Ref: 071196/LO/2004/C1

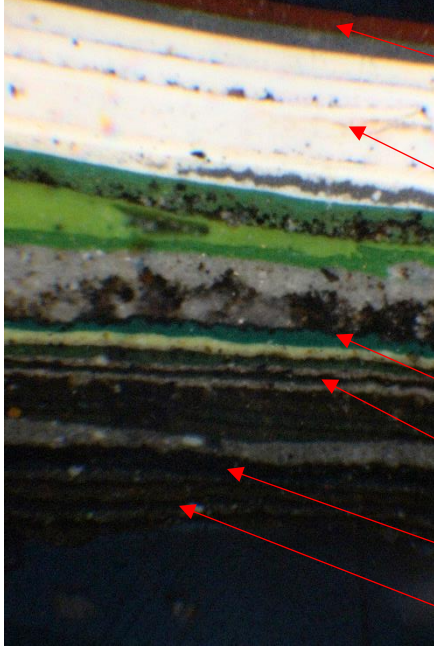
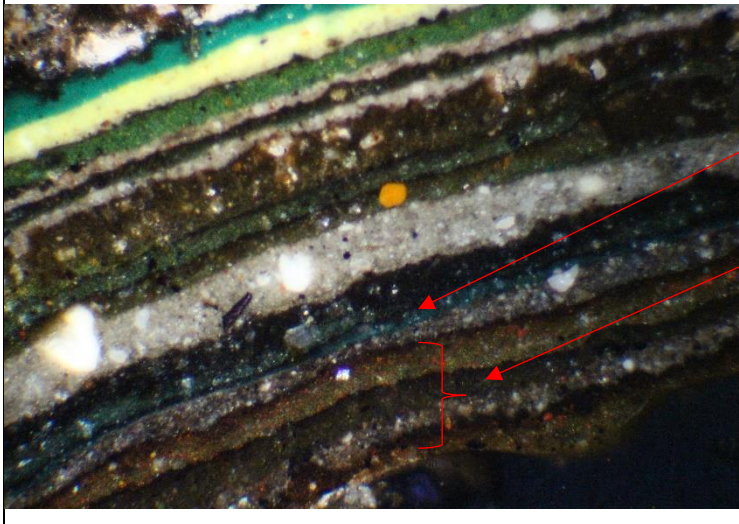
Appendix A – Sample Analysis Sheets

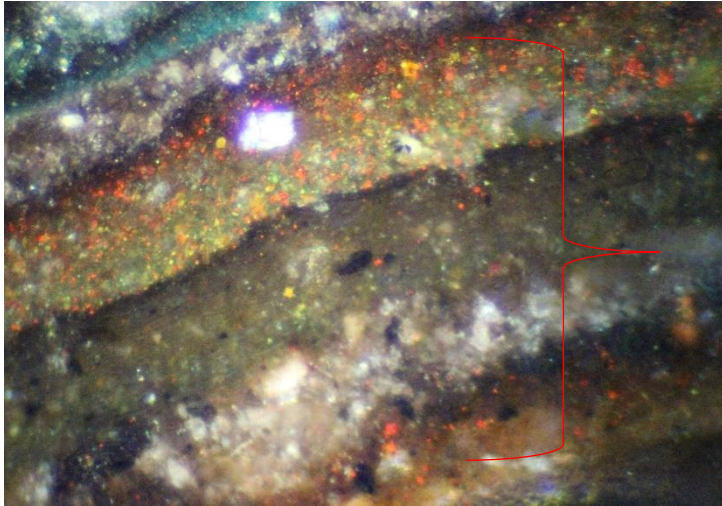
Sample Ref: 01 – (Window)	Location: Freetrade Exchange
Paint sample removed from: Location: 01 – First Floor Window – South Elevation A total of 13 separate paint layers were found.	
Sectional Photographs	Description
	X50 – Current dark red colour scheme (Red alkyd paint with grey intermediate coating and white primer layer). 3 separate green oil paints over grey intermediate coats. Single blue paint colour. 3 No green oil paints (earliest paint coatings). X400 - Earliest paint layers. Earliest paint scheme – green oil paint with considerable dirt on the surface of the paint.
Lead Test	
Early schemes tested for lead Yes – evidence of white and red lead present.	

