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CONSERVATION

Research and conservation of historic decorative schemes in the built environment

July/August 2020
2020/06

Project Name: Paint Analysis
59/59A High Street, Lowestoft

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1.0: Introduction

Lincoln Conservation were commissioned by [retracted] to carry out an architectural paint research exercise on the façade of 59/59A, High Street, Lowestoft.

Figure 1: The shop façade facing the road

Architectural Paint Research is a technique widely used to help define the decorative history of historic buildings and other structures. It is an evidence-based approach that relies on the microscopic examination of small samples of paint removed from key locations. Sample locations are carefully selected to yield as much information as possible (the thickest paint layers) and include a portion of substrate (in this case, wood) to ensure a complete historical record is examined.

With the decorative history of an historic building revealed, the client is provided with the evidence needed to make informed decisions about how a building should be presented to reflect its past appearance. With sufficient evidence, it may be possible to faithfully recreate

the appearance of a historic building at some point in its past; or if information is lacking or fragmentary there is normally enough evidence to reintroduce a flavour of its decorative appearance and extrapolate the colour schemes onto areas of later repair.

1.1: History of the building

This former Chemist's shop is listed grade II by Historic England[1] (list entry no. 1462138), and built for Robert Morris, Chemist & Druggist in 1851. The following text is quoted from the HE list entry notice.

Architectural Interest

- *A rare and intelligible example of a purpose-built mid-Victorian chemist shop and house*
- *For the rare and complete survival of the original shopfront*
- *As an early example of an Italianate style shopfront, particularly suited to chemist shops*
- *For the wealth of internal fixtures and fittings, dating from construction to the mid 20th century*

Historic Interest

- *As a building which remained in use as a chemist for around 161 years and clearly reflects its history and evolution within its fabric*

Group value

- *As one of numerous listed buildings along the High Street which contribute to the character of Lowestoft High Street and stand testament to its Victorian prosperity.*

2.0: Methodology

The samples, including substrate, were mounted in polyester resin in cross-section and polished back to reveal the full stratigraphy of the paint layers applied. The earliest paint

[1] Historic England listing notice: https://historicengland.org.uk/listing/the-list/list-entry/1462138

layers appear at the bottom of the sample, with subsequent layers stacked above, as they would have been applied over time (similar to an archaeological record).

The sample is then viewed through a microscope at various magnifications under simulated daylight to determine the distinct layers of paint applied and to reveal colours. The presence of dirt layers helps to determine the separate decorative schemes – a scheme can be made up of more than one layer, commonly a primer and topcoat. Ultra-violet illumination causes different types of paint and varnishes to fluoresce (or glow) in a characteristic manner, helping to distinguish traditional oil paints (both lead and zinc based) from modern synthetic alkyds, distempers and varnish coatings.

3.0: How to read this report

The architectural paint research findings are presented in three formats;

- Scheme chart
- Annotated photomicrographs
- Results

Scheme Chart

A chart-based representation of the paint samples as seen in cross section. Each column represents a paint sample, with the rows on the chart representing layers of paint in that sample. The far left-hand side column groups together the phases of decorative schemes that the layers correspond to. The substrate is simply whatever base the paint is applied to (in this case wood).

A decorative scheme represents each time the shop front was painted, and represents a snapshot in history. There are often multiple layers to a scheme, that include primers and top coats. The schemes are colour coded and labelled in the chart.

Sometimes, a scheme chart will have blank cells with no information contained. This signifies that information is missing from the record. Here at 59/59A High Street, many of the earliest paint schemes are missing from the samples removed at low level (beneath the window). This is because this vulnerable area has rotted over time, resulting in the replacement and repair of the joinery and stripping of paint.

Annotated photomicrographs

A photograph taken at high magnification through a microscope. Selected images are included in section 5.0 of this report. Some of them display a large number of paint layers, starting in the mid 19th century with many others stacked above, up to the present day. Others show fewer layers, indicating areas that have been stripped or replaced. Where possible the timber substrate is included with the image, indicating a complete record has been examined.

Discussion

This summarises the research and provides the concluding remarks, with options for redecoration that re-introduces an earlier appearance of the shop front based on the evidence uncovered. If evidence is missing, sensible conclusions are drawn extrapolating the data uncovered, drawing on our extensive experience on similar buildings over many years.

4.0: Sample locations

Every sample removed carries a unique identifying number corresponding to the locations illustrated in this section of the report.

