SHEEN GATE
264 Sheen Lane

A Report on the Decorative Schemes
following an Examination of the
External Timber Framing

Patrick Baty FSA

10th May 2021

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A BRIEF SYNOPSIS

Analysis suggests that there are two possibilities for the original treatment of the timber framing:

a) It was left untreated, or
b) It was stained.

On balance, I would say that it was originally untreated.

What is clear, however, is that it was first painted (black) much later – possibly after ca.1960.

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Introduction

I was instructed by Mr William Smalley RIBA to carry out an investigation of the coatings on the external timber framing of Sheen Gate, 264 Sheen Lane. The aim was to see if the original treatment of the timber framing could be established. Had it been stained or painted, or even left unfinished?

Historical Background and Description[1]

The house was designed in 1924 by Sydney Ernest Castle FRIBA for H.S. Pyne, Headmaster of Warwick School, incorporating stained-glass inserts on the south side by Francis H Spear. In 1934-35 Sydney Castle also built a small addition on the service end for a subsequent owner, E.D. Bisgood. The house is Listed Grade II.

The exterior is a mixture of red brick (mainly in Flemish bond but some herringbone), structural timber framing with plastered infill to the east porch, south front and north west projecting larder, and tile-hanging. The tiled roof has variously gables, half-hips, catslide roof to the east and has two tall moulded brick chimneystacks. The windows are metal-framed casements with leaded lights throughout, some with circular or octagonal-shaped panes and there are stained-glass inserts to the staircase hall windows on the south side.

The east or entrance front has a projecting chimneystack with plastered tablet with the entwined owners' initials HSP and a corner timber-framed porch with plastered infill and studded oak door set diagonally. The remainder of this front has a steeply pitched roof sweeping down to ground-floor level with dormer windows.

The south or garden elevation has a brick bay to the west, interrupted by a projecting gable of two storeys and attic, timber framed with plastered infill. The attic floor has diagonal braces and the jetty is supported on carved brackets. The first floor is close-studded and has a five-light oriel window. The ground floor has a mullioned-and-transomed window and French windows with rectangular fanlight with circular panes. The remainder of this front is of two storeys. The adjoining bay is recessed behind a tiled balcony (which probably covers the original timber balcony with plastered infill) and is supported on four brick piers with tile-on-edge capitals. The first floor has a large seven-light bay window with stained glass inserts. The ground floor has a casement window with stained glass inserts, decorative octagonal and square panes above and a studded oak door. The end bay has a projecting two-storey square bay with close-studded timber framing between the floors and the end of this front is tile hung.

[1] Taken almost verbatim from the Historic England Listing - https://historicengland.org.uk/listing/the-list/list-entry/1393964

The west front has a first-floor hipped dormer and patterned herringbone brick between it and the three-light ground floor casement window. The north return is of two storeys with plain casement windows, and on the west return the roof sweeps down to ground-floor level. There is one casement window but most of the original ground floor has been replaced by the 1934-5 single-storey extension of brick with tile-on-edge quoins and cornice and flat roof.

The north side service end is of two storeys and attics brick with a half-hipped gable, the only decorative feature an oval window on the ground floor. To the extreme right is a projecting timber-framed larder with ventilation grille to the window and tiled roof. This is not shown on the original architects' drawing but is shown on the 1935 Ordnance Survey map.

Attached to the house on the south and west sides are stone paved paths and steps incorporating two circular features.

Areas Examined

Samples were taken from representative elements of relevant timberwork on three sides of the building, with most from the south. A list of samples, photographs and drawings can be seen in the appendices.

Scope of Report

The purpose of the analysis was to see if the original treatment of the timber framing could be established.

Investigation of Samples

A total of 10 samples were taken by Patrick Baty on 5th May 2021.

This report contains the following:
a) Appendix One – Elevation and photographs of some of the elements sampled;
b) Appendix Two - Photomicrographs of relevant cross-sections;
c) Appendix Three - A list of the samples taken;
d) Appendix Four - Some pigments mentioned in the text;
e) Appendix Five - Some information on the analysis techniques, and
f) Appendix Six - Bibliography.

Limitations

It is not normally possible to show at what stage a stain was applied to wood. There is no component that would give a clear indication of date. Similarly, it is not possible to date black paint as the main ingredient is carbon black, which has been used from the earliest times.[2] One

[2] (Baty 2017, 51). See also Appendix Four.

can learn more from primers and undercoats, but on a building from the 1920s this information is limited.