Sample Ref: 02 – (Window)	Location: FreeTrade Exchange
Paint sample removed from: Location: 02 – Second Floor Window – East Elevation A total of 11 separate paint layers were found.	
Sectional Photographs	Description
	X50 – Current dark red colour scheme (Red alkyd paint with grey intermediate coating and white primer layer). 4No separate Titanium white paint coatings over white intermediate coatings. 2No green oil paints (earliest paint coatings).
	X400 – Earliest paint layers. Earliest paint layer present – green oil paint. Earliest paint layers are missing in sample. (Window fully abraded prior to application of green layers).
Lead Test	
Early schemes tested for lead Yes – no evidence of lead paints.	

Sample Ref: 03 – (Window)	Location: Freetrade Exchange
Paint sample removed from: Location: 03 – Third Floor Window – North Elevation A total of 3 separate paint layers were found.	
Sectional Photographs	Description
	X50 – Current dark red colour scheme (Red alkyd paint with grey intermediate coating and white primer layer). (Windows are modern replacements – only one paint scheme applied since installation).
	X400 – Earliest paint layers. Earliest paint layer present – white primer. Hardwood timber window.
Lead Test	
Early schemes tested for lead No – modern window construction. No evidence of lead paints.	

Sample Ref: 04 – (Window)	Location: Freetrade Exchange
Paint sample removed from: Location: 04 – Fourth Floor Window – East Elevation A total of 20 separate paint layers were found.	
Sectional Photographs	Description
	X50 – Current dark red colour scheme (Red alkyd paint with red intermediate coating and white primer layer). Earliest paint layers (over later green paint layer due to (partial detachment))
	X400 - Earliest paint layers. Single blue paint layer. Earliest paint layers present – 3No green oil paint layers. Later modern green alkyd paint.
Lead Test	
Early schemes tested for lead Yes – Evidence of white and red lead pigments.	

Sample Ref: 05 – (Window)	Location: FreeTrade Exchange
Paint sample removed from: Location: 05 – Ground Floor Window – East Elevation A total of 31 separate paint layers were found.	
Sectional Photographs	Description
	X50 – Current dark red colour scheme (Red alkyd paint with grey intermediate coating and white primer layer). 4x Modern Titanium white gloss alkyd paints with white intermediate coatings. 3No green alkyd paints over grey intermediate coating. Blue / green gloss over yellow intermediate coating. 4No green oil paints over grey intermediate coatings. Single blue oil paint. 3No green oil paints X100 - Earliest paint layers.
	Single blue paint layer. Earliest paint layers present – 3No green oil paint layers.



X400 – Earliest layers

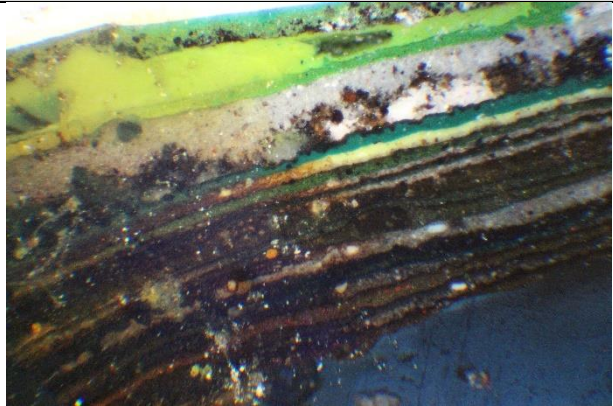
Dirt on surface of paint.