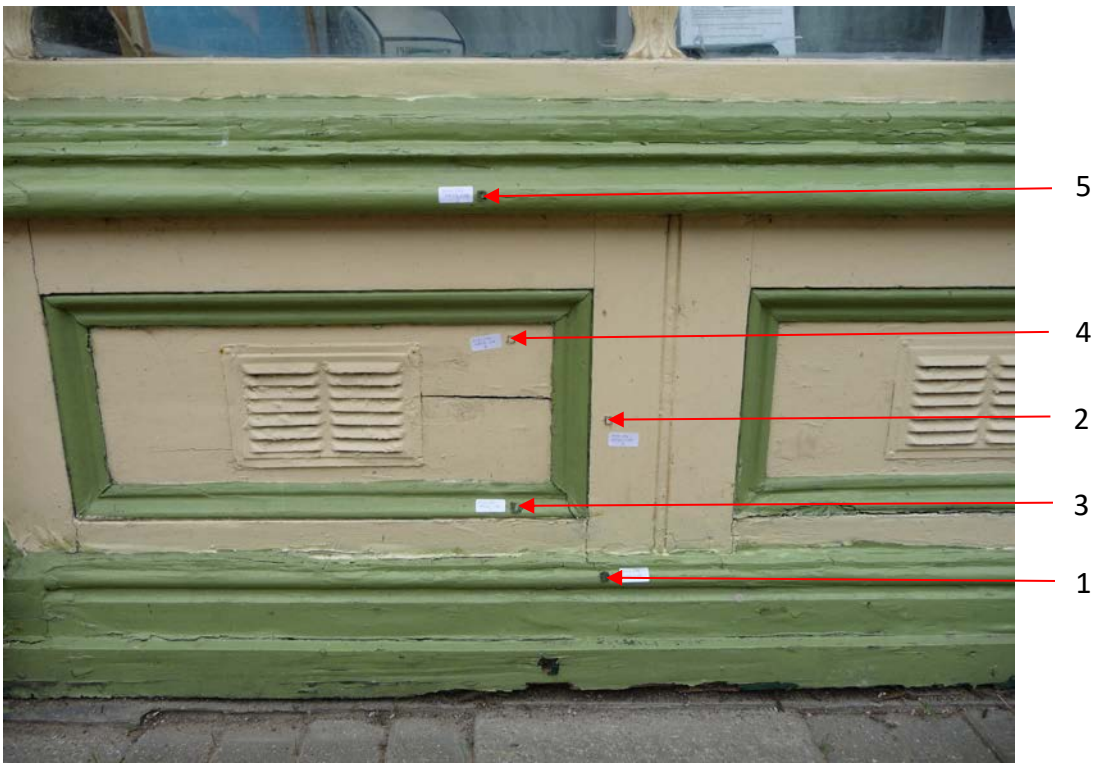


Figure 2: sample locations 1 - 5

Figure 3: sample locations 6 - 8

Figure 4: sample locations 9 & 10

Figure 5: sample locations 11 & 12 (first floor stone window dressings and sills)