Some Notes on Terminology

The following terms appear throughout the report.

Scheme A series of coats of paints usually applied within days of each other when (re)decoration is carried out. A scheme in oil paint may consist of a primer (initially), one or two undercoats and a top / finish coat.

White A paint made up of a white pigment such as chalk, or lead white, with no visible colouring matter (pigment) added. The overall effect would often have been of an off-white due to the inherent yellowness of the pigment and / or the medium.

In Appendix Two there are three chemical symbols used:

TiO_2 = Titanium Dioxide
ZnO = Zinc Oxide
Pb = Lead

It is very difficult to interpret the depth of a colour when viewed as a cross-section under the microscope. The large amount of light used to illuminate the sample combined with the magnified detail causes distortion. The only way of getting a closer idea of the depth of colour is to remove a small lump of the substrate, to carefully expose the relevant layer and to leave it exposed to UV light for a period of time. This is not always practical, especially when sampling a room in an inhabited building or ironwork (where the substrate is not removed). For that reason, a general description of the colour is given. By definition this may sometimes be misleading. The rule of thumb is that colours are invariably darker than they appear in a photomicrograph.[3] If anything, the descriptions of the colours in this report are likely to err on the paler side.

Analysis of Samples

General

Following a careful examination, areas of timber were selected that a) appeared to be old/original; b) displayed thicker layers of paint, and c) were either exposed, or also sheltered, from direct sun.

One element was found that could be sampled on both sides – exposed and sheltered – so that a direct comparison could be made to see the effect of exposure (see photomicrographs of SHG/4 and SHG/5 in Appendix Two).

[3] (Baty 1995, 27-37) (http://bit.ly/v5zhF). (Baty 1996, 9-15) (http://bit.ly/10s8kc).

Detailed Analysis

On all the samples the upper surface of the wood is darker than lower down. It is possible that this is a mid-tone stain, or it could be UV degradation. The reason for thinking the latter is that when one compares the two samples taken from either side of the diagonal brace the wood on the (south-facing) outer face (SHG/5) is darker than the protected face (SHG/4). These areas are marked 'Denatured?' in Appendix Two to indicate the uncertainty.[4]

With stained oak one can usually see clear signs of the stain penetrating the wood and travelling along the vessel elements. It is just possible that one is seeing signs of it here (see SHG/4 marked with 'or Stain?'. However, this is the only slight suggestion and seen just once.

Most of the samples show that a white lead-based[5] primer was applied at some later stage (see, for example, SHG/2). This was followed by a zinc-based white undercoat. A dark grey undercoat was then applied. The latter seems to have been based on a mix of titanium dioxide and zinc oxide,[6] which immediately suggests a date of ca.1960 plus. The finish coat of this scheme was a black gloss. Evidence has been found of touching-in with later coats of black gloss – perhaps on two occasions. A sample taken from the balcony may show the remains of an earlier black gloss (SHG/4). The latter may be a 'flow-down' of the later gloss but, if so, it is not clear how it has found its way between the lead primer and zinc undercoat.

Conclusions

There are two possibilities as far as the treatment of the timber framing:

c) It was left untreated, or
d) It was stained.

On balance I would say that it was originally untreated.

What is clear, however, is that it was first painted (black) much later – possibly after ca.1960.

Further sampling is unlikely to shed any more light on the original treatment of the timber.