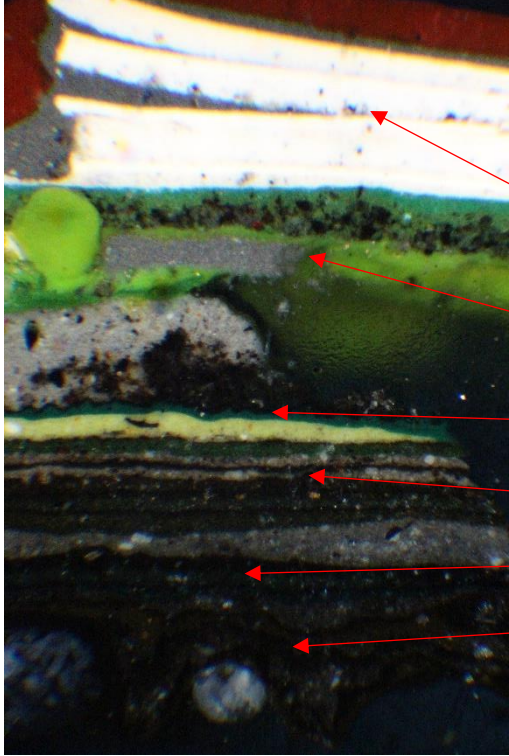
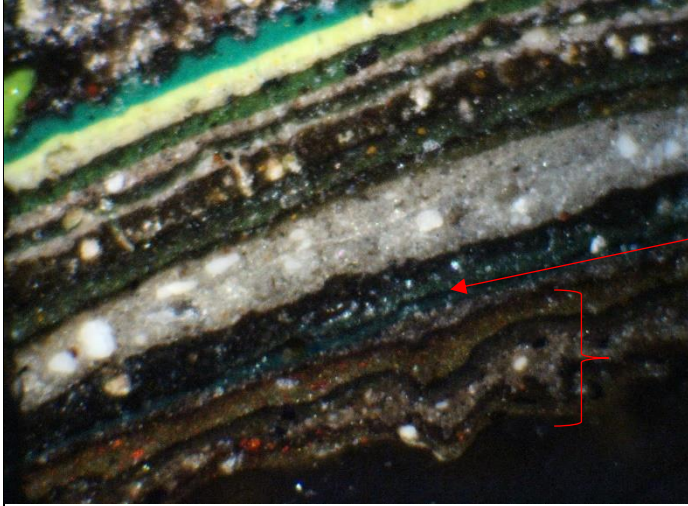
3No green oil paint layers.

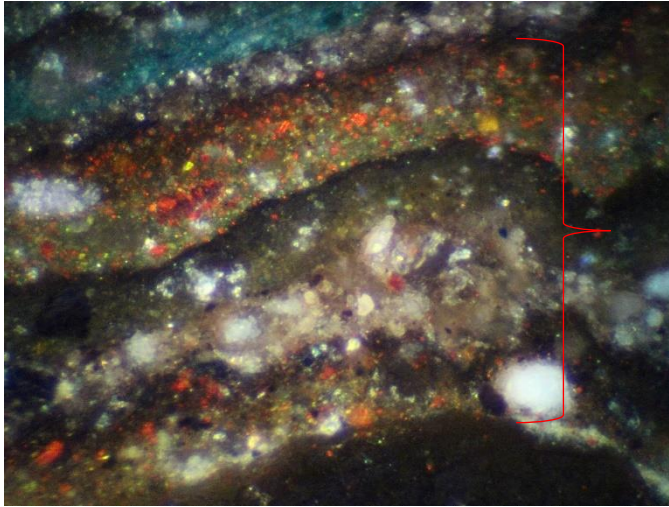
Lead Test

Early schemes tested for lead

Yes – Evidence of white and red lead pigments.



Sample Ref: 06 – (Window)	Location: Freetrade Exchange
Paint sample removed from: Location: 06 – Ground Floor Window – East Elevation A total of 31 separate paint layers were found.	
Sectional Photographs	Description
	X50 – Current dark red colour scheme (Red alkyd paint with grey intermediate coating and white primer layer). 4x Modern Titanium white gloss alkyd paints with white intermediate coatings. 3No green alkyd paints over grey intermediate coating. Blue / green gloss over yellow intermediate coating. 4No green oil paints over grey intermediate coatings. Single blue oil paint. 3No green oil paints
	X100 – Earliest paint layers. Single blue paint layer. Earliest paint layers present – 3No green oil paint layers.



X400 – Earliest paint layers.

3No green oil paints (with grey intermediate coatings).

Note: Dirt layers on surface of pint.

Lead Test

Early schemes tested for lead

Yes – Evidence of white and red lead pigments.