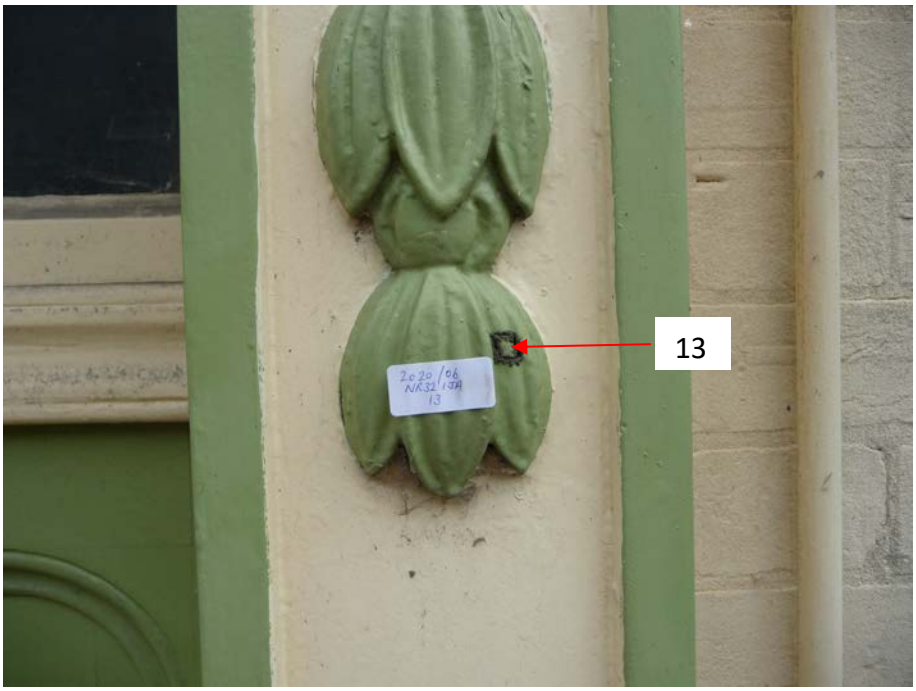


Figure 6: sample location 13

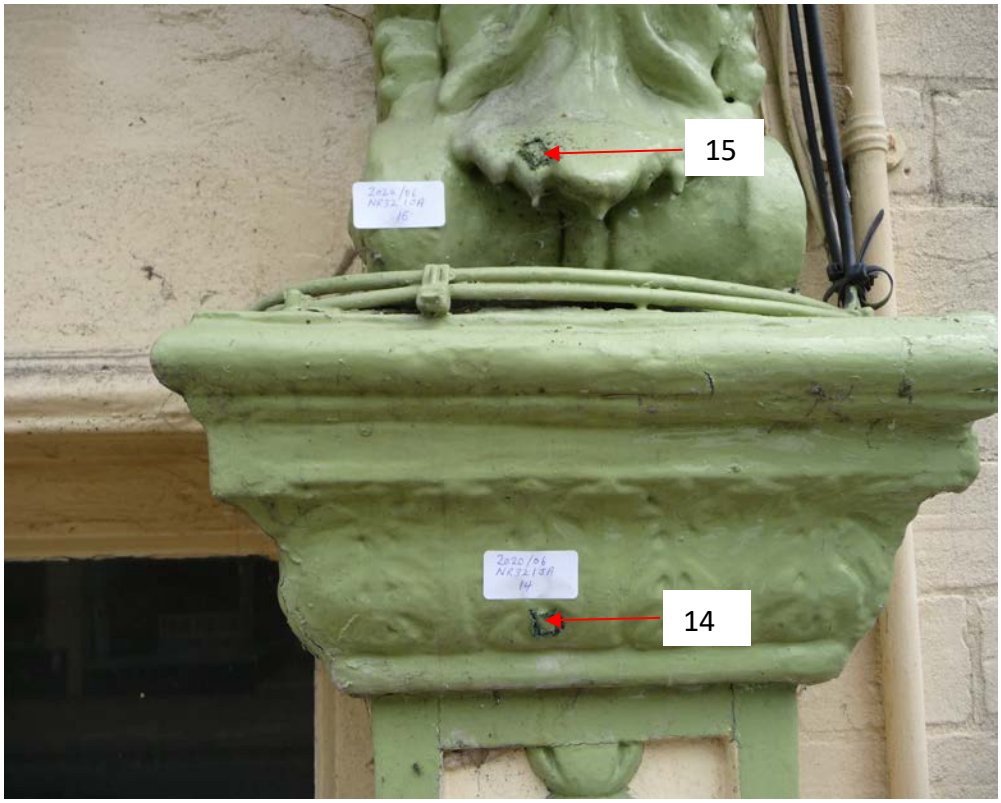


Figure 7: sample locations 14 & 15

Figure 8: sample locations 16 & 17

	Samples 14 & 15 Acanthus & pilaster capital	Sample 13 Husk	Sample 17 Door pilaster edge	Sample 9 Door	Samples 1, 3 & 5 Beneath shop window	Sample 10 Door frame	Samples 2 & 4 Beneath shop window	Samples 6, 7 & 8 window glazing bars/frame	Sample 16 Door pilaster
Post war colour schemes c.1950 - present	Pale Green	Pale Green	Pale Green	Pale Green	Pale Green	Cream	Cream	Cream	Cream
	Green	Green	Green	Green	Green				
	Green	Green	Green	Green	Green				
	Green	Green	Green	Green	Green				
	Dark brown	Dark brown	Dark brown	Dark brown	Dark brown				
	Reddish brown	Reddish brown	Reddish brown	Reddish brown	Reddish brown				
	magenta	magenta	magenta	magenta		Olive green			
	magenta	magenta	magenta	magenta					
	Bright blue	Al Primer	Al Primer					Al Primer	Al Primer
	green								
	cream								
	cream								
	Pale blue		NO EVIDENCE		NO EVIDENCE	NO EVIDENCE	NO EVIDENCE		
	Pale blue							NO EVIDENCE	NO EVIDENCE
	Pale blue								
Pre- war colour schemes c.1900 - 1940	**CLEANED OFF**	NO EVIDENCE		NO EVIDENCE					
	Green lead and zinc oil paints		Green						
19th century colour schemes 1851 – c.1900	Black oil paints with varnish. Acanthus picked out in gold leaf		NO EVIDENCE			Black oil paints with varnish			
		Traces of black oil paint			Traces of lead white & varnish on sample 3. It is unclear if this is part of the original scheme.		Traces of black oil paint		Traces of black oil paint
	Grey primer	Grey primer				Grey primer	Grey primer		Grey primer
	Substrate	**Substrate**	**Substrate**	**Substrate**	**Substrate**	**Substrate**	**Substrate**	**Substrate**	**Substrate**

Table 1: Scheme Chart

5.0: Sample photomicrographs

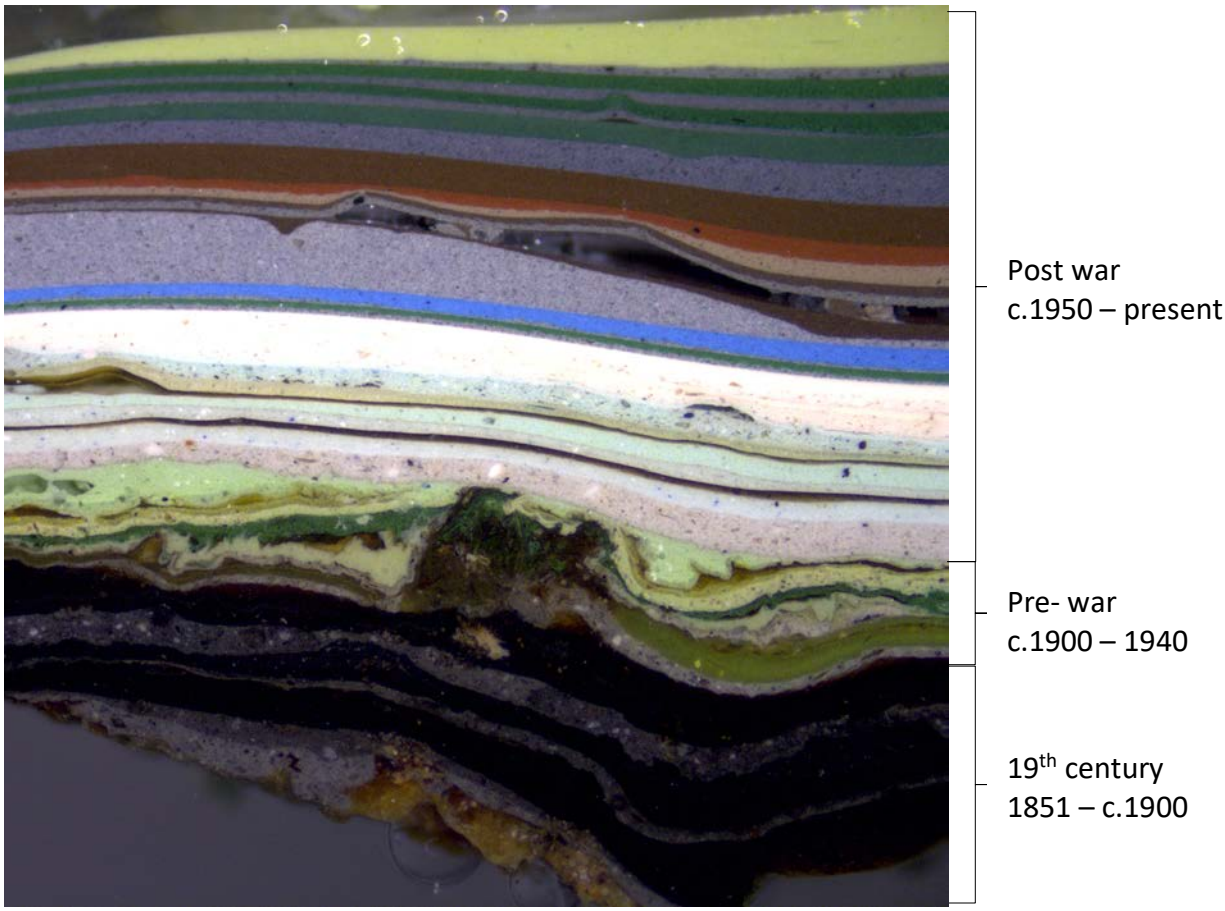
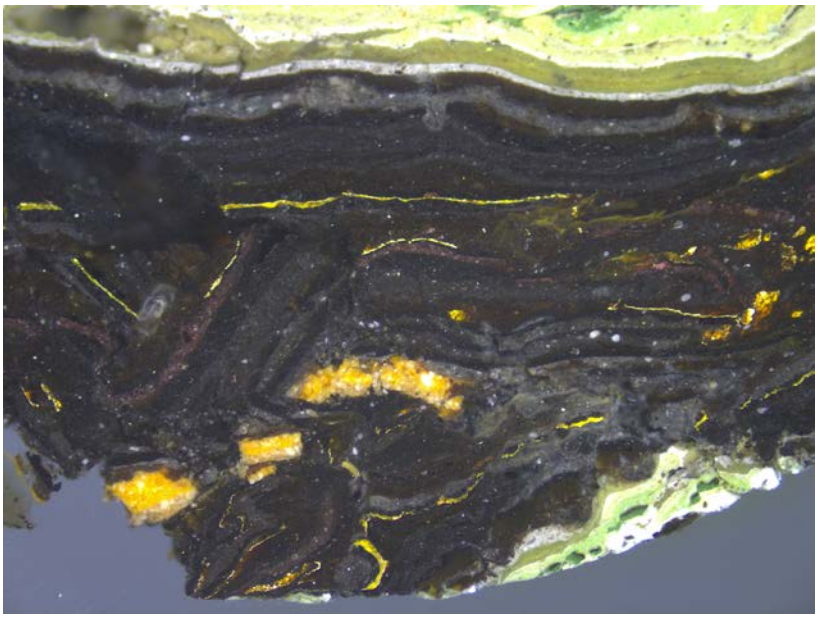