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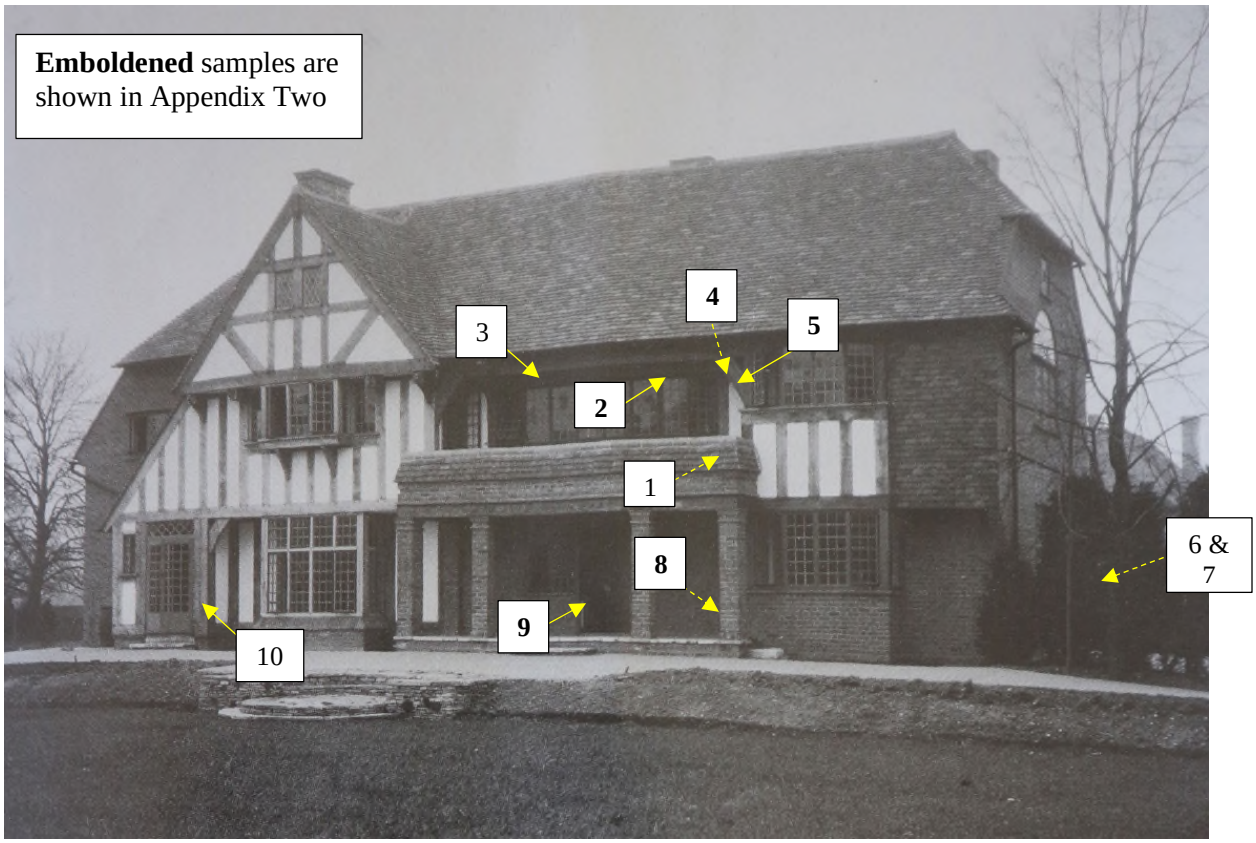
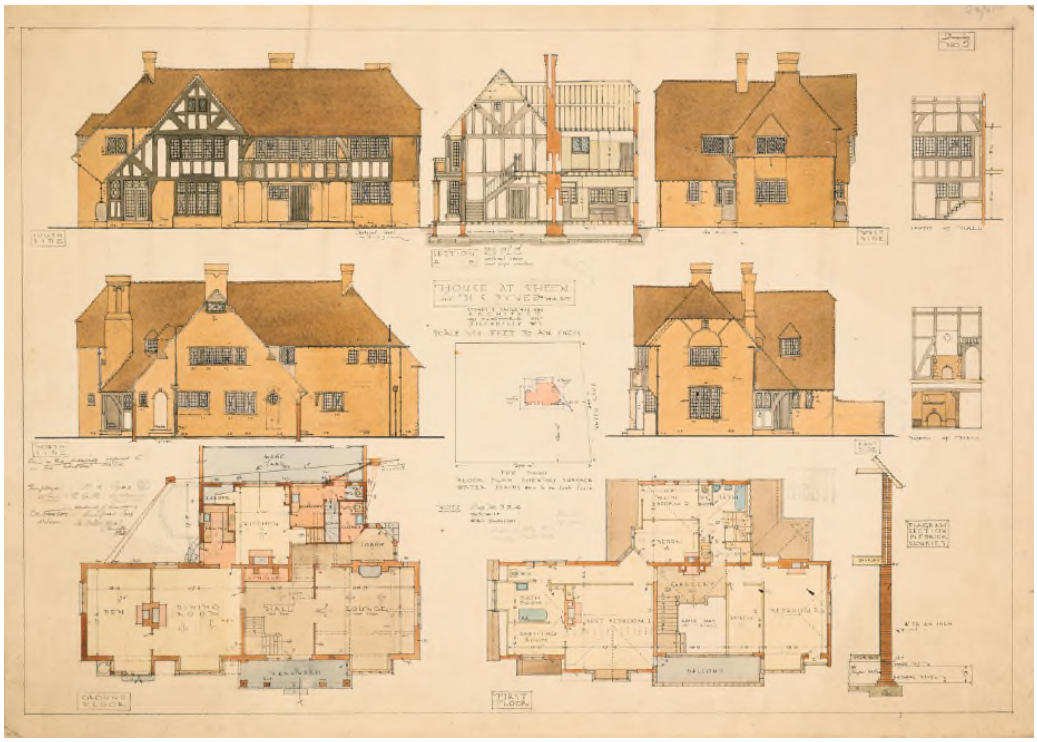
[4] UV Light was employed for the photomicrographs as it shows the sequence more clearly than Plain Light.
[5] See Appendix Four for some information on pigments.
[6] See Appendix Four for some information on these pigments.