Figure 9: sample 14 door pilaster capital (water leaf moulding)



Confused mass of black paint coeval with the black at the base of sample 14.

Although difficult to define clearly; gilding appears to have been applied on two separate occasions to the acanthus leaves above pilaster capitals.

Figure 10: sample 15 acanthus leaf displaying traces of gold leaf

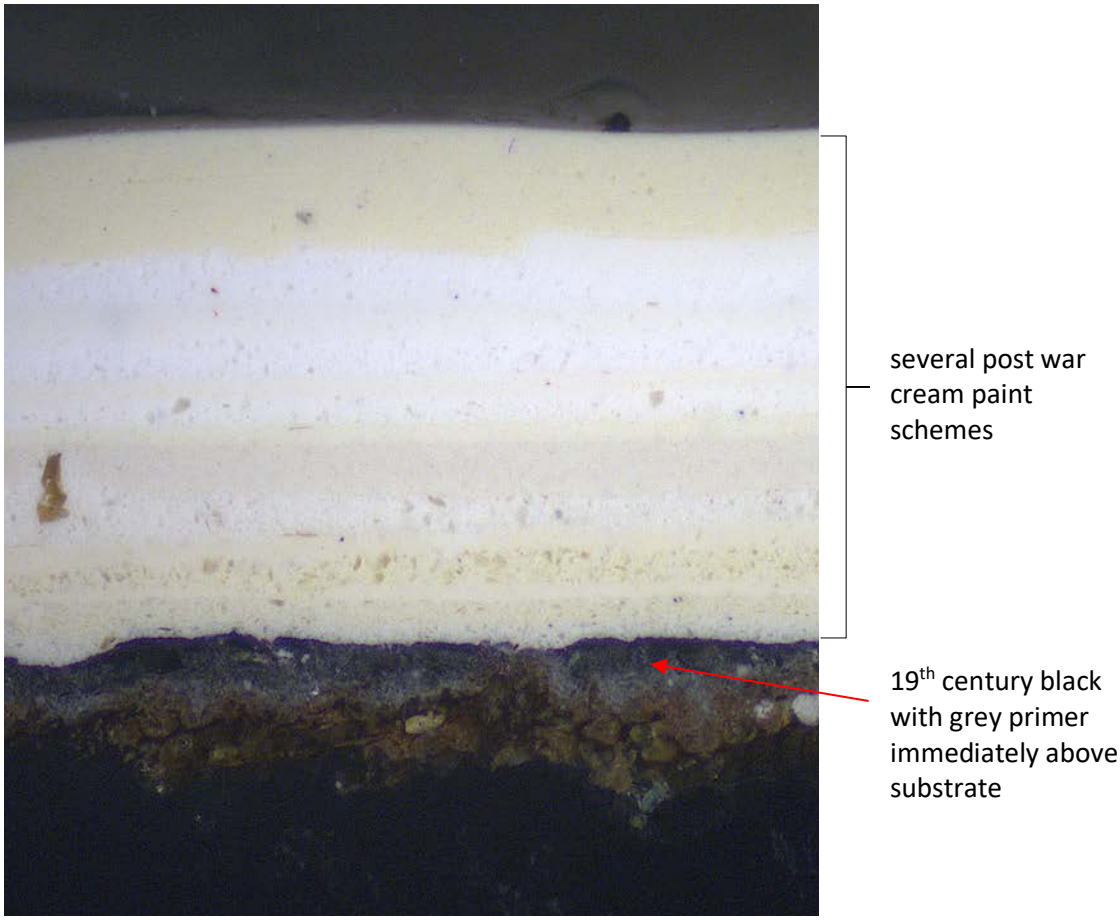


Figure 11: sample 2, cream paint beneath shop window

Apart from a trace of the original mid 19th century black paint, all the paint schemes applied prior to the 1950's have been stripped, in preparation of the surface prior to redecoration. The grey primer and black oil paint at the base of the sample provides clear evidence a black paint scheme was applied beneath the window in the 19th century.

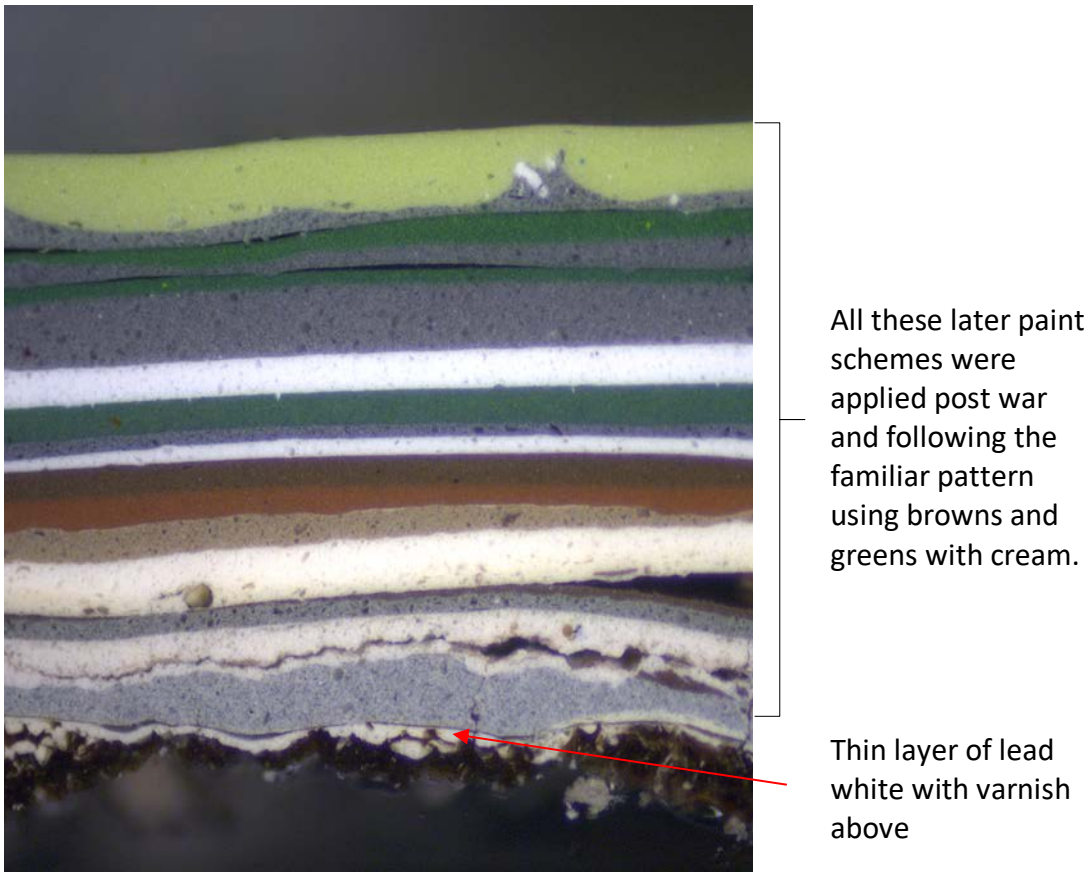


Figure 12: sample 3 panel mouldings beneath window

The photomicrograph of sample 3 (panel mouldings beneath the window) is included because it shows a thin layer of lead white oil paint immediately above the wooden substrate at the base of the image, with a varnish layer above. It remains unclear if this layer represents the first decorative scheme coeval with the varnished black oil paints, but it remains a possibility.

Above the lead white at the base, only the later post war paint schemes are visible, suggesting either all the earlier schemes have been cleaned off.