APPENDIX ONE

PHOTOGRAPHS AND LOCATION OF SAMPLING



Undated view of garden elevation (Thirties Society Journal No 4, 1984)



1924 drawing of elevations, plans and sections (RIBA Collections)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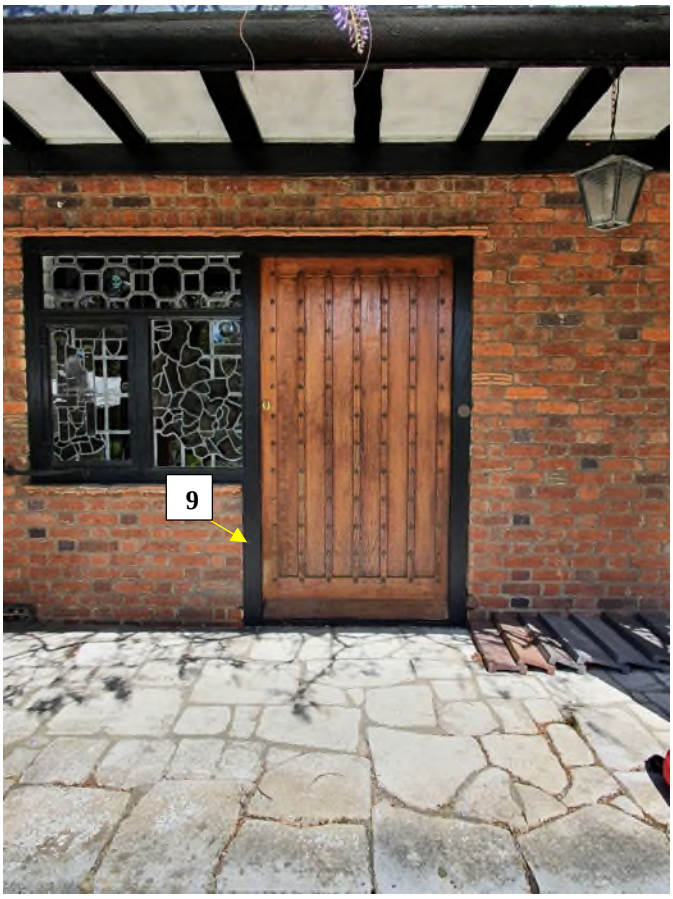
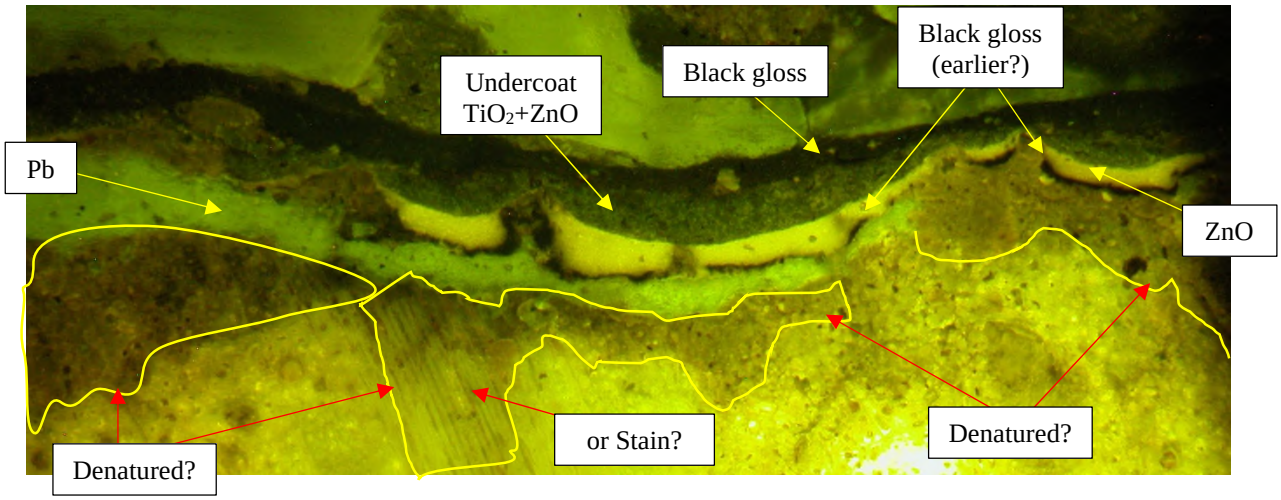

9

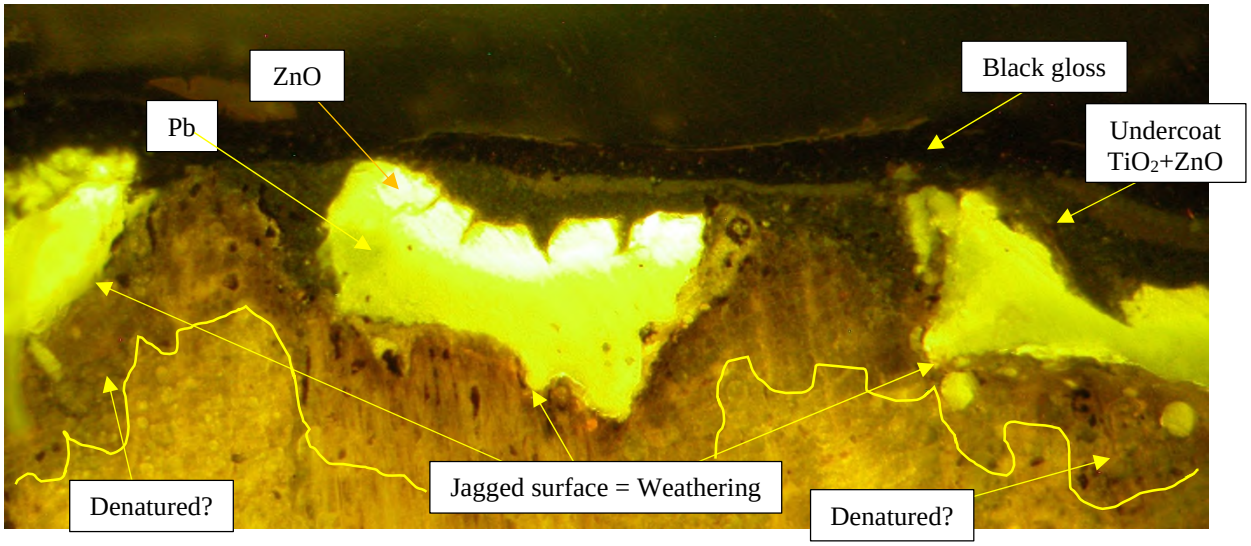

10

APPENDIX TWO

PHOTOMICROGRAPHS

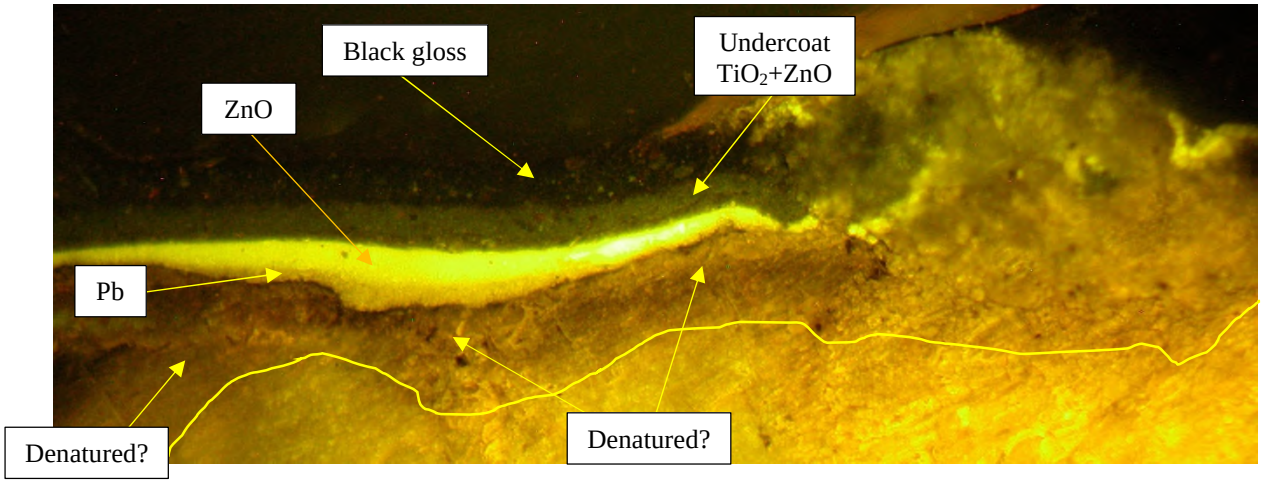


Photomicrograph of SHG/4 (x200 under UV Light)
First Floor. South-facing