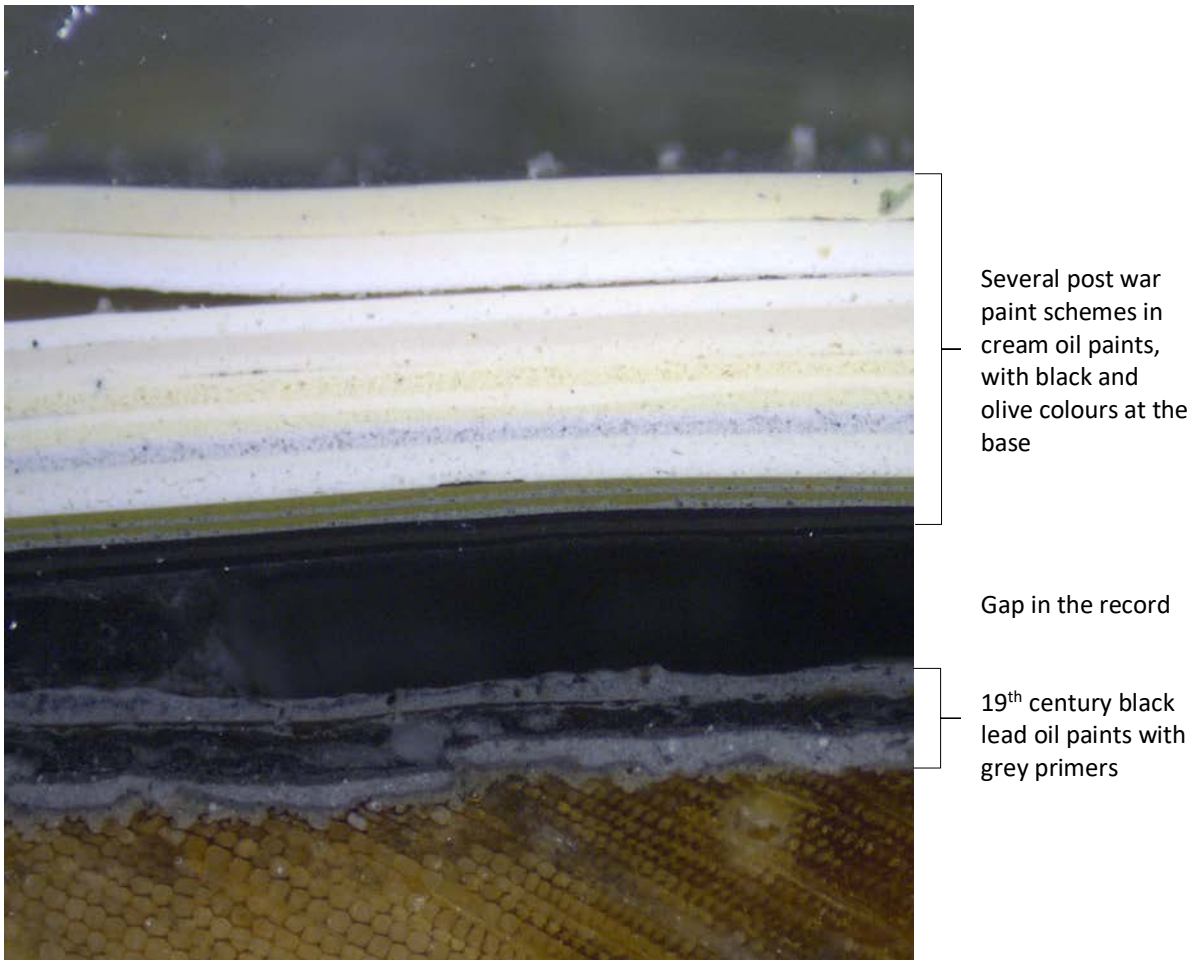


Figure 13: sample 10 door frame

The original paint scheme from the mid 19th century survives immediately above the softwood substrate at the base of the image as grey primer with black lead topcoat. Although no early paint schemes survive on the doors, the presence of black on the door frame strongly suggests the shop doors would also have been painted black throughout the 19th century.

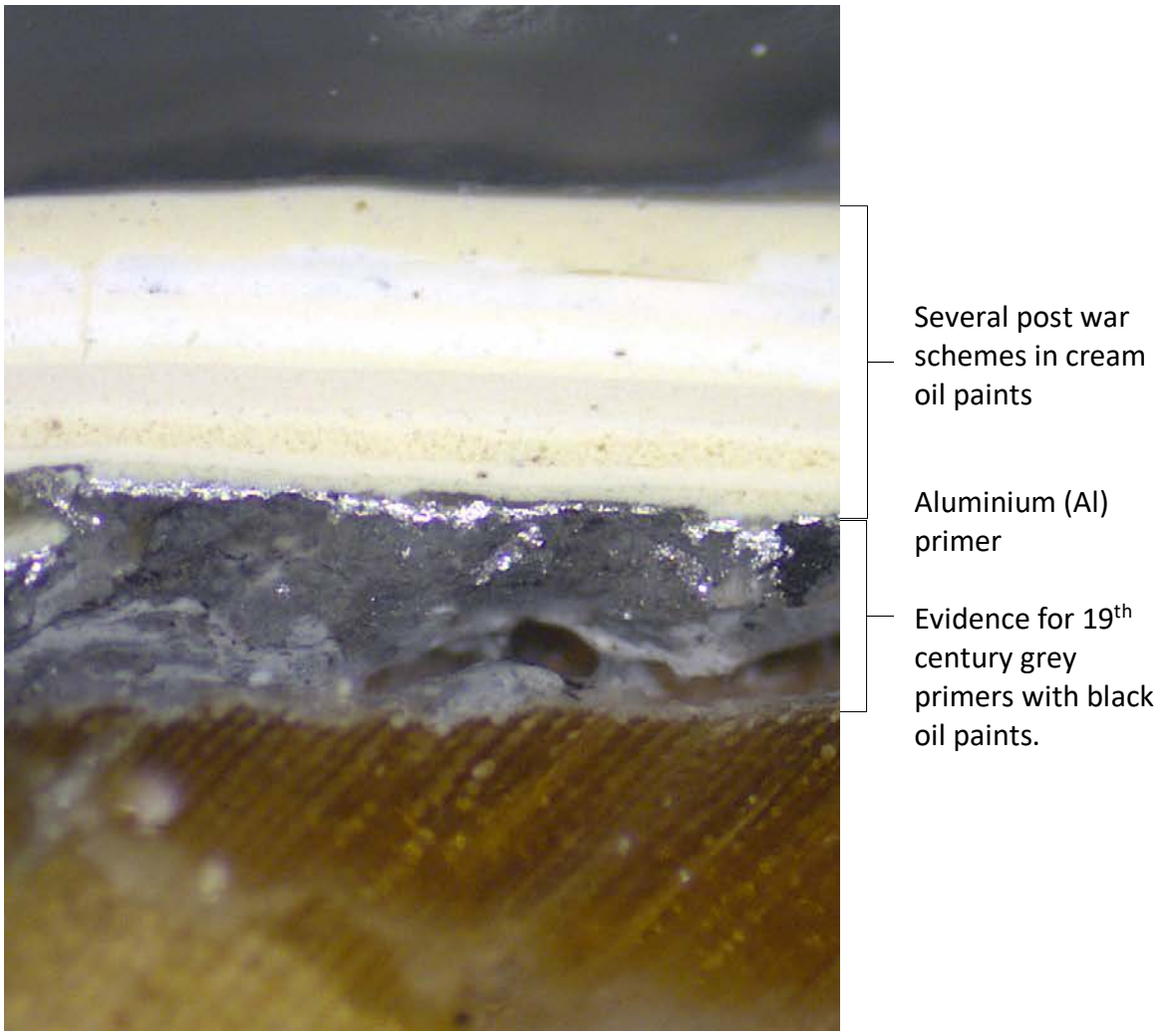


Figure 14: sample 16, pilaster shaft framing the doors

This sample removed from the pilaster surrounding the doors, provides further evidence for a consistent theme of black oil paint applied to the shop façade throughout the 19th century.