balcony. East end. Diagonal brace. Inner face

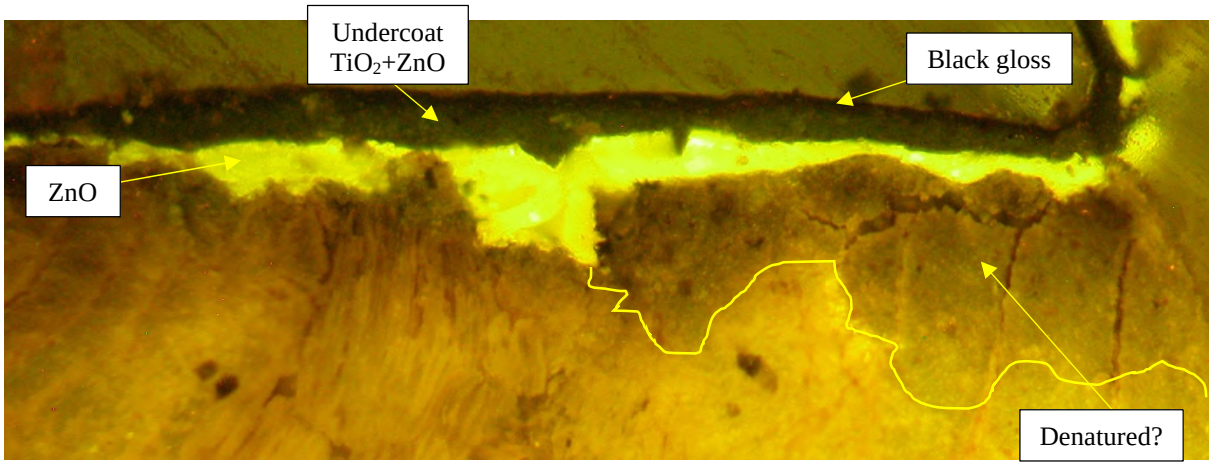


Photomicrograph of SHG/5 (x200 under UV Light)
First Floor. South-facing balcony. East end. Diagonal brace. Outer face