The aluminium primer has been detected on other samples and represents a period of overhaul, repair and redecoration of the façade, sometime during the last 50 years.

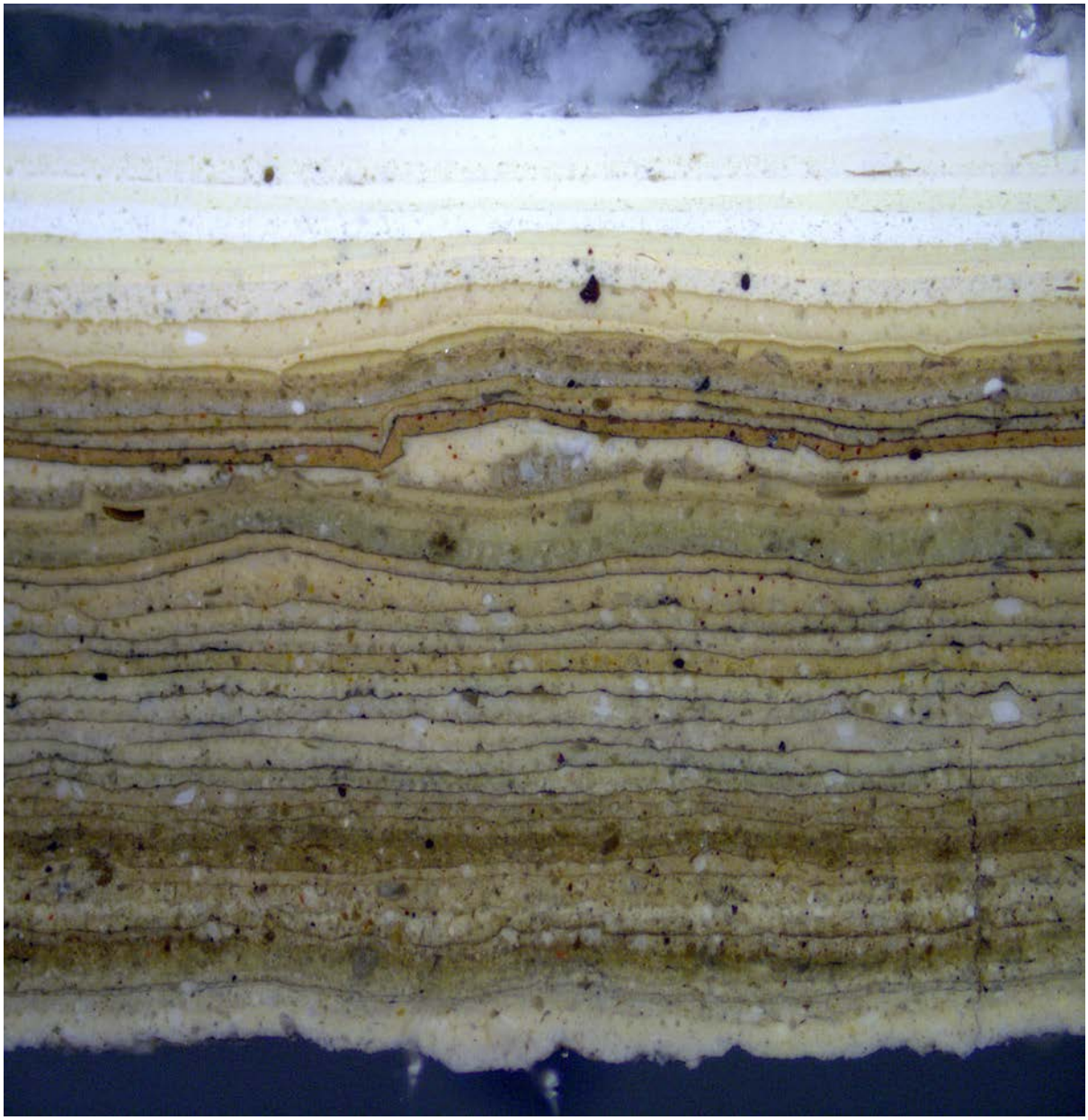


Figure 15: sample 12, stone window dressing on the 1st floor

This sample, removed from the stone window dressing on the 1st floor (see fig. 5), displays a remarkable 26 schemes of stone coloured lead oil paint, plus some modern cream alkyd paints at the top of the sample. This undoubtedly represents a full paint chronology and is indicative of the number of times the shop has been painted throughout its life.

6.0: Discussion

Throughout the past 170 years this shop front has been painted approx. 30 times (an average of about once every six years). The thickest paint layers (and consequently most information) were detected at high level on the acanthus leaves above the doors (sample 15) and on the stone window dressings and sill on the first floor (samples 11 & 12).

The decorative history of this shop façade can best be presented as three phases, each lasting about 50 years.

Phase 1: throughout the 19th century (from construction in 1851 to the dawn of the Edwardian period – approx. the first 50 years), the shop was painted predominantly in black oil paints with varnish above; repainted in black three times and refreshed several times with new varnish coatings, in the periods between. There is also clear evidence for oil gilding using pure gold leaf to highlight the acanthus leaves (sample 15) on the console brackets at high level. It is also a distinct possibility other decorative architectural features will also have been gilded during this early period, particularly the acorns and decorative husks (sample 13). The acorns were not sampled due to height restriction and the early paints on the husks have been stripped, although there are traces of grey primer and black paint left behind, early in the record.

An early lead white oil paint was picked up immediately above the substrate on the panel mouldings beneath the window (sample 3). Although the date of this layer remains uncertain, it does suggest some features may have been picked out in lead white during this initial decorative phase, namely: the panel mouldings, window glazing bars and window frame

There may also have been a gilded inscription, highlighted against a black background across the board above the window with the proprietor's name or other detail.

Phase 2: from the early 20th century to the end of the 2nd World War (1900 to late 1940's). This was a 'green and cream period' with several shades of green oil paints used, with evidence surviving on the acanthus leaf (sample 15) and the raised border surrounding the pilasters (sample 17) framing the doors. The allocation of the green and cream was probably identical, or very similar to what we see today. This is absolutely typical of the period with a contrasting theme of various colours deemed fashionable or desirable, continuing to the present day. This continuity is seen in the final phase below.

Phase 3: from the post war period (c.1950) to present day. During this period, we see a move away from traditional linseed oil-based paints and the introduction of synthetic alkyd oil paints (the modern 'plastic' paints in use today). There is evidence for a programme of major overhaul of the joinery at low level, doubtless to replace rotten elements, with paint stripped from surrounding areas. This has resulted in the loss of most of the earliest paint evidence at low level, although traces of the early black oil paints applied during the 19th century have remained in some areas and picked up under microscopic examination.
This probably occurred during the 1960's/70's, with an aluminium primer applied to the repaired and stripped surfaces.
During this phase the façade was painted in a variety of colours: blues, greens magenta and browns, with the allocation of cream painted areas as we see them today.

Two samples were removed from the stone window dressings and window sill on the first floor (samples 11 & 12) with a complete record of approx. 25 applications of stone coloured lead oil paints. There is very little paint on the brickwork, confirming this is a relatively recent application.

The following pages (figures 16 & 17) provide an illustration of how the shop façade would have appeared throughout the 19th century

Figure 16: option 1 - reconstructed 19th century facade

This reconstruction of the shop façade is based purely on the evidence uncovered during this research exercise.

All joinery painted black with gilded highlights applied to the acanthus leaves on the console brackets.

Although the acorns were not sampled, it is assumed they would have been gilded to complement the acanthus beneath.

Figure 17: option 2 - reconstructed 19th century facade

This second reconstruction presents the façade as previous in black, with the acanthus leaves and acorns gilded.

However, here the evidence for white painted panel mouldings beneath the windows has been included and extrapolated onto the window and window frame.

The husks adorning the top of the pilasters framing the doors have also been gilded, to further complement the other architectural features above.

7.0: Lead in Paint

Lead was added to traditional oil paints as both a pigment to impart colour and as a drier to speed up the drying process.

Although the dangers and risk to health associated with lead paint have been known for many years, it is surprising to note that the use of lead in paint was not formally restricted until 1992[2], with a further tightening of regulations in 2006[3].

Lincoln Conservation has examined a representative sample of historic paint beneath the surface layers on this shop front using a Bruker portable x-ray fluorescence (XRF) analyser, specifically calibrated for lead in paint and restricted materials

This raises the question: is there lead in the paint here at 59/59A High Street and if so, what is the level, and should it be considered lead containing material?

There is a lack of legislative guidance on 'acceptable' levels of lead in paint in the UK. However, the U.S. Consumer Product Safety Commission - CPSC (who instituted the Consumer Product Safety Improvement Act of 2008) changed the regulations on lead limits in paint and substrates from 0.06% (w/w) to 0.009%, or 90 parts per million (ppm), on 14th August 2009. Furthermore, the National Building Specification (NBS), a subsidiary of the Royal Institute of British Architects (RIBA) state a UK limit at 0.01%, or 100ppm (although the source for this figure is not specified).

Therefore, for the purpose of this assessment if the paint tested meets or exceeds the 0.01% (100ppm) threshold stated by NBS, it will be considered lead containing material (LCM) and should be dealt with accordingly during any restoration or repainting work.

Guidance on the removal and repainting of lead painted surfaces is provided by the British Coatings Federation[4]

The test results are shown overleaf

[2] The Environmental Protection (Controls on Injurious Substances) Regulations 1992, available from https://www.legislation.gov.uk/uksi/1992/31/made

[3] The Controls on Dangerous Substances and Preparations Regulations 2006, available from https://www.legislation.gov.uk/uksi/2006/3311/contents/made

[4] Lead in Painted Surfaces. Guide on repainting and removal for DIY and professional painters and decorators. Available online: https://www.owatroldirect.co.uk/wp-content/uploads/2018/10/Old-lead-paint-British-Coating-Federation.pdf

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Results of XRF analysis using Bruker Titan 600 analyzer

Operator: Paul Croft	No.: 423	Date: 24/07/2020	Time: 14:32:00

Name: Former Chemist's Shop
ID: 59/59A High Street, Lowestoft
Field1: Client: [retracted]
Duration: 60.0 s
Application: Restricted Materials
Method: 5015MD_RoHS

Element		Min [ppm]	Conc. [ppm]	Max [ppm]	Stddev. [ppm]
Calcium	Ca		110012.00		573.00
Titanium	Ti		22790.00		249.00
Iron	Fe		7279.00		296.00
Barium	Ba		5021.00		141.00
Lead	Pb		2033.00		67.00
Zinc	Zn		165.00		25.00
Arsenic	As		< LOD		24.00

Concentrations of elements are expressed in parts per million (ppm).
The presence of calcium (Ca) and barium (Ba) siuggest the use of chalk and barytes as extenders added to bulk the paint

titanium, iron and zinc added as pigments

No arsenic based pigments were detected.

Lead is present at over 2000 ppm and will have been added as either a pigment or drier.
It is present in varying concentrations in the paint layers throughout the shop front.

The paint should be considered lead containing material and treated accordingly.

HISTORIC MATERIALS ANALYSIS

HISTORIC INTERIORS

ARCHITECTURAL CERAMICS AND TILES

OBJECT CONSERVATION

DIGITAL HERITAGE

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Lincoln Conservation is a specialist research and consultancy centre within the University of Lincoln.