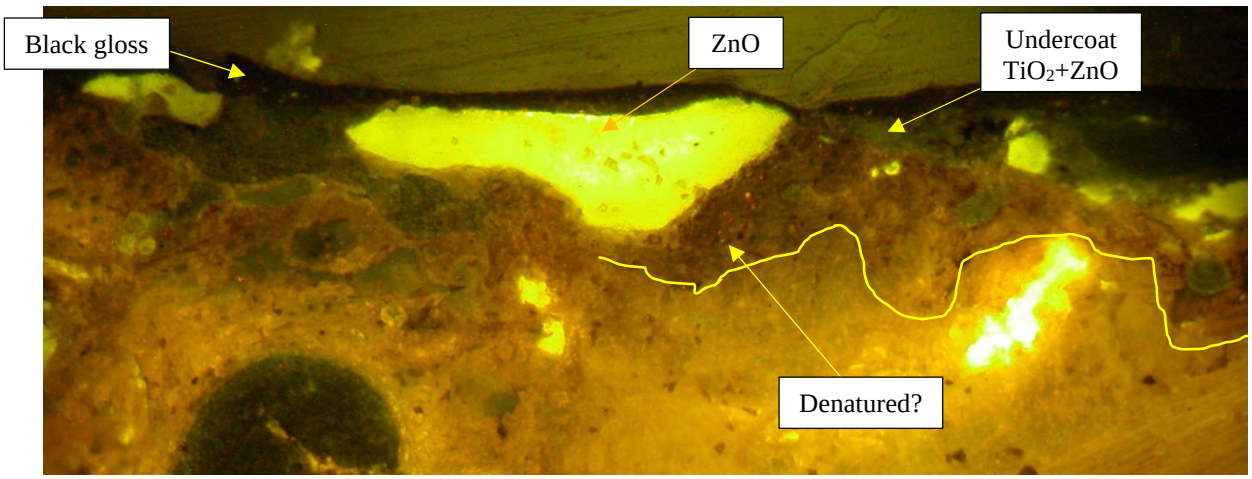
Two samples from either side of the same element. The weathering on the outer-facing side can be seen clearly in the form of the jagged surface (see SHG/5). On both sides the upper surface of the wood is darker than lower down. It is possible that this is a mid-tone stain or it could be UV degradation. The reason for thinking the latter is that the (South-facing) outer face is darker than the protected face – one might presume that a stain would be bleached.
At a later stage the wood was primed with an oil primer based on lead white and given a zinc-based white undercoat. A dark grey undercoat was then applied. The latter seems to have been based on a mix of titanium dioxide and zinc oxide. The finish was a black gloss. Evidence has been found of touching-in with later coats of black gloss. SHG/4 may show an earlier black gloss.



Photomicrograph of SHG/2 (x200 under UV Light)
First Floor. South-facing balcony. East of centre. Top element of window frame.



Photomicrograph of SHG/8 (x200 under UV Light)
Ground Floor. East side. Upright to panel to RH of Front Door



Photomicrograph of SHG/9 (x200 under UV Light)
Ground Floor. South side. Centre Door. LH stile

APPENDIX THREE

CROSS SECTIONS MADE

(Samples shown in **bold** are illustrated)

SHG/1	First Floor. South-facing balcony. East end. Diagonal strut
SHG/2	First Floor. South-facing balcony. East of centre. Top element of window frame.
SHG/3	First Floor. South-facing balcony. West end. Main beam above window
SHG/4	First Floor. South-facing balcony. East end. Diagonal brace. Inner face
SHG/5	First Floor. South-facing balcony. East end. Diagonal brace. Outer face
SHG/6	Ground Floor. North side. Upright to panel to RH of Front Door
SHG/7	Ground Floor. East side. Upright to panel to LH of Front Door
SHG/8	Ground Floor. South side. Upright at East end of terrace
SHG/9	Ground Floor. South side. Centre Door. LH stile
SHG/10	Ground Floor. South side. French window. Upright to RHS

APPENDIX FOUR

SOME PIGMENTS FOUND ON THE TIMBER FRAMING

White Lead

"White may be said to be the basic colour in all painting practice, for few pigments are used without the incorporation of some white to give body (opacity) or to reduce colour strength. Until some fifty years ago [about 1900] white lead was the only white pigment produced in any great quantity, but since then other whites have been introduced which have practically superseded white lead for some purposes, notably interior painting. In spite of certain drawbacks, however, white lead remains unsurpassed for exterior painting. The other principal basic whites used in this country are zinc oxide, lithopone, antimony and titanium".[7]

Zinc Oxide

Zinc oxide is a bright white pigment that is non-poisonous, and is not discoloured by sulphurous fumes. These properties led to its consideration as a replacement for white lead towards the end of the nineteenth century. One of the earliest references to it appears in a book of specifications published in 1859.[8] In this instance it was recommended in rooms with gaslights where the "clearness and brilliancy" of the white was to be preserved. Its chief disadvantage is the hardening effect it has on oil, which causes it to produce a hard non-elastic and brittle paint film. This may lead to premature breakdown of the paint on external surfaces by cracking or chalking unless corrected. In mixture with white lead it produces a very good paint. The zinc hardens the lead and helps it to maintain colour in a smoky atmosphere, while the lead moderates any hardening action of the zinc and so prevents brittleness. Paints containing such a blend of lead white and zinc oxide were used in the first quarter of the twentieth century.

The use of zinc oxide appears to have reached its peak in the second decade of the twentieth century. It was at this time that Arthur Jennings, the prolific writer on paint, wrote:

Before 1914 nearly the whole quantity of zinc oxide used in this country was imported from France, Belgium, Holland, and the United States of America, but since that time several factories have been started in England, and the present produce has already reached an output almost sufficient to fill all home requirements.[9]

Its appearance in paint stratigraphy usually indicates the period ca.1890-1960.

Titanium Dioxide

A pigment known as *titanium white*, which was a combination of titanium oxide and barium sulphate was introduced into Britain in 1921, and this rapidly became established as one of the staple pigments for paint manufacture. Towards the close of 1927, however, as a result of long experience and research, the difficulties of preparing a satisfactory pigment from the pure oxide

[7] (Hurst 1949, 61).
[8] (Donaldson 1859, xxi).
[9] (Jennings 1921, 1:184-185).

were finally overcome, and a pigment of brilliant whiteness and intense opacity was introduced containing approximately 98 per cent titanium oxide. The outstanding qualities of this were soon recognised, and by the late 1940s it had largely superseded the original type of pigment for many purposes, although the composite pigment was still manufactured and used for a while. It has been the prime white pigment in house paints for the last forty years.

The following figures show how the production of the pigment increased sharply after the last war:

Estimated UK Production of TiO_2 in Thousands of Tons[10]

1931	4
1937	6
1941	9
1948	16
1950	30

Carbon Black

Lamp black was the soot collected after burning the resinous parts of fir-trees. It came mostly from Sweden and Norway, although it was manufactured on a large scale in Germany at the beginning of the nineteenth century.[11] John Smith referred to its being "made up in small boxes and barrels of deal, of several sizes, and so brought over to us".[12]

It was the most commonly used of the blacks, being cheap and plentiful. It was a very fine pigment, that would serve most needs, without grinding, if mixed up well with linseed-oil. If used in this manner, however, the greasiness would retard its drying time, unless a drying agent were added.[13]

Blacks, of various forms, were often added to white paint in order to combat the inherent yellowness of a lead white and linseed oil paint.

[10] (Chatfield 1955, 248).
[11] (Tingry 1804, 347).
[12] (Smith 1687, 16-17).
[13] (*Pocket* 1825, 89).

APPENDIX FIVE

SAMPLE ANALYSIS TECHNIQUES

Sample Preparation Procedures

Pigments
Samples of pigments from specific paint layers were permanently cast in Cargille Meltmount (with a refractive index of 1.66) onto microscope slides. The pigment samples were examined at 500x and 1000x magnifications under both transmitted, and plane polarized light.

The pigments were identified using polarized light microscopy (PLM) techniques which allows identification of different pigment particles based on the characteristics of particle shape, colour, refractive index, and optical properties. In certain instances, where further confirmation was required, energy-dispersive X-ray analysis (EDX), using the scanning electron microscope, was carried out.

Cross Sections
Samples of finish coatings and substrates were removed from representative surfaces in the rooms being examined with a scalpel, craft knife or dental drill. Depending on the material, the samples varied in size from 5mm to 10mm. The samples were divided before casting, leaving a portion of the sample available for future testing. Samples were cast in small cubes in silicon rubber moulds using clear casting polyester resin (Alec Tiranti Ltd, Reading, Berks.). The resin was allowed to cure for 24 hours at room temperature and under ambient light. The cubes were then cut in half to expose the cross sections, and wet polished with 240, 400, 600 and 1200 grade wet-and-dry papers.

The cross section samples were examined under visible light using a Brunel metallurgical microscope at 100x, 200x and 400x magnifications. Those that appeared to have the full sequence of layers, i.e. that displayed an intact sequence from the substrate through to the final scheme, were examined particularly closely. These intact samples were compared with those samples that were distorted or unclear, and with those that were incomplete. The combined information has provided the details in this report.

The cross sections were photographed with a Nikon Coolpix 5000 digital camera and the resulting images were compared on a 19-inch monitor. The best photomicrographs for each area have been included with this report. Most photographs were taken at 200x, and 500x, although other magnifications have been used. Many of the photomicrographs have been digitally altered to fit the page.

APPENDIX SIX